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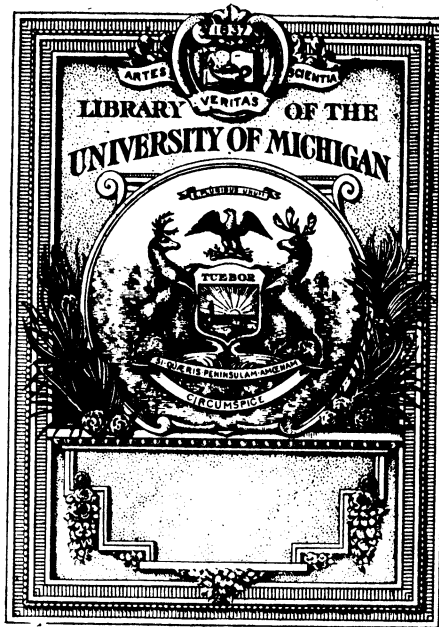
PHILIPPINE
WEATHER
BUREAU
BULLETIN
1915

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Weather Bureau

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THE GOVERNMENT OF THE PHILIPPINE ISLANDS

Philippine Is.
WEATHER BUREAU

MANILA CENTRAL OBSERVATORY

MONTHLY BULLETIN, 1915

PREPARED UNDER THE DIRECTION OF

REV. JOSÉ ALGUÉ, S. J.

DIRECTOR OF THE WEATHER BUREAU

MANILA
BUREAU OF PRINTING
1915

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INTRODUCTION.

Our readers will notice that a slight modification has been introduced this year in the table of observations for the Central Observatory in Manila. Up to the present the only rainfall data published in the Bulletins were those obtained from the rain gauges on the top of the observatory tower which is some 18 meters above the ground. Moreover, the daily rainfall in Manila was calculated on the basis of a natural day, from midnight, to midnight, whereas in the rest of the meteorological stations in the Philippines the daily rainfall has been considered as that which fell from 6 to 6 a. m.

Beginning with the month of January, 1915, we will include in our Bulletins not only the amount of rain collected in the gauges on the tower, which is necessary in order to make a comparison with the normal of previous years, but also the amount collected in the gauges placed in the meteorological park. And in order to bring about uniformity with the other stations the daily rainfall both in the park and on the tower will be measured from 6 to 6 a. m.

We subjoin a list of all the meteorological stations of the Weather Bureau together with the names of the respective observers, who are in a great measure responsible for the accuracy of the observations published in this Bulletin.

SECONDARY STATIONS AND OBSERVERS OF THE WEATHER BUREAU.

Station.	North latitude.	East longitude.	Observer.	Class.
Jolo	6 03	121 00	Rufino de la Cruz	III
Isabela, Basilan	6 42	121 58	Inocencio Rodriguez	IV
Zamboanga	6 54	122 05	Ramon Ortega	III
Davao	7 01	125 35	Lamberto Garcia	III
Cotabato	7 13	124 15	Rafael P. Albano	III
Cagayan, Misamis	8 29	124 38	Dolorito Contreras	III
Dapitan	8 40	123 25	Agaton Alingal	IV
Butuan	8 56	125 32	Generoso Copin	III
Dumaguete	9 18	123 19	Matias Ordiales	III
Tagbilaran	9 38	123 51	Francisco Burgos	II
Iwahig	9 44	118 38	Filemon C. Bulaong	III
Surigao	9 48	125 29	Francisco Tiangco	II
Maasin	10 08	124 50	Aguedo Espina	III
Cebu	10 18	123 54	Domingo de los Angeles	I
Iloilo	10 42	122 34	Ricardo A. Luna	I
San Jose Buenavista	10 44	121 55	Teodoro Peñeiro	III
Cuyo	10 51	121 01	Roman Kabigting	III
Ormoc	11 00	124 36	Pedro Baltasar	I
Guiuan	11 02	125 44	Patricio Yabao	III
Tacloban	11 15	125 00	Deogracias Tablan	II
Capiz	11 35	122 45	Juan Lugod	II
Borongan	11 37	125 26	Cesareo Montes	III
Calbayog	12 04	124 36	Segundo Peñaflorida	II
Masbate	12 22	123 36	H. L. Heath	IV
Romblon	12 35	122 16	Pedro M. Asturias	III
Batag	12 40	125 04	Placido A. Edroso	IV
Gubat	12 55	124 08	Victorio Ramos	IV
Legaspi	13 09	123 45	Bernardino Costa	I
Sumay, Guam	13 24	144 38	Herbert Taylor	III
Calapan	13 25	121 11	Aquilino Nokom	III
Virac	13 35	124 14	Eusebio Talion	III
Nueva Caceres	13 37	123 11	Eduardo Ontengco	III
Batangas	13 45	121 03	Enrico Cabral	III
Atimonan	14 00	121 55	Leon G. Guinto	I

Secondary stations and observers of the Weather Bureau—Continued.

Station.	North latitude.	East longitude.	Observer.	Class.
Ambulong, Tanauan	14 07	121 04	Gregorio Peralta	II
Paracale	14 17	122 47	Benito Pelaez	II
Santa Cruz, Laguna	14 18	121 25	Doroteo Eusebio	III
Antipolo	14 36	121 10	Valeriano Garcia	IV
Iba	15 20	119 58	Apolonio Perez	III
San Isidro	15 22	120 53	Bernardo Pecache	II
Tarlac	15 30	120 35	Valeriano Magat	IV
Baler	15 40	121 34	Santiago Palmero	IV
Dagupan	16 03	120 20	Jose M. Sison	I
Bolinao	16 24	119 53	Ezequiel Reynoso	II
Baguio	16 25	120 36	Pastor P. Daroy	I
San Fernando, Union	16 37	120 19	Estanislao F. Feraren	III
Echague	16 41	121 39	Benito Maramba	III
Candon	17 12	120 26	Luis Quismorio	IV
Vigan	17 34	120 23	Jose de Jesus	II
Tuguegarao	17 36	121 40	Jose C. de Leon	II
Laoag	18 12	120 35	Jose Saez	III
Aparri	18 22	121 38	Manuel Delgado	I
Santo Domingo, Batanes	20 28	121 59	Claudio Castillejos	III

The signs and symbols employed in this publication are the following:

Symbol.	Equal to—	Symbol.	Equal to—
Ci.	Cirrus.	o	Overcast.
Ci.-S.	Cirro-stratus.	p	Passing showers of rain.
Ci.-Cu.	Cirro-cumulus.	q	Squally weather.
A.-Cu.	Alto-cumulus.	u	Ugly or threatening.
A.-S.	Alto-stratus.	v	Visibility of distant objects.
S.-Cu.	Strato-cumulus.	w	Wet or heavy dew.
N.	Nimbus.	●	Rain.
Cu.	Cumulus.	☁	Fog or mist.
Cu.-N.	Cumulo-nimbus.	☁	Dew.
S.	Stratus.	☉	Solar corona.
Fr.-Cu.	Fracto-cumulus.	☾	Lunar corona.
Fr.-N.	Fracto-nimbus.	☾	Lunar halo.
Fr.-S.	Fracto-stratus.	☉	Solar halo.
S.-cf.	Stratus-cumuliformis.	⚡	Heat lightning.
N.-cf.	Nimbus-cumuliformis.	⚡	Thunderstorm.
M.-Cu.	Mammato-cumulus.	⚡	Thunder without lightning.
b	Bright, clear sky.	↻	Strong wind.
c	Cloudy weather.	↻	Rainbow.
d	Drizzling, light rain.	∞	Dry mist.
g	Gloomy or stormy-looking weather.		

NOTE.—A small ° or ² used as an exponent to the above symbols indicates, respectively, that the intensity of the meteor denoted by the symbols thus affected was small or very great.

INTRODUCCIÓN.

Nuestros lectores notarán fácilmente una ligera modificación que hemos introducido este año en la tabla de observaciones de Manila. Hasta el presente veníamos publicando únicamente la cantidad de lluvia recogida en los pluviómetros colocados en la torre del observatorio a unos 18 metros de altura sobre el nivel del suelo, y además considerábamos como lluvia diaria para Manila la caída en un día natural, de media noche a media noche, siendo así que para los demás estaciones de Filipinas se consideraba como lluvia total de un día la ocurrida desde 6 a. m. de dicho día hasta 6 a. m. del día siguiente.

A partir de este año 1915 incluiremos en nuestros boletines la lluvia diaria recogida en los pluviómetros del parque, aunque sin omitir por esto la lluvia de la torre, puesto que solamente esta última se puede comparar con la normal deducida de años anteriores. Tanto la lluvia diaria del parque como la de la torre se contará en adelante de 6 a 6 a. m. a fin de que haya así uniformidad con la lluvia diaria de otras estaciones de Filipinas.

Damos en el texto inglés una lista de todas nuestras estaciones con los nombres respectivos de los observadores, los cuales son en gran parte responsables de las observaciones que se publican en estos boletines.

Los signos y símbolos usados en esta publicación son los siguientes:

Símbolos.	Significado.	Símbolos.	Significado.
Ci.	Cirrus.	o	Cubierto.
Ci.-S.	Cirro-stratus.	p	Lluvia pasajera.
Ci.-Cu.	Cirro-cumulus.	q	Achubascado.
A.-Cu.	Alto-cumulus.	u	Tiempo feo o amenazador.
A.-S.	Alto-stratus.	v	Traspacidad del aire.
S.-Cu.	Strato-cumulus.	w	Húmedo.
N.	Nimbus.	●	Lluvia.
Cu.	Cumulus.		Niebla o neblina.
Cu.-N.	Cumulo-nimbus.	⊕	Rocío.
S.	Stratus.	⊙	Corona solar.
Fr.-Cu.	Fracto-cumulus.	⊕	Corona lunar.
Fr.-N.	Fracto-nimbus.	⊙	Halo lunar.
Fr.-S.	Fracto-stratus.	⊕	Halo solar.
S.-cf.	Stratus-cumuliformis.	⊙	Relámpago sin trueno.
N.-cf.	Nimbus-cumuliformis.	⊕	Tempestad de trueno.
M.-Cu.	Mammato-cumulus.	⊙	Trueno sin relámpago.
b	Despejado.	⊕	Viento duro.
c	Nublado.	⊙	Arco-iris.
d	Llovizna o lluvia ligera.	⊕	Niebla seca.
g	Mal cariz; tiempo cerrado, fosco.	⊙	

NOTA.—Un ° o un ² puestos como exponentes de los signos, indican respectivamente una muy débil o una muy fuerte intensidad en el meteoro que representan.

BULLETIN FOR JANUARY, 1915.



METEOROLOGICAL BULLETIN FOR JANUARY, 1915.

By Rev. JOSE CORONAS, S. J.

Chief, Meteorological Division of the Weather Bureau.

GENERAL WEATHER NOTES.

Pressure and temperature.—The mean atmospheric pressure of the month was less than that of last year in all the stations of the Philippines, and especially so in the Island of Luzon. Nevertheless in Manila the monthly mean was 0.96 mm. higher than the normal for January. The highest pressures were recorded on the 16th, 17th, and 18th; the lowest on the 1st and 2d in the Visayas and Mindanao, and on the 7th in Luzon.

The mean monthly temperature was slightly greater than that of January, 1914, especially in the stations of Luzon. In Manila the absolute values were 32.6° C. on the 10th and 17.5° C. on the 16th. In Baguio they were 25.5° C. and 11.5° C. on the top of Mirador and 26.2° C., 10.6° C. in the valley.

PRESSURE AND TEMPERATURE AT THE FIRST AND SECOND CLASS STATIONS FOR JANUARY, 1915.

Station.	Pressure.						Temperature.					
	Mean.	Departure from Jan., 1914.	Highest mean.	Day.	Lowest mean.	Day.	Mean.	Departure from Jan., 1914.	Highest.	Day.	Lowest.	Day.
	mm.	mm.	mm.		mm.		°C.	°C.	°C.		°C.	
Tagbilaran	760.92	— 0.69	762.31	18	759.77	2	25.4	+ 0.4	33.4	29	17.8	25, 26
Surigao	61.09	—	62.38	18	60.04	2	25.6	—	31.1	10	19.3	25
Cebu	61.20	— .69	62.67	18	60.06	1	26.5	+ .6	31.6	7	20.9	26
Iloilo	60.92	— .83	62.75	16	59.76	2	26.2	+ .9	31	Various	20.9	28
Ormoc	61.44	— .64	62.96	17	60.27	1	25.5	+ .1	32.8	1	16.9	26
Tacloban	61.57	— .78	63.20	17	60.35	1	25.4	+ .2	32.6	2	19	23, 26
Capiz	61.63	— .91	63.74	16	60.20	7	26.1	+ 1.2	32	31	19.8	23
Calbayog	61.72	— .77	63.62	16	60.47	1	25.1	+ .5	33.4	1	17.4	26
Legaspi	61.81	— 1.03	64.06	17	60.26	7	26.3	+ 1.1	32.6	20, 21	20.4	24
Atimonan	62.08	— 1.44	64.54	17	60.14	7	25.9	+ 1.2	30.4	19	20.9	20
Ambulong, Tanauan	61.65	— 1.13	64.27	16	59.83	7	26.1	+ 1.2	33.8	28	19.2	18
Paracale	62.48	— 1.15	65.02	17	60.53	7	25.5	+ .6	30.4	7	20.5	20
Manila	62.16	— 1.08	64.76	16	60.52	7	24.8	+ 1.1	32.6	10	17.5	16
San Isidro	62.43	— .97	65.14	16	60.89	7	25.5	+ 1.3	34.1	21	19.4	2
Dagupan	61.45	— 1.09	64.06	16	60.36	7	26	+ .9	35.7?	29	17.5	2
Bolinao	61.97	— .84	64.56	16	61.01	9	26.4	+ 1	32.9	5	19	3
Baguio ^a	638.87	— .39	640.73	16	637.91	7	17.2	+ 1.3	25.5	25	11.5	1
Vigan	761.93	— .98	764.49	16	760.87	29	25.1	+ .2	33.2	14	18.2	2
Tuguegarao	63.23	— 1.60	66.35	17	61.27	7	24.3	+ 1.9	34.4	5	16.6	4
Aparri	63.44	— 1.50	66.90	17	61.62	27	23.5	+ 1.4	30.5	27, 31	18.6	16

^a The barometric readings of this station are not reduced to sea level.

Rainfall.—But a few stations had greater rainfall than the normal for January, while in general there was scarcity of rain, especially in the southeast and northeast of Luzon, as may be seen from the following table. In Manila only 5.6 mm. of rain fell during the month, which is 21.3 mm. less than the normal, while in Baguio there were 3.1 mm. of rain only, or 29.6 mm. less than the normal for the month.

RAINFALL AT VARIOUS STATIONS OF THE WEATHER BUREAU DURING THE MONTH OF JANUARY, 1915.

Station.	Total.	Departure from Jan., 1914.		Rainy days.	Departure from normal.		Greatest rainfall in a single day.	Day.	Station.	Total.	Departure from Jan., 1914.		Rainy days.	Departure from normal.		Greatest rainfall in a single day.	Day.
		mm.	mm.		mm.	mm.					mm.	mm.					
Jolo	58.7	+ 35.8	- 27.7	7	+ 1	20.8	14	Calapan	94.4	+ 48.5	- 18	18	+ 3	24.9	5		
Isabela, Basilan	22.1	- 15.8	- 28.5	4	- 1	14	16	Virac	116.6	- 60.6	- 21	21	+ 4	26.5	4		
Zamboanga ^a	1.8	- 37.1	- 35.2	1	- 4	1.8	15	Nueva Caceres	12.7	- 53.9	- 93.8	4	- 3	5.3	22		
Davao	89.9	+ 22	- 42.1	8	+ 2	24.1	3	Batangas	38.4	+ 24.7	- 27	13	- 3	33.3	8		
Cotabato	37.1	+ 16.6	- 42	8	+ 3	12.4	16	Atimonan	156.9	- 27	- 36.9	13	- 3	32.5	9		
Cagayan, Misamis	21.4	-	-	6	-	13.2	14	Ambulong, Tana-uan	2.8	- 2.8	-	2	- 1	1.5	13		
Dapitan	99.5	+ 50.8	- 9.1	18	+ 6	22.1	14	Paracale	362.7	+ 73.6	- 15	15	0	84.6	8		
Butuan	236.5	+ 105.5	+ 54.6	16	- 6	63.3	3	Santa Cruz, Laguna	17.9	+ 2.8	-	3	- 1	5.8	2		
Dumaguete	80.6	+ 37.4	- 7	7	- 6	35.6	14	Manila	5.6	2.1	- 21.3	5	+ 2	3.5	30		
Tagbilaran	21.6	- 40.3	- 56.1	9	+ 2	8.3	23	Antipolo	1	+ 1	-	1	+ 1	1	13		
Iwahig	12.3	- 23.8	- 5	5	- 2	6.9	21	Iba	2.5	+ 2.5	-	1	+ 1	2.5	23		
Surigao	390.8	-	+ 52.4	25	-	56.4	14	San Isidro	2.1	+ 1.8	- 13.4	3	+ 2	2.8	3		
Maasin	197.5	+ 79	+ 55.7	7	- 2	56.7	3	Tarlac	20.8	+ 20.8	+ 12.8	1	- 1	20.8	6		
Cebu	54.1	5	- 37.3	9	- 5	23.1	17	Baler	454	+ 314.7	+ 188	21	+ 4	122.4	22		
Iloilo	63.2	+ 41.3	+ 16.2	5	- 1	35.8	10	Dagupan	4.9	+ 4.9	- 4.7	2	+ 2	4.1	31		
San Jose Buenavista	2.3	+ .5	- 23.8	2	+ 1	2	0	Bolinao	33	+ 57.9	+ 22.6	2	+ 1	30.5	16		
Cuyo	0	- .5	- 9.3	0	- 1	0	0	Baguio	3.1	+ 3.1	- 29.6	3	+ 3	2.3	23		
Ormoc	144	+ 103.8	- 20.6	14	+ 1	49.7	16	San Fernando, Union	0	0	- 10.5	0	0	0	0		
Guiuan	354.3	+ 120.8	- 23	1	- 1	76.7	9	Echague	6.9	- 11.1	-	4	- 6	2.5	13		
Tacloban	305.7	+ 102.7	+ 76.6	19	0	83.2	5	Candon	0	0	- 4	0	0	0	0		
Capiz	51.1	- 22.8	- 81.7	10	- 5	16.7	9	Vigan	3	+ .3	+ .1	1	+ 1	3	7		
Borongan	409.4	+ 33.6	- 50.2	23	- 5	62.7	3	Tuguegarao	20.1	+ 5.7	- 6.2	6	+ 2	7.9	25		
Calbayog	52.8	+ 10.1	- 76.6	14	+ 5	16.7	9	Laoag	0	0	-	0	0	0	0		
Masbate	22.2	- 56.2	- 94.3	9	- 4	6.9	17	Aparri	114	+ 12.8	- 91.2	12	- 2	33.1	24		
Romblon	49.9	- 58.2	- 49.7	11	- 7	13.3	9	Santo Domingo, Batanes	399.9	+ 139.2	+ 151.1	22	+ 5	69.3	3		
Batag	186.5	+ 26.8	- 13	0	0	39.9	6										
Gubat	161	- 12.8	- 123.2	13	- 5	51.8	5										
Legaspi	143.9	- 66.6	- 205.1	19	+ 3	30	2										
Sumay, Guam	132.1	+ 89.4	- 15	+ 5	33	30	26										

^a 29 days of observation.

DEPRESSIONS AND TYPHOONS.

During the month there was not any typhoon of importance in the neighbourhood of the Philippines. There was, however, a well-developed one in the Pacific to the S and E of Japan, the vortex of which passed close to the steamship *Cyclops* on the 8th, as may be seen from the observations published below and made on board the steamer. In Plate I we give the track of this typhoon together with the barographic curve furnished us by the captain of the *Cyclops*. It may be well to point out here that it is not so very extraordinary for a ship to meet a well-developed typhoon to the SE or E of Japan during the month of January.

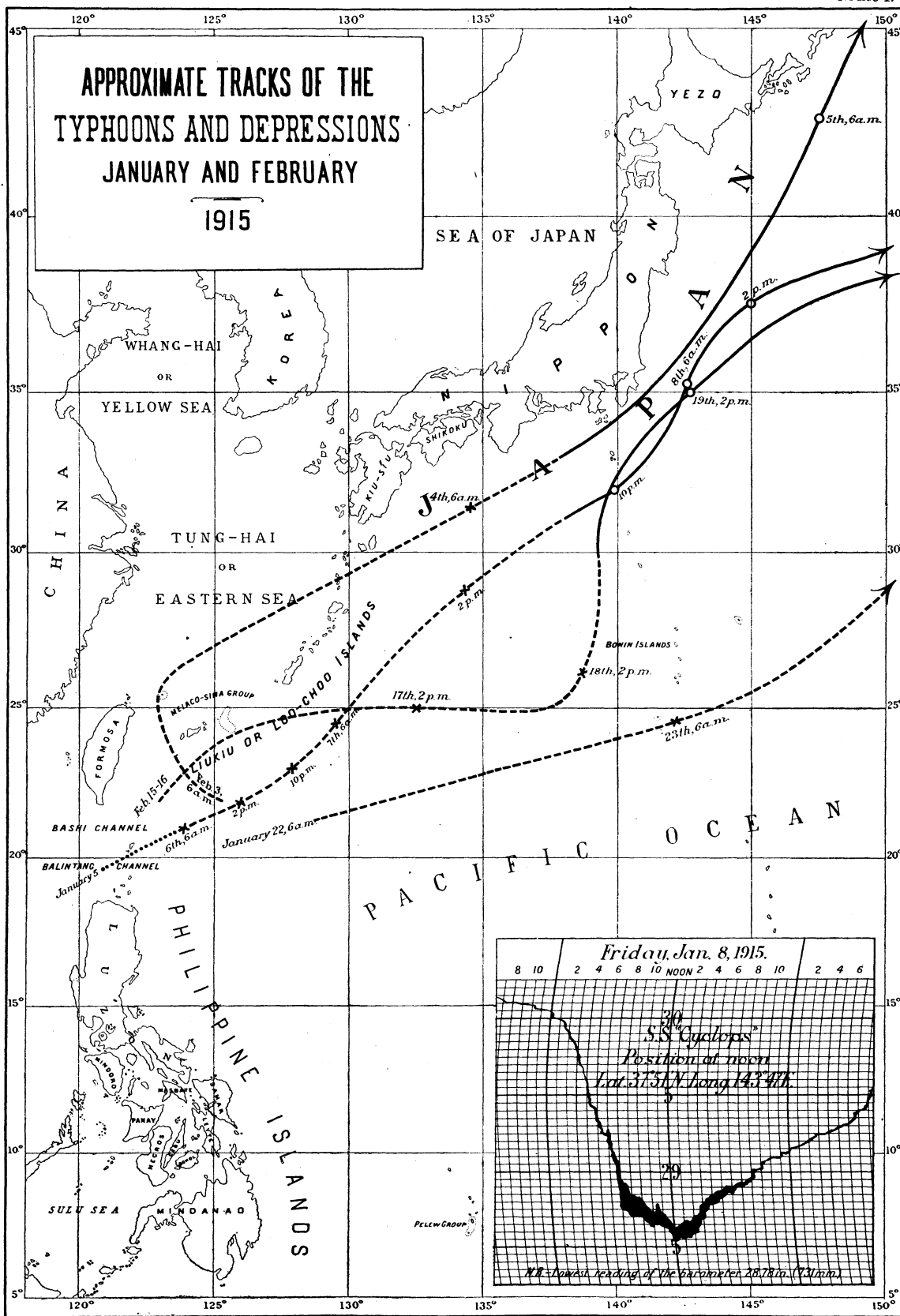
METEOROLOGICAL OBSERVATIONS MADE ON BOARD THE STEAMER "CYCLOPS," JANUARY 7 TO 9, 1915. (CAPTAIN, D. ARTHUR.)

Date and hour.	Position.		Pressure.	Wind.		Sea.		Remarks.
	Latitude north.	Longitude east.		Direction.	Force.	State.	Direction.	
Jan. 7:			mm.		0-12.			
Noon	40 08	147 41	766.05	WNW	6	Rather rough	WNW	
4 p. m.			66.81	WNW	2			
8 p. m.			65.29	NNE	4	Smooth	NE	10 p. m. heavily overcast; commenced rain and continued to midnight.
Midnight			60.72	E	4	Moderate	Ely.	
Jan. 8:								
4 a. m.			49.54	ESE	8	High	ESE	8.30 a. m. wind NE, force 11; 10.30 a. m. glass inclined to rise.
8 a. m.			32.52	NE	8-9	Very high	NE	11.30 a. m. wind hauling north-ernly, glass falling slightly.
Noon	37 51	143 47	31	NE	8-9	Tremendous	NE	3 p. m. gale moderating.
4 p. m.			36.08	NNW	10-11	do	NNW	
8 p. m.			42.17	NNW	9-10	Very high	NNW	
Midnight			46.24	NWbyW	7	High	NNW	Heavy squalls.
Jan. 9:								
4 a. m.			47.76	NWbyW	6	do		Wind and sea decreasing.
8 a. m.			51.57	NWbyW	6	do		
Noon	35 47	141 44	54.62	NbyW	6	Rather rough		
4 p. m.			57.41	NbyW	6	do		

According to all probabilities this typhoon was considerably developed on the 7th to the E of the Loochoo Islands, for on the 6th there was only a depression to the S of these islands and E of the Bashi Channel.

During the 22d and 23d there was a depression, apparently of slight importance, which moved to E by N and NE from the S of the Loochoos to the S and E of the Bonin Islands. (See the track in Plate I.)

Plate I.



NOTAS GENERALES DEL TIEMPO.

Presión y temperatura.—La presión atmosférica media de este mes es para todas las estaciones de Filipinas menor que la del año anterior, especialmente en la Isla de Luzón. Comparando, sin embargo, la media mensual de Manila con la normal de Enero, hallamos que la supera en 0.96 mm. Las presiones más altas se observaron el 16, 17 ó 18; las más bajas ocurrieron generalmente el 1 ó 2 en Visayas y Mindanao, y el 7 en Luzón.

La temperatura media mensual es algo mayor que la de Enero, 1914, especialmente en las estaciones de Luzón. La máxima y mínima absolutas para Manila fueron 32.6° C. el día 10 y 17.5° C. el día 16. En Baguio se registraron las siguientes temperaturas extremas: 25.5° C., 11.5° C. para la cumbre del Mirador, y 26.2° C., 10.6° C. para el valle.

Precipitación acuosa.—Pocas son las estaciones que den este mes un total de lluvia superior a la normal de Enero. En general ha habido escasez de lluvia, la cual ha sido particularmente notable en el sudeste y nordeste de Luzón, según puede verse en la tabla que acompaña el texto inglés. En Manila solamente se han recogido en todo el mes 5.6 mm. de agua, cantidad que difiere de la normal es -21.3 mm. Todavía menor fué la lluvia mensual de Baguio, pues no pasó de 3.1 mm., diferenciándose de la normal en -29.6 mm.

DEPRESIONES Y TIFONES.

No ha habido en todo el mes tifón alguno de importancia en las cercanías de Filipinas. Sin embargo, lejos en el Pacífico, al S y E de Japón, hubo un tifón bien desarrollado cuyo vórtice pasó cerca del vapor *Cyclops* el día 8, según puede verse por las observaciones hechas a bordo de este vapor las cuales publicamos en una tabla en el texto inglés. En la lámina I damos la trayectoria de este tifón juntamente con la curva barográfica que mucho agradecemos al capitán del *Cyclops*. Bueno será advertir aquí que no es cosa nueva que en el mes de Enero se encuentre un barco con algún tifón bien desarrollado al SE o E de Japón.

Según todas las probabilidades, este tifón se fué desarrollando el día 7 al E de las Islas Loochoos, pues el día 6 aparecía solamente como una depresión al S de dichas islas y E del canal de Bashi.

Durante los días 22 y 23 una depresión, al parecer de poca importancia, se movió al E $\frac{1}{4}$ NE y NE desde el S de las Islas Loochoos hasta el S y E de las Islas Bonín. (Véase su trayectoria en la lámina I.)

METEOROLOGICAL DATA FOR MANILA CENTRAL OBSERVATORY.*

[ϕ=14° 34' 41" N; λ=120° 58' 33" E; barometer above sea, 14.2 meters; gravity correction not applied, -1.72 mm.]

Day.	Pres- sure (mean).	Air temperature. ^b			Underground temperature.				Rela- tive humid- ity (mean).	Vapor pres- sure (mean).	Radiation.		Evaporation. ^b			
		Mean.	Maxi- mum.	Mini- mum.	0.25 meter.		0.50 meter.				1.50 meters.	2.50 meters.	Mini- mum on grass	Maxi- mum in sun. Black bulb in vacuo.	Free ex- posure (total)	Shelter (total).
					8 a.m.	2 p.m.	8 a.m.	2 p.m.								
	<i>mm.</i>	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	Per cent.	<i>mm.</i>	°C.	°C.	<i>mm.</i>	<i>mm.</i>	
1	761.17	24.3	31.1	18.4	26.3	27.4	27.5	27.7	28.1	77.8	17.3	16.3	51.1	3.8	2.9	
2	61.27	24.1	31.5	17.8	25.9	27.5	27.5	27.8	28.2	76.5	16.8	15.1	51.5	4.5	3.2	
3	61.62	24.5	30.9	19.2	26.3	27.5	27.6	27.7	28.1	77.2	17.5	16.5	52.1	4.2	3	
4	62.28	24.6	29.9	19.5	26.3	27.5	27.6	27.6	28.1	77.5	17.6	17.1	46.9	3.2	2.5	
5	61.88	25.3	30.3	21.8	26.5	27.6	27.6	27.7	28.2	82.6	19.6	20	45.5	2.9	2.1	
6	61.19	26.1	32.2	21.9	26.8	28	27.6	27.9	28.1	81.8	20.2	20	53.1	4	2.7	
7	60.52	26.6	31.7	22.7	27.2	28.7	27.8	28	28.2	78.4	20.1	20.3	51.6	5.7	4.1	
8	61.13	25.1	28.6	23.3	27.4	27.8	27.8	28.1	28	82.6	19.5	22.3	41.9	1.5	1.4	
9	61.44	25.4	30	21.5	26.7	27.6	27.8	27.8	28.1	80.8	19.2	19.6	47.7	3	2.4	
10	62.04	25.7	32.6	20.8	26.6	27.6	27.8	27.8	28	77	18.5	18.8	53.8	8	4	
11	62.20	25.8	31.7	20.5	26.5	27.9	27.6	27.8	28	79.4	19.4	17.8	50.8	4	3	
12	62.39	25.3	30.9	22	26.9	27.6	27.8	27.8	28.1	78.6	18.6	19.3	54.7	3.1	2.5	
13	63.49	24.5	30.6	20.5	26.6	27.6	27.7	27.8	27.9	81	18.4	17.6	56	2.8	2.3	
14	63.47	24.1	29.3	19.5	26.3	27.2	27.6	27.6	27.8	78	17.2	17.2	45.5	3.7	2.7	
15	63.98	23.8	30	19.4	26.3	27	27.3	27.8	27.8	77.9	16.9	17.3	47.8	3.3	2.9	
16	64.76	23.8	30.2	17.5	25.6	27.3	27.1	27.4	27.9	74.2	15.9	15.4	50.7	4.7	3.5	
17	64.62	24	31.5	18.1	25.7	27.4	27.2	28	27.8	75.1	16.5	15.7	55.6	4.6	3.4	
18	64.11	24.8	31.3	21.1	26.3	27.7	27.1	27.5	27.8	76.7	17.7	18.2	54.7	4.2	3.2	
19	62.60	24.5	31.4	19.5	26	27.6	27.2	27.5	27.8	77.3	17.4	16.8	51.4	4.3	3.1	
20	61.41	24.6	30.9	19.7	26.2	27.8	27.2	27.6	27.8	76.2	17.2	16.8	50.7	4	2.8	
21	61.55	24.7	32.2	18.5	26.1	27.7	27.3	27.6	27.7	75.3	17.2	16	51.5	5.2	3.8	
22	62.12	25.9	32.4	20.8	26.5	28.2	27.4	27.8	27.8	72.9	17.8	18.3	51.5	4.7	3.5	
23	61.86	24.8	30	20.4	26.7	27.6	27.6	27.8	27.8	80.5	18.5	18	46.1	3.2	2.4	
24	61.45	24.8	29.7	20.2	26.5	27.4	27.5	27.5	27.8	75.9	17.4	18	51.2	3.6	2.8	
25	62.09	25.1	31.4	21	26.3	27.5	27.2	27.5	27.6	76.9	18	18.4	51.7	3.9	3	
26	61.92	25.5	32.5	21.1	26.2	28	27.2	27.5	27.7	74.9	17.6	18.8	53	5.1	3.9	
27	61.48	24	31	20.2	26.2	27.1	27.3	27.4	27.7	84.8	18.7	17.7	49.9	2	1.9	
28	61.16	24.6	31.4	19.6	25.8	27.5	27.2	27.3	27.7	81.7	18.5	17.5	45.6	3.1	2.7	
29	61.58	24.6	30.5	19.8	26.2	27.2	27.1	27.3	27.7	79.4	18	17.7	43.6	2.7	2.4	
30	62.14	24.1	27	22.3	26.3	26.7	27.2	27.2	27.7	90.2	20.1	20.7	45.3	5	1.1	
31	61.98	25.3	32.2	19.8	25.8	27.3	27.2	27.2	27.7	78.6	18.4	17.8	51	4.1	3.9	
Mean Total	762.16	24.8	30.9	20.3	26.4	27.6	27.4	27.6	27.9	78.6	18.1	18	50.1	3.6	2.8	
Departure from normal	+0.96	-0.1	+0.8	-0.1						+0.5	0					

Day.	Wind.			Direction at the time of the maximum velocity.	Amount (mean).	Clouds.		Sun- shine.	Rain, 24 hours beginning 6 a. m.		Miscellaneous.		
	Prevailing direction.	Total move- ment.	Maximum hour- ly velocity.			Form and direction.			On the tower.	In the park.			
						Upper.	Lower.						
	<i>Km.</i>	<i>Km.</i>	<i>Km.</i>	0-10.			<i>h.</i>	<i>m.</i>	<i>mm.</i>	<i>mm.</i>			
1	SE quad.	128.5	15	WNW	2.8	Ci.	Cu.	E	8	50			
2	ESE	135	15.5	SE	.1		Cu.		9	10			
3	W	120	15	WNW	3	Ci.	Cu.	EbyN	8	25			
4	E quad.	55	7.5	NNW	7.8	Ci.-S.	Cu.	ESE	1	15			
5	E quad.	39	7	WSW	8.9	A.-Cu.	Cu.	E	0	10			
6	NW quad.	83.5	14.5	W	5.1	A.-Cu.	Cu.	E	7	50			
7	N	244	27.5	N	4	Ci.-S.	Cu.	E	6	15			
8	N	173	24.5	N	9	A.-Cu.	Cu.-N.	E	1	25	0.8	0.8	p° p.
9	NW quad.	98.5	13	ESE	9.3	Ci.-S.	N.-cf.	E	2	25			
10	ESE	176	20	ESE	4.3	A.-Cu.	E	Cu.	E	7	15		
11	E quad.	130	16	W	1.7		Cu.	E	8	50			○ a.
12	E quad.	98	8	N, ESE	6.8	Ci.-S.	Cu.	E	4	40	.1	.3	● a.
13	ESE	83.5	12	SE	6.1	ci.-s., A.-Cu.	Cu.-N.	E	4	30			d° p.
14	E quad.	111.5	18	E	9	Ci.-S.	Cu., Cu.-N.	E	1	10			
15	NE quad.	154	21	ENE	9.3	Ci.-S.	Cu.-N.	E	2	45			d° a.
16	NNE, WSW	137.5	15	WNW	5.1	Ci.	Cu.	E	6	35			
17	E quad.	126.5	20	WNW	4.9	Ci.	Cu.	E	7	05			
18	E quad.	136	18	nwbyw, wsw	6.5	Ci.-S.	Cu.	E	6	35			
19	E quad.	149.5	13	WNW, SE	1.3		Cu.		8	55			
20	SE, WSW	101.5	14	WSW	.7	Ci.	Cu.		9	00			
21	SE	139.5	15	SE	.9	A.-Cu.	Cu.		9	20			
22	SE	101	12	swbyw, swbyw	1.2	A.-Cu.	Cu.		8	10			
23	Variable	59	11	W	5.4	A.-Cu.	Cu.	E	4	25			
24	Variable	77.5	12	W	7.8	A.-Cu.	Cu.	E	2	15			
25	W, ESE	108.5	13	WSW, W	6.6	A.-Cu.	Cu.	E	5	55			
26	ESE	170	20	ESE	5.4	Ci., A.-Cu.	Cu.	E	6	25			
27	NE quad.	98	13	NbyE	8	Ci.-S.	Cu., Cu.-N.	E	3	25	.3	.4	d° a. d. p.
28	Variable	56.5	11.5	WSW	6.2	A.-Cu.	Cu.	E	4	00			
29	E, ESE	82.5	9.5	E	8	A.-Cu., Ci.-S.	Cu.	E	2	05	.9	.9	● p.
30	NE, WNW	47.5	8	WNW	9.7	A.-Cu.	Cu.-N.	E	1	00	3.5	3.3	d a. ● p.
31	ESE, N	175	17.5	SE	5.2	Ci.	Cu.	E	8	50			
Mean Total		116	14.7		5.5				5	27			
Departure from normal		3,595.5							168	55	5.6	5.7	
Departure from normal		-1,483.5			+0.2				-21	53	-21.3		

* All the mean values given in this table are deduced from hourly observations.

^b These values are taken from instruments mounted in the Observatory Park, 1.5 meters above ground.

METEOROLOGICAL DATA FOR MIRADOR OBSERVATORY, BAGUIO.^a

[$\phi=16^{\circ} 25' N$; $\lambda=120^{\circ} 36' E$; barometer above sea, 1,512.5 meters; gravity correction not applied, -1.65 mm.]

Day.	Pres- sure ^b (mean).	Air temperature at Mirador (on the top of the mountain).					Air temperature in the valley (near the city hall).					Rela- tive humid- ity (mean).	Vapor pres- sure (mean).	Radiation.		Evaporation.	
		Mean.	Maxi- mum.	Hour.	Mini- mum.	Hour.	Maxi- mum.	Hour.	Mini- mum.	Hour.	Mini- mum on grass.			Maxi- mum in sun. Black bulb in va- cuo. ^c	Free ex- posure (total)	Shel- ter (total)	
																	^{°C.}
1	638.12	17	22.8	1.30p.	11.5	5.50a.	24.7	11.00a.	11	6.20a.	Per ct.	mm.	^{°C.}	mm.	mm.		
2	38.22	17.8	24	1.20p.	13.2	5.00a.	24.1	1.05p.	11.4	6.40a.	76.2	10.7	10	45.2	4.8	1.6	
3	38.44	17.4	23.5	11.00a.	13.2	6.35a.	24.2	10.50a.	11.5	6.20a.	64.3	9.5	11.5	45.3	7.2	3.1	
4	39.03	17.6	24.8	Noon	12.8	5.55a.	25.5	0.40p.	11.3	5.00a.	72	10.3	12	45.1	6.6	3.3	
5	39.14	18.6	24	0.50p.	15.6	2.00a.	25.5	10.40a.	15.9	6.10a.	64.2	9.4	11.7	45.3	8.8	3.8	
6	38.67	17.7	23.2	Noon	15.1	4.45a.	24.5	9.50a.	14.4	6.20a.	80.5	12.8	15	45.2	3.8	1.6	
7	37.91	17.6	24.9	Noon	14.7	5.00a.	24.3	1.10p.	14.3	6.00a.	89.7	13.5	13.9	44	1.6	.9	
8	37.92	17.1	23.8	1.10p.	14.4	11.55p.	24.4	1.10p.	13.8	4.10a.	90.2	13.5	13.5	47.6	2.2	1	
9	38.22	18	24.9	0.50p.	13.8	6.05a.	25.5	2.25p.	13.5	6.30a.	85.2	12.4	12.5	50	5	2.1	
10	38.88	17.8	25.3	11.50a.	14.5	4.00a.	26.2	0.15p.	14.5	4.40a.	70.8	10.8	13.2	45.2	9.8	5	
11	39.33	17.3	23.5	1.00p.	13.8	4.00a.	23.4	3.35p.	12.4	6.55a.	78.8	11.6	11.3	46.2	4	2.1	
12	38.98	17.2	23.8	1.50p.	13	6.50a.	23.1	2.55p.	11	7.00a.	74.5	10.9	10.5	46.4	4	2.1	
13	39.70	17.1	24.8	11.30a.	13.1	6.50a.	25.5	0.10p.	11.5	6.10a.	79.3	11.3	11.3	46.2	4.8	2.8	
14	39.74	16.9	23.1	11.00a.	12.4	3.55a.	25	11.55a.	11.4	4.00a.	75.8	10.6	11	44.6	7	2.6	
15	39.89	16.1	22.7	10.40a.	12.6	6.25a.	23	11.00a.	11.5	11.10p.	83	11.1	11.5	44.8	3.8	1.6	
16	40.73	16	22.5	0.30p.	12.3	4.25a.	23	0.25p.	10.6	6.05a.	80.7	10.8	11.2	47.7	3.8	2.2	
17	40.46	16	23	11.20a.	12.4	5.00a.	24.5	1.10p.	11.9	5.55a.	82	11	11.8	44.3	4.7	2	
18	40.25	16.7	23.1	11.00a.	12.2	6.05a.	24.7	11.15a.	11.4	6.55a.	80.5	11.2	11.3	45	4.3	2.2	
19	39.18	16.7	23.4	1.40p.	12	6.00a.	23.4	1.20p.	11	6.10a.	82.3	11.4	10.7	46.9	4.3	2.1	
20	37.99	16.3	22.5	1.00p.	13	7.05a.	22.3	1.10p.	11	7.40a.	86.5	11.9	10.7	38.5	3.2	1.4	
21	38.35	17.4	23.3	0.40p.	12.9	5.45a.	25	0.25p.	11.4	7.00a.	77.2	11.2	11.8	46	4.4	2.1	
22	39.11	18.3	24	2.30p.	13.7	2.30a.	24.7	2.50p.	11.5	6.45a.	76.7	11.8	12.5	45.8	4.9	2.1	
23	38.71	16.6	23.5	0.20p.	14.4	4.30a.	23.5		13	12m.n.	88.3	12.5	12.9	49.5	2.3	1.6	
24	37.98	16.1	24	0.15p.	13.5	12m.n.	23.8	Noon	13.2	4.00a.	82.8	11.2	12.7	51.9	4.6	2	
25	38.86	18	25.5	11.00a.	13.5	0.10a.	25.9	11.00a.	12.3	5.20a.	75.2	11.3	12.7	47	8.8	3.4	
26	38.84	17	21.9	11.55a.	14.9	11.45p.	23.1	11.55a.	13.5	3.35a.	88.8	12.8	13.8	32.7	3	1.4	
27	38.36	17.4	24.5	1.00p.	13.7	.15a.	24.7	2.00p.	12.7	6.00a.	85.3	12.6	12.6	47	3.2	1.5	
28	38.23	18	23.2	11.00a.	14.3	6.45a.	23.6	10.25a.	13.8	7.00a.	80.3	12	13.3	47	3.6	1.8	
29	38.46	17.4	25	11.15a.	13.8	6.05a.	25.7	11.20a.	12.7	7.00a.	83	11.9	13	48.7	4.8	2.3	
30	38.64	16.7	21.5	1.20p.	14	4.55a.	25.1	10.15a.	13.2	3.00a.	88	12.4	12.7	32.3	2.5	1.1	
31	38.75	17.1	25.4	1.35p.	14.3	.00a.	24.6	1.25p.	13.7	3.05a.	86	12.4	13.5	49.2	2.7	1.8	
Mean Total	638.87	17.2	23.7		13.5		24.4		12.5		80.3	11.6	12.2	45.4	4.6	2.1	
															142.5	66.4	

Day.	Prevailing direction. ^d	Wind.			Amount (mean). ^e	Clouds.		Sun- shine.	Rain, 24 hours begin- ning 6 a. m.	Miscellaneous.
		Total move- ment.	Maxi- mum hour- ly veloc- ity.	Direction at the time of the maximum velocity.		Form and direction.				
						Upper.	Lower.			
1	E	Km. 267.1	Km. 22.7	W	0-10. 0.6	Ci.	Cu.	h. m. 8 05	mm. 0.2	☁
2	E	343.5	22.2	SW	.6	Ci.	Cu.	9 05		☁
3	E	370.4	25.4	E	2	Ci.	Cu.	7 45		☁
4	E	414.8	26.8	SE	4.4	A.-Cu.	S	6 55		☁
5	E	236.1	18	SW	6.6	Ci.	Cu.	5 40		☁
6	E	237.3	20.9	W	4.4	Ci.	Cu.	3 25	0.5	☁
7	W	202.8	20.1	W	6.4	A.-Cu.	Cu.	5 25		☁
8	W	274.6	25.4	E	5.7	Ci.	S.-Cu.	E 4 55		☁
9	E		30.4	E	0	Ci.	Cu.	ESE 9 10		☁
10	SE		30.9?	E?	3	A.-Cu.	Cu.	5 35		☁
11	W, NE				3.1	Ci.	Cu.	6 35		☁
12	W	266.9	23.6	SW	4.4	Ci.	Cu.	7 15		☁
13	SE	333.2	21.7	SE	4.3	Ci.	Cu.	5 50		☁
14	SE	445	26.9	SE	2.1		Cu.	SE 7 25		☁
15	E	395.5	23.8	E	5.6		Cu.	3 50		☁
16	E	357.6	23.9	W	5.4	Ci.	Cu.	4 45		☁
17	E	386.5	30.3	SE	6.3	Ci.-S.	Cu.	4 30		☁
18	E	363.9	23.3	E	3	Ci.	Cu.	EbyN 6 50		☁
19	W, NE	293.4	24.7	W	.9	Ci.	Cu.	WSW 7 55		☁
20	SE	289.3	21.9	SE	5.3	Ci.	Cu.-N.	SW 5 25		☁
21	E	312	22.5	W	1.4	Ci.	Cu.	WSW 7 20		☁
22	E	270.6	21.9	W	.7	Ci.	Cu.	SW 9 05		☁
23	E	261.7	26.8	W	4.6	Ci.	Cu.	4 35	2.3	☁
24	E	349.2	27.2	E	7.3	A.-Cu.	Cu.-N.	S 3 10		☁
25	E	464.1	29.6	SE	2.4		Cu.	7 55		☁
26	E		24.6?	SE	9.4		Cu.-N.	SSE 1 00	.3	☁
27	W, SE				5.3	Ci.	Cu.	SE 4 50		☁
28	NE quad.	277.6	22.5	W	5.3	A.-Cu., Ci.	Cu.-N.	SSW 4 50		☁
29	E	346.5	25.4	SW	3.6		Cu.-N.	SE 5 55		☁
30	W, E	269.7	19.5	E	8.6	A.-Cu.	Cu.-N.	S 0 15		☁
31	E	337.2	29.2	W	4.7	Ci.	Cu.-N.	WSW 5 20		☁
Mean Total		321.8	24.6		4.1			5 50		
								180 35	3.1	

^a All the mean values given in this table are deduced from six daily observations taken at 2, 6, 10 a. m. and 2, 6, 10 p. m.
^b The barometric readings of this station are not reduced to sea level.
^c Maximum of hourly observations taken from 6 a. m. to 6 p. m.
^d This element is based on hourly observations taken from a quadruple register, which gives only eight possible directions of the wind.

DAILY RAINFALL AT THE STATIONS OF THE WEATHER BUREAU, JANUARY, 1915.

Station.	Day of month.															
	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.
	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.
Jolo									3.8					20.8	11.4	3.8
Isabela, Basilan			4.6												1.5	14
Zamboanga															1.8	
Davao			24.1	2.5		3			3.8				5.8	18.5	13.7	
Cotabato	4.9		9.4		2.5				.8					2	4.8	12.4
Cagayan, Misamis	1.5		1.3											13.2	3.3	1.8
Dapitan		1.3	2.5	4.3	1.5			1.5	9.4	1.5		2.5	11.9	22.1	6.6	17.6
Butuan	22.9		63.8	4.1	1.3	3.6					2.5		11.7	19.3	28	20.6
Dumaguete			1.3					3.3						35.6	12.2	15.5
Tagbilaran		3.8	.5			1.3								.8	.5	1.8
Iwahig								.5			2.4					
Surigao	17.6	1.3	55.1	15.8	5.8	7.1	3	1.1	19.1		4.6		32.3	56.4	38.1	47.2
Maasin	11.2		56.7								29.8			24.6		54.6
Cebu	.3		2.5			1.8				13.2	4.3			2.5		.3
Iloilo			6.1						17.8	35.8	1					
San Jose Buenavista									2							
Cuyo																
Ormoc			49.7	4.6	3.5	.6			25.7	37.3			2.5	1.6		1.8
Guiuan	15.7	12.4	18.8	4.5	12		5.6	1.6	67.1	13.7		2	3.3	5.6		76.7
Tacloban	1.9		40	4.3	11.8	26.3		11.2	83.2	63.8	3		1.9	8.1		.9
Capiz			2.3	3	16.7				4.4	15.3						3
Borongan	8.9	8.4	41.4	49.6	37.6	9.9		2.5	62.7	19.8	5.8	4.8	11.4	16.8	.3	1.3
Calbayog	1	1.3	16.7	.5	1	11.7			2.3				.5			
Masbate		.5	4.6		3.6	.5			1							
Romblon				9.7	5.3	1		1.5	13.8							
Batag	9.1		34.3	2.3	25.4	39.9			18				1.8			
Gubat	3.8	12.4	23.6	10.9	51.8	4.1		6.1	2.8					1.3		
Legaspi		30	5.1	16.8	11.7	5.1		7.4	6.5							.8
Sumay, Guam	1.3			7.6	20.3	2.5		1.3		10.2	10.2					
Calapan		1	1	7.2	24.9	1.8		2	2	.3			.5			
Virac	.5	9.6	2	26.5	23.6	.8		7.8	4	1					2.6	
Nueva Caceres		1.1														
Batangas								33.3	4.3							
Atimonan		1.5	6.9	.8	17.5	23.9		23.4	32.5							
Ambulong, Tanauan													1.5			
Paracale		21.4	6.1	64.2	6			34.6	6.3							
Santa Cruz, Laguna		5.8		1	4.6			1.3	.5	.3				2.1		
Manila									.8							
Antipolo													1			
Iba																
San Isidro								.8								
Tarlac						20.8										
Baler				10.4				11.9	3	51.8	105.1	1		5.6	8.2	14.8
Dagupan																9.9
Bolinao															2.5	
Baguio						.5										30.5
San Fernando, Union																
Echague													2.5	1.3	1.3	
Candon																
Vigan								.3								
Tuguegarao						3.3		.3								1.5
Laoag														4.6		
Aparri						.8			2.1				7.6	15.3	.5	3.6
Santo Domingo, Batanes	1.5	14.2	69.3	52.1	25.5		31	9.9				3.1	47	9.7	20.5	28.9

Daily rainfall at the stations of the Weather Bureau, January, 1915.—Continued.

Station.	Day of month.															Total.
	17.	18.	19.	20.	21.	22.	23.	24.	25.	26.	27.	28.	29.	30.	31.	
Jolo	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.
Isabela, Basilan							0.5	1	17.6							58.7
Zamboanga	(a)	(a)				2										22.1
Davao					18.5											1.8
Cotabato					3											89.9
Cagayan, Misamis					6.9	2.3										37.1
Dapitan	1				50.3	.8				0.5		5.3			0.8	21.4
Butuan		2												0.3	4.8	236.5
Dumaguete	8.6			4.1												30.6
Tagbilaran	3.6	5			8.8											21.6
Iwahig							6.9					2				12.3
Surigao	21.9	21.8	3.6	10.7	12.2					3.3	0.3	2.3	0.5	6.5	3.1	390.8
Maasin		1.3			7.6											197.5
Cebu	23.1	6.1														54.1
Iloilo			2.5													63.2
San Jose Buenavista			.3													2.3
Cuyo																0
Ormoc	4.1	2		.3	2.4							7.9				144
Guiuan	73.1	10.7	4.1	10.4	2.6					1.5	7.9	2.5	.5		2	354.3
Tacloban	11.4	20.1	.3	1	15.1	.3						3.8				305.7
Capiz	4.1	6.4	.5	.8												51.1
Borongan	23.4	39.6	4.3	27.2	13.7					12.4	3.3	4.3				409.4
Calbayog	2	3.3		.5	8.5	1.5						2				52.8
Masbate	6.9	1.3													2.5	22.2
Romblon		3					3.8	7.6	1.8				.5			4.6
Batag	7.6	5.1	3.6		20.3			3.6							15.5	186.5
Gubat	3.3				30											4.8
Legaspi	.5	1				11	7.1	11.2	.8	2	.3	13.5	5.4	7.7		161
Sumay, Guam		10.2	1.3				19.1	2.5	3.8	33	2.5	6.3				143.9
Calapan				5.1	3		16.8	1	6.6	2.1	10.2	9.1	2.5			132.1
Virac				1.8	8.9	3.8	1.1	7.4	2.1	1.8	1.3	1.3	4.6	4.1		94.4
Nueva Caceres					5.3							1.5				116.6
Batangas																12.7
Atimonan				2.5		25.6	8.9		1.5				6.4	.5		35.4
Ambulong, Tanauan																156.9
Paracale				20.8	7.6	25.7	17.5	28.9	11.2			37	18.3	7.1	1.3	2.8
Santa Cruz, Laguna														2.3		362.7
Manila												.3	.9	3.5		17.9
Antipolo																5.6
Iba							2.5									1
San Isidro												.5	.8			2.5
Tarlac																2.1
Baler	.5	10.4	.5			122.4	1.3		35.3	32.5	1.3		10.2	20.3	.3	20.8
Dagupan													.8		4.1	454
Bolinao																4.9
Baguio							2.3			.3						33
San Fernando, Union																3.1
Echague									1.8							0
Candon																6.9
Vigan																0
Tuguegarao									7.9	1			1.8			.3
Laoag																20.1
Aparri	15.3						16	33.1	5.5	9.6				4.6		0
Santo Domingo, Batanes	16	11.2	10.7	1.2			35.2		.3	2		7.7	.3	2.6		114
																399.9

* No observation.

Maximum and minimum temperatures at the stations of the Weather Bureau, January, 1915—Contd.

Day.	Vigan.		Tuguegarao.		Laoag.		Aparri.		Sto. Domingo, Batanes.		Dapitan. ^a	
	Maxi- mum.	Mini- mum.	Maxi- mum.	Mini- mum.	Maxi- mum.	Mini- mum.	Maxi- mum.	Mini- mum.	Maxi- mum.	Mini- mum.	Maxi- mum.	Mini- mum.
	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.
1	29.7	19.8	32.9	19.3	32.2	17.4	29.6	20.6	29.4	19.6?	30.7	23.3
2	31.3	18.2	32.7	20.1	32.3	17.2	29.2	20.4	25.4	19.2	30	24.1
3	32	20.2	32.2	18	32.2	16.6	28.6	19.5	25.8	21.5	31	24.8
4	30.5	21	29.6	16.6	32.6	16.4	29.4	18.7	26	20.5	30	24.5
5	30.2	22.5	34.4	21.7	33.2	19.5	29.8	21.6	28.4	21.4		24.7
6	29.8	22.2	34.2	20.8	31.7	20.4	27.6	22.6	27	22.4	30.6	23.6
7	26.6	20.8	27.8	21	27.7	22.6	25.4	22.4	25	21.4	31.4	24.1
8	28.3	19.6	29.3	19.8	32.4	16.2	26.1	19	22	19	31.4	22
9	29.3	19.8	31.7	19.6	35.8	18.4	26.6	21.3	24.9	19.4	31.3	24
10	29.3	20.4	32	18.1	32.5	18.3	30	20.5	27.7	22.2	30.9	23.1
11	30.5	21.4	33.5	19.5	32.2	18.2	28.6	21	27.7	21.6	31.8	23.9
12	28.5	19	33.3	19.4	31.3	17.5	29.5	21.2	28	20.2	30.3	24.3
13	29.5	18.3	33	20	34.1	17	27.9	21	22	19.5	30.2	21.3
14	33.2	21	26.6	20	33.2	19.4	24	20.8	21.8	17.2	31	22.5
15	32	22.2	28.6	19.6	34.6	18.3	25	20.2	22	17.6	28.3	22.8
16	29.4	21.7	31.1	17.5	32.4	18.2	25.9	18.6	22.5	19.5	28.2	22.4
17	30.2	20.8	28.1	20.4	32	21.5	23.6	20.5	21.4	18.4	28.6	22.8
18	28.8	20	31	20.3	32.7	17.6	25.9	20.5	22.5	17.8	28.7?	24.2
19	30	21.3	33.6	18.3	31.2	18.6	29.9	19.4	24	20	29.9	24.3
20	29	19.7	33	20.8	30.3	20.4	26.1	21.2	25.9	20.6	30.4	23.6
21	29.7	21.3	33.6	20.5	32.4	19.5	29.7	21	27.6	19.1	31.1	22.2
22	29	19.8	32.6	19	32.5	18.9	27.4	21.6	26.8	19.6	31.4	24.2
23	30.8	20.5	31.5	19.5	34.1	18.4	28.1	21.8	25.9	18.5	30	24.1
24	29.5	20.1	26.3	19.5	33.6	20.5	22.7	20.5	23	18	30.2	21
25	30	22.2	29.1	20.3	34.2	18	25.3	20.5	25.6	20.2	31.2	21.2
26	31.2	21.8	29	21	32	22.5	24.1	21.7	25.1	21.5	30.1	22.2
27	30.3	22.1	34	19.4	33.9	20.8	30.5	21	28.4	22	31	23.8
28	30.2	19.8	31.6	20.4	33.2	19	27.1	21.3	26.2	21.6	31.5	21.6
29	31.2	18.7	24	20.3	35	17.5	25.1	21.4	23.4	20.8	31.7	22.3?
30	32.7	23	30.2	20.6	33.8	19.4	27.7	20.8	26.4	20	30.6	23.8
31	30.4	21.8	33.8	19.6	34.1	20.7	30.5	20.5	28.5	22.6	30.6	24
Mean	30.1	20.7	31.1	19.7	32.8	18.9	27.3	20.7	25.4	20.1	30.5	23.2

^a Received late.

SEISMOLOGICAL BULLETIN FOR JANUARY, 1915.

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EARTHQUAKES FELT IN THE PHILIPPINES.¹

4, 20^h 07^m 06^{s*} [5, 4^h 07^m 06^s]. SE Luzon and Visayas. Earthquake of intensity IV, in the SE part of Luzon; NW of Samar; W of Leyte, Masbate; N of Cebu; and N of Panay. Its epicenter seems to be located W of Masbate Island not far from its coasts. In this island two light foreshocks with a constant direction WNW-ESE had been felt at 18^h 00^m and 18^h 20^m [5, 2^h 00^m and 2^h 20^m]; these observations were made in the capital of the island, which lies on the coast facing to the NE and running in a NW-SE direction. That the origin was toward the W of Masbate is indicated by the fact that this first earthquake and the following ones, spoken of below, were felt in Capiz and Nueva Caceres with nearly as much intensity as in Masbate Island; the former of these stations is placed in northern Panay and the latter in Camarines, SE of Luzon, while the imaginary line which unites them passes through the sea, W of Masbate. It is our opinion that the origin must be placed near that line under the sea opening between the Islands of Masbate, Burias, Sibuyan and northern Panay, and that it was prolonged in a nearly NNE-SSW direction. The earthquake was certainly felt more strongly in Camarines, and northern Panay than toward the W in the Island of Romblon.

The supposed epicentric region has a very interesting physiography; in it seem to center the two principal trends of the tectonic lines or arches of the Archipelago: it comprises not only the Island of Masbate, considered as the keystone of the different structural arches, but in the north it is limited by the Island of Burias which is greatly prolonged in the direction of the NW-SE arch, while farther toward the W lies the similarly long Island of Tablas, the NNE-SSW trend of which conforms with the direction of the southern structural arches.

About two hours after the preceding earthquake, at 22^h 08^m 19^{s*} [5, 6^h 08^m 19^s] a second one much stronger occurred, originated seemingly in the same place. In the station of Masbate undulations in the WNW-ESE direction were very noticeable, and reached the V-VI degree of intensity. The isoseism V had a radius of somewhat more than 150 kilometers in the NNE-SSW direction, and comprised Camarines, Albay, and northern Panay, while it was certainly shorter toward the W, and probably also eastwards. This earthquake was registered by the seismographs of Formosa, China coast, and Japan.

It repeated with intensity III at 22^h 23^m 08^{s*} [5, 6^h 23^m 08^s]: some minor aftershocks occurred on the 5th at 0^h 02^m [8^h 02^m], 5^h 15^m [13^h 15^m], 11^h 20^m [19^h 20^m] and 13^h 24^m

¹ The intensity of earthquakes is given in the notation known as the Rossi-Forel scale. The time is that indicated by the seismographs at the Central Observatory whenever the disturbance has been registered by them. This fact is denoted by an asterisk (*). Otherwise the time is that noted by the observer who sent the report. All time indications are in Greenwich mean time (midnight=0^h), Insular time being added in brackets for the convenience of Philippine readers.

[21^h 24^m]. None of these was perceptible beyond the region comprised within the iso-seism. V of the principal earthquake, nor registered by the seismographs of the Observatory some 300 kilometers distant.

There are not any records showing that during historic times the same region has been the center of great earthquakes: most of the strong and frequent earthquakes felt in the neighborhood of Masbate Island originated either near the south or near the north, but not W of it; consequently we consider the present series of shocks as an extraordinary and new occurrence.

7, 16^h 48^m 32^{s*} [8, 0^h 48^m 32^s]. Laoag (NW Luzon). Earthquake of intensity III.

11, 13^h 40^m [11, 21^h 40^m]. Butuan (N Mindanao). Oscillatory earthquake, direction SE-NW, intensity III.

13, 17^h 33^m 37^{s*} [14, 1^h 33^m 37^s]. Nueva Caceres (SE Luzon). Oscillatory earthquake, direction NW-SE, intensity III, duration 5 seconds.

14, 17^h 40^m [15, 1^h 40^m]. Cagayan (N Mindanao). Earthquake of intensity IV.

15, 3^h 06^m [15, 11^h 06^m]. Butuan (N Mindanao). Oscillatory earthquake, direction NE-SW, intensity IV, duration more than 20 seconds. In this earthquake there was distinctly observed a sudden shock followed by large slow undulations of such a duration which gave sufficient time to call the attention of the people. Probably it was felt along the Agusan Valley and principally in the western part of it, a suggestion based on the fact that it was also slightly perceptible at Cotabato, some 200 kilometers distant toward SW.

20, 4^h 03^m 38^{s*} [20, 12^h 03^m 38^s]. Dapitan (NW Mindanao). Oscillatory earthquake, direction NE-SW, intensity III-IV, duration 5 seconds. The origin of this earthquake probably was situated under the sea, W of the volcanic Island of Camiguin: it was slightly perceptible at Butuan and consequently must have been felt also along the northern coast of Mindanao running between Dapitan and Butuan, and in the southern part of Bohol, Cebu, and Negros.

21, 15^h 05^m 54^{s*} [21, 23^h 05^m 54^s]. Central Mindanao. Earthquake of intensity V-VI; its epicenter comprised the central and southern part of the Agusan Valley, and the Provinces of Cotabato, western part of Davao, Bukidnon, Lanao and southern part of Misamis; its origin probably lay toward the NE end of the Cotabato Province. At Cotabato the shocks and the rumbling sounds awakened the people with terror. This earthquake was distinctly felt through an area more than 200 kilometers long and wide, and registered in most of the observatories of the Far East.

27, 19^h 06^m 00^{s*} [28, 3^h 06^m 00^s]. SE Luzon and Visayas. Earthquake of intensity IV-V, originated in the same region W of Masbate Island, as those which occurred on the 4th, and felt also through the SE of Luzon, NW of Samar and Leyte, and N of Panay Island.

30, 7^h 48^m [30, 15^h 48^m]. Surigao (NE Mindanao). Earthquake of intensity II-III.

31, 12^h 06^m 52^{s*} [31, 20^h 06^m 52^s]. NE Mindanao. Earthquake of intensity IV, felt in the Province of Surigao, northern part of the Agusan Valley, Leyte Island, and southern part of Samar. Its origin was situated toward the deepest part of the Philippine Deep, in the Pacific, close to Siargao Island.

RECORDS OF THE MICROSEISMOGRAPH.

[Time: Greenwich mean. Midnight=0^h. Instrument: Wiechert seismograph; 1,000 kilograms. A_N: T=9.0, ε=3.31, $\frac{r}{T_0^2}$ =0.039; A_E: T=6.2, ε=2.58, $\frac{r}{T_0^2}$ =0.082. Alluvium. 2.40 meters above sea level.]

No.	Date.	Character.	Phase.	Hour.	Period.	Amplitude.		Remarks.	
						A _N μ	A _E μ		
1	1	Iv	eP	h. 8	m. 47	s. 50			
			L	48	09				
			M _E	48	13	2		179	
			M _N	48	29	2	143		
			F	59					
2	1	Iv	eP	15	08	32			
			F	11					
3	3	IIv	eP	17	30	20			
			S	31	24				
			L	32	15				
			M _E	32	42	4		111	
			M _N	33	09	5	92		
			F	47					
4	4	Iv	eP	20	07	06			SE Luzon and Visayas.
			S	07	48				
			L	08	00				
			M _N	08	34	5	23		
			F	21					
5	4	IIv	eP	22	08	19			W of Masbate Island.
			S	08	55				
			L	09	59				
			M _E	11	14	8		365	
			M _N	11	17	9	360		
6	4	Iv	eP	22	23	08			New earthquake. W of Masbate Island.
			L	23	44				
			M _E	24	07	6		26	
			F	23	02				
7	5	I _r	eP	14	42	26			
			iS	50	04				
			eL	53	00				
			M _N	55	32	10	14		
			F	15	31				
8	5	II _r	eP	23	29	16			Maximum and end in N-S component lost by the force of the shock.
			S	31	41				
			L	34	27				
			M _E	39	59	10		306	
			F	1	20				
9	7	Iv	eP	16	48	32			Laoag (NW of Luzon).
			F	51					
10	9	Iv	eP	13	51	49			
			F	55					
11	12	Iv	eP	18	29	40			
			F	35					
12	12	Iv	eP	18	41	36			
			F	47					
13	13	I _u	eP	7	08	08			Italian earthquake.
			eS	19	19				
			eL	30	36				
			M _N	47	47	18	6		
			M _E	47	53	15		3	
			F	8	48				
14	13	Iv	eP	17	33	37			Nueva Caceres (SE of Luzon).
			iL	33	59				
			M _E	34	04	2		77	
			F	41					
15	13	I _v	eP	20	21	57			
			eL	22	30				
			M _N	22	56	4	16		
			M _E	23	22	3		12	
			F	35					
16	14	Iv	eP	22	13	37			
			F	16					
17	14	Iv	eP	22	17	13			
			F	20					
18	15	Iv	eP	18	38	48			
			F	41					

Records of the microseismograph—Continued.

No.	Date.	Character.	Phase.	Hour.	Period.	Amplitude.		Remarks.
						A _N μ	A _E μ	
19	16	Iv	eP F	<i>h. m. s.</i> 12 27 18 30				
20	20	Iv	eP F	4 03 38 31				Dapitan (NW of Mindanao).
21	20	Iv	eP F	15 37 31 39				
22	21	Iv	eP eL M _E M _N F	15 05 54 07 31 09 22 10 41 16 12		6 8	58 45	Central Mindanao.
23	21	Iv	eP F	22 11 16 14				
24	24	Iv	eP F	23 00 00 03				
25	26	Iv	eP L M _E F	18 50 32 51 06 51 17 56		2	19	
26	27	Iv	eP L M _E F	19 06 00 06 45 06 50 11		2	9	SE Luzon and Visayas.
27	31	Iv	eP F	12 06 52 17				NE of Mindanao.

TEMBLORES DE TIERRA SENTIDOS EN FILIPINAS.¹

4, 20^h 07^m 06^{s*} [5, 4^h 07^m 06^s]. SE de Luzón y Visayas. Temblor de tierra de intensidad IV, en la parte SE de Luzón, NW de Sámar, W de Leyte, Masbate, N de Cebú, y NE de Panay. El epicentro parece se hallaba al W de Masbate, pero no lejos de sus costas: en dicha isla, a 18^h 00^m y 18^h 20^m [5, 2^h 00^m y 2^h 20^m] se habían sentido ya dos temblorcitos oscilatorios de intensidad III-IV y dirección constante de WNW-ESE. Es de notar que la observación se hizo en la capital de Masbate situada hacia el centro de las costas que miran al NE y corren en dirección al SE. También indica que el epicentro se hallaba al W de la isla el hecho, de que éste y los otros temblores, de que luego hablaremos, se sintieron en Cápiz y en Nueva Cáceres casi con la misma intensidad que en Masbate: la primera de las citadas estaciones está en la parte N de la Isla de Panay, y la segunda en Camarines, pasando la línea imaginaria que las une por el W de Masbate. Creemos que el epicentro no debía estar lejos de la expresada línea y por consiguiente en el mar que se extiende entre Masbate, Burias, Sibuyan y la parte NE de Panay. Parece además que la forma del epicentro era prolongada en la dirección NNE-SSW, por haberse sentido los diversos temblores más en Camarines y Panay que hacia el W en la Isla de Romblón.

La supuesta región epicentral es de una fisiografía muy interesante por concurrir en ella las dos direcciones principales de las líneas tectónicas del Archipiélago: pues además de comprender la Isla de Masbate, considerada como el núcleo o la clave de dos diferentes arcos tectónicos, tiene al N la pequeña Isla de Burias exageradamente prolongada en la dirección del arco SE-NW, y al W la de Tablas, la cual se prolonga en la dirección NNE-SSW, y se conforma ya con los arcos tectónicos meridionales de esta dirección.

Unas dos horas después del precedente temblor, a 22^h 08^m 19^{s*} [5, 6^h 08^m 19^s] ocurrió otro de mayor intensidad y extensión, originado al parecer en el mismo sitio. En Masbate se observaron movimientos oscilatorios de la misma dirección WNW-ESE y de intensidad V-VI. La isosisma V, tenía un radio de algo más de 150 kilómetros en la dirección NNE-SSW, comprendiendo Camarines y Albay y el N de Panay, mientras que se extendía bastante menos hacia el W y probablemente también hacia el E.

Repetió con intensidad III a 22^h 23^m 08^{s*} [5, 6^h 23^m 08^s], siguiéndose después otras repeticiones más débiles a 0^h 02^m [8^h 02^m], 5^h 15^m [13^h 15^m], 11^h 20^m [19^h 20^m] y 13^h 24^m [21^h 24^m]. Ninguna de estas repeticiones fué perceptible fuera de la región comprendida por la isosisma V del temblor principal, ni registrada por los sismógrafos del Observatorio de Manila a unos 300 kilómetros de distancia. El temblor ocurrido a 22^h 08^m 19^s registráronlo también los de Formosa, de la China y de Japón.

No existen datos que demuestren que esta región haya sido en los tiempos históricos el centro de grandes terremotos; los muchos y fuertes que frecuentemente se han sentido en las cercanías de Masbate, parece que solían originarse más bien al sur y norte de dicha isla, pero no al oeste, por manera que consideramos la actual serie como un fenómeno algo extraordinario y nuevo.

7, 16^h 48^m 32^{s*} [8, 0^h 48^m 32^s]. Laoag (NW de Luzón). Temblor de tierra de intensidad III-IV.

11, 13^h 40^m [11, 21^h 40^m]. Butúan (N de Mindanao). Temblor oscilatorio, dirección SE-NW, intensidad III.

¹ La intensidad de los terremotos se indica conforme a la conocida escala de Rossi-Forel. Cuanto a la hora de su ocurrencia, adoptamos la indicada por los sismógrafos de este Observatorio siempre que los hayan registrado, distinguiéndola por medio de un asterisco (*). En caso contrario copiamos la apuntada por los observadores que nos envían las notas. Todas las indicaciones del tiempo se refieren al tiempo medio de Greenwich (medianoche=0^h). Para conveniencia de los lectores de Filipinas se añade también el tiempo insular.

13, 17^h 33^m 37^s** [14, 1^h 33^m 37^s]. Nueva Cáceres. (SE de Luzón). Temblor oscilatorio, dirección NW-SE, intensidad III, duración 5 segundos.

14, 17^h 40^m [15, 1^h 40^m]. Cagayán (N de Mindanao). Temblor de tierra de intensidad IV.

15, 3^h 06^m [15, 11^h 06^m]. Butúan (N de Mindanao). Temblor oscilatorio, dirección NE-SW, intensidad IV, duración más de 20 segundos. Este temblor fué muy notado por una primera sacudida brusca, seguida de ondulaciones muy suaves, pero de larga duración, que dió tiempo para fijarse mucho en ella y en los movimientos de los objetos. Probablemente se sintió en todo el Valle del Agusan en las regiones del W de dicho Valle, puesto que fué muy suavemente perceptible en Cotabato, distante más de 200 kilómetros hacia el SW.

20, 4^h 03^m 38^s** [20, 12^h 03^m 38^s]. Dapitan (NW de Mindanao). Temblor oscilatorio dirección NE-SW, intensidad III-IV, duración 5 segundos. Este temblor probablemente se originó en el mar, al W de la Isla volcánica de Camiguín; fué muy ligeramente perceptible en Butúan y debió serlo también en toda la costa N de Mindanao y en la parte S de Negros, Cebú y Bohol.

21, 15^h 05^m 54^s** [21, 23^h 05^m 54^s]. Centro de Mindanao. Temblor de tierra de intensidad V-VI, cuyo epicentro comprendió la parte central y meridional del Valle del Agusan y los distritos y provincias de Cotabato, parte occidental de Dávao, Bukidnón, Lánao y parte sur de Misamis; su origen se hallaba probablemente en la parte NE del distrito de Cotabato. En esta población los movimientos y ruidos subterráneos que los acompañaban, despertaron y causaron gran temor a sus habitantes. Fué bien perceptible en un radio de más de 200 kilómetros y lo registraron casi todos los observatorios del Extremo Oriente.

27, 19^h 06^m 00^s** [28, 3^h 06^m 00^s]. SE de Luzón y Visayas. Temblor de tierra de intensidad IV-V; originado en la misma región al W de Masbate que los del día 4, y sentido como aquellos en el SE de Luzón, NW de Sámar y Leyte y N de Panay.

30, 7^h 48^m [30, 15^h 48^s]. Surigao (NE de Mindanao). Temblor de tierra de intensidad II-III.

31, 12^h 06^m 52^s** [31, 20^h 06^m 52^s]. NE de Mindanao. Temblor de tierra de intensidad IV, en la Provincia de Surigao, N de la del Agusan, y muy débilmente en la Isla de Leyte parte de Sámar. Su origen se hallaba sin duda hacia la parte más profunda del Abismo del Pacífico, no lejos de la pequeña Isla de Siargao.



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THE GOVERNMENT OF THE PHILIPPINE ISLANDS

WEATHER BUREAU

MANILA CENTRAL OBSERVATORY

BULLETIN FOR FEBRUARY, 1915

PREPARED UNDER THE DIRECTION OF

REV. JOSÉ ALGUÉ, S. J.

DIRECTOR OF THE WEATHER BUREAU

MANILA
BUREAU OF PRINTING
1915

BULLETIN FOR FEBRUARY, 1915.



METEOROLOGICAL BULLETIN FOR FEBRUARY, 1915.

By Rev. JOSÉ CORONAS, S. J.,
Chief, Meteorological Division of the Weather Bureau.

GENERAL WEATHER NOTES.

Pressure and temperature.—The mean atmospheric pressure for the month was slightly less than that of the preceding February in all the stations of the Philippines. In Manila it was 0.15 mm. greater than the normal for the month, and 0.78 mm. less than the monthly mean of February, 1914.

The mean monthly temperature was higher than that of the corresponding month last year, especially in Luzon. In Manila it was 1.5° C. higher than in February, 1914, but only 0.4° C. greater than the normal for the month.

The extreme temperatures recorded in Manila were 34.2° C. on the 26th, and 17.3° C. on the 4th. In Baguio they were 27.2° C., 11.6° C. on the top of Mirador, and 28.0° C., 10.3° C. in the valley.

PRESSURE AND TEMPERATURE AT THE FIRST AND SECOND CLASS STATIONS FOR FEBRUARY, 1915.

Station.	Pressure.						Temperature.					
	Mean.	Departure from Feb., 1914.	Highest mean.	Day.	Lowest mean.	Day.	Mean.	Departure from Feb., 1914.	Highest.	Day.	Lowest.	Day.
	mm.	mm.	mm.		mm.		°C.	°C.	°C.		°C.	
Tagbilaran	760.72	-0.56	761.58	19	759.27	12	25.4	+0.9?	34.4	13	17.6	9
Surigao	61.08	-.45	61.93	19	59.66	12	25.4	-.4	32.3	22	19.7	19
Cebu	61.11	-.46	61.86	15	59.77	12	26.6	+.6	32	27	22	3
Hilo	60.59	-.70	61.54	19	59.06	11	26.5	+1.1	32.5	4	20.5	4
Ormoc	61.26	-.47	62.13	15	59.81	11	25.5	+.4	33.8	13	16.4	8
Tacloban	61.33	-.74	62.30	15	59.92	11	25.7	+.3	33.6	13	18.6	7
Capiz	61.30	-.82	62.21	19	59.77	11	26.1	+1.3	33.3	13,23,25	19.2	4
Calbayog	61.46	-.66	62.48	15	60	11	24.9	+.5	34.8	24	17.7	21
Legaspi	61.47	-.78	62.56	15	59.95	11	26.4	+1	32.6	9	18.3	18
Atimonan	61.46	-1.06	62.74	15	60	11	26	+1.3	32.5	25	18	4
Ambulong, Tanauan	61.09	-.75	62.19	15	59.61	11	26.4	+1.3	34.2	8	17.5	4
Paracale	61.91	-.72	63.25	15	60.50	11	25.4	+1.2	30.8	24	18.8	4
Manila	61.48	-.78	62.58	15	60.03	11	25.7	+1.5	34.2	26	17.3	4
San Isidro	61.67	-.72	63.02	15	60.31	3	25.9	+.9	34.6	19	16.5	17
Dagupan	60.70	-.83	61.95	19	59.18	3	26.6	+.9	36.4	26	18.6	17
Bolinao	61.20	-.65	62.72	19	59.70	3	26.8	+1.5	36	25	18.9	10
Baguio ^a	638.30	-.15	639.35	15	637.02	3	17.5	+1.3	27.2	4	11.6	17
Vigan	761.06	-.89	762.67	19	759.57	3	26	+.9	32.5	25	19.2	20
Tuguegarao	61.80	-1.36	63.61	28	59.78	3	26	+2	37.1	24	16.1	10
Aparri	62	-1.22	64.06	28	59.69	3	24.8	+1.9	32	26	20.2	10,27

^a The barometric readings of this station are not reduced to sea level.

Rainfall.—The shortness of rain was very great during the month, throughout the whole of the Philippines, but especially so in the eastern part of Luzon and Mindanao, in Samar and Leyte. This is shown in the following table, where besides the monthly totals the respective normals are given. In 16 stations there was no rain at all; 6 in the Island of Luzon; 7 in the Visayas and Cuyo; and 3 in Mindanao. Baguio was one of the stations in which there was no rain. In Manila there was only 3.8 mm.

RAINFALL AT VARIOUS STATIONS OF THE WEATHER BUREAU DURING THE MONTH OF FEBRUARY, 1915.

Station.	Total.	Departure from Feb., 1914.	Departure from normal.	Rainy days.	Departure from Feb., 1914.	Greatest rainfall in a single day.	Day.	Station.	Total.	Departure from Feb., 1914.	Departure from normal.	Rainy days.	Departure from Feb., 1914.	Greatest rainfall in a single day.	Day.
	mm.	mm.	mm.		mm.	mm.			mm.	mm.	mm.		mm.	mm.	
Jolo	6.1	+ 5.6	- 79.9	1	0	6.1	3	Sumay, Guam	15.4	- 86.9	-----	6	- 5	8.9	18
Isabela, Basilan	1.3	+ 2.3	- 74.4	1	1	1.3	28	Calapan	30.5	- 44	-----	6	- 5	12.4	26
Zamboanga	1.3	- 2.3	- 48.1	1	0	1.3	28	Virac	14	+ 2	-----	6	- 1	6.9	11
Davao	0	- 21.5	- 121.9	0	2	0	0	Nueva Caceres	1.8	- 4	- 74.8	1	- 2	1.8	22
Cotabato	0	- 8.6	- 78.6	0	1	0	0	Batangas	0	- 21.6	-----	0	- 4	0	0
Cagayan, Misamis	0	-----	-----	0	0	0	0	Atimonan	.3	- 66.4	- 113.4	1	- 6	.3	12
Dapitan	3.3	- 3	- 104.8	3	2	12	7	Ambulong, Tanauan	0	-----	-----	0	-----	0	0
Butuan	3.7	- 42.9	- 200.6	4	6	2	17	Paracale	17	- 106.8	-----	2	- 3	6.6	11
Dumaguete	0	- 9.7	-----	0	3	0	0	Santa Cruz, Laguna	1.8	- 20.6	-----	2	- 3	1	25
Tagbilaran	0	-----	- 102.2	0	0	0	0	Manila	3.8	- 3.5	- 6.5	1	- 3	3.8	21
Iwahig	1.1	+ 1.1	-----	1	2	1	28	Antipolo	0	- 3	-----	0	- 1	0	0
Surigao	53.5	- 24.2	- 294.6	15	4	15.3	28	Iba	.3	+ 3	-----	1	+ 1	.3	23
Maasin	0	- 10.2	- 154.9	0	1	0	0	San Isidro	2.1	+ 1.5	- 2.8	2	0	1.8	22
Cebu	0	- 5	- 62.5	0	2	0	0	Tarlac	5.1	+ 4.8	- 3.4	1	0	5.1	22
Iloilo	0	0	- 24.9	0	1	0	0	Baler	151.22	- 88.4	+ 15.8	11	- 7	46.8	21
San Jose Buenavista	0	0	- 11.4	0	0	0	0	Dagupan	10.7	+ 10.7	- 6.4	1	+ 1	10.7	22
Cuyo	0	0	- 11.7	0	0	0	0	Bolinao	.3	- 71.8	- 8.4	1	- 3	.3	22
Ormoc	3.1	+ .6	- 83.6	2	1	1.8	28	Baguio	0	0	- 13.2	0	0	0	0
Guiuan	28.9	- 12.1	-----	11	+ 5	11.4	28	San Fernando, Union	22.4	+ 22.4	+ 15.7	1	+ 1	22.4	22
Tacloban	14	+ 1.9	- 174.7	9	+ 3	3.4	28	Echague	4.3	- 5.4	-----	2	- 4	3.8	21
Capiz	19.7	+ 17.8	- 73.3	5	+ 3	10.7	25	Candon	0	- 14	- 6.5	0	- 1	0	0
Borongan	34.8	- 37.6	- 343.9	12	+ 1	8.4	10	Vigan	0	0	- 1.6	0	0	0	0
Calbayog	23.5	+ 24.1	- 124.8	8	+ 6	7.4	10	Tuguegarao	2.3	+ 2.3	- 14.3	1	+ 1	2.3	21
Masbate	15.8	+ 9.4	- 119.8	6	+ 3	6.9	28	Laoag	2.3	+ 2.3	-----	1	+ 1	2.3	19
Romblon	18.8	- 40.3	- 43	6	+ 1	6.9	13	Aparri	7.6	- 64.5	- 80.3	6	- 7	2.4	28
Batag	36.6	+ 7.9	-----	5	+ 3	17.8	6	Santo Domingo, Batanes	76	- 83.4	- 40.8	7	- 6	26.7	13
Gubat	44.4	- 37.2	- 200.6	9	+ 2	14.2	28								
Legaspi	45.4	+ 2.8	- 217.9	9	+ 2	13	11								

DEPRESSIONS AND TYPHOONS.

This month, like last January, was free from any typhoon or depression of importance in the vicinity of the Philippines. There were, however, to the S and E of Japan, two cyclonic centers which apparently followed tracks similar to the one of the typhoon of January 6-8. In Plate I (January BULLETIN) these two tracks were given, the first, that of February 3-5, being copied almost exactly from the "Journal of the Meteorological Society of Japan" No. 4. To the first part of this track, corresponding to February 3, 6 a. m., to February 4, 6 a. m., we have been able to give only a probable value. The second track was traced according to our weather maps, and to the part corresponding to February 15 or 16 to February 19, 6 a. m., we can also give only a probable value.

According to these tracks, both typhoons appeared as depressions of little importance to the S of Meiacosima, but acquired greater development as they approached the SE coasts of Japan in their movement of translation to the NE.

NOTAS GENERALES DEL TIEMPO.

Presión y temperatura.—La presión atmosférica media de este mes es para todas las estaciones de Filipinas algo menor que la de Febrero del año pasado. La de Manila se diferencia en $+0.15$ mm. de la normal de este mes, y en -0.78 mm. de la media mensual del año anterior.

La temperatura media mensual es mayor que la del año anterior, especialmente en Luzón. La de Manila difiere de la de Febrero, 1914, en $+1.5^{\circ}$ C., aunque solamente se diferencia de la normal de este mes en $+0.4^{\circ}$ C.

Las temperaturas extremas registradas en Manila fueron 34.2° C. el día 26, y 17.3° C. el día 4. Las máximas y mínimas mensuales para Baguio fueron 27.2° C., 11.6° C. en la cumbre del Mirador, y 28.0° C., 10.3° C. en el valle.

Precipitación acuosa.—Es en verdad muy notable la falta de lluvia que se notó durante este mes en todo el Archipiélago, y muy particularmente en la parte oriental de Luzón y Mindanao, en Sámar y en Leyte. Para convencerse de esto bastará a nuestros lectores dar una simple ojeada a la tabla de lluvia mensual que acompaña el texto inglés, fijándose especialmente en las diferencias entre las sumas totales de este mes y las normales respectivas. A 16 asciende el número de estaciones en que no ha habido nada de lluvia en todo el mes: 6 en la Isla de Luzón; 7 en las Islas Visayas más la Isla de Cuyo; y 3 en Mindanao. Baguio es una de estas estaciones en que no ha llovido nada. En los pluviómetros de Manila solamente se han recogido 3.8 mm. de agua.

DEPRESIONES Y TIFONES.

Este mes lo mismo que el anterior se pasó sin haberse observado tifón o depresión alguna de importancia en las cercanías de Filipinas. Sin embargo, al S y E de Japón hubo dos centros ciclónicos que siguieron, al parecer, trayectorias muy semejantes a la del tifón de 6 a 8 de Enero próximo pasado. En la lámina I (BOLETÍN de Enero) incluimos estas trayectorias, la primera de las cuales correspondiente a los días 3-5 de Febrero está casi exactamente copiada del "Journal of the Meteorological Society of Japan No. 4." A la primera parte de esta trayectoria comprendida entre 6 a. m. del 3 y 6 a. m. del 4 no podemos darle más que un valor algo probable. La otra trayectoria está trazada según nuestros mapas del tiempo, y tampoco podemos dar más que como probable la parte comprendida entre el día 15 ó 16 y 6 a. m. del 19.

Según estas trayectorias, ambos tifones aparecieron como depresiones de poca importancia al S de Meiacosima y adquirieron gran desarrollo en cuanto se iban acercando a las costas del SE de Japón en su movimiento de traslación al NE.

METEOROLOGICAL DATA FOR MANILA CENTRAL OBSERVATORY.*

[$\phi=14^{\circ} 34' 41''$ N; $\lambda=120^{\circ} 58' 33''$ E; barometer above sea, 14.2 meters; gravity correction not applied, -1.72 mm.]

Day.	Pressure (mean).	Air temperature. ^b			Underground temperature.				Relative humidity (mean)	Vapor pressure (mean)	Radiation.		Evaporation. ^b			
		Mean.	Maximum.	Minimum.	0.25 meter.		0.50 meter.				1.50 meters.	2.50 meters.	Minimum on grass	Maximum in sun. Black bulb in vacuo.	Free exposure (total)	Shelter (total)
					8 a.m.	2 p.m.	8 a.m.	2 p.m.								
	mm.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	Per ct.	mm.	°C.	°C.	mm.	mm.	
1	761.98	25.7	33.5	19.5	25.8	28.1	27	27.4	27.7	72.6	17.2	16.8	53.2	5.6	4.2	
2	60.94	25.6	32.9	18.9	26.2	28.3	27.1	27.4	27.6	69.3	16.3	16.2	55	6	4.8	
3	60.28	25.1	32.9	18.8	26	28.2	27.3	27.6	27.6	67.8	15.5	15.9	55.8	6.3	5	
4	60.53	24.6	33.4	17.3	25.8	28.2	27.2	27.6	27.6	70.9	15.7	14.3	55	5.7	4.4	
5	61.31	25.3	32.6	19.1	26	27.5	27.3	27.7	27.5	72.2	16.8	16	55	5.8	4.2	
6	61.05	24.8	31.6	18.4	26.2	27.7	27.4	27.7	27.6	72.8	16.5	15.3	51.9	5.1	4	
7	60.80	25.8	33.4	19	26.2	28.5	27.5	27.8	27.6	69.4	16.6	16.1	54.2	6.7	5	
8	61.40	25.9	33.5	19.4	26.3	28.6	27.6	27.8	27.6	65.2	15.7	16.4	54.9	7.5	5.8	
9	61.61	26.2	33.7	19	26.2	28.6	27.5	27.8	27.5	66.6	16.2	16.2	53.6	7.8	6	
10	60.76	25.7	32.7	20.5	26.3	28.6	27.6	27.8	27.6	71.5	17.2	17.5	53.9	6.5	4.7	
11	60.03	26.6	33.7	21.3	26.5	28.6	27.6	27.8	27.5	71.7	18.2	18.3	57	6.6	4.8	
12	60.48	27.2	32.1	23.6	27	28.5	27.8	27.9	27.5	71.8	19.1	20.2	54	5.6	4.9	
13	60.49	26.6	33.4	21.2	26.8	28	27.8	27.8	27.6	69.7	17.7	18.5	46.2	6.4	4.7	
14	61.52	25.7	33.3	19.4	26.4	28.2	27.7	27.8	27.5	69.3	16.6	16.8	55	7.1	5.3	
15	62.58	25.9	33.7	18.5	26	28.6	27.6	27.8	27.5	61.9	14.6	15.1	55.6	8.7	6.5	
16	62.34	25.4	33.2	18.3	25.8	28.5	27.4	27.7	27.5	60.8	14	14.7	55	8.8	6.6	
17	61.81	24.7	32.2	17.5	25.8	27.8	27.4	27.7	27.5	63.9	14.4	14	54.1	6.8	5.1	
18	61.85	24.5	32.4	18.1	25.7	27.4	27.1	27.4	27.4	70	15.5	14.4	51	5.9	4.2	
19	62.44	25.3	31	19.7	25.7	27.6	27.1	27.4	27.6	74.2	17.6	16.5	50.7	5.9	4.1	
20	61.83	26.2	32.2	22.5	26.5	27.8	27	27.4	27.4	71.2	17.8	20.8	47.9	5.3	3.7	
21	62.21	25	29.8	22.4	26.7	27.5	27.5	27.6	27.6	82.2	19.4	19.7	47.9	1.4	1.8	
22	62.13	25.7	31	20.8	26.5	27.7	27.4	27.6	27.6	76.2	18.5	18.6	52.7	4.5	3.4	
23	62.18	26.5	33.4	20.9	26.5	28.3	27.4	27.7	27.6	68.9	17.2	18.6	57.5	6.3	4.9	
24	62.03	26.5	33.6	19.5	26.3	28.6	27.5	27.7	27.5	63.7	15.8	16.3	55.1	8.7	6.4	
25	62.10	25.3	32.6	19.4	26.3	27.7	27.5	27.6	27.5	68.2	16	16.2	55.4	5.2	4	
26	61.62	25.5	34.2	18	25.6	27.9	27.2	27.6	27.5	65.9	15.4	15.2	55	7.5	5.5	
27	61.34	25.9	32.6	19.5	26.3	28	27.4	27.6	27.4	69.9	17	16.4	53.4	6.5	4.7	
28	61.72	25.9	33.1	21.2	26.7	28.3	27.6	27.8	27.3	66.9	16.1	18	54.9	6.3	4.8	
Mean	761.48	25.7	32.8	19.7	26.2	28.1	27.4	27.7	27.5	69.5	16.6	16.8	53.6	6.3	4.8	
Total														176.5	133	
Departure from normal	+0.15	+0.4	+2	-0.5						-4.3	-0.9					

Day.	Wind.				Amount (mean).	Clouds.		Sunshine.	Rain, 24 hrs. beginning 6 a. m.		Miscellaneous.
	Prevailing direction.	Total movement.	Maximum hourly velocity.	Direction at the time of the maximum velocity.		Form and direction.			On the tower.	In the park.	
						Upper.	Lower.				
1	SE	141	12.5	ESE	3.5	Ci.	Cu.	E	9	55	
2	SE	142	14.5	SE	2.1	Ci.	Cu.	E	10	05	
3	SE	145	21	ESE	1.7		Cu.	E	10	15	
4	SE quad.	132	15.5	SW	.9		Cu.		10	10	
5	E quad.	151	16	SE by S	.3	Ci.	Cu.		9	40	
6	E quad.	130	15	WSW	.3		Cu.		9	45	
7	ESE	173	20	ESE	2.6		Cu.	E	10	20	
8	E quad.	191	19.5	SE	2.7		Cu.	E	10	20	
9	E	193.5	21	ESE	3.3	A.-Cu.	Cu.	E	10	10	
10	ESE	204	23.5	ESE	5.8	Ci.	Cu.	E	8	25	
11	SE	185.5	26	SE	5.8	Ci.	Cu.	E	6	15	
12	ESE	195	15	WNW	6.9	A.-Cu.	Cu.	E	5	25	
13	ESE	214.5	26.5	ESE	6.8	Ci.	Cu.	E	8	20	
14	ESE	212	27.5	SE	3	Ci.	Cu.	ENE	10	00	
15	E quad.	264.5	26	SE	.8	Ci.-S.	Cu.		10	25	
16	E quad.	225.5	25	SE, ESE	1.7		Cu.		10	25	
17	SE, WNW	187	20	W by N	2.2	Ci.	Cu.	E	9	55	
18	NE, SE	149	20.5	SE	3.2	Ci., A.-Cu.	Cu.	E	10	15	
19	SW quad.	179.5	20.5	SW	2.8	A.-Cu.	Cu.	E	10	00	
20	N, W	192.5	16.5	N	5.8	A.-Cu.	Cu.	ENE	7	20	
21	NE quad.	66	12	E	9.7	Ci.-S.	Cu.-N.	E	0	40	3.8 4.3 d° a. ● p.
22	Variable	134	18.5	NW	7.8	A.-Cu.	Cu.-N.	E	4	45	
23	E, ESE	147	18.5	E	8.2	A.-Cu.	Cu.	E	5	30	
24	E	233	27	SE	2.3	Ci.-S., Ci.	Cu.	ENE	10	50	
25	E	161	18.5	ESE	5.9	Ci.	Cu.	E	6	35	
26	SE	182	18	SE	2.4	Ci.	Cu.		10	35	
27	SE, W	173.5	19	WNW	4.1	A.-Cu.	Cu.	E	9	20	
28	E quad.	125	19	E	4.2	A.-Cu.	Cu.	ENE	6	45	
Mean		172.5	19.7		3.8				8	39	
Total		4,829							242	25	3.8 4.3
Departure from normal		-542.7			-1				+42	48	-6.5

* All the mean values given in this table are deduced from hourly observations.
 b These values are taken from instruments mounted in the Observatory Park, 1.5 meters above ground.

METEOROLOGICAL DATA FOR MIRADOR OBSERVATORY, BAGUIO.*

[$\phi=16^{\circ} 25' N$; $\lambda=120^{\circ} 36' E$; barometer above sea, 1,512.5 meters; gravity correction not applied, -1.65 mm.]

Day.	Pres- sure ^b (mean)	Air temperature at Mirador (on the top of the mountain).					Air temperature in the valley (near the city hall).					Rela- tive hu- midity (mean).	Vapor pres- sure (mean).	Radiation.		Evaporation.	
		Mean.	Maxi- mum.	Hour.	Mini- mum.	Hour.	Maxi- mum.	Hour.	Mini- mum.	Hour.	Mini- mum on grass.			Maxi- mum in sun. Black bulb in va- cuo. ^c	Free expo- sure (total)	Shel- ter (total)	
	mm.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	P.ct.	mm.	°C.	°C.	mm.	mm.	
1	638.89	17.2	24.2	0.55p.	13.7	7.00a.	23.7	1.15p.	12.8	5.00a.	86.8	12.6	12.6	50	3	1.4	
2	37.83	17.3	24.8	2.20p.	12	6.50a.	23.7	3.10p.	11.7	5.55a.	82.3	11.8	10.9	49.8	3.7	2	
3	37.02	18.2	24.8	10.30a.	13.4	4.45a.	26	10.50a.	12.6	6.30a.	71.7	10.9	12.6	46.3	8.1	3.7	
4	37.63	19.4	27.2	10.40a.	14.2?	1.10a.	27.8	11.40a.	11.2	3.15a.	52.5	8.5	11.6	49.7	8.7	3.8	
5	38.21	17.8	24.8	2.00p.	13.4	5.30a.	24.7	2.25p.	12.2	4.30a.	84.7	12.6	11.7	45.9	4	1.6	
6	37.91	17.7	23.8	1.00p.	13.7	6.40a.	23.7	2.05p.	13.1	6.55a.	84.5	12	11.9	47.3	4	1.6	
7	37.68	17.7	23.8	2.25p.	14	6.50a.	25	0.20p.	13.6	6.30a.	82.7	12.2	13.2	49.8	3.7	1.9	
8	38.39	17.6	24.3	11.00a.	13.2	6.45a.	25.2	11.30a.	11.9	6.50a.	80.5	11.8	11.6	50.3	3.8	1.8	
9	38.51	17.8	24.3	11.45a.	13.3	6.50a.	26.5	Noon	11.7	6.50a.	76.2	11.4	10.8	47.2	6.2	2.7	
10	37.72	18.2	25.8	11.05a.	12.8	5.55a.	27.7	11.55a.	11.5	3.45a.	75.3	11.1	9.5	46.8	6.6	3.4	
11	37.48	18.5	25.8	11.00a.	13.5	3.00a.	28	11.45a.	12.7	6.15a.	78	12.2	12.7	47	4.8	2.4	
12	37.88	18	23.2	11.50a.	14	5.00a.	24.3	10.50a.	12.7	7.00a.	85.2	12.8	12.7	45.8	2.7	1.4	
13	37.78	17.5	24.7	1.15p.	13.5	6.30a.	25.1	1.15p.	12.6	6.55a.	81.5	12	12.3	40	4.5	2.3	
14	38.50	17.3	24.4	11.00a.	13.2	5.00a.	25.3	11.10a.	12.5	6.50a.	80.7	11.6	12	46.4	3.8	1.7	
15	39.35	17.7	24.4	2.55p.	12.8	5.55a.	24.7	2.10p.	11.9	6.55a.	79.8	11.8	11.5	49	6	2.8	
16	38.86	17	23.6	2.20p.	13.2	3.10a.	23.7	0.55p.	10.3	6.25a.	71	10.3	11.7	48.2	5.1	2.3	
17	38.37	17	24.1	2.05p.	11.6	4.20a.	23.2	2.20p.	10.4	5.15a.	74	10.5	10	48.5	6.4	2.8	
18	38.27	16.5	22.7	1.50p.	12.5	6.40a.	23.6	0.45p.	10.5	6.40a.	79.3	11	9.3	47	5.6	2.6	
19	38.89	15.8	23.6	0.05p.	12.3	5.30a.	22.7	0.50p.	11.4	6.50a.	81.7	10.9	10.3	52.8	5.1	2.1	
20	38.41	17.1	22.2	0.25p.	13.2	6.30a.	22.8	0.25p.	11.6	3.10a.	76.5	10.8	10.7	45.7	3.8	1.7	
21	38.58	16.6	22.6	10.25a.	12.8	6.15a.	25	10.45a.	11.1	5.00a.	82.2	11.4	11.6	45	4	1.7	
22	38.76	16.9	23.4	0.10p.	14	6.40a.	25.4		13.2	7.20a.	83.2	11.9	12.9	46.8	4.1	2	
23	38.84	17.4	23	9.55a.	13.2	3.30a.	23.2	9.55a.	12.5	6.10a.	80	11.7	12.7	46	2.7	1.7	
24	38.77	18.1	24.2	2.50p.	13.9	6.30a.	24.8	11.35a.	13.2	6.50a.	69.3	10.5	13	47.5	7.1	3.3	
25	38.69	17.7	25.6	1.55p.	12.1	3.50a.	26.1	1.25p.	10.7	6.45a.	58.8	8.4	10.4	48.4	8.6	4.4	
26	38.42	17.9	24.8	1.45p.	12.8	6.00a.	24.8	2.05p.	10.3	4.30a.	56	8	10.4	47	8.4	4.2	
27	38.20	17.2	24.1	0.35p.	13	6.00a.	23.8	0.55p.	10.7	5.45a.	67	9.6	9.7	44.7	6.8	3.4	
28	38.43	17.2	24.1	10.20a.	13.6	7.20a.	23.2	11.35a.	12.7	7.05a.	70.2	10	12.7	44.5	5.3	2.4	
Mean	638.30	17.5	24.2		13.2		24.8		11.9		76.1	11.1	11.5	47.3	5.2	2.5	
Total															146.6	69.1	

Day.	Wind.				Amount		Clouds.		Sun- shine.	Rain, 24 hours begin- ning 6 a. m.	Miscellaneous.
	Prevailing direction. ^d	Total move- ment.	Maxi- mum hour- ly veloc- ity.	Direction at the time of the maximum velocity.	Upper.	Lower.	Form and direction.				
								0-10.			
1	SE, W	302.9	23.8	W	5.4	Ci.	SWbyW	Cu.	W	4 45	Ω a. ≡ p.
2	SE, W	278.2	24.7	W	2.7	Ci.	SW	Cu.	WNW	7 40	Ω ² ≡ a. ≡ p.
3	E	399.7	24.1	W	1.3	Ci.		Cu.	WSW	8 15	Ω a. ≡ p.
4	SE, W	336.8	24.7	W	1.6	Ci.		Cu.	WSW	8 20	Ω a. ≡ p.
5	W	267.6	26.6	W	3.6			Cu.	Variable	8 40	Ω ² Ω ² a. ≡ p.
6	SE	288.2	24.7	SW	2.9			Cu.	E	6 05	Ω a. ≡ p.
7	SE	381.8	26.4	W	2.9			Cu.	W	6 30	Ω a. ≡ p.
8	W, SE	286.4	24.7	W	3.4			Cu.	ESE	7 10	Ω a. ≡ p.
9	E quad.	270.2	23.8	W	1.9	Ci.		Cu.	WSW	9 10	Ω ² a. ≡ p.
10	SE	326.2	23.1	SW	1	Ci.		Cu.		8 30	Ω a. ≡ p.
11	E, SE	360.7	26.8	E	1.6	Ci.	S	Cu.		9 05	Ω a. ≡ p.
12	SE, W	281.8	22.8	W	5.3			Cu.		5 15	Ω a. ≡ p.
13	E, W	335.4	23.8	W	2.7	Ci.		Cu.	SSE	5 55	Ω a. ≡ p.
14	E	342.4	23.9	SW	3.4	Ci.		Cu.	E, ESE	7 05	Ω a. ≡ p.
15	W, E	376.3	24.7	W	2.6	Ci.		Cu.	E	8 10	Ω ² ≡ a. ≡ p.
16	E	370.3	26.6	W	1.4			Cu.	WNW	9 00	Ω a. ≡ p.
17	SE, W	392.3	27.7	W	2.7			Cu.	WSW	8 55	Ω ² ≡ a. ≡ p.
18	E, W	382.5	25.7	W	3.6			Cu.	WSW	8 25	Ω a. ≡ p.
19	W	303.1	28.2	SW	4.3			Cu.	N.-cf. w quad.	5 45	Ω a. ≡ p.
20	W, SE	257.3	25.7	W	4.4	Ci.		Cu.	SSW	5 50	Ω a. ≡ p.
21	E, W	276.8	22.7	SE	5.4	Ci.		Cu.	N.-cf. SW	3 20	Ω a. ≡ p.
22	E, SE	400.1	29	SE	5.9			Cu.	SW	4 20	Ω a. ≡ p.
23	E	355.8	24.9	SE	7.1	Ci.		Cu.-N.	S, SW	4 00	d ^o a. p. ≡ p.
24	E, W	364.9	28.4	W	2.3			Cu.	ESE	8 25	Ω a. ≡ p.
25	E	420.1	31.7	SW	2.1	Ci.		Cu.	SE	9 25	Ω p.
26	E quad.	306.1	31.6	W	.7	Ci.		Cu.	SW	9 55	Ω ² ≡ a. ≡ p.
27	W	286.9	32.2	W	4	Ci.		Cu.	SSE	8 00	Ω ² ≡ a. ≡ p.
28	E	355.3	23.8	W	6.4	A.-Cu.	SW	Cu.	W quad.	4 20	Ω ² ≡ a. p.
Mean		332.4	26		3.3					7 09	
Total		9,306.1								200 15	0

* All the mean values given in this table are deduced from six daily observations taken at 2, 6, 10 a. m. and 2, 6, 10 p. m.
^b The barometric readings of this station are not reduced to sea level.
^c Maximum of hourly observations taken from 6 a. m. to 6 p. m.
^d This element is based on hourly observations taken from a quadruple register, which gives only eight possible directions of the wind.

DAILY RAINFALL AT THE STATIONS OF THE WEATHER BUREAU, FEBRUARY, 1915.

Station.	Day of month.															
	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.
	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.
Jolo			6.1													
Isabela, Basilan																
Zamboanga																
Davao																
Cotabato																
Cagayan, Misamis																
Dapitan						.5	.8					2				
Butuan	.3				.3											
Dumaguete																
Tagbilaran																
Iwahig																
Surigao	2.3		3.3			.3			2			1	.5	4.1	1.5	.3
Maasin																
Cebu																
Iloilo																
San Jose Buenavista																
Cuyo																
Ormoc																
Guiuan			.8		2.3					1		.5		.5	.3	
Tacloban					2.7							.1		1.3	.8	
Capiz					1.3	5.9		.3			1.5					
Borongan					2.5					8.4	.8	1.8			.8	
Calbayog					2.8	2.5				7.4	.8					
Masbate					.5					.5			2.8			
Romblon											2		6.9	.5		
Batag					17.8				4.3							
Gubat						4.3			2.5	2	5.1	11.5		1		
Legaspi						7.1				7.4	13	.3				
Sumay, Guam	1.3									1.3		1.3				1.3
Calapan						3.6	8.4					.5				
Virac						1.8				2.5	6.9	.5				
Nueva Caceres																
Batangas																
Atimonan												.3				
Ambulong, Tanauan																
Paracale						.3			4.3	2	6.6					
Santa Cruz, Laguna																
Manila																
Antipolo																
Iba																
San Isidro																
Tarlac																
Baler										5.6		4.8	1.3	4.6?		
Dagupan																
Bolinao																
Baguio																
San Fernando, Union																
Echague																
Candon																
Vigan																
Tuguegarao																
Laoag						1.3										
Aparri						9.4	4									
Santo Domingo, Batanes				.7								2.3	26.7			

Daily rainfall at the stations of the Weather Bureau, February, 1915—Continued.

Station.	Day of month.												Total.
	17.	18.	19.	20.	21.	22.	23.	24.	25.	26.	27.	28.	
	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.
Jolo													6.1
Isabela, Basilan												1.3	1.3
Zamboanga												1.3	1.3
Davao													0
Cotabato													0
Cagayan, Misamis													0
Dapitan													3.3
Butuan												1.1	3.7
Dumaguete													0
Tagbilaran													0
Iwahig												1	1.1
Surigao			1.5					3.3	5.3	4.5	13.3	15.3	58.5
Maasin													0
Cebu													0
Iloilo													0
San Jose Buenavista													0
Cuyo													0
Ormoc											1.3	1.8	3.1
Guiuan				3.3				5	5.3		3	11.4	28.9
Tacloban					1.8			2	.3		1.6	3.4	14
Capiz									10.7				19.7
Borongan					.5	2.3	2		2.5	.8	4.3	8.1	34.8
Calbayog			.5				5.1		4.3		5.1		28.5
Masbate							1.8	3.3				6.9	15.8
Romblon					2.8			.5	6.1				18.8
Batag		5.1			5.3			4.1					36.6
Gubat					1.3	2.5						14.2	44.4
Legaspi					.5	3.3		5.6	.8			7.4	45.4
Sumay, Guam	1.3	8.9								1	12.4		15.4
Calapan						4.6							30.5
Virac			1.8								5		14
Nueva Caceres						1.8							1.8
Batangas													0
Atimonan													.3
Ambulong, Tanauan													0
Paracale				1.3			.5	1.5		.5			17
Santa Cruz, Laguna							.8						1.8
Manila				3.8					1				3.8
Antipolo													0
Iba								3					.3
San Isidro						1.8		3					2.1
Tarlac						5.1							5.1
Baler				37.1	46.8	26.9	10.7		1.5	10.9	1		151.22
Dagupan						10.7							10.7
Bolinao						.3							.3
Baguio													0
San Fernando, Union						22.4							22.4
Echague				3.8								.5	4.3
Candon													0
Vigan													0
Tuguegarao				2.3									2.3
Laosag			2.3										2.3
Aparri			.3	1.3		1					1.3	2.4	7.6
Santo Domingo, Batanes											20.3	12.6	76

MAXIMUM AND MINIMUM TEMPERATURES AT THE STATIONS OF THE WEATHER BUREAU, FEBRUARY, 1915.

Day.	Jolo.		Isabela, Basilan.		Zamboanga.		Davao.		Cotabato.		Cagayan, Misamis.		Dapitan.		Butuan.	
	Maxi-mum.	Mini-mum.	Maxi-mum.	Mini-mum.	Maxi-mum.	Mini-mum.	Maxi-mum.	Mini-mum.	Maxi-mum.	Mini-mum.	Maxi-mum.	Mini-mum.	Maxi-mum.	Mini-mum.	Maxi-mum.	Mini-mum.
	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.
1	32.8	20.6	31.6	21.6	29.5	23.3	32.2	21.5	32.7	21.7	31.5	22	31.7	24.5	28.6	22.2
2	31.4	21.9	32.1	21.5	30.4	23	33.5	21.5	31.3	22.6	31.5	21.1	31.9	23.5	29.7	21.3
3	31.5	21.4	33.6	21.1	29.4	22.1	31.7	18.2	30.8	19.8	29.7	19.2	31.9	20.5	27.8	20.1
4	30	21.8	31.8	20.3?	29.5	21.5	32.6	19.4	34.4	19.9	30.2	19.4	31.6	20.1	30.4	20.7
5	28.9	20	33.1	20.5?	31	21	32.7	19.4	30.4	20.7	29.8	20.2	32.4	20.6	29.6	20.8
6	29.4	20.5	33.6	21.8	30.8	21.6	30.7	20.5	33.6	21.3	30.6	20.7	32.5	21.8?	29.3	20.4
7	29.7	21	34.4	21.7	31.1	22.6	32.6	18.2	34.6	22.2	31.7	20.5	31.1	22.7	29.6	21.4
8	30.9	21.3	33.1	21.8	30.9	22.1	33.7	21.9	30.5	22.6	31.6	20	31.1	24.3	30.3	20.1
9	29.5	20.9	34.6	22.1	30	21.5	34.2	20.5	33.2	20.2	31	18.7	31	22.7	29.7	18.6
10	28.9	21	35.6	21.1	31	21.1	33.3	20.1	35.4	20.5	31.9	19	31.1	23.5	29.6	19.2
11	32.5	19.5	32	19.6	30.2	21	33.7	18	34.7	20.8	32.2	17.7	30.9	21.3	31	19.3
12	32	20.8	30.7	19.8	29.5	21.5	33.7	20.5	32.4	19.9	31.5	20.1	30.5	23	29.2	22.2
13	29	22.3	35	22.1	32.1	22.3	34.2	22.2	34	20.4	32.9	21.8	30.6	24	29.8	21.1
14	29.1	20.4	33.8	22.1	31.5	22.3	36.2	20.2	35.5	21.1	32.6	19.5	31.5	24	30	21.2
15	31.4	22.4	35	20.6	32	22.3	34.7	21	33.8	22.3	32.9	21	30.3	24.8	31.5	22.2
16	31.6	19.9	35	20.6	31.8	22	33.7	22	34.7	21	31	19.6	30.9	24	28	18.6
17	29.9	20	34.6	19.1	31.5	21.6	34.7	19	31.4	19.2	30.7	18.9	29.7	23.8	30.3	17.4
18	29.6	19.5	33.9	19.1	31.5	21.1	34.7	19	32.2	19.3	30.4	17.9	30.7	23.4	30	19.7
19	28.6	20.3	33.9	19.1	31	20.4	35.5	20.8	33.5	19.9	30.7	20	31.3	21.3?	29.6	18.2
20	28.4	19.4	33.6	18.5	30.2	19	34.5	20.9	33.7	21.3	31	19.1	31.3	21.9	30.1	21.6
21	29.6	19.4	34.6	19.5	31	20.8	34.2	20.8	35	21.6	31.5	19.6	30.5	21.8?	29.6	21.2
22	28.9	19.6	34.8	19.1	31	21.5	35	22.3	30.2	23.5	33.5	22.5	30.5	21.8	31.9	20.6
23	31.1	20.8	35.6	20.1	31.5	21.5	33	22.5	33.7	19.9	31.7	20.7	30.6	21.9	31	20.3
24	30.3	20.3	33.1	21.1	29.4	21.6	35.7	21.4	34.9	21.7	31.3	20.6	32	23.8	30.6	19.7
25	31	20.3	35.6	20.1	31	22	36.7	20.9	33.5	21.2	32.4	20.5	31.6	24.8	31	20.9
26	33.1	20.9	31	21.6	29.5	23.4	34.2	22.4	32.1	21.7	30.6	20.5	32	24.4	29.5	23
27	29.4	21.3	31.8	20.1	29.6	22	35.5	21.3	33.1	21.3	31	21.6	32.2	22.6	30.8	19.8
28	29.5	21.6	32.1	21.6	30.5	20.9	36.1	22.8	34	21.4	31	23.4	32.7	23.6	28.6	21.2
Mean	30.3	20.7	33.6	20.6	30.7	21.7	34	20.7	33.2	21	31.4	20.2	31.3	22.9	29.9	20.5

Day.	Dumaguete.		Tagbilaran.		Iwahig.		Surigao.		Maasin.		Cebu.		Iloilo.		San Jose Buenavista.	
	Maxi-mum.	Mini-mum.	Maxi-mum.	Mini-mum.	Maxi-mum.	Mini-mum.	Maxi-mum.	Mini-mum.	Maxi-mum.	Mini-mum.	Maxi-mum.	Mini-mum.	Maxi-mum.	Mini-mum.	Maxi-mum.	Mini-mum.
	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.
1	30.3	25.4	30.4	20.7	31.4	21.2	29.1	22.6	29.5	22.3	30.5	23.8	30.5	23	33.3	21.5
2	28.2	22.6	30.3	18.7	31.2	19.8	30.3	21	30.4	21.6	29.2	22.9	31.1	21.6	33.3	20.1
3	29.9	21	31.5	18.5	31.6	18.3	27.6	20	29.5	20.6	30.5	22	31.4	20.9	33.1	18.1
4	28.8	22.1	30.5	19.6	31.1	17.9	29.8	20.6	29.5	24	30	23.5	32.5	20.5	32.6	19.1
5	28.9	21.8	29.6	19.7	32.8	17.6	30	20	29	21.6	30.5	22.7	30.6	21.6	32.7	19.6
6	28.8	22.9	30.3	20.2	32	18.3	30.3	21.4	30.4	21.5	29.1	24	32	23.2	33.8	21
7	29.4	23.1	31.4	19.7	31.3	20.7	30.2	20.2	29.8	20.6	30	22.9	31	22.3	33.8	19.6
8	29.5	23.7	31.5	18.7	31.5	18.5	31.4	20.3	30	20.8	30	22.5	31.9	21.9	32.9	17.6
9	29.6	21.2	32	17.6	31.3	17.7	30.5	20.5	31.4	20.8	30	22.5	31.4	22	32.7	19
10	29.2	23	30.5	18.8	32	18.4	30.7	20.3	30	22.6	30.5	22.6	31.5	21.9	33.2	17.9
11	29.3	22.7	32.4	19.9	33.1	16.4	30.8	19.8	30.1	22.1	31.4	22.8	32	23.3	33.7	21.1
12	29.6	22.4	32.5	20.4	32.5	19.6	27.9	20.8	31	21.5	30	22.5	31.3	23	33.9	21.2
13	29.1	22.1?	34.4	21.9	32.6	20.5	29	23.8	31.4	22.5	31.2	23.5	31	23	34.7	21
14	29.1	24	33.9	20.6	32	20	29.8	22	30.2	22.2	29.4	23.2	30.9	22.8	-----	20.3
15	29.2	24	34.3	22.6	31.7	20.1	29.9	24.4	30	24	30	24.5	31	24	-----	24
16	30.2	24.3	33.5	21.5	31.2	19	28.4	21.7	31.5	22.2	30.6	23.4	31.1	23.1	-----	20.3
17	28.4	23.7	32.4	18.9	32.6	17.8	29.4	21.6	31	21.2	30.4	22.9	31	22.3	34.6	20
18	28.8	24.1	32.4	19	31.3	17.8	30.3	20.9	30.6	21.4	30.2	22.5	30.7	21.3	33.3	19.5
19	29.1	22.7	30.8	18.8	32.4	16.9	29.5	19.7	28.5	21.2	31.1	22.9	31.5	21.3	33.6	20
20	28.2	21.7	30.8	19.7	33	17	29.8	20.2	28.6	21	29.5	23.3	31.4	21.4	33.7	18.5
21	28.9	22.1	31.6	18.8	31.9	17.1	29.6	19.9	31.1	20.6	29.5	22.5	31.9	21.4	33.7	19.2
22	29.6	22.7	33.2	18.7	32.8	16.3	32.3	21	30.6	20.6	30.1	22.6	31.5	22.1	-----	20
23	30.3	21.6	32	19.7	31.7	17.6	30.8	20.8	31.1	21.4	30.8	23	31.1	22.6	34.7	19.8
24	30.7	21.2	32.4	18.5	32.1	17.5	30.2	20.3	31.7	22.4	30.2	23.2	31.5	23.3	-----	22
25	29.8	23.8	31.4	20.5	31.7	19.8	29.8	21.8	29.5	21.4	29.6	23.7	31	23.6	-----	21
26	28.6	22.3	32.4	21.2	32	18.7	29.6	21.8	30	22	30	23.5	31.1	23.5	34.2	20.6
27	28.8	22	31.5	19.5	32.5	18	29.3	21.2	29	21.4	32	23.2	31.1	23.4	33.7	21
28	28.8	22.9	32.4	21.6	32.9	18	28.3	22.1	30	21.8	29.5	24	30.9	23.6	34.4	20.5
Mean	29.3	22.8	31.9	19.8	32	18.4	29.8	21.1	30.2	21.7	30.2	23.1	31.3	22.4	33.6	20.1

Maximum and minimum temperatures at the stations of the Weather Bureau, February, 1915—Ctd.

Day.	Cuyo.		Ormoc.		Guiuan.		Tacloban.		Capiz.		Borongan.		Calbayog.		Masbate.	
	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.
	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.
1	30.4	25.5	31.7	19.5	30.3	24.2	31.6	22.1	32	22.5	30.6	22	34.4	20.5	32.4	23.6
2	31.4	24.7	31.2	18.4	30.9	24.3	30.8	20.4	31.9	21.6	30.8	20	30.3	19.4	31.6	23.5
3	30.3	21.1	30.3	16.5	31.1	20	32	20.5	31.5	20.5	31.9	18.2	29.7	17.9	32.4	22.4
4	31.4	20.3	31.1	19.5	30.8	20.5	30.8	21.5	31.8	19.2	31	19.2	30.6	19.5	32.2	22.6
5	30.4	21.2	31	16.8	30.3	19.7	29.9	20.2	31.7	19.9	30.1	19.2	31.6	19.8	32.4	23
6	30.5	25.1	32.1	20.7	30.2	22.3	30.3	20.4	29.8	23.5	30.6	21.4	28.9	19.8	31.8	23.8
7	31.8	23.7	32.6	17.6	30.7	22.5	30.7	18.6	31	20.8	31	18.7	31.3	18.6	32.5	
8	31.5	22.7	32.6	16.4	30.8	22.5	30.6	19	32	19.5	31.1	19.4	30.7	18.2	32.6	22.4
9	31	24.7	32.6	17.1	30.9	22.3	31.2	20.5	32.2	23	31.3	19.7	31	19.5	32.2	23.6
10	30.6	22.1	31.4	16.7	31	22.5	30.5	19.8	32	22.5	31	20	29.5	20.2	32	23.8
11	31	22.6	32.4	19.8	31.1	22.6	31.5	21.3	32.2	24.5	30.6	21.3	30.6	20.6	31.4	24
12	30.5	24.4	32.6	18.6	31.5	21.8	32.2	22	32.7	22.5	31.6	22	33.7	20.8	33.8	23.2
13	30.8	25.4	33.8	22.2	30.9	24.9	33.6	22.5	32.9	23	32.6	25.2	34.5	20.5	32.4	22.8
14	30.9	24.5	31.4	20.7	30.2	24.4	30.6	20.9	32.4	24.3	30.6	24.2	34.1	20	31.6	23.2
15	30.9	25.4	33.1	23.5	31.4	25.5	32.4	22.4	33.3	24.7	31.6	24.7	33.3	22.4	32.8	24.5
16	31.3	24.9	33.4	20.9	31	24.8	33	22.4	31.3	23	31.6	22.2	34.5	20.7	32.5	23.6
17	31.7	24.3	30.9	18.2	30.5	23.8	32.3	19.5	32.5	21.6	31	18.9	32.7	18.4	33.4	23.5
18	31.6	22.6	32.8	17.6	31.2	24.3	31.4	20	31.9	21.3	31.5	19.4	32.6	18.9	32.6	22.6
19	31	25.1	31.1	17.5	31.1	21.6	32.1	21	32.4	21.8	31.6	19.2	31.3	18.7	32.8	21.6
20	30.6	25.1	32.8	17.4	31.4	21.2	31.5	20.7	32.3	21.7	31.6	18.4	30.6	18.2	31.8	23.2
21	31.2	24.7	33.5	17.9	30.9	21.5	30.8	19.1	32.3	21.9	31.6	18.2	32.3	17.7	32	
22	31.4	24.4	32.8	19.5	31.7	22.6	31	20.6	32.3	22	30.9	20.5	30.6	19.5	30.6	24
23	31.8	25.1	33	18.3	31.7	24.3	31.4	21	33.3	23.3	32.1	20.5	29.9	19.6	33.5	24
24	30.2	25.4	31.7	19.6	31.4	23.5	32.2	21.5	33	24.2	31.6	20.4	34.8	21.8	33.8	23.2
25	31.6	25.4	30.4	21.5	31	24.8	32.5	21.5	33.3	24.5	32	24.3	34.1	22.2	33.5	22
26	32.3	24.4	31.4	20.8	30.8	24.7	32	22.5	32.3	23.2	31.1	22.8	32.2	20.6	34.2	23.5
27	32.2	24.9	31	18.9	31.5	24.3	31.5	20.9	31.8	23.1	32.1	22	31.4	21.9	34.4	23.4
28	31	25.8	31	21.8	30.9	22.5	30.5	22.2	31.8	23.6	30.9	21.9	30.3	21.7	34.4	
Mean	31.1	24.1	32	19.1	31	23	31.5	20.9	32.1	22.4	31.3	20.9	31.8	19.9	32.6	23.2

Day.	Romblon.		Batag.		Gubat.		Legaspi.		Sumay. Guam.		Calapan.		Virac.		Nueva Caceres.	
	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.
	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.
1	33.3	22.5	28.5	22.6	30.1	22.9	30.6	21.5	27.4	21.8	32.2	20	31	18.7	33.3	16.4
2	32	21.3	29	23	30.2	24.9	31.2	21.2	28.4	22.2	31.1	19.2	31.5	18.1	32.3	15.9
3	32.5	17.7	29	21.4	29.4	21.1	31.1	19.1	28.8	23.4	30.5	19	31.1	17.5	31.8	15.1
4	31.7	21.7	29	21.4	29.6	21.5	31.6	18.9	28.2	22.9	29.5	16.9	31.4	17.8	33	15
5	32.7	21.7	28.5	21.6	29.5	22.4	31.7	20.1	28.6	23.4	30	18.5	32.6	18	31.6	16
6	32.2	21.7	28.4	21.8	29.7	25.4	27.9	21	28.2	22.8	31	18.5	29	19.8	30.9	17.9
7	33.7	23.3	29	22	30	24.6	30.9	22.2	29	22.2	30	22	30.2	19	32.6	17.6?
8	31.6	21.2	29	21	29.9	21.8	31.6	20.4	28.2	22.2	30.6	20	32.5	18.9	32.6	15.8
9	33.7	21.2	29	21.6	30	25.4	32.6	24.1	28	23.4	31.5	20.5	31.8	18.8	32	16
10	33.2	23	28.8	22	29	25.4	30.6	24.1	28.2	23.4	31.1	21.1	32	19.5	31.1	17.6
11	32.9	24.3	29	22	29.5	22.9	29.9	22.9	27.4	22.8	31.8	21.4	31	20.3	31.6	20
12	33.1	24.1	29	21.6	29.5	25.4	31.2	22.2	28.4	22.8	31.1	22	31.7	20.8	31.1	21
13	31.7	22.9	29	22	29.5	25.4	31.8	24	29	23	32.3	22.3	32.1	21.5	34	19.6
14	32.7	23.8	29	23	30	24.9	31.4	23.5	29.2	23.4	32.1	21.9	32.6	18.2	32.5	14.9
15	32.6	22.8	29.9	23	30	24.6	32.4	23.4	29.6	24	31.7	21.3	32.8	22.3	33.6	15.9
16	33.6	23	29.5	23	30	24.9	31.6	23.8	28.8	23.2	31.6	21.2	33.5	21.5	31.5	15.8
17	33.1	22.3	30.4	22.6	30.8	28.2	32.2	20	29.6	23.4	31.6	22.1	32.7	19.8	32.8	15.7
18	32.7	21.7	29.5	22.2	30	20.5?	31.8	18.3	28.6	22.8	30.6	19.6	31	17.1	32	14.1
19	33.3	21	29.5	21.5	30	19.8	32.2	18.8	28.4	22.8	31.6	17.4	30	17	33.2	15.5
20	32.5	21.8	29.5	21.4	29.6	20.9	31.8	20.2	28.8	22.8	31.5	18.6	31.1	16.5	32.7	14.7
21	32.5	21.8	29.5	22	29.8	20.9	31.9	21.8	29	23.5	31.6	22	31.1	17.3	33.3	15.5
22	32.2	21.7	29	22	29.8	22.3	31.1	20.7	28	23	31.1	21	30.8	19	30.9	20.2
23	32.3	24.3	29.5	23.5	30.8	22.1	31.7	24.2	29.8	21.6	31.7	21.8	31.5	22.8	32.2	18.4
24	33.6	23	31	22.5	29.9	25	32.4	24.2	30.2	23.4	32	20.6	32.4	18.5	32.7	14.9
25	32.6	22.9	30	22.5	29.6	23.9	31.6	22.7	28.8	23.4	30.9	21	32.8	21.9	32.1	17.5
26	32.5	24.2	30	23.5	29.9	24.9	32.1	24.3	29.4	22.2	31.2	22	30.9	21.1?	32.9	17.1
27	33.3	22.7	29	23.4	29.6	23	32.5	24.3	30.4	23.4	31.2	20.8	30.4	19.2	32	17.4
28	33.6	22.5	31	22.4	30.6	24	29.6	23.3	29.8	22.6	31.6	20.5	29.8	19.3	29.6	19.8
Mean	32.8	22.6	29.3	22.2	29.8	23.1	31.4	22	28.8	22.9	31.2	20.5	31.4	19.3	32.2	16.8

Maximum and minimum temperatures at the stations of the Weather Bureau, February, 1915—Ctd.

Day.	Batangas.		Atimonan.		Ambulong, Tanauan.		Paracale.		Santa Cruz, Laguna.		Manila.		Antipolo.		Iba.	
	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.
1	32.5	20.7	29.5	21	33.8	20.1	30.5	21	31.6	20.2	33.5	19.5	34.1	19	31.4	18.6
2	32	20.2	30	20.5	32	19.5	29.7	21	32.1	20.5	32.9	18.9	33.3	18.3	30.7	18.6
3	32.3	20	29.3	19.6	33.2	19	29.1	19.9	31.6	19.6	32.9	18.8	33.1	18.3	31	17.5
4	32.5	16	29.9	18	32.3	17.5	29.5	18.8	31.7	15.6	33.4	17.3	33.6	17.8	30.8	17.9
5	34	18.7	28.9	19.2	32.8	19.5	29.4	19.5	31.1	18.5	32.6	19.1	33.8	18.2	30.7	19.1
6	33.4	17	28	19.4	34	19.5	29.8	20	31.2	17.8	31.6	18.4	33.8	18.4	31.3	19
7	31	21.5	29.8	21	31.6	19.4	30.1	22.2	31.8	19.7	33.4	19	33	19.9	31.7	18.7
8	33.8	21	30	20.2	34.2	20.8	30	22.3	32.3	21.1	33.5	19.4	34	19.3	31.7	17.8
9	33.3	21.8	30	22.5	33.2	22.5	29.4	22.5	31.7	19.6	33.7	19	33.8	19	32.2	16.7
10	33.3	21.8	30	24	34.1	21.1	29.6	22.9	31.9	21.3	32.7	20.5	32.5	19	31.4	17
11	34.5	22.6	30	22.9	33.3	22.5	30.1	22.2	32.3	22.4	33.7	21.3	34.5	21.8	33.6	18.8
12	34.4	24.2	31.4	22.6	33.4	24.3	30	23.4	32.1	23	32.1	23.6	32.7	22.3	32.2	19.5
13	34.9	22.4	31.5	23	33.2	22	30.2	23.2	31.7	22.2	33.4	21.2	34.1	20.7	32.8	19.2
14	33.3	21.2	31.6	22.3	34	20.7	30.4	23.3	31.1	21.1	33.3	19.4	32	19.7	32.1	18.4
15	34.8	20.2	31.3	22.4	32	22.5	30.1	20.3	31.6	19.3	33.7	18.5	35.3	20.2	32.4	16.1
16	34.3	20.8	30.7	24.9	31.3	21.9	30.4	21.5	30.8	19.6	33.2	18.3	34.3	19	31.5	15.5
17	33.4	20	29	20.6	33.2	19.6	30	21.3	31.8	17.8	32.2	17.5	33.8	19.9	31.5	15.5
18	32.8	19.8	29.4	20.6	32.1	18.8	30	19.9	31.1	19.7	32.4	18.1	34.2	19	30.9	16.5
19	32	17	29.9	19	33.2	18.4	30.3	19.5	31.6	18	31	19.7	32.6	19.3	31.3	17.5
20	33	20.2	30.2	20	32.3	21	30	19.4	31.7	21.6	32.2	22.5	32.8	21.3	31.6	16.9
21	32.9	20.6	30.6	23.3	31.8	23	30.2	19.9	32	21.2	29.8	22.4	30.4	21	31.4	19.3
22	33.8	21.6	30.3	22.4	32.8	21.9	30	22.5	31.1	22.5	31	20.8	32.7	20.8	31.9	22.8
23	33.5	23	30.6	23.5	32.2	22.3	30.5	24.8	32.4	22.4	33.4	20.9	33.1	20.4	34	19.9
24	35.3	23.3	30.7	22.1	34	21.8	30.8	21.3	31.6	22	33.6	19.5	34.5	20.2	35.2	18.4
25	33.4	21.3	32.5	25.4	32.5	22	30.3	23.2	30.7	20.5	32.6	19.4	31.5	20	34.5	18.3
26	34	23.2	30.3	25	33.2	21	30.3	22	31.7	20.2	34.2	18	34.5	19.2	33.5	17.7
27	34.2	21.2	31.4	21.5	34	20	30.6	21	32.3	21.6	32.6	19.5	35	20.7	32.2	17.3
28	33.8	21	30.9	25.2	33	21.9	30	22.3	31.3	21.6	33.1	21.2	34.5	20.8	34	17.5
Mean	33.4	20.8	30.3	21.9	33	20.9	30	21.4	31.6	20.4	32.8	19.7	33.5	19.8	32.1	18.1

Day.	San Isidro.		Tarlac.		Baler.		Dagupan.		Bolinao.		Baguio.		San Fernando, Union.		Echague.	
	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.
1	34	20.1	35.1	19.2	32.8	19.6	33.8	22.5	32.8	21.4	24.2	13.7	32	21.6	32.3	19.4
2	34	20.2	35.6	19.3	30.3	19.8	34	21.2	32.1	21	24.8	12	32.6	20.2	33.1	18.7
3	34.1	19.2	35.4	19	31	20.4	34.8	21.2	32	21.1	24.8	13.4	32.1	20.7	32.3	19
4	33.9	18.9	35.2	18	32.4	17.7	31.6	20.2	31.2	20.4	27.2	14.2	31.1	20.5	32.1	17.1
5	34	19.6	35.6	18.5	32.8	19.4	34	22.4	32	25.4	24.8	13.4	31.2	22.8	33.2	21.6
6	34.5	20.3	36	20	33.3	19.4	32.1	22.6	32.1	22.5	23.8	13.7	31	21.7	33	18.6
7	33.5	19.4	35.4	20.2	30	20.9	35.4	21.4	31.5	21.2	23.8	14	32.6	21.3	33.3	20.8
8	34	18.6	35.8	18.2	32.3	19.2	35.8	20.5	32.8	21.5	24.3	13.2	31.8	21.2	33.6	17.4
9	32.7	18.1	35.6	18.5	33.6	18.6	35.8	20.6	33	22.5	24.3	13.3	32.4	21	33.2	17.6
10	33.5	18.3	36.6	17.5	33	19	35.4	19.5	32.3	18.9	25.8	12.8	32	20	33.3	15.3
11	33.3	21.2	35.4	20.8	31.5	21.9	32.5	21.2	31.5	21	25.8	13.5	31.8	21.5	34.3	18.5
12	31.9	21	35.3	20.6	30.7	21	32.6	22	31.9	26	23.2	14	32.8	22.2	34.2	18.7?
13	34.2	19.8	35.6	20.2	31.8	21.4	33.8	21.4	34.1	22.3	24.7	13.5	32.7	22.5	33.9	21.4
14	31.7	20	35	19.2	27.1	21.8	34.3	21.4	33.4	22.9	24.4	13.2	31.3	21.2	31.8	20.7
15	33.9	17.2	36.7	18.1	32.4	18.9	34.3	21	33.1	21.4	24.4	12.8	32.8	20.6	33.7	18.7
16	33	17	35.7	18	32.6	19	34.3	20.3	32.9	21.9	23.6	13.2	31.8	21.6	33.6	18.7
17	33.9	16.5	35.8	16.2	31	17	32.8	18.6	32.5	21.4	24.1	11.6	31.9	21	33.6	16.8
18	33.5	18.5	35.8	17.5	32	18.2	34.3	20	32.1	25.4	22.7	12.5	32.7	19.5	33.7	17.7?
19	34.6	20.1	35.3	20	32.5	19	30.4	24.5	32	24.4	23.6	12.3	31.5	20.7	33.3	19.7
20	32.6	18.8	35.8	19	33.5	20.4	30.1	20.2	30.5	24.6	22.2	13.2	31.2	18.6	31.3	20
21	31	23	34.4	19	31.3	22.3	31.3	21	32.2	22.8	22.6	12.8	31.3	20	28.3	20.7
22	29.1	21.7	29.9	23	28	22.8	34.3	21.6	31.7	20.4	23.4	14	32.1	21.6	29.4	21
23	31.6	21.9	31.8	22.2	27	21.9	32.8	21.6	33.3	22.6	23	13.2	31.8	22.5	29.4	19.4
24	33.1	18.7	36	19.5	31.5	19.3	35.4	20.6	33.3	21.6	24.2	13.9	33	20.8	34.7	17.6
25	32.3	17.9	35.5	18.4	31.3	19.2	35.9	21.5	36	19.4	25.6	12.1	33.8	20.2	33.8	17.4
26	34	17.6	36.5	18	28.2	23.3	36.4	20	34.7	20.9	24.8	12.8	33.5	20.3	34.1	16.4
27	34.5	18.9	37.7	19.4	28.7	20.5	33	20.2	33.3	20.4	24.1	13	31.9	20	34.4	16.4
28	33.7	19.5	36.7	20.2	30.3	19.2	34.8	21.9	31.5	24.3	24.1	13.6	32	21.7	29	18.5
Mean	33.2	19.4	35.4	19.2	31.2	20	33.8	21.1	32.6	22.1	24.2	13.2	32.1	21	32.7	18.7

Maximum and minimum temperatures at the stations of the Weather Bureau, February, 1915—Ctd.

Day.	Candon.		Vigan.		Tuguegarao.		Laoag.		Aparri.		Santo Domingo, Batanes.	
	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.
	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.
1	30	22.4	30.2	22.3	34.4	21.6	32.5	19	28.1	22	28	21.8
2	30.1	20.9	30.9	20.8	34.3	21.1	33.4	19.5	30.7	21	28.3	20.4
3	30.4	21.5	31.1	20.3	34.5	20	33.8	19.4	31.4	20.6	29	20.3
4	30.5	23	30.3	22.9	33.1	19.3	33.3	20.7	29.1	20.7	29.8	22.7?
5	30.4	23.4	30.9	21.4	34.8	21.5	33.9	20	29.1	22.5	26.8	21.7
6	30	23.2	30.8	21.4	28.4	20.9	33.1	20.3	26.9	23.5	22.7	20
7	30.5	21.7	31	20.8	34.8	21.8	33.2	21.2	31.1	21.5	28	19.6
8	30.2	23.6	30.7	22.4	35.3	18.6	34.4	21.6	31.3	21.9	28.5	22.3
9	30.7	22.7	30.3	22.6	35.5	19.6	34.7	20.8	31	21.4	28.9	20.7
10	30.2	23	30.5	22.4	36.1	16.1	34.5	21	31.3	20.2	29.6	23.6
11	30.5	23.5	30.5	22.7	37	18.8	33.7	20.9	31.9	20.8	30	24.3
12	30.5	24	30.3	22.1	33.5	23.3	33.4	22.4	29.3	23.5	27.4	19.1
13	30.5	22.4	31.3	20.4	34	22.2	36.8	20.3	28.9	23.4	26.4	21
14	30	23.8	30.6	24.3	35.1	21.2	35.3	21.1	28.7	20.8	25.6	20.4
15	30.7	23.5	30.2	23.6	36	21.2	34.1	20	29.3	22.1	26.4	19.8
16	30.5	22.1	30.6	22	35.5	20.6	32	19.2	28.6	20.5	27.9	21.5
17	30	22	30.5	22.2	34.8	18.5	32.1	20.4	28.1	21.1	26.7	18.9
18	30.1	21.1	30.7	20.3	34.7	19.9	33.3	19.5	27.3	23.2	27.8	20.7
19	28.5	21.9	27.7	20.7	34.1	20.6	27.7	20.3	26.4	20.5	25.3	20.9
20	29	20	28.8	19.2	33	18.5	32.2	17.9	27	20.8	26	20.5
21	29.5	20.5	30.1	19.5	29.5	21.4	34.3	17.6	27.1	22.5	27.7	18.6
22	30	22.5	30	22.1	32	21	33.9	20.6	26.5	22	26.5	21.2
23	31.1	23.5	31.5	23.1	36.1	19.7	33.8	19.5	30.7	21.2	28.8	22.7
24	30.2	22.8	32.1	21.4	37.1	22.4	34.7	21.6	29.2	21.9	26.7	21.6
25	30.7	23	32.5	22.8	36	19.1	33.4	20.5	31.1	21	28.6	19.2
26	30.2	21.6	31.5	21.4	36.8	17.1	33	20.1	32	20.4	29.6	23
27	30.5	20.6	31	20.9	36	17.3	33.5	18.2	31.3	20.2	29.4	18.9
28	31.6	22.4	31.3	20.9	30.1	20.2	33.7	22	26.4	21.8	22.4	17.2
Mean	30.3	22.4	30.6	21.7	34.4	20.1	33.5	20.2	29.3	21.5	27.5	20.8

SEISMOLOGICAL BULLETIN FOR FEBRUARY, 1915.

By Rev. MIGUEL SADERRA MASÓ, S. J.,
Assistant Director of the Weather Bureau.

EARTHQUAKES FELT IN THE PHILIPPINES.¹

- 3, 2^h 20^m [3, 10^h 20^m]. **Butuan** (N Mindanao). Earthquake of intensity II-III.
- 11, 20^h 10^m [12, 4^h 10^m]. **Davao** (SE Mindanao). Earthquake of intensity III.
- 12, 1^h 30^m [12, 9^h 30^m]. **Cotabato** (SW Mindanao). Earthquake shock of intensity III, very short duration. It repeated with the same intensity at 15^h 37^m [23^h 37^m].
- 12, 16^h 39^m [13, 0^h 39^m]. **Central Mindanao**. Earthquake of intensity IV-V felt throughout the Provinces of Cotabato, Lanao, Bukidnon, Agusan and Davao. Its origin seems to have been in the NE part of Cotabato Province, in the same place where originated the preceding light shocks felt at Cotabato and some more strong recorded in January.
- 12, 22^h 45^m [13, 6^h 45^m]. **Butuan** (N Mindanao). Earthquake of intensity III.
- 13, 15^h 06^m [13, 23^h 06^m]. **Davao** (SE Mindanao). Earthquake shocks of intensity II-III. They repeated at 15^h 40^m [23^h 40^m].
- 13, 17^h 07^m 56^{s*} [14, 1^h 07^m 56^s]. **Laoag** (NW Luzon). Subsultory and oscillatory shocks of intensity III, duration 3 seconds.
- 14, 1^h 44^m 38^{s*} [14, 9^h 44^m 38^s]. **Batangas** (S Luzon). Oscillatory earthquake, direction SE-NW, intensity III, duration 4 seconds. Its origin was some 120 kilometers distant from Manila in the strait which separates Mindoro from the southern coast of Batangas Province.
- 18, 11^h 26^m [18, 19^h 26^m]. **Surigao** (NE Mindanao). Oscillatory earthquake, intensity IV, duration 5 seconds. Repeated with intensity II-III at 11^h 42^m [19^h 42^m].
- 19, 5^h 38^m 07^{s*} [19, 13^h 38^m 07^s]. **Eastern Luzon**. Earthquake of intensity IV, felt throughout the Oriental Cordillera of Luzon and in the Provinces of Laguna, Bulacan, Nueva Ecija, Tayabas, and Nueva Vizcaya. Its origin was probably in the Pacific, south of the Baler Bay.
- 19, 10^h 47^m 05^{s*} [19, 18^h 47^m 05^s]. **Borongan** (E Samar). Oscillatory earthquake, direction E-W, intensity IV, duration 6 seconds.
- 20, 4^h 34^m [20, 12^h 34^m]. **Ormoc** (W Leyte). Oscillatory earthquake, direction NW-SE, intensity II-III.
- 20, 15^h 41^m 48^{s*} [20, 23^h 41^m 48^s]. **Eastern Mindanao**. Earthquake felt in the eastern coasts and oriental part of Mindanao, from the Davao Gulf to the northern part of the Agusan Valley. Probably it originated in the southern part of the Great Deep in the Pacific.
- 22, 6^h 37^m [22, 14^h 37^m]. **NE Mindanao**. Oscillatory earthquake, direction E-W, intensity III-IV, duration 3 seconds. It was perceptible throughout the Province of Surigao and northern part of the Agusan Valley. Its origin was in the Pacific near the coast.

¹The intensity of earthquakes is given in the notation known as the Rossi-Forel scale. The time is that indicated by the seismographs at the Central Observatory whenever the disturbance has been registered by them. This fact is denoted by an asterisk (*). Otherwise the time is that noted by the observer who sent the report. All time indications are in Greenwich mean time (midnight=0^h), In-sular time being added in brackets for the convenience of Philippine readers.

RECORDS OF THE MICROSEISMOGRAPH.

[Time: Greenwich mean. Midnight=0h. Instrument: Wiechert seismograph; 1,000 kilograms. A_N : $T_0=9.0$, $\epsilon=3.31$, $\frac{r}{T_0^2}=0.039$;
 A_E : $T_0=6.2$, $\epsilon=2.58$, $\frac{r}{T_0^2}=0.032$. Alluvium. 2.40 meters above sea level.]

No.	Date.	Character.	Phase.	Hour.	Period.	Amplitude.		Remarks.
						A_N μ	A_E μ	
28	3	Iv	eP	h. m. s.				
			L	2 58 22				
			F	58 32				
				3 02				
29	4	Iv	eP	5 50 53				
			L	51 11				
			F	54				
30	4	Iv	eP	19 27 00				
			L	28 51				
			F	35				
31	5	Iv	eP	14 21 00				
			F	25				
32	10	Iv	eP	18 57 33				
			F	19 00				
33	13	Iv	eP	17 07 56				
			L	08 40				
			F	13				
34	14	IIv	eP	1 44 38				
			L	44 50				
			M _N	45 53	6	195		
			M _E	45 54	5	292		
			F	2 02				
35	15	I	e	12 43				
			F	13 02				
36	19	IIv	eP	5 38 07				
			L	38 28				
			M _E	38 43	2	197		
			M _N	38 44	1	127		
			F	54				
37	19	Iv	eP	9 37 35				
			F	42				
38	19	Iv	eP	10 47 05				
			L	48 10				
			F	52				
39	19	Iv	eP	13 44 00				
			F	47				
40	20	Iv	eP	15 41 48				
			L	43 30				
			F	51				
41	21	Iv	eP	0 49 27				
			L	49 46				
			M _N	49 49	1	45		
			F	53				
42	21	Iv	eP	7 22 19				
			L	22 39				
			M _E	22 42	1	49		
			F	27				
43	25	Ir	eP	20 46 14				
			M _E	55 04				
44	25	Iv	eP	21 01 51				
			F	19				
45	26	I	e	3 04 10				
			F	39				
46	28	IIv	eP	19 01 22				
			iS	03 00				
			eL	04 28				
			M _N	06 22	11	393		
			M _E	07 25	13	245		
			F	20 31				

TEMBLORES DE TIERRA SENTIDOS EN FILIPINAS.¹

3, 2^h 20^m [3, 10^h 20^m]. Butúan (N de Mindanao). Temblor de tierra de intensidad II-III.

11, 20^h 10^m [12, 4^h 10^m]. Dávao (SE de Mindanao). Temblor de tierra de intensidad III.

12, 1^h 30^m [12, 9^h 30^m]. Cotabato (SW de Mindanao). Temblor de tierra susultorio, de intensidad III, duración muy corta. Repitió con la misma intensidad a 15^h 37^m [23^h 37^m].

12, 16^h 39^m [13, 0^h 39^m]. Centro de Mindanao. Temblor de tierra de intensidad IV-V sentido en las Provincias de Cotabato, Lánao, Bukidnón, Agusan y Dávao: Su origen parece se hallaba en la parte NE de la Provincia de Cotabato, en el mismo centro donde se originaron los precedentes temblorcitos de Cotabato y algunos de mayor intensidad del mes de Enero.

12, 22^h 45^m [13, 6^h 45^m]. Butúan (N de Mindanao). Temblor de tierra de intensidad III.

13, 15^h 06^m [13, 23^h 06^m]. Dávao (SE de Mindanao). Temblor de tierra de intensidad II-III. Repitió a 15^h 40^m [23^h 40^m] con la misma intensidad.

13, 17^h 07^m 56^{s*} [14, 1^h 07^m 56^s]. Laoag (NW de Luzón). Temblor oscilatorio y susultorio, intensidad III, duración 3 segundos.

14, 1^h 44^m 38^{s*} [14, 9^h 44^m 38^s]. Batangas (S de Luzón). Temblor oscilatorio, dirección SE-NW, intensidad III, duración 4 segundos. El origen se hallaba a unos 120 kilómetros de Manila, hacia el estrecho que separa Mindoro de la costa meridional de Batangas.

18, 11^h 26^m [18, 19^h 26^m]. Surigao (NE de Mindanao). Temblor de tierra oscilatorio, intensidad IV, duración 5 segundos. Repitió con intensidad II-III a 11^h 42^m [19^h 42^m].

19, 5^h 38^m 07^{s*} [19, 13^h 38^m 07^s]. E de Luzón. Temblor de tierra de intensidad IV sentido en la cordillera oriental de Luzón y en las Provincias de Laguna, Bulacán, Nueva Écija, Tayabas y Nueva Vizcaya. Su origen se hallaba probablemente en el Mar Pacífico, al S de la Bahía de Baler.

19, 10^h 47^m 05^{s*} [19, 18^h 47^m 05^s]. Borongan (E de Sámar). Temblor oscilatorio, dirección E-W, intensidad IV, duración 6 segundos.

20, 4^h 34^m [20, 12^h 34^m]. Ormoc (W de Leyte). Temblor oscilatorio, dirección NW-SE, intensidad II-III.

20, 15^h 41^m 48^{s*} [20, 23^h 41^m 48^s]. E de Mindanao. Temblor de tierra de intensidad IV sentido en las costas y parte oriental de Mindanao, desde el Golfo de Dávao hasta la parte norte del Valle del Agusan. Probablemente se originó en la parte sur del Grande Abismo del Pacífico.

22, 6^h 37^m [22, 14^h 37^m]. NE de Mindanao. Temblor oscilatorio, dirección E-W, intensidad III-IV, duración 3 segundos. Fué perceptible en toda la Provincia de Surigao y N del Valle del Agusan: su origen se hallaba cerca de la costa en el Mar Pacífico.

¹ La intensidad de los terremotos se indica conforme a la conocida escala de Rossi-Forel. Cuanto a la hora de su ocurrencia, adoptamos la indicada por los sismógrafos de este Observatorio siempre que los hayan registrado, distinguiéndola por medio de un asterisco (*). En caso contrario copiamos la apuntada por los observadores que nos envían las notas. Todas las indicaciones del tiempo se refieren al tiempo medio de Greenwich (medianoche = 0^h). Para conveniencia de los lectores de Filipinas se añade también el tiempo insular.



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THE GOVERNMENT OF THE PHILIPPINE ISLANDS

WEATHER BUREAU

MANILA CENTRAL OBSERVATORY

BULLETIN FOR MARCH, 1915

PREPARED UNDER THE DIRECTION OF

REV. JOSÉ ALGUÉ, S. J.

DIRECTOR OF THE WEATHER BUREAU

MANILA
BUREAU OF PRINTING
1915

BULLETIN FOR MARCH, 1915.

METEOROLOGICAL BULLETIN FOR MARCH, 1915.

By Rev. JOSÉ CORONAS, S. J.,
Chief, Meteorological Division of the Weather Bureau.

GENERAL WEATHER NOTES.

Pressure and temperature.—The mean atmospheric pressure of the month was greater than that of the preceding March in all the stations of the Philippines. In Manila it was greater than the March normal by 1.36 mm. The highest pressures were recorded on the 4th, 15th, and 19th; the lowest on the 12th and 26th.

The mean monthly temperature differed but slightly from that of last year; in the Visayas and in the central and south of Luzon is was a trifle higher than that of last year and in the N of Luzon, a little less. In Manila the extreme temperatures were 36.4° C. on the 31st and 18.9° C. on the 7th; in Baguio they were 26.4° C., 12.9° C. on the top of Mirador, and 26.9° C., 11.8° C. in the valley.

PRESSURE AND TEMPERATURE AT THE FIRST AND SECOND CLASS STATIONS FOR MARCH, 1915.

Station.	Pressure.						Temperature.					
	Mean.	Departure from March, 1914.	Highest mean.	Day.	Lowest mean.	Day.	Mean.	Departure from March, 1914.	Highest.	Day.	Lowest.	Day.
	mm.	mm.	mm.		mm.		°C.	°C.	°C.		°C.	
Tagbilaran	761.29		762.52	4	760.16	26	26.4		33.4	16	19.6	12
Surigao	61.73	+ 1.51	63.07	4	60.44	26	26	- 0.1	32	23	20.3	13, 15
Cebu	61.61	+ 1.41	62.98	4	60.39	26	27.4	+ .1	32.6	24	22.5	12
Iloilo	60.99	+ 1.17	62.22	19	59.92	12	27.9	+ .7	34.4	14	22.3	13
Ormoc	61.66	+ 1.27	62.93	4	60.49	26	26.7	+ .4	35.2	8	18	15
Tacloban	61.91	+ 1.23	63.25	4	60.81	26	26.4	0	33	24, 25, 27	19.5	6
Capiz	61.74	+ 1.02	62.88	4	60.54	12	27.4	+ .9	34.5	24	22	13
Calbayog	62.01	+ 1.29	63.26	4	60.72	26	25.8	+ .1	35.6	28	19.7	1
Legaspi	61.90	+ 1.05	63.40	4	60.44	12	27.3	+ .3	33.6	31	21.2	13
Atimonan	61.87	+ .70	63.04	4	60.29	12	26.8	+ .3	33.8	13	20.3	14
Ambulong, Tanauan	61.64	+ 1.23	62.72	15	60.32	12	27.2	+ .2	36.6	10	20.4	7
Paracale	62.42	+ 1.07	63.61	9	60.52	12	26.3	+ .4	32.9	14	21.4	7
Manila	61.92	+ 1.15	63.06	19	60.39	12	26.8	+ .3	36.4	31	18.9	7
San Isidro	62.08	+ 1.22	63.22	4, 19	60.42	12	27.5	0	37	31	18.6	7
Dagupan	61.10	+ 1.11	62.60	19	59.45	12	27.6	0	37.8	30, 31	19.6	6
Bolinao	61.58	+ 1.22	63.20	19	59.87	12	27.5	+ .6	35.3	27, 28	20.4	1
Baguio ^a	638.88	+ .88	640.12	4	637.49	12	18.1	- .1	26.4	29, 31	12.9	1
Vigan	761.50	+ 1.03	762.99	10	759.74	12	26.6	- .2	34.1	15	19.7	20
Tuguegarao	62.52	+ 1.37	64.67	15	59.80	12	26.5	- .8	38.5	4, 5	18	2, 6
Aparri	62.88	+ 1.61	65.25	15	59.73	12	24.6	- .9	33.3	12	19.6	2

^a The barometric readings of this station are not reduced to sea level.

Rainfall.—Speaking in general concerning the whole of the Archipelago, we may say that the drought spoken of in last month's BULLETIN continued during this month, though not with same intensity. In the following table may be seen the differences between the rainfall of the month and the normal for each station. The differences for the stations of the E and N of Mindanao, and for the Province of Albay in the SE of Luzon are specially noteworthy. There was no rain at all in the stations of Dapitan and Cagayan de Misamis, in the N of Mindanao, Iba and Candon on the western coast of Luzon, and Cuyo. In Manila there was only 3.3 mm. of rain, and in Baguio but 5.1 mm., quantities which are 14.6 mm. and 29.7 mm. less than their normals.

RAINFALL AT VARIOUS STATIONS OF THE WEATHER BUREAU DURING THE MONTH OF MARCH, 1915.

Station.	Total.	Departure from March, 1914.		Departure from normal.	Rainy days.	Departure from March, 1914.		Greatest rainfall in a single day.	Day.	Station.	Total.	Departure from March, 1914.		Departure from normal.	Rainy days.	Departure from March, 1914.		Greatest rainfall in a single day.	Day.
		mm.	mm.			mm.	mm.					mm.	mm.			mm.	mm.		
Jolo	92.9	+ 67.1	+ 21.1	9	+ 5	35	10	35	10	Sumay, Guam	24	- 14.5		9	0	6.3	9		
Isabela, Basilan	3.1	- 11.9	- 47.6	5	+ 3	8.1	28	8.1	28	Calapan ^c	22.9			16	+ 3	19	16		
Zamboanga	13.7	- 13.1	- 12.2	5	+ 1	24.1	31	24.1	31	Virac	65.9	- 73.2		3	+ 2	2.8	27		
Davao	72.6	- 103.2	- 73.9	6	- 2	9.9?	21	9.9?	21	Nueva Caceres	36.3	- 24.2	- 21.7	7	0	17.9	15		
Cotabato ^a	24.9		- 40.1?			0	0	0	0	Batangas	3.9	+ 3.6		9	+ 2	17.3	27		
Cagayan, Misamis	0			0		0	0	0	0	Atimonan	69.5	+ 45	- 6.8	9	+ 2	17.3	27		
Dapitan	0	- 18.8	- 51.6	0	- 12	4.3?	7	4.3?	7	Ambulong, Tana-uan	5.4	+ 3.3		3	+ 2	2.8	1		
Butuan ^b	13.7		- 121.5?			1.3	19	1.3	19	Paracale	89	+ 9.3		14	+ 4	20.6	16		
Dumaguete	2.1	- 11.2		2	- 3	14.6	18	14.6	18	Santa Cruz, Laguna	27.2	+ 22.7		9	+ 4	13.7	14		
Tagbilaran	3.6		- 62.9	1	+ 1	7.1	28	7.1	28	Manila	3.3	- 2.8	- 14.6	4	+ 2	2.4	20		
Iwahig	14.6	+ 14.6		1	+ 1	26.6	30	26.6	30	Antipolo	15.6	+ 14.6		4	+ 3	9.1	14		
Surigao	87.1	- 153.5	- 162.9	16	- 6	0	0	0	0	Iba	0	- 5.3		0	1	0	0		
Maasin	7.1	- 48	- 78.5	1	- 3	3	28	3	28	San Isidro	5.9	+ 4.9	- 6.3	3	+ 2	5.1	25		
Cebu	8.3	- 21.4	- 42.7	5	- 5	1.6	29	1.6	29	Tarlac	1.8	- 8.9	- 19.3	2	0	1	21		
Iloilo	1.6	- 18.2	- 26.2	1	- 2	0	0	0	0	Dagupan	35.1	+ 27.3	+ 6.2	3	+ 1	34.3	16		
San Jose Buenavista	.3	- 4.3	- 15.7	1	0	0	0	0	0	Bolinao	1.4	- 12.8	- 11.5	3	+ 1	.8	16		
Cuyo	0	0	- 1.4	0	0	11	30	11	30	Baguio	5.1	- 10.4	- 29.7	1	- 4	5.1	26		
Ormoc	18.8	- 27.6	- 53	6	- 5	33.3	30	33.3	30	San Fernando, Union	2.5	- 2.8	- 5.2	1	0	2.5	19		
Guiuan	115.6	- 103.3		19	- 2	23.1	28	23.1	28	Echague	8.1	+ 5.2		3	- 1	3.3	26		
Tacloban	108	- 2.7	- 8.4	12	- 8	40.9	9	40.9	9	Candon	0	0	- 9.7	0	0	0	0		
Capiz	7.1	- 13.7	- 15.1	2	- 6	23.9	30	23.9	30	Vigan	5.3	+ 5.3	+ 1.8	1	+ 1	5.3	17		
Borongan	211.8	- 4.6	- 5.2	19	- 4	3	9	3	9	Tuguegarao	2.3	+ 2.3	- 25.2	3	+ 3	1	29		
Calbayog	45.1	- 137.2	- 59.6	11	- 7	15.7	15	15.7	15	Laog	13.5	+ 13.5		2	+ 2	12.7	13		
Masbate	7.1	- 47.2	- 38.8	5	- 3	7.6	3, 18	7.6	3, 18	Aparri	75.5	+ 50.9	+ 23.3	11	+ 6	28.4	13		
Romblon	30.8	- 19.7	- 16.7	7	- 3	52.8	4	52.8	4	Santo Domingo, Batanes	85.9	- 77.2	- 34.4	15	+ 8	21.6	13		
Batag	33.8	- 117.1		8	- 3	19.3	17	19.3	17										
Gubat	132.2	- 3.1	- 25.4	15	+ 5														
Legaspi	55.3	- 64.1	- 105.4	12	+ 1														

^a 26 days of observation.^b 25 days of observation.^c 16 days of observation.

DEPRESSIONS AND TYPHOONS.

The neighborhood of the Philippines was free from depressions and typhoons during the month; and even at a distance from the Philippines in the Pacific there were only two depressions or low-pressure areas of very little importance. Both of these formed to the S of the Loochoos, whence they traveled to the NE; the first on the 17th, and the second 24th-26th.

NOTAS GENERALES DEL TIEMPO.

Presión y temperatura.—La presión atmosférica media de este mes es mayor que la del año anterior en todas las estaciones de Filipinas. La de Manila difiere de la normal de Marzo en +1.36 mm. Las presiones más altas ocurrieron los días 4, 15 y 19; y las más bajas los días 12 y 26.

La temperatura media mensual no se diferencia mucho de la del año anterior, siendo ligeramente mayor en Visayas y en el centro y sur de Luzón, y ligeramente menor en el norte de Luzón. Las temperaturas extremas en Manila fueron 36.4° C. el día 31, y 18.9° C. el día 7. Las máximas y mínimas absolutas de Baguio fueron 26.4° C., 12.9° C. para la cumbre del Mirador, y 26.9° C., 11.8° C. para el valle.

Precipitación acuosa.—Hablando en general de todo el Archipiélago, ha continuado este mes, aunque no de una manera tan notable, la falta de lluvia de que se habló en el BOLETÍN del mes pasado. En la tabla de lluvia mensual que acompaña el texto inglés pueden verse las diferencias entre la lluvia recogida durante todo este mes y la normal respectiva de cada estación. Llamamos especialmente la atención las diferencias correspondientes a la parte este y norte de Mindanao y a la Provincia de Albay en el sudeste de Luzón. No llovió en todo el mes en las estaciones de Dapitan y Cagayán de Misamis, en el norte de Mindanao, Iba y Candón, en la costa occidental de Luzón, y Cuyo. En Manila solamente se recogieron este mes 3.3 mm. de agua, y en Baguio 5.1 mm.; cantidades que difieren de sus normales respectivas en -14.6 mm. y -29.7 mm.

DEPRESIONES Y TIFONES.

No hubo durante este mes depresión ni tifón alguno en las cercanías de Filipinas. Y aun lejos de Filipinas en el Pacífico solamente hubo dos depresiones o áreas de baja presión de muy poca importancia. Ambas se formaron al sur de las islas Loochoos desde donde se dirigieron al NE. La primera ocurrió el 17, y la segunda del 24 al 26.

METEOROLOGICAL DATA FOR MANILA CENTRAL OBSERVATORY.*

[$\phi=14^{\circ} 34' 41''$ N; $\lambda=120^{\circ} 58' 33''$ E; barometer above sea, 14.2 meters; gravity correction not applied, -1.72 mm.]

Day.	Pressure (mean).	Air temperature. b			Underground temperature.				Relative humidity (mean).	Vapor pressure (mean).	Radiation.		Evaporation. b			
		Mean.	Maximum.	Minimum.	0.25 meter.		0.50 meter.				1.50 meters.	2.50 meters.	Minimum on grass.	Maximum in sun. Black bulb in vacuo.	Free exposure (total).	Shelter (total).
					8 a.m.	2 p.m.	8 a.m.	2 p.m.			8 a.m.	8 a.m.				
1	762.34	24.9	29.9	21.6	26.7	27.8	27.6	27.7	27.4	27.4	76.9	17.9	19.1	47.9	3.2	2.7
2	62.68	25.7	32.9	20.5	26.2	27.8	27.5	27.6	27.5	27.6	69.7	16.6	17.5	57	6.2	4.6
3	62.48	26	33.5	20.2	26.2	28.1	27.4	27.5	27.5	27.5	66.5	16	16.8	53	6.4	5.1
4	62.96	27.1	34.9	21	26.4	28.8	27.2	27.7	27.4	27.5	65.8	16.9	17.6	55.7	7.2	5.1
5	62.82	26.4	34.1	20.5	26.6	29.1	27.6	27.9	27.5	27.5	66.2	16.5	17.6	55.4	8.1	5.7
6	61.98	26.3	34.5	20	26.8	28.7	27.7	27.9	27.5	27.5	64.8	16.1	17	54.5	6.8	5.1
7	61.80	26.5	33.7	18.9	26.5	28.6	27.8	27.9	27.5	27.5	69.5	17.4	15.5	53.9	6.4	4.9
8	62.71	27	34.4	20.7	27.1	29.2	27.8	28.1	27.5	27.5	70.1	18.1	18.2	54	7.5	5.4
9	62.86	26.9	35	20.5	27.3	29.3	28	28.3	27.5	27.5	65.9	16.8	18	58	7.4	5.8
10	62.95	26.6	33.6	20.6	27.1	29.3	28	28.4	27.5	27.5	70.8	17.9	17.2	53.9	6.2	4.2
11	61.92	27.2	34.4	21.6	27.6	29.9	28.2	28.6	27.6	27.6	68.4	17.9	18.7	55	7.3	5.2
12	60.39	27.3	35.7	20	27.4	30.1	28.2	28.7	27.6	27.6	69.1	17.8	17	55.1	6.9	5.1
13	60.89	26.7	32.7	21.5	27.8	29.7	28.5	28.8	27.6	27.5	73.7	18.9	18.7	52.8	5.6	4
14	61.52	26.8	33	21.2	27.7	29.7	28.6	28.8	27.7	27.6	72.9	18.9	18	52.7	6	4.5
15	62.40	26.5	32.2	23	28.3	29.6	28.7	28.8	27.7	27.5	74	18.7	21.2	53.7	4.8	3.7
16	61.65	26.5	33.7	21.6	27.5	29.3	28.6	28.8	27.6	27.4	72.9	18.4	18.6	53.9	6	4.3
17	61.33	27	33.1	21.6	27.5	29.8	28.5	28.7	27.7	27.4	75.2	19.7	19.2	52.1	6	4
18	62.44	26.5	32.3	24	28.3	29.3	28.7	28.8	27.6	27.4	74	18.9	22.8	51	4.1	3.2
19	63.06	26.6	32.9	22	27.5	29.3	28.5	28.7	27.8	27.5	73	18.5	19.4	53.1	5.9	4.1
20	62.57	25.3	29.7	23.3	27.7	28.8	28.5	28.8	27.8	27.5	81.9	19.6	22.4	56	1.9	1.9
21	61.25	27.2	34	21.2	27.5	29.7	28.5	28.7	27.6	27.5	72.4	18.9	19	56.3	6.2	4.3
22	60.91	27.6	34.4	22.4	27.8	30.2	28.6	28.9	27.9	27.5	71.7	19.2	19.9	57.7	6.7	4.9
23	61.51	27.8	34.6	22.4	28.3	30.7	28.8	29.1	27.9	27.5	67.4	18.1	19.8	55.8	8.1	5.9
24	62.10	27	34.5	20.2	27.8	30.1	28.8	29	27.9	27.5	69.1	17.7	17.3	55	7.5	5.5
25	61.17	28	35.2	23.1	28.4	30.5	28.9	29.3	28	27.6	71.7	19.7	20.7	53.7	6.9	4.8
26	60.95	27.5	34	24.2	28.7	30.3	29	29.3	28	27.6	71.3	19.2	23.3	59	5.5	4.1
27	61.47	26.7	33.2	23.6	28.5	29.4	28.9	29.2	28	27.6	73.5	19	21.1	55.7	5.1	4
28	61.73	27.3	34.2	22.9	28.2	30.2	28.9	29.1	28.1	27.6	73.1	19.3	21.5	54.5	6.7	4.8
29	61.86	27.2	34.4	20.9	28.2	30	28.8	29.2	28.1	27.6	70.4	18.3	18.4	53.6	6.9	4.9
30	61.70	28.2	35.2	23.5	28.5	30.5	29	29.5	28.2	27.6	67.6	18.9	20.8	55.3	7.6	5.5
31	60.99	27.8	36.4	21.6	28.5	30.8	29	29.5	28.2	27.6	68.7	18.6	19	55.6	7.2	5
Mean	761.92	26.8	33.8	21.6	27.6	29.5	28.3	28.6	27.7	27.5	70.9	18.2	19.1	54.5	6.3	4.6
Total Departure from normal		+1.36	+0.2	+1.3	+0.3						-0.5	+0.1			194.3	142.3

Day.	Wind.				Clouds.			Rain, 24 hours beginning 6 a. m.		Miscellaneous.		
	Prevailing direction.	Total movement.	Maximum hourly velocity.	Direction at the time of the maximum velocity.	Amount (mean).	Form and direction.		Sunshine.	On the tower.		In the park.	
						Upper.	Lower.					
												h.
1	NE	100	14	NE	9.2	A.-Cu.	Cu., Cu.-N. E	4	05	0.3	0.3	d p.
2	ENE	169	22.5	ENE	6.2	Ci.	Cu. E	6	25			d ^o a.
3	ESE	143.5	16	E	7.6	Ci.-S.	Cu. E	2	15			d ^o a.
4	SE	174	18	SE	4.1	A.-Cu.	Cu. E	7	40			
5	SE, ESE	246.5	24.5	SE	4.2	Ci.	Cu. E	9	20			
6	SE	191.5	22	SE	4.2	Ci.-S.	Cu. E	6	30			
7	W	176	15.5	WNW	3.8	Ci.	Cu. E	10	20			Δ ^o a.
8	W, ESE	202	21.5	SE	3.1	Ci.	Cu. EbyN	9	00			
9	E quad.	215.5	23	SE	2.1	Ci., A.-Cu.	Cu. E	10	00			∠ ^o p.
10	WSW, SE	146.5	14	W	1	Ci.	Cu. E	10	10			
11	SE	240	28	SE	2.8	A.-Cu.	Cu. E	9	15			d a.
12	SE	196	18.5	SW	1.6	Ci.	Cu. E	9	50			
13	SW	211.5	23	SW	3.6	Ci.	Cu. E	10	00			
14	SW quad.	230	19	WSW	2.5	Ci.	Cu. E	9	10	.3	.3	
15	E	149	17	E	8.8	A.-Cu.	Cu. E	2	45			d a.
16	SE	192	28	SE	4.8	Ci.	Cu. E	6	35			
17	SW quad.	168.5	20	SSW	1.9	Ci.-S.	Cu. E	8	30			d ^o a.
18	N quad.	192	20	NNW	9.7	Ci.-S.	Cu. E	0	35			
19	SE	174.5	15	WNW, SE	3.5	Ci.	Cu. E	7	10			
20	SE quad.	143	11.5	SEbyS	9.4	A.-Cu. E	Cu.-N. E	1	10	2.4	1.9	● ^o a. p.
21	SE	175.5	15.5	SE	3.9	A.-Cu.	Cu. E	8	50			
22	ESE	169.5	15.5	ESE	7.2	ci.-s., A.-Cu.	Cu. E	7	00			d ^o a.
23	ESE, SE	277.5	28	SE	4.7	Ci.	Cu. E	8	50			
24	SE	184.5	23	SE	1.2	Ci.	Cu. E	9	15			
25	N quad.	203.5	18	SE	2.2		Cu. E	8	10			
26	ESE	204.5	20	SE	7.1		Cu. E	4	55			
27	ESE	202	19	E, SE	8.8	A.-Cu. E	Cu. ENE	3	40	.3	.3	d ^o p.
28	ESE	237.5	22	ESE	5.2	Ci.	Cu. E	8	30			d a.
29	SE	179	19	W	1.5	Ci.	Cu. E	9	25			
30	SE	223	27	SE	2.5	Ci.	Cu. E	9	15			
31	SE	194.5	16.5	SSE	1.4	Ci.	Cu. E	9	15			
Mean		190.7	19.8		4.4			7	21			
Total Departure from normal		5,912			0			227	50	3.3	2.8	
		-899.7			0			-11	07	-14.6		

* All the mean values given in this table are deduced from hourly observations.
 b These values are taken from instruments mounted in the Observatory Park, 1.5 meters above ground.

METEOROLOGICAL DATA FOR MIRADOR OBSERVATORY, BAGUIO.^a

[$\phi=16^{\circ} 25' N$; $\lambda=120^{\circ} 36' E$; barometer above sea, 1,512.5 meters; gravity correction not applied, -1.65 mm.]

Day.	Pres- sure ^b (mean).	Air temperature at Mirador (on the top of the mountain).					Air temperature in the valley (near the city hall).					Relative humid- ity (mean).	Vapor pressure (mean).	Radiation.		Evaporation.	
		Mean.	Maxi- mum.	Hour.	Mini- mum.	Hour.	Maxi- mum.	Hour.	Mini- mum.	Hour.	Mini- mum on grass.			Maxi- mum in sun. Black bulb in va- cuo. ^c	Free ex- posure (total)	Shel- ter (total)	
		mm.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	Per ct.			mm.	°C.	°C.	mm.
1	638.63	17	24.3	1.25p.	12.9	5.55a.	24.2	1.35p.	12.1	6.10a.	78.7	11.2	11.6	45.2	4	2.1	
2	39.26	17.2	23.4	2.55p.	13.7	4.30a.	24.7	10.15a.	12.1	6.20a.	78.8	11.5	11.8	48	3.8	2	
3	39.30	18.1	24.4	0.30p.	13.8	5.55a.	25.1	0.50a.	12.7	6.35a.	76.2	11.4	12.1	45	4.2	2.3	
4	40.12	17.9	25.1	2.30p.	13.7	5.00a.	24.5	2.15p.	13.2	6.00a.	80.3	12.1	12.3	52.5	4	1.2	
5	39.77	18.8	25	0.05p.	14.5	6.35a.	25.7	10.35a.	13.2	6.10a.	74.7	12	12.8	47.7	3.8	2	
6	38.93	18.8	25.6	1.30p.	13.8	5.00a.	26.7	11.50a.	12.6	5.15a.	76	11.9	12.2	47.5	5	2.7	
7	38.83	18.2	24.3	2.10p.	14.1	4.45a.	24.9	1.00p.	12	6.00a.	80	12.2	12.3	46.8	4.6	2.2	
8	39.66	18.6	24.5	1.25p.	14.1	5.05a.	25.6	1.20p.	13.7	6.30a.	81.7	12.9	12.4	49.1	5.2	2.4	
9	39.82	18.8	26.3	0.50p.	14.3	6.00a.	26.9	Noon.	12.7	6.05a.	68.3	10.8	13.3	47.8	8.4	3.8	
10	40	17.9	24.6	1.55p.	14.1	1.40a.	24.8	1.15p.	11.8	3.25a.	76.2	11.6	12.9	47.2	4.6	2.1	
11	38.96	19.1	25.5	2.35p.	14.4	6.35a.	25.7	11.20a.	12.2	5.35a.	70.5	11.3	13.7	49.3	6.3	3.1	
12	37.49	17.8	25.7	2.10p.	14.3	5.30a.	25.5	2.40p.	12.7	4.15a.	78.5	11.6	12.5	49.4	4.4	2.6	
13	37.98	17.6	25.1	0.50p.	13.6	6.00a.	25.7	1.50p.	12.6	6.30a.	79.7	11.6	12.1	53	4.7	2.8	
14	38.51	17.6	25.5	0.35p.	13	3.00a.	25.3	11.45a.	12	6.25a.	74	11	11.4	49.2	6	2.8	
15	39.18	17.8	24.9	1.45p.	13.8	5.55a.	24.7	0.15p.	13.2	6.40a.	73.8	11.1	13	44.5	5.8	2.9	
16	38.67	18.3	24.4	10.45a.	13.3	5.55a.	25.5	11.10a.	12	6.10a.	73.2	11.1	12.5	46.3	5.3	2.6	
17	38.74	18	25.3	1.00p.	14.5	2.20a.	24.2	0.30p.	13.7	2.35a.	84.2	12.8	13.2	47	4	2.1	
18	39	18	25.7	1.10p.	14.3	6.30a.	24.8	0.55p.	13.5	6.35a.	80.5	12.3	13.5	47.4	2.9	1.8	
19	39.56	16.9	23	11.15a.	14.3	2.40a.	22.5	1.55p.	13.5	6.50a.	86.3	12.3	12.7	45	3	1.2	
20	38.80	17.5	24.5	10.50a.	13.6	6.00a.	23.7	10.55a.	13	6.15a.	81.3	11.9	12.3	51	3.8	1.9	
21	38.06	17.6	23.9	1.30p.	13.5	5.35a.	24.5	3.00p.	13	4.15a.	84	12.4	12.6	49.3	3.2	1.6	
22	37.83	17.8	25.7	0.25p.	14.5	6.30a.	24.7	1.15p.	14.2	6.45a.	85.5	12.9	13.8	50.8	4.1	1.6	
23	38.65	18.3	24.9	1.05p.	15	6.35a.	24.7	3.20p.	15	6.40a.	87.5	13.6	14.4	46	3.9	1.6	
24	39.41	19.5	25.4	11.35p.	15.4	6.35a.	25.8	10.15a.	14.5	6.30a.	78.2	13	14.3	48.5	3.5	1.4	
25	38.68	18.8	25.8	1.55p.	15.6	4.40a.	25.4	1.35p.	14.5	6.30a.	83.5	13.4	13.8	47.2	4.3	1.9	
26	38.10	18.2	25.2	11.55a.	15.5	5.50a.	24.7	0.25p.	15.1	6.00a.	88.5	13.6	14.4	47.8	2.2	1.5	
27	38.33	18.1	24.5	11.15a.	14.3	4.30a.	24.7	0.05p.	13.6	6.10a.	77.7	11.8	13.7	44.3	7.1	3.3	
28	38.54	17.7	23.1	10.25a.	14.2	6.10a.	23.1	10.30a.	12.8	6.20a.	78	11.6	13.8	45.1	4.1	2.3	
29	38.97	18.5	26.4	0.55p.	14.3	6.00a.	25.1	2.20p.	12.7	6.40a.	83.8	12.9	13.3	50.8	6	2.9	
30	39.02	18.5	25.6	0.35p.	15	6.00a.	24.3	1.15p.	14.6	6.00a.	82	12.8	13.2	45	4.3	2.1	
31	38.57	19.7	26.4	1.10p.	15.2	5.30a.	25.7	0.15p.	14.6	5.45a.	78.3	13.2	14	48.4	5	2.5	
Mean	638.88	18.1	25		14.2		24.9		13.2		79.4	12.1	13	47.8	4.6	2.2	
Total															141.5	69	

Day.	Wind.				Clouds.				Sun- shine.	Rain, 24 hours begin- ning 6 a. m.	Miscellaneous.	
	Prevailing direction. ^d	Total move- ment.	Maxi- mum hour- ly velo- city.	Direction at the time of the maximum velocity.	Amount (mean).	Form and direction.		Upper.				Lower.
						0-10.	Amount.					
1	W. E	365.1	28	W	7	A.-Cu.	S	Cu. SW quad.	h. m.	mm.	☉ p.	
2	E	320.7	26.9	SW	6.4	Ci.		Cu. S quad.	4 30		☉ a. ☉ p.	
3	SE	314.5	33	W	5.1	Ci.		Cu. SSW	5 15		☉ a. ☉ p.	
4	E quad.	322.4	25.5	W	6	Ci.		Cu. SW quad.	6 05		☉ a.	
5	E quad.	320.1	30	W	3.4	Ci.	WNW	Cu. WSW	7 30		☉ a.	
6	E quad.	313.8	33	W	1	Ci.		Cu. SW	8 45		☉ a. ☉ p.	
7	SE. W	305	27.6	W	2.9	Ci.		Cu. WSW	8 45		☉ a. ☉ p.	
8	SE	380.3	27.2	SE	5	Ci.		Cu. E. SE	7 00		☉ a. ☉ p.	
9	SE	416.5	26	SE	6	Ci.		Cu. WSW	9 25		☉ a. ☉ p.	
10	E	292.5	26.8	SW	4.3	Ci.		N.-cf. WSW	6 25		☉ p.	
11	SE	343.8	26.4	SW	2.4	Ci.		Cu. SSE, S	9 25		☉ p.	
12	W	343.3	35.6	W	3.6	Ci.		Cu. S, WSW	8 05		☉ a. ☉ p. ☉ p.	
13	W	360.1	30.4	W	4.3	Ci.		Cu. W	8 40		☉ a.	
14	W	330.4	30.1	W	4.7	A.-Cu. WNW, W		Cu. WSW	7 25		☉ a. ☉ p.	
15	E	460.7	25.1	SW	5.3	Ci.		N.-cf. sw quad.	4 30		☉ a. ☉ p.	
16	E, W	398.8	25.5	SW	2.3	Ci.		Cu. SW	8 35		☉ a. ☉ p.	
17	NW, W	394.9	33.2	W	3.3	Ci.		Cu. S quad.	6 20		☉ a. ☉ p.	
18	W	343.9	32.5	W	4	Ci.	W	Cu. WSW	6 20		☉ a. ☉ p.	
19	W	249.5	22.3	W	6	Ci.		N.-cf. WSW	4 30		☉ a. ☉ p.	
20	SE	441.2	29.5	SW	5.7	Ci.		N.-cf. WSW	4 40		☉ a. ☉ p.	
21	E, W	334.7	31.9	W	4.9	Ci.		Cu. SSW	6 05		☉ a. ☉ p.	
22	SE	400	30.9	W	5.7	Ci.		N.-cf. sw, wsw	4 45		☉ a. ☉ p.	
23	SE, W	329.1	22.5	W	7.9	Ci.		Cu. S	5 50		☉ a. ☉ p.	
24	W	335.6	26.4	W	5.9	Ci.		Cu. S, SSW	7 20		☉ a. ☉ p.	
25	W	270.2	27.6	W	6.1	Ci.		N.-cf. WSW	6 20		☉ a. ☉ p.	
26	E	260.2	21.5	W	8	Ci.		N.-cf. SW	5 10	5.1	☉ a. ☉ p.	
27	E	457.57	29.8	SE	4.3	Ci.		Cu.-N. S	7 05		☉ a. ☉ p.	
28	E	391.7	32.4	SE	6.7	Ci.-Cu. WSW		Cu.-N. SE	4 20		☉ a. ☉ p.	
29	E quad.	403.6	32.8	W	5.1	Ci.		Cu. W quad.	9 10		☉ a. ☉ p.	
30	SE	416.5	27.7	W	7.3	Ci.		Cu. variable	5 15		☉ a. ☉ p.	
31	W	352.4	34.1	SW	5.9	Ci.		Cu.-N. W, wsw	8 05		☉ a.	
Mean		353.8	28.8		4.9				6 41			
Total		10,969							207 05	5.1		

^a All the mean values given in this table are deduced from six daily observations taken at 2, 6, 10 a. m. and 2, 6, 10 p. m.
^b The barometric readings of this station are not reduced to sea level.
^c Maximum of hourly observations taken from 6 a. m. to 6 p. m.
^d This element is based on hourly observations taken from a quadruple register, which gives only eight possible directions of the wind.

DAILY RAINFALL AT THE STATIONS OF THE WEATHER BUREAU, MARCH, 1915.

Station.	Day of month.															
	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.
	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.
Jolo			6.7							35		0.3				
Isabela, Basilan							0.5									
Zamboanga	0.8							0.5								
Davao	5.1					9.4	11.7									
Cotabato						.5										
Cagayan, Misamis																
Dapitan																
Butuan	2		3.1			2	4.3									
Dumaguete																
Tagbilaran																
Iwahig																
Surigao	8.1	3.6	3	3	0.5	2.8	3.6	3.3								0.3
Maasin																
Cebu								.8								
Iloilo																
San Jose Buenavista																
Cuyo																
Ormoc												.5				
Guiuan	5.3	1.3	5.8			11	4.1	2.8	1.6		6.4	1			1.3	
Tacloban	5.1		6.5	.1					5.5			.5				
Capiz																
Borongan	4.8		9.6		3.6	9.4	8.9	2.5	40.9	1.3	5.8	4.6				2.5
Calbayog		1.8	5	1.8			1.3		1.3	.5						.6
Masbate								.8	3						2	
Romblon									3.8						15.7	5.1
Batag			7.6		1.3			1.5			1					
Gubat		4	8.2	52.8		3.8	3.8	1.5	7.1	1.3					8.6	8.1
Legaspi			1	.8	5.3	.8				6.3					1.3	17.2
Sumay, Guam			2.5			1.3	1.3	2.5	6.3						2.5	
Calapan					(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)
Virac	.3	1.8	15.5	.8	2			.3				1.8			7.3	19
Nueva Caceres														0.9	17.9	6.6
Batangas															.8	
Atimonan	12.7								.5					10.2	1	
Ambulong, Tanauan	2.8															
Paracale	4.5	1.8						3						1.3	5.6	20.6
Santa Cruz, Laguna	1.8	1.1												13.7		
Manila	.3													.3		
Antipolo														9.1		
Iba																
San Isidro														.5		
Tarlac																
Dagupan		.5														34.2
Bolinao																.8
Baguio																
San Fernando, Union																
Echague																
Candon																
Vigan																
Tuguegarao																
Laoag												12.7	.8			
Aparri								2				28.4	22.2		11.4	
Santo Domingo, Batanes								8.4	.3			2.7	21.6	16.7	4.6	3.8

^a No observation.

Daily rainfall at the stations of the Weather Bureau, March, 1915—Continued.

Station.	Day of month.															Total.
	17.	18.	19.	20.	21.	22.	23.	24.	25.	26.	27.	28.	29.	30.	31.	
	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.
Jolo											12.2	20.1		6.9	9.9	92.9
Isabela, Basilan						0.5	0.3	1.5				.8		.5		3.1
Zamboanga										0.5	3.8	8.1				13.7
Davao					2.5									19.8	24.1	72.6
Cotabato					9.9		5.6	8.9			(a)	(a)	(a)	(a)	(a)	24.9
Cagayan, Misamis																0
Dapitan											(a)	(a)	(a)	(a)	(a)	0
Butuan				0.5				1.8								13.7
Dumaguete			1.3	.8												2.1
Tagbilaran														3.6		3.6
Iwahig		14.6														14.6
Surigao			4.8							.8	3.3	4.8	10.2	26.6	8.4	87.1
Maasin												7.1				7.1
Cebu		.5	2								2	3				8.3
Iloilo													1.6			1.6
San Jose Buenavista			.3													.3
Cuyo																0
Ormoc			3.1							.3	1.6	2.3		11		18.8
Guiuan		4.1	3.3						8.9	.3	2	20.6	1.5	33.3	1	115.6
Taloban		1.3	19.1							.7	4.3	23.1	20.2	21.6		108
Capiz			.3										6.8			7.1
Borongan		31.5	13							2.5	2.1	31.7		23.6	.8	211.8
Calbayog		1.5					2						5.4	23.9		45.1
Masbate		.5											.8			7.1
Romblon		1	.3	4.1							.8					30.8
Batag		7.6										3.3	6.4	5.1		33.8
Gubat		16		10.2							2.5			1.5	2.8	132.2
Legaspi	19.3	.5		.3	1						1.5					55.3
Sumay, Guam		2.5					2.6				2.5					24
Calapan	(a)	(a)	(a)								22.9					22.9
Virac	2.8	4.1		4.1	.5						4.8			.5	.3	65.9
Nueva Caceres	1.3	3.5									2				4.1	36.3
Batangas		.3									2.8					3.9
Atimonan	11.9	5.5		5.8							17.3			4.6		69.5
Ambulong, Tanauan										1.3	1.3					5.4
Paracale	1.5	16.7			11.2				.3	2	17	.5		3		89
Santa Cruz, Laguna		2.5		.5		.8				.6	1.6	4.6				27.2
Manila				2.4							.3					3.3
Antipolo				2.5						1.5	2.5					15.6
Iba																0
San Isidro					.3				5.1							5.9
Tarlac					1									.8		1.8
Dagupan				.3												35.1
Bolinao	.5											.1				1.4
Baguio											5.1					5.1
San Fernando, Union			2.5													2.5
Echague											3.3			2.8	2	8.1
Candon																0
Vigan	5.3															5.3
Tuguegarao						.8							1	.5		2.3
Lacag																13.5
Aparri	3	.5	2.8						.8	2.6			.5		1.3	75.5
Santo Domingo, Batanes	3.2	1.4					.3	.2	2.1			1	18.9		.7	85.9

^a No observation.

Maximum and minimum temperatures at the stations of the Weather Bureau, March, 1915—Continued.

Day.	Tuguegarao.		Laoag.		Aparri.		Santo Domingo, Batanes.		Dapitan. ^a	
	Maxi- mum.	Mini- mum.	Maxi- mum.	Mini- mum.	Maxi- mum.	Mini- mum.	Maxi- mum.	Mini- mum.	Maxi- mum.	Mini- mum.
1	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.
2	32	20.1	18.5	27	21.4	24.1	17	31.7	24.4	24.4
3	35.6	18	34.5	19.4	28.2	19.6	26.1	19.7	31.6	24.4
4	37.3	22.6	33.7	19.6	29.9	20.9	27.4	21.6	32	24.5
5	38.5	20	35.4	21.4	32.2	22.5	29.9	23.1	31.3	24.4
6	38.5	22.1	35	19.3	29.9	19.9	27.6	19.8	32.4	24.6
7	36.8	18	34.2	22.1	32	21.4	29	19.9?	32.6	25
8	37.7	19.5	34	20.5	31.3	21.6	28.9	22.8	32	25.1
9	35.5	20.3	34.3	19	29	21.2	27	21.6	32.4	25.3
10	37.6	21	34.5	20	30.1	22.5	27.5	19.8	32.6	24.7
11	37.5	21.4	33.8	21.7	31.3	22.2	28	20.8	31.4	24.9
12	35.8	23.6	35.2	20	29.8	24.4	27.9	21.8	32.6	22.8
13	37.8	22.6	35.7	21.9	33.3	22.4	28	22.6	32.7	23.6
14	37.2	22	34.2	23	29.7	23	22.6	20.4	32.4	20.7
15	30.2	21.7	32.2	22.1	24.6	21.5	22.4	19.2	33.3	21.2
16	29.6	21.2	36.8	21.9	24.9	20.4	22.3	16.8	34.5	20.6
17	34.6	21.6	34.2	20.8	27.4	21	25	20	34	24.6
18	35.3	19.8	31.3	22.9	28.5	21.1	22.9	20.4	32.4	23.8
19	29.4	20.5	33.8	20.9	23.3	20.2	23.5	20.4	33.6	21.1
20	29.5	20.8	32	19.5	24	19.8	25.4	19.8	34	22.6
21	32.4	21.3	33.4	18.7	26.1	20.4	25.5	18	34	24.8
22	35.2*	19.5	32.5	21.4	28	19.8	27.8	21.6	33.9	24.6
23	37.6	21.8	34	21.5	30.1	21	28.4	22.6	33.5	25
24	37.2	21.1	32.5	22.7	31.1	21.5	29.7	24	32.1	25.3
25	38.2	24	34.2	21.6	30.4	22.3	26	21.9	33.4	24.4
26	35	23.5	31.7	22.1	29.2	24.3	27.3	21.9	33.7	22.3
27	31.2	21.9	34.6	22.8	25.3	21.8	24.5	18.8	34.7	23.4
28	29.5	21.2	37.1	21.1	24.4	21	23.9	19.6	34.6	24.9
29	35.3	20	33.6	20.9	27.6	20.1	26.3	20	33.4	25.4
30	38.3	22.1	35.2	22.2	32.4	21.8	24.5	20.6	32.6	24.3
31	32.6	22.7	34.7	21.5	28.9	23.5	24.4	19.6	34.2	26.1
	38.1	22.7	34.8	23.3	32.2	23	27.7	21.8	33	25.3
Mean	35.1	21.2	34.1	21.1	28.8	21.5	26.2	20.3	33	24

^a Received late.

SEISMOLOGICAL BULLETIN FOR MARCH, 1915.

By Rev. MIGUEL SADERRA MASÓ, S. J.,
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EARTHQUAKES FELT IN THE PHILIPPINES.¹

4, 10^h 43^m [4, 18^h 43^m]. Calbayog (NW Samar). Earthquake of intensity II-III, duration 3 seconds.

4, 21^h 35^m [5, 5^h 35^m]. Agusan Valley (E Mindanao). Earthquake of intensity IV, which was probably felt all along the valley of River Agusan and in Davao Gulf. Its origin was near the center of the valley, nearer to Butuan than to Davao, two stations at opposite extremities of the valley. In Butuan slow undulations apparently from S to N, of large duration and intensity III-IV, were observed; while in Davao the undulations which were also slow and of the same intensity, lasted only 5 seconds. The distance between Butuan and Davao in the N-S direction is 200 kilometers.

7, 13^h 18^m [7, 21^h 18^m]. Calbayog (NW Samar). Oscillatory earthquake, intensity III, duration short. There was a repetition of the same intensity at 16^h 15^m [8, 0^h 15^m].

12, 14^h 49^m 34^{s*} [12, 22^h 49^m 34^s]. SE Luzon and Eastern Visayas. Earthquake of large extension and of intensity VI-VII. Its epicenter was close to the western part of the Island of Masbate: the meizoseismic area was a zone, prolonged in the NNE-SSW direction, which is precisely that of the western spur of the Island of Masbate and other principal tectonic lines of the Archipelago; it comprehended the whole of Masbate, the extreme SE of Luzon and the NE of the Island of Panay and had an extension of 250 kilometers from NNE to SSW and less than 100 kilometers from E to W. The isoseism II-III inclosed all the SE part of Luzon, the Islands of Samar, Leyte, Cebu, Panay, and part of Negros.

After this earthquake there were many repetitions of variable intensity though none of them exceeded number IV of the scale. The principal repetitions which were felt in Masbate and in the other islands mentioned above, took place at the following times: 8^h 08^m 12^{s*} [13, 16^h 08^m 12^s] 11^h 58^m 13^{s*} [13, 19^h 58^m 13^s] of the 13th, and at 6^h 46^m 36^{s*} [15, 14^h 46^m 36^s] and 13^h 40^m 55^{s*} [15, 21^h 40^m 55^s] of the 15th. Some of the repetitions of smaller intensity were perceptible to the north of the meizoseismic region and others to the south of the same region. The principal shock was also lightly felt in the station at Butuan which is some 400 kilometers distant to the SSE; we have on other occasions called attention to the fact that in the district of Butuan distant earthquakes are felt although these same shocks may not be felt in intermediate stations nearer to the epicenter.

This earthquake was registered by all the seismographs of Europe and America.

13, 18^h 50^m 47^{s*} [14, 2^h 50^m 47^s]. Nueva Caceres (SE Luzon). Oscillatory earthquake, direction E-W, intensity III, duration 2 seconds.

¹The intensity of earthquakes is given in the notation known as the Rossi-Forel scale. The time is that indicated by the seismographs at the Central Observatory whenever the disturbance has been registered by them. This fact is denoted by an asterisk (*). Otherwise the time is that noted by the observers who sent the report. All time indications are in Greenwich mean time (midnight=0^h), Insular time being added in brackets for the convenience of Philippine readers.

15, 23^h 36^m [16, 7^h 36^m]. Borongan (E Samar). Oscillatory earthquake, intensity III.
17, 11^h 02^m [17, 19^h 02^m]. Nueva Caceres (SE Luzon). Oscillatory earthquake, direction SE-NW, intensity III, duration 2 seconds.

21, 5^h 42^m [21, 15^h 12^m]. Guam (Mariana Islands). Earthquake of intensity IV, duration short.

24, 3^h 52^m [24, 13^h 22^m]. Guam (Mariana Islands). Earthquake of intensity III. There was a repetition at 11^h 37^m [21^h 07^m] of the same intensity.

24, 15^h 16^m 53^s* [24, 23^h 16^m 53^s]. Tuguegarao (NE Luzon). Earthquake of intensity II-III.

30, 19^h 22^m [31, 3^h 22^m]. Island of Masbate. Earthquake of intensity III-IV, which was felt throughout the meizoseismic region of the shock on the 12th; it may be considered as a repetition of the earthquake of the 12th.

30, 20^h 45^m [31, 4^h 45^m]. Dansalan (N Mindanao). Oscillatory earthquake, direction WSW-ENE, intensity IV, duration 10 seconds.

RECORDS OF THE MICROSEISMOGRAPH.

[Time: Greenwich mean. Midnight=0^h. Instrument: Wiechert seismograph; 1,000 kilograms. A_N: T₀=9.0, ε=3.31, $\frac{r}{T_0^2}$ =0.039;
A_E: T₀=6.2, ε=2.53, $\frac{r}{T_0^2}$ =0.082. Alluvium. 2.40 meters above sea level.] T₀²

No.	Date.	Character.	Phase.	Hour.	Period.	Amplitude.		Remarks.
						A _N μ	A _E μ	
47	2	Iv	eP	14	24	1	26	
			L	24	25			
			M _N	24	29			
			F	28				
48	3	Iv	eP	20	05			
			F	07				
49	5	Iv	eP	19	12			
			F	15				
50	5	Iv	eP	19	48			
			F	50				
51	8	I _r	e	15	36			
			F	59				
52	10	Iv	eP	0	50	7	20	
			S	51	52			
			L	53	16			
			M _N	54	18			
			M _E	55	17			
			F	1	16			
53	12	IIIv	eP	14	49	7	455	W of Masbate Island.
			iL	50	25			
			M _N	54	56			
			M _E	54	56			
			F	16	42			
54	13	Iv	eP	8	08	8	68	W of Masbate Island.
			eL	09	10			
			M _E	12	26			
			F	44				
55	13	Iv	eP	11	58	4	23	W of Masbate Island.
			L	59	13			
			M _E	59	26			
			F	12	17			
56	13	I _v	eP	18	21			
			F	37				
57	13	Iv	eP	18	50			Nueva Caceres (SE of Luzon).
			F	53				
58	15	Iv	eP	6	46	6	14	W of Masbate Island.
			L	47	19			
			M _N	48	58			
			F	59				

Records of the microseismograph—Continued.

No.	Date.	Character.	Phase.	Hour.	Period.	Amplitude.		Remarks.
						A _E μ	A _N μ	
59	15	Iv	eP	<i>h. m. s.</i>				W of Masbate Island.
			L	13 40 55				
			M _N	41 38				
			F	43 02	6	12		
			F	51				
60	17	Ir	eP	18 51 34				
			eS	56 49				
			iL	19 00 08				
			M _N	01 40	6	39		
			M _E	01 54	8	23		
			F	59				
61	18	Ir	eP	1 23 05				
			eS	25 25				
			iL	27 57				
			M _E	29 00	10	12		
			M _N	29 58	11	14		
			F	2 19				
62	18	Iv	eP	12 58 47				
			F	13 07				
63	21	Iv	eP	8 22 48				
			F	26				
64	24	Iv	eP	5 26 27				
			F	30				
65	24	Iv	eP	15 16 53				Tuguegarao (NE of Luzon).
			L	17 40				
			F	26				
66	26	I	e	5 44				
			F	6 05				
67	27	Iv	eP	16 55 03				
			S	56 06				
			L	57 04				
			M _E	58 42	6	22		
			M _N	58 49	8	16		
			F	17 14				

TEMBLORES DE TIERRA SENTIDOS EN FILIPINAS.¹

4, 10^h 43^m [4, 18^h 43^m]. Calbayog (NW de Sámar). Temblor de tierra de intensidad II-III, duración 3 segundos.

4, 21^h 35^m [5, 5^h 35^m]. Valle del Agusan (E de Mindanao). Temblor de intensidad IV, sentido probablemente a lo largo del valle del Río Agusan y en el Golfo de Dávao. Su origen se hallaba hacia el centro del Valle, más cerca de Butúan que de Dávao, dos estaciones extremas que dieron aviso de él. En Butúan se observaron ondulaciones lentas, aparentemente de S a N, de larga duración y de intensidad III-IV; mientras que en Dávao se experimentaron también ondulaciones algo lentas, de la misma intensidad, pero de una duración de solos 5 segundos. Butúan y Dávao distan entre sí cerca de 200 kilómetros en la dirección N-S.

7, 13^h 18^m [7, 21^h 18^m]. Calbayog (NW de Sámar). Temblor oscilatorio, intensidad III, duración corta. Repitió con la misma intensidad a 16^h 15^m [8, 0^h 15^m].

12, 14^h 49^m 34^{s*} [12, 22^h 49^m 34^s]. SE de Luzón y Visayas Orientales. Temblor de tierra de grande extensión y de intensidad VI-VII. Su origen se hallaba cerca de la parte occidental de la Isla de Masbate: el área meizosísmica formaba una zona muy prolongada en la dirección NNE-SSW, que es precisamente la del espolón occidental de la Isla de Masbate y de otras líneas tectónicas principales del Archipiélago; comprendía toda la Isla de Masbate la parte extrema SE de Luzón y la NE de la Isla de Panay, en una extensión de 250 kilómetros de NNE a SSW y menos de 100 de E a W. La isosisma II-III encerraba toda la parte SE de Luzón y las Islas de Sámar, Leyte, Cebú, Panay y parte de Negros, lo que representa una grande extensión.

Después de este terremoto hubo frecuentes repeticiones de variable intensidad pero sin exceder al grado IV; las principales, sentidas no sólo en Masbate sino también en las otras islas mencionadas arriba donde se sintió el terremoto ocurrieron a 8^h 08^m 12^{s*} y 11^h 58^m 13^{s*} [13, 16^h 08^m 12^s], [13, 19^h 58^m 13^s] del día 13 y 6^h 46^m 36^{s*} y 13^h 40^m 55^{s*} [15, 14^h 46^m 36^s y 21^h 40^m 55^s] del día 15. De las repeticiones de menor intensidad parece que unas fueron más perceptibles hacia el Norte de la región meizosísmica y otras hacia el Sur de la misma. El terremoto principal fué también ligeramente perceptible en la estación de Butúan que dista más de 400 kilómetros hacia el SSE: ya en otras ocasiones hemos llamado la atención sobre la facilidad con que se sienten en esta región temblores lejanos no sentidos en otras estaciones intermedias y más próximas a los respectivos epicentros: lo cual puede atribuirse tal vez a las condiciones del terreno.

Este terremoto fué registrado por todos los sismógrafos tanto de Europa como de América.

13, 18^h 50^m 47^{s*} [14, 2^h 50^m 47^s]. Nueva Cáceres (SE de Luzón). Temblor oscilatorio, dirección E-W, intensidad III, duración 2 segundos.

15, 23^h 36^m [16, 7^h 36^m]. Borongan (E de Sámar). Temblor de tierra oscilatorio de intensidad III.

17, 11^h 02^m [17, 19^h 02^m]. Nueva Cáceres (SE de Luzón). Temblor oscilatorio, dirección SE-NW, intensidad III, duración 2 segundos.

21, 5^h 42^m [21, 15^h 12^m]. Guam (Islas Marianas). Temblor de tierra de intensidad IV, duración corta.

¹ La intensidad de los terremotos se indica conforme a la conocida escala de Rossi-Forel. Cuanto a la hora de su ocurrencia, adoptamos la indicada por los sismógrafos de este Observatorio siempre que los hayan registrado, distinguiéndola por medio de un asterisco (*). En caso contrario copiamos la apuntada por los observadores que nos envían las notas. Todas las indicaciones del tiempo se refieren al tiempo medio de Greenwich (medianoche = 0^h). Para conveniencia de los lectores de Filipinas se añade también el tiempo insular.

24, 3^h 52^m [24, 13^h 22^m]. Guam (Islas Marianas). Temblor de intensidad III. Repitió a 11^h 37^m [21^h 07^m] con la misma intensidad.

24, 15^h 16^m 53^{s*} [24, 23^h 16^m 53^s]. Tuguegarao (NE de Luzón). Temblor de tierra de intensidad II-III.

30, 19^h 22^m [31, 3^h 22^m]. Isla de Masbate. Temblor de tierra de intensidad III-IV, sentido en la región meizosísmica del terremoto del día 12, debe considerarse como una réplica de aquél.

30, 20^h 45^m [31, 4^h 45^m]. Dansalan. (N de Mindanao). Temblor oscilatorio, dirección WSW-ENE, intensidad IV, duración 10 segundos.



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THE GOVERNMENT OF THE PHILIPPINE ISLANDS

WEATHER BUREAU

MANILA CENTRAL OBSERVATORY

BULLETIN FOR APRIL, 1915

PREPARED UNDER THE DIRECTION OF
REV. JOSÉ ALGUÉ, S. J.
DIRECTOR OF THE WEATHER BUREAU

MANILA
BUREAU OF PRINTING
1915

BULLETIN FOR APRIL, 1915.

METEOROLOGICAL BULLETIN FOR APRIL, 1915.

By Rev. JOSE CORONAS, S. J.,
Chief, Meteorological Division of the Weather Bureau.

GENERAL WEATHER NOTES.

Pressure and temperature.—The mean atmospheric pressure of this month is slightly above that of the preceding year and also above the April normal. The highest pressures were observed on the 6th in Mindanao, the Visayas, and southeastern Luzon, and on the 7th, 13th, and 24th in rest of Luzon. The lowest pressures took place generally on the 17th.

The mean monthly temperature is likewise higher than the normal and than that of April, 1914. The extreme temperatures for Manila were 38° C. on the 30th and 20.6° C. on the 24th. Owing to a prolonged period of dry weather, we had some very high maximum temperatures during the month, particularly in several stations of Luzon. In Manila the daily maximum temperature was in twenty-two days higher than 36° C., and in seven days higher than 37° C. Temperatures higher than 41° C. were registered three times during the month in Tuguegarao. In Tarlac the daily maximum temperature was four times above 40° C. The extreme temperatures for Baguio were: 28.6° C., 14.1° C. on the top of Mirador, and 28° C., 12.5° C. in the valley.

PRESSURE AND TEMPERATURE AT THE FIRST AND SECOND CLASS STATIONS FOR APRIL, 1915.

Station.	Pressure.						Temperature.					
	Mean.	Departure from April, 1914.	Highest mean.	Day.	Lowest mean.	Day.	Mean.	Departure from April, 1914.	Highest.	Day.	Lowest.	Day.
	mm.	mm.	mm.		mm.		°C.	°C.	°C.		°C.	
Tagbilaran ^a	759.67		761.55	6	758.38	17	27.4	0.3	34.6?	13?	20.8?	8?
Surigao.....	60.24	+ 0.26	62.11	6	58.71	30	26.7	+ 0.3	32.8	9	21.2	5
Cebu.....	60.16	+ .25	62.16	6	58.68	30	28.2	+ .1	32.4	30	23.4	8
Iloilo.....	59.53	+ .09	61.13	6	58.04	17	29	+ .5	35.4	4	22.9	7
Ormoc.....	60.30	+ .24	62.09	6	58.70	17	27.6	+ 1	34.8	11	17.4	5
Tacloban.....	60.42	+ .15	62.28	6	58.97	17	27.3	+ .2	33.6	10, 23	21	16
Capiz.....	60.29	+ .12	61.81	6	58.59	17	28.4	+ .8	35.4	30	22	6
Calbayog.....	60.55	+ .26	62.22	6	58.92	17	26.8	+ .8	35.8	24	20.3	7
Legaspi.....	60.52	+ .22	62	6	58.85	17	28.4	+ .4	34.6	30	20.5	7
Atimonan.....	60.32	+ .09	61.72	13	58.62	17	28.3	+ .9	34.6	5	21.7	7
Ambulong, Tanauan.....	60.04	+ .24	61.41	24	58.02	17	28.3	+ .3	37.9	11	21	7
Paracale.....	60.92	+ .25	62.42	13	59.09	17	27.7	+ .5	32.8	4, 5	21.7	7
Manila.....	60.31	+ .14	61.65	7	58.43	17	28.7	+ .7	38	30	20.6	24
San Isidro.....	60.56	+ .25	61.97	13	58.61	17	29.6	+ .8	39.1	5	21.6	15, 24
Dagupan.....	59.42	+ .01	61.11	7	57.49	17	29.5	+ .7	39.9	12	22.6	8
Bolinao.....	59.86	+ .06	61.68	7	58.02	17	29.4	+ .6	37.9	27	22.6	9, 26
Baguio ^b	638.21	+ .13	639.53	13	636.46	17	19.9	+ .8	28.6	11	14.1	24
Vigan.....	759.88	+ .02	761.84	7	758.16	17	28.8	+ .6	35.6	23	21.1	8
Tuguegarao.....	60.65	+ .18	62.63	24	58.51	17	28.8	+ .2	41.6	14	20	24
Aparri.....	60.72	+ .18	63.12	24	58.24	17	26.9	+ .3	34.3	12, 17	21.3	15

^a 25 days of observation.

^b The barometric readings of this station are not reduced to sea level.

Rainfall.—As it is shown in the following table, the drought which prevailed in the Philippines the preceding months has continued during the whole of April, there being only a very few stations with a monthly total of rain greater than the normal for this month. Particularly noteworthy are the differences between the respective normals and the monthly totals of rain of this month for the stations of Cotabato, Davao, Legaspi, Nueva Caceres, and Baler. There was no rain in the whole month at Laoag, Bolinao,

San Isidro (Nueva Ecija), Batangas, Cuyo, and San Jose Buenavista. In the gauges of the Central Observatory only 0.5 mm. of rain was collected during the month, which is 33.4 mm. less than the normal for April, while in Baguio there were 74.7 mm. of rain or 38.7 mm. less than the normal.

RAINFALL AT VARIOUS STATIONS OF THE WEATHER BUREAU DURING THE MONTH OF APRIL, 1915.

Station.	Total.	Departure from April, 1914.	Departure from normal.	Rainy days.	Departure from April, 1914.	Greatest rainfall in a single day.	Day.	Station.	Total.	Departure from April, 1914.	Departure from normal.	Rainy days.	Departure from April, 1914.	Greatest rainfall in a single day.	Day.
	mm.	mm.	mm.		mm.	mm.			mm.	mm.	mm.		mm.	mm.	
Jolo	114.7	+ 59.4	+ 8.1	15	+ 5	50.3	15	Calapan	25.6	- 42.5	mm.	9	- 2	8.6	2
Isabela, Basilan	14.7	- 80.7	- 69.2	4	- 3	10.2	22	Virac	56.9	-153.6		14	+ 1	14.8	26
Zamboanga	21.9	- 45	- 12.4	2	- 1	17.6	25	Nueva Caceres	10.3	-218.5	- 94.3	2	- 7	8.4	20
Davao	43.8	+ 21.2	-123.3	4	+ 1	24.4	18	Batangas	0	-102.6		0	- 7	0	0
Cotabato	38.6	-120.5	-114.3	11	- 3	20.1	22	Atimonan	33.9	- 77.7	- 55.9	7	+ 1	12.7	23
Cagayan, Misamis	17.3	+ 12.5		1	- 2	17.3	25	Ambulong, Tana-							
Dapitan	12	- 67.1	- 83.67	3	- 5	8.9	30	uan	39.1	- 65.9		2	- 3	34.3	18
Dumaguete	4.3	14.4		1	- 3	4.3	23	Paracale	56.4	- 66.4		13	+ 3	17	21
Tagbilaran ^a	20.1			2	- 3	10.77	257	Santa Cruz, Laguna	26.2	- 2.2		5	+ 1	19.8	22
Iwahig	8	19.6		2	- 3	5	21	Manila	5	- 52.9	- 33.4	1	- 6	5	22
Surigao	173.5	54.6	86.2	15	- 3	32.1	25	Antipolo	9.6	- 75.3		2	- 6	5.8	22
Maasin	31.7	71.5	33.9	3	- 3	16.5	12	Iba	14	- 18.8		1	- 4	14	29
Cebu	1	31.7	30.3	1	- 1	1	20	San Isidro	0	-100.4	- 36.2	0	- 9	0	0
Iloilo	5.9	3.5	33.5	2	- 1	3.8	21	Tarlac	3.8	-124.3	- 66.4	2	- 8	3	29
San Jose Buenavista	0	18.1	40.5	0	- 6	0	0	Baler	193.9	- 46.6	-114.8	22	+ 5	44.2	29
Cuyo	0	20.6	18.4	0	- 1	0	0	Dagupan	107.4	- 4.8	+ 29.3	5	0	50.8	17
Ormoc	14.7	83.1	49.7	5	- 6	6.9	13	Bolinao	0	- 29.8	- 27.9	0	- 6	0	0
Guinan	83.2	-103.9		21	+ 4	16.7	13	Baguio	74.7	- 42.9	- 38.7	6	- 8	30.5	2
Tacloban	57.6	89.3	78.6	13	0	14.2	13	San Fernando,							
Capiz	5	43.1	48.1	1	- 7	5	24	Union	8.7	+ 5.7	- 7.5	2	+ 1	7.4	18
Borongan	152.7	+ 6.1	82	17	0	19.3	29	Echague	39.1	- 25		4	- 4	18.3	7
Calbayog	135.9	+ 43.1	+ 27	10	- 2	50	17	Candon	4.6	- 11.2	- 8.3	1	- 1	4.6	17
Masbate	9.6	9.7	30.6	5	+ 2	2.8	21	Vigan	15.5	+ 15.5	- 3.2	2	+ 2	8.6	18
Romblon	34.5	44.37	19.8	5	- 5	21.3	24	Tuguegarao	84.3	+ 67.5	+ 19.5	7	+ 2	27.7	2
Batag	55.3	73.5		12	+ 5	9.4	26	Laags	0	- .5		0	- 1	0	0
Gubat	73.2	10.4	- 10.4	12	+ 1	22.6	22	Aparri	52.1	+ 39.6	+ 10.6	6	+ 4	42.7	7
Legaspi	58.1	82.9	-102.7	8	- 4	11.4	26	Santo Domingo,							
Sumay, Guam	24.1	7.8		6	- 1	12.7	6	Batanes	60.8	- 2.4	- 59.9	7	0	37	24

^a 25 days of observation only.

DEPRESSIONS AND TYPHOONS.

There was no depression or typhoon this month in the neighborhood of the Philippines. And even in the Pacific we could only observe a depression or low-pressure area of little importance, which seems to have recurved northeastward on the 21st between the Bonin and the Loochoo Islands, and to have moved afterwards toward the southeastern part of Japan.

NOTAS GENERALES DEL TIEMPO.

Presión y temperatura.—La presión atmosférica media de este mes es ligeramente mayor que la de Abril del año pasado y mayor también que la normal de este mes. Las presiones más altas tuvieron lugar en Mindanao, Visayas y sudeste de Luzón el día 6, y en el resto de Luzón los días 7, 13 y 24. Las presiones más bajas se registraron generalmente el día 17.

La temperatura media mensual es algo más alta que la normal y que la media mensual de Abril, 1914. Las temperaturas extremas de Manila fueron 38° C. el día 30, y 20.6° C. el día 24. Debido a la falta de lluvias, de que hablaremos luego, fueron muy notables las máximas temperaturas observadas en este mes, especialmente en varias estaciones de Luzón. En Manila tuvimos veintidós días con una máxima absoluta diaria mayor de 36° C. y siete días con una máxima mayor de 37° C. Temperaturas mayores de 41° C. se han registrado tres veces durante este mes en Tuguegarao. En Tárlac se observó cuatro veces una temperatura mayor de 40° C. Las temperaturas extremas de Baguio fueron: 28.6° C., 14.1° C. en la cumbre de Mirador, y 28° C., 12.5° C. el valle.

Precipitación acuosa.—En la tabla de lluvia mensual que, como de costumbre, acompaña el texto inglés se echa de ver que también este mes ha habido falta de lluvia en Filipinas, siendo rarísimas las estaciones que aparecen con un total de lluvia mayor que la del año anterior o que la normal de este mes. De una manera especial llama la atención lo mucho que se diferencian de la normal los totales de lluvia de Cotabato, Dávao, Legaspi, Nueva Cáceres y Baler. No hubo nada de lluvia en todo el mes en Laoag, Bolinao, San Isidro (Nueva Écija), Batangas, Cuyo y San José de Buenavista. En Manila sólo se recogieron 0.5 mm. de agua, cantidad que se diferencia de la normal de Abril en — 33.4 mm. La lluvia total de Baguio fué 74.7 mm., menor que la normal en 38.7 mm.

DEPRESIONES Y TIFONES.

No ha habido este mes depresión ni tifón alguno en las cercanías de Filipinas. Y aun en el Pacífico solamente hemos podido observar una depresión o área de baja presión de poca importancia que parece haber recurvado al NE el 21 entre las Islas Bonín y Loochoos, moviéndose después de la recurva en dirección a la parte sudeste de Japón.

METEOROLOGICAL DATA FOR MANILA CENTRAL OBSERVATORY.*

[φ=14° 34' 41" N; λ=120° 58' 33" E; barometer above sea, 14.2 meters; gravity correction not applied, -1.72 mm.]

Main meteorological data table with columns for Day, Air temperature, Underground temperature, Radiation, Evaporation, Wind, Clouds, Rain, etc.

* All the mean values given in this table are deduced from hourly observations.
b These values are taken from instruments mounted in the Observatory Park, 1.5 meters above ground.

METEOROLOGICAL DATA FOR MIRADOR OBSERVATORY, BAGUIO.*

[φ=16° 25' N; λ=120° 36' E; barometer above sea, 1,512.5 meters; gravity correction not applied, -1.65 mm.]

Table with columns: Day, Pressure (mean), Air temperature at Mirador (Mean, Maximum, Hour, Minimum, Hour), Air temperature in the valley (Maximum, Hour, Minimum, Hour), Relative humidity (mean), Vapor pressure (mean), Radiation (Minimum on grass, Maximum in sun, Black bulb in vacuo), Evaporation (Free exposure, Shelter). Rows 1-30 and Mean/Total.

Table with columns: Day, Wind (Prevailing direction, Total movement, Maximum hourly velocity, Direction at the time of the maximum velocity), Clouds (Form and direction: Upper, Lower), Sunshine (h. m.), Rain, 24 hours beginning 6 a. m. (mm.), Miscellaneous. Rows 1-30 and Mean/Total.

* All the mean values given in this table are deduced from six daily observations taken at 2, 6, 10 a. m. and 2, 6, 10 p. m.
b The barometric readings of this station are not reduced to sea level.
c Maximum of hourly observations taken from 6 a. m. to 6 p. m.
d This element is based on hourly observations taken from a quadruple register, which gives only eight possible directions of the wind.

DAILY RAINFALL AT THE STATIONS OF THE WEATHER BUREAU, APRIL, 1915.

Station.	Day of month.															
	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.
Jolo	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.
Isabela, Basilan		1	0.8	10.4					15.2	0.5	5.8	0.3		2.3	50.3	1.3
Zamboanga														1	4.3	
Davao														9.7	6.1	
Cotabato	2											3.8	0.3	.5	4.6	
Cagayan, Misamis									1.8							
Dapitan																
Dumaguete																
Tagbilaran	(a)	(a)	(a)	(a)	(a)											
Iwahig																
Surigao								2.3	6.6	7.9			9.4			
Maasin								12.4		2.8		16.5				
Cebu																
Iloilo																
San Jose Buenavista																
Cuyo																
Ormoc												2.3	6.9			
Guiuan			3					1	7.4		.3	5.6	16.7	.8	.5	
Tacloban		.3						3.1	.6			3.2	14.2	7.3		
Capiz																
Borongan	.3							14.5	17		2	3.1				
Calbayog	13.2							.3		1		33.3			1.5	
Masbate																
Romblon													1.3			
Batag									8.1	4.8	6.6	2.5	1.3			
Gubat								5.1	8.9			15.5				
Legaspi										3.6				3.3		
Sumay, Guam					1.3	12.7									3.8	
Calapan		8.6									7.7					.8
Virac			3.6						.5	1.3		5.1	.5	4.1		
Nueva Caceres																
Batangas																
Atimonan	4.3										1.8					
Ambulong, Tanauan																
Paracale								2.3	1			13.2	2.8			
Santa Cruz, Laguna																
Manila																
Antipolo		3.8														
Iba																
San Isidro																
Tarlac																
Baler	14.7							7.9	7.6	6.9		3.3	4.6	2.3	2.3	3.8
Dagupan		2.5														
Bolinao																
Baguio		30.5							8.9			1.5				
San Fernando, Union																1.3
Echague			7.1		13.2		18.3									
Candon																
Vigan																
Tuguegarao	12.7	27.7	10.9													
Lacag																
Aparri	1	3.3	.8					42.7								
Santo Domingo, Batanes					.2			5.8	.2							

^a No observation.

Daily rainfall at the stations of the Weather Bureau, April, 1915—Continued.

Station.	Day of month.														Total.	
	17.	18.	19.	20.	21.	22.	23.	24.	25.	26.	27.	28.	29.	30.		
	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	
Jolo	1			2		6.1	2			13.2			3		3	114.7
Isabela, Basilan						10.2										14.7
Zamboanga									17.6							21.9
Davao		24.4			3.6											43.8
Cotabato	2.5	.5				20.1	1.8	1		1.5						38.6
Cagayan, Misamis									17.3							17.3
Dapitan												1.3			8.9	12
Dumaguete								4.3								4.3
Tagbilaran					.8		6.8	1.8	10.7							20.1
Iwahig					.5			.3								.8
Surigao				1.5	15	8.1	14.5	27.7	32.1	11.3	4.3	11.7	20.3	.8		173.5
Maasin																31.7
Cebu				1												1
Iloilo					3.8			2.1								5.9
San Jose Buenavista																0
Cuyo																0
Ormoc					1.3			1.6							2.6	14.7
Guiuan	5.1	7.1	3.3	.3	2.3	7.4	3	.8	1	3.6	1.8		8.1	4.1		83.2
Tacloban				1.7	7.2	1.1		6.2	3.3		.1				9.3	57.6
Capiz								.5								.5
Borongan	11.4		3	1.3	9.6	11.7	1	13.4	12.2	8.6	10.5		19.3	13.8		152.7
Calbayog	50					5.8			13.2		15.8				1.8	135.9
Masbate				2.5	2.8	2	1	1.3								9.6
Romblon							1.8	21.3		7.6	2.5					34.5
Batag			3.8	2.3	3.6			3.8	5.1	9.4				4		55.3
Gubat			3.3	4	5.1	22.6		1.5	4.6	3.3	2.8	1.5				78.2
Legaspi				9.1	8.1	9.9			4.1	11.4	8.6					58.1
Sumay, Guam	2.5								2.5	1.3						24.1
Calapan	.3			3.6	1.3	1.5	.8		1							25.6
Virac				7.1	6.1	6.4	1.5		1.8	14.8	2.8	1.3				56.9
Nueva Caceres				8.4		1.9										10.3
Batangas																0
Atimonan			3.8	.3		10.5	12.7						.5			33.9
Ambulong, Tanauan		34.3				4.8										39.1
Paracale				.5	17	6.1	4.1		1.8	2.3	.8	1.5	3			56.4
Santa Cruz, Laguna					2.8	19.8		1.3	2		.3					26.2
Manila						.5										.5
Antipolo						5.8										9.6
Iba													14			14
San Isidro																0
Tarlac													3	.8		3.8
Baler	6.1	11.7	8.6	21.4	11.4	8.1	3.3	2.3	4.3	15	3.6		44.2	.5		193.9
Dagupan	50.8	2.5									1.3				50.3	107.4
Bolinao																0
Baguio	21.1	5.3								.5					7.4	74.7
San Fernando, Union		7.4														8.7
Echague																39.1
Candon	4.6															4.6
Vigan		8.6			6.9											15.5
Tuguegarao	14.7								2.3	1.8			14.2			84.3
Laoag																0
Aparri						.5	9.2	2.3	2							52.1
Santo Domingo, Batanes								37	7.9							60.8

Maximum and minimum temperatures at the stations of the Weather Bureau, April, 1915—Continued.

Day.	Vigan.		Tuguegarao.		Laoag.		Aparri.		Santo Domingo, Batanes.	
	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.
1.....	32.7	22	39.6	23.1	34.7	22	30.4	22.4	26.8	22.8
2.....	33.1	23.4	37.2	22.8	35.7	23.1	34	22.1	30.6	22.7
3.....	33	24.5	37.6	22.1	36.5	24.5	31.9	21.5	30.8	23.4
4.....	33.3	25.9	36.6	23.8	35	23.7	32.6	23.2	30	23.2
5.....	33.5	24.3	37	24	35.1	24.1	31.2	24.5	30.4	23.8
6.....	34	24.2	39.7	24.3	25.7	23	33.9	23.7	31.4	23.1
7.....	31.7	23.6	36	22.9	33.8	25.5	30.1	24.4	27.3	23.2
8.....	32.6	21.1	36.3	22.2	35.4	20.8	27.9	23.4	25	18.7
9.....	32.7	25	38.4	23.7	35.6	23	32.1	22	29.4	21.67
10.....	32.3	24.2	39	21.5	35.3	22.9	33.5	23	30	25.2
11.....	32.8	25.6	40.3	22.7	35.2	24.1	33.9	23.4	31	25.4
12.....	34.2	24.9	41.1	23.5	36.2	23	34.3	24.4	31.3	24.8
13.....	33.3	25.1	41.1	22.8	35.3	23.5	32.2	23.3	30.9	25.6
14.....	32.9	25	41.6	20.6	35.2	24.8	31.9	22.5	30.5	25
15.....	33.1	25	40.7	22	35.5	23.4	32.4	21.3	30.9	25
16.....	32.5	24.2	40	23.5	35.4	24	33.4	22	31.4	25.3
17.....	33.1	26	40	23.5	35.7	24.7	34.3	24.4	31.6	25.6
18.....	33.8	25	37	24	35.8	24.2	32.9	24.4	31.9	25.8
19.....	32.8	25.1	39.9	22.3	35.7	24.9	32.8	23.8	31.3	25.8
20.....	33.3	24.7	38.4	22.6	35.9	23.4	32.8	24	31.4	25.5
21.....	33.7	26	39.1	22.1	35.8	24.1	31.8	22.2	31.4	25.3
22.....	35.4	26	37.2	23	37.2	23.6	31.8	22.4	31.4	24.7
23.....	35.6	26.1	37.4	22.7	39.6	22	31.5	22.2	27.6	23.6
24.....	34.5	26.7	35.4	20	39	20.9	30.6	22.1	23.8	21.7
25.....	35.4	26	35.4	22.2	39.5	23.7	29.9	22.5	27.5	21.8
26.....	34.3	26.2	38.6	22.5	38.6	23	30.8	23	30.2	23.9
27.....	33.5	26.4	39.6	23.1	37.2	24.4	32.8	23.2	30	24.6
28.....	33.2	26	41	21.9	36	24.7	32.4	23.7	30.4	24
29.....	33.8	26.3	39.5	23.6	36.2	24.6	32	23.4	30.4	24.6
30.....	34	26.5	39.6	25	36.3	25.5	31.9	24.8	30.3	22.8
Mean	33.5	25	38.7	22.8	36.1	23.6	32.1	23.1	29.9	24

SEISMOLOGICAL BULLETIN FOR APRIL, 1915.

By Rev. MIGUEL SADERRA MASÓ, S. J.,
Assistant Director of the Weather Bureau.

EARTHQUAKES FELT IN THE PHILIPPINES.¹

2, 17^h 23^m 00^{s*} [3, 1^h 23^m 00^s]. Capiz (N Panay). Oscillatory earthquake, direction E-W, intensity III, duration 3 seconds.

4, 14^h 42^m 40^{s*} [4, 22^h 42^m 40^s]. Nueva Caceres (SE Luzon). Earthquake shocks of intensity II-III.

6, 2^h 51^m 33^s [6, 12^h 21^m 33^s]. Guam (Mariana Islands). Earthquake shocks of intensity IV, duration 5 seconds.

6, 20^h 59^m 22^{s*} [7, 4^h 59^m 22^s]. Samar and Leyte Islands. Earthquake of intensity IV, felt in the northern part of Leyte and western of Samar. Its origin lay probably in the volcanic group of islands situated N of Leyte.

9, 8^h 09^m 21^{s*} [9, 16^h 09^m 21^s]. Legaspi (SE Luzon). Oscillatory earthquake, direction ENE-WSW, intensity III, duration 8 seconds.

12, 13^h 06^m 39^{s*} [12, 21^h 06^m 39^s]. Northern Luzon. Earthquake of intensity VI-VII, felt in the septentrional part of Luzon, the region affected extended from the northern coasts to the parallel 15°.5, a distance of about 300 kilometers. The records of the seismographs at Manila place the origin of the shocks at a distance of about 410 kilometers. The intensity was decreasing from the Cagayan and Ilocos Norte Provinces comprised in the meizoseismic area, southward to the central provinces, what shows that the epicenter lay between the northern coast of Luzon and the Babuyan Islands. It was also registered by the seismographs of the Zikawei Observatory, China.

16, 18^h 24^m 11^{s*} [17, 2^h 24^m 11^s]. Baguio (W Luzon). Subsultory earthquake of intensity III, very short duration.

18, 11^h 27^m 18^{s*} [18, 19^h 27^m 18^s]. Western Luzon. Earthquake of intensity V, felt throughout the Provinces of Ilocos Sur, Union, Pangasinan, and the southern part of the Mountain Province. Its origin was some 240 kilometers distant from Manila, very probably to the W of the Benguet Subprovince, along the low coast ranges which exist in that part of Luzon. In the direction of these coast ranges runs a very important seismotectonic line.²

25, 0^h 49^m 40^{s*} [25, 8^h 49^m 40^s]. Iba (W Luzon). Earthquake of intensity III, duration 6 seconds. Its origin lay in the China Sea near to the Zambales coasts.

26, 14^h 16^m 34^{s*} [26, 22^h 16^m 34^s]. Camarines and Albay (SE Luzon). Earthquake of intensity III-IV felt along the northern coasts of the Ambos Camarines and Albay Provinces.

¹ The intensity of earthquakes is given in the notation known as the Rossi-Forel scale. The time is that indicated by the seismographs at the Central Observatory whenever the disturbance has been registered by them. This fact is denoted by an asterisk (*). Otherwise the time is that noted by the observer who sent the report. All time indications are in Greenwich mean time (midnight=0^h), Insular time being added in brackets for the convenience of Philippine readers.

² The relation of seismic disturbances in the Philippines to the geological structure.—M. Saderra and W. D. Smith.

29, 9^h 07^m 26^s* [29, 17^h 07^m 26^s]. Aparri (NE Luzon). Oscillatory earthquake, direction ENE–WSW, intensity IV, duration 9 seconds. The records of the seismographs at Manila show that the origin of this earthquake was some 600 kilometers distant, consequently in the Pacific, off the NE coast of Luzon.

RECORDS OF THE MICROSEISMOGRAPH.

[Time: Greenwich mean. Midnight=0^h. Instrument: Wiechert seismograph; 1,000 kilograms. $A_N: T_0=9.0, \epsilon=3.31, \frac{r}{T_0^2}=0.039$; $A_E: T_0=6.2, \epsilon=2.58, \frac{r}{T_0^2}=0.082$. Alluvium. 2.40 meters above sea level.]

No.	Date.	Character.	Phase.	Hour.			Period.	Amplitude.		Remarks.
								A_N μ	A_E μ	
68	2	Iv	eP F	h. m. s.					N Panay.	
				17 23 00						
				32						
69	3	Ir	eP eS eL M _E M _N F	13 48 34						
				54 19						
				58 31						
				14 01 45	14			7		
				03 27	13		10			
				53						
70	4	Iv	eP L F	14 42 40					SE Luzon.	
				43 13						
				49						
71	6	Iv	eP L M _N F	4 50 39						
				50 57						
				51 14	2		20			
				59						
72	6	Ir	e F	5 38 52						
				6 10						
73	6	Iv	eP L M _E F	20 59 22					Samar and Leyte.	
				21 00 17						
				00 53	3		8			
				09						
74	7	Ir	e F	16 15 51						
75	7	Iv	eP F	18 08 17						
				12						
76	9	Ir	e F	2 30 34						
				44						
77	9	Iv	eP L M _E F	8 09 21					SE Luzon.	
				09 53						
				10 17	2		15			
				19						
78	10	Iv	eP F	10 15 16						
				21						
79	11	Iv	eP L M _E F	5 17 40						
				19 07						
				20 42	3		8			
				29						
80	11	Iv	eP L M _E F	5 49 11						
				50 12						
				50 17	3		7			
				56						
81	11	Iv	eP F	19 15 31						
				18						
82	12	IIv	eP L M _E M _N F	13 06 39					N Luzon.	
				07 24						
				08 07	5		488			
				08 42	5		432			
				27						
83	16	Iv	eP L F	4 20 10						
				21 02						
				27						
84	16	Ir	eP S L M _E M _N F	14 01 27						
				03 31						
				05 38						
				07 22	5		3			
				07 28	6		15			
				24						

Records of the microseismograph—Continued.

No.	Date.	Character.	Phase.	Hour.	Period.	Amplitude.		Remarks.
						A _E μ	A _N μ	
85	16	Iv	eP L F	<i>h. m. s.</i> 18 24 11 24 35 30				W Luzon.
86	17	Iv	eP F	18 25 14 28				
87	18	Iv	eP L F	3 48 00 48 12 51				
88	18	IIv	eP L M _N M _E F	11 27 18 27 45 29 39 31 34 43		6 6	438 415	W Luzon.
89	18	Iv	eP F	11 51 24 55				
90	23	I	e F	15 47 16 08				
91	25	Iv	e F	0 06 36 17				
92	25	IIv	eP L M _E F	0 49 40 50 00 50 10 58		2	138	W Luzon.
93	26	Iv	eP L F	14 16 34 17 13 20				SE Luzon.
94	28	Ir	eP M _E M _N F	3 26 40 37 21 38 42 4 08		15 11	4 12	
95	29	Iv	eP L F	9 07 26 08 37 12				NE Luzon.
96	30	Ir	eP M _E M _N F	1 51 46 06 40 08 12 36		14 11	5 14	
97	30	Iv	eP L F	11 56 15 56 28 12 00				
98	30	Iv	eP L F	14 00 17 00 43 03				
99	30 1	Iv	eP F	23 56 16 0 05				

TEMBLORES DE TIERRA SENTIDOS EN FILIPINAS.¹

2, 17^h 23^m 00^{s*} [3, 1^h 23^m 00^s]. Cápiiz (N de Panay). Temblor oscilatorio, dirección E-W, intensidad III, duración 3 segundos.

4, 14^h 42^m 40^{s*} [4, 22^h 42^m 40^s]. Nueva Cáceres (SE de Luzón). Temblor de tierra de intensidad II-III.

6, 2^h 51^m 33^s [6, 12^h 21^m 33^s]. Guam (Islas Marianas). Temblor de tierra de intensidad IV, duración 5 segundos.

6, 20^h 59^m 22^{s*} [7, 4^h 59^m 22^s]. Sámar y Leyte. Temblor de tierra de intensidad IV, sentido en la parte N de Leyte y W de Sámar. Su origen se hallaba probablemente en las islas volcánicas situadas al N de Leyte.

9, 8^h 09^m 21^{s*} [9, 16^h 09^m 21^s]. Legaspi (SE de Luzón). Temblor oscilatorio, dirección ENE-WSW, intensidad III, duración 8 segundos.

12, 13^h 06^m 39^{s*} [12, 21^h 06^m 39^s]. Norte de Luzón. Temblor de tierra de intensidad VI-VII, sentido en toda la parte septentrional de Luzón hasta el paralelo 15°.5, comprendiendo por consiguiente una extensión de algo más de 300 kilómetros desde sus costas del N hacia el S. El origen a juzgar por los registros de los sismógrafos de Manila que lo colocan a unos 410 kilómetros de distancia y por la disminución progresiva de intensidad de N a S, desde las provincias más septentrionales de Ilocos Norte y Cagayán comprendidas en la región meizosísmica hasta las centrales, se hallaba entre las costas de Luzón y el grupo de las Islas Babuyan. Fué también registrado por los sismógrafos de Zikawei en China.

16, 18^h 24^m 11^{s*} [17, 2^h 24^m 11^s]. Baguio (W de Luzón). Temblor de tierra subsultorio de intensidad III, duración muy corta.

18, 11^h 27^m 18^{s*} [18, 19^h 27^m 18^s]. W de Luzón. Temblor de tierra de intensidad V, sentido en la Provincia de Ilocos Sur, Unión, Pangasinán y parte meridional de la Montañosa. El origen se hallaba a 240 kilómetros de Manila, probablemente al W de la subprovincia de Benguet a lo largo de los pliegues o sierras costales que existen en esta parte de Luzón, por donde pasa una línea sismotectónica importante.²

25, 0^h 49^m 40^{s*} [25, 8^h 49^m 40^s]. Iba (W de Luzón). Temblor de tierra de intensidad III, duración 6 segundos. Su origen se hallaba en el Mar de la China cerca de las costas de Zambales.

26, 14^h 16^m 34^{s*} [26, 22^h 16^m 34^s]. Ambos Camarines y Albay (SE de Luzón). Temblor de tierra de intensidad III-IV sentido a lo largo de las costas septentrionales de las Provincias de Ambos Camarines y Albay.

29, 9^h 07^m 26^{s*} [29, 17^h 07^m 26^s]. Aparri (NE de Luzón). Temblor oscilatorio, dirección ENE-WSW, intensidad IV, duración 9 segundos. Los registros de los sismógrafos del Observatorio dan unos 600 kilómetros de distancia al origen de este temblor; por consiguiente se hallaría en el Pacífico al NE de Luzón.

¹ La intensidad de los terremotos se indica conforme a la conocida escala de Rossi-Forel. Cuanto a la hora de su ocurrencia, adoptamos la indicada por los sismógrafos de este Observatorio siempre que los hayan registrado, distinguiéndola por medio de un asterisco (*). En caso contrario copiamos la apuntada por los observadores que nos envían las notas. Todas las indicaciones del tiempo se refiere al tiempo medio de Greenwich (medianoche=0^h). Para conveniencia de los lectores de Filipinas se añade también el tiempo insular.

² The relation of seismic disturbances in the Philippines to geological structure.—M. Saderra, W. D. Smith.

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THE GOVERNMENT OF THE PHILIPPINE ISLANDS

WEATHER BUREAU

MANILA CENTRAL OBSERVATORY

BULLETIN FOR MAY, 1915

PREPARED UNDER THE DIRECTION OF

REV. JOSÉ ALGUÉ, S. J.

DIRECTOR OF THE WEATHER BUREAU

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METEOROLOGICAL BULLETIN FOR MAY, 1915.

By Rev. JOSÉ CORONAS, S. J.,
Chief, Meteorological Division of the Weather Bureau.

GENERAL WEATHER NOTES.

Pressure and temperature.—The mean atmospheric pressure for this month is slightly higher than last year in the Visayas and Mindanao, and slightly lower in Luzon. That of Manila differs from the normal by -0.20 mm. The highest pressures of the month were generally observed on the 18th and 19th, and the lowest on the 31st.

The mean monthly temperature is almost identical with, or somewhat above, that of May, 1914, in southern Luzon, the Visayas, and Mindanao, while it is slightly below in northern Luzon. That of Manila is 0.7° C. higher than the normal for May. The extreme temperatures registered in Manila were 38.6° C. on the 17th, and 22.6° C. on the 1st. The absolute maximum and minimum temperatures for Baguio were: 27.2° C., 15.0° C. on the top of Mirador, and 26.6° C., 13.6° C. in the valley. As there was no rain in Manila until the afternoon of the 17th, we had during that period of the month 11 days with a maximum temperature higher than 36° C., it being even higher than 37° C. in 5 of those days. In Tuguegarao the maximum daily temperature was twice greater than 40° C., and in Tarlac there were registered 6 maximum daily temperatures higher than 39° C.

PRESSURE AND TEMPERATURE AT THE FIRST AND SECOND CLASS STATIONS FOR MAY, 1915.

Station.	Pressure.						Temperature.					
	Mean.	Departure from May, 1914.	Highest mean.	Day.	Lowest mean.	Day.	Mean.	Departure from May, 1914.	Highest.	Day.	Lowest.	Day.
	mm.	mm.	mm.		mm.		$^{\circ}$ C.	$^{\circ}$ C.	$^{\circ}$ C.		$^{\circ}$ C.	
Tagbilaran ^a	758.36		759.77	28	757.06	7, 8	27.8	+0.1	34.8	8	22.7	5
Surigao	58.54	+0.27	59.86	18	57.23	31	27.5	+0.3	33.8	23	22.4	5
Cebu	58.46	+0.07	59.73	18	57.14	31	28.9	+0.4	35	11	23.5	22
Iloilo	58.14	+0.07	59.53	18	56.72	7	28.7	+0.3	35.5	1	23.9	25
Ormoc	58.65	+0.16	59.87	19	57.29	31	27.7	+0.2	34.3	7	19.9	5
Tacloban	58.50	0	59.84	18	57.07	31	28.1	+0.5	33.7	13	22.5	5
Capiz	58.38	-0.06	59.70	18	56.96	31	28.4	-0.1	36.7	14	23.4	5
Calbayog	58.60	+0.12	59.88	18	57.24	31	27.8	+0.1	36.6	20	21.5	5
Legaspi	58.21	-0.18	59.29	19	56.66	31	28.9	+0.1	36.2	31	22.4	5
Atimonan	57.82	-0.70	59.27	18	56.13	31	28.7	+0.3	36.7	30	23.4	1
Ambulong, Tanauan	57.84	-0.22	58.97	1	56.28	31	28.9	0	33	1	21.8	1
Paracale	58.23	-0.49	59.44	18	56.47	31	28.1	-0.1	36	15	23.5	4
Manila	58.16	-0.26	59.48	18	56.81	31	29.2	+0.7	38.6	17	22.6	1
San Isidro	58.34	-0.27	59.69	19	56.94	31	28.7	-0.4	39.6	1, 2	23	2
Dagupan	57.32	-0.38	58.79	19	55.99	31	28.7	-0.5	38.4	6	23.6	6
Bolinao	57.67	-0.40	58.82	19	56.41	31	28.7	-0.5	38	6	23.1	6
Baguio ^b	636.61	-0.26	637.49	19	635.59	31	19.2	-0.2	27.2	12	15	6
Vigan	757.64	-0.47	758.70	19	756.48	31	28.6	-0.6	35.2	13	21.3	28
Tuguegarao	57.86	-0.61	59.56	6	55.73	31	28.2	-1.3	40.4	12	22	26
Aparri	57.81	-0.66	59.43	6	55.86	31	27.3	-0.8	35.6	14	23	6

^a 30 days of observation.

^b The barometric readings of this station are not reduced to sea level.

Rainfall.—Although generally speaking there was more rain in the Philippines this month than last April, yet the total rainfall of the month is still much below the normal in the greatest part of the Archipelago, and most particularly in the Island of Samar. In the northernmost part of the Archipelago, however, the rains were so abundant during the month, that the monthly total for the stations situated above 16° 30' latitude N is considerably greater than that of May, 1914, and than the normal of this month. These abundant rains were mainly due to electric storms and to the influence of two depressions which passed between Luzon and Formosa on the 14th and 28th.

RAINFALL AT VARIOUS STATIONS OF THE WEATHER BUREAU DURING THE MONTH OF MAY, 1915.

Station.	Total.	Departure from May, 1914.	Departure from normal.	Rainy days.	Departure from May, 1914.	Greatest rainfall in a single day.	Day.	Station.	Total.	Departure from May, 1914.	Departure from normal.	Rainy days.	Departure from May, 1914.	Greatest rainfall in a single day.	Day.
	mm.	mm.	mm.		mm.	mm.			mm.	mm.	mm.		mm.	mm.	
Jolo	242.1	+ 92.8	+ 57.2	20	+ 8	50	17	Sumay, Guam	49.6	- 28		8	- 4	12.7	30
Isabela, Basilan	309.3	+ 171.3	+ 183.5	18	+ 6	109.5	14	Calapan	89	- 26.5		13	+ 2	24.1	25
Zamboanga	45.7	- 79	- 25.1	7	+ 0	39.1	14	Virac	73.4			11		51.8	23
Davao	174.5	- 164.8	- 62.7	13	+ 3	34.3	16	Nueva Caceres	74.5	- 89	- 24.5	10	- 1	24.6	2
Cotabato	243.9	- 72.2	+ 14.2	18	+ 3	89.9	27	Batangas	21.3	- 94.9		6	- 4	12.4	5
Cagayan, Misamis	44.3	- 36.3		13	+ 1	13.5	13	Atimonan	33.2	- 77.2	- 115.7	10	- 1	9.1	3
Dapitan	125.4	- 54.1	+ 37.6	12	- 3	50.3	27	Ambulong, Tanauan	98.4	- 67.7?		7	+ 4?	49.1	5
Butuan ^a	110.1?					46.7?	??	Paracale	152.8	+ 86.3		17	+ 4	34.6	17
Dumaguete ^b	79.1	+ 30.8		8	+ 1	30.5	27	Santa Cruz, Laguna	98.8	- 27.2		13	+ 5	26.2	22
Tagbilaran ^b	59.3	+ 31.2	- 38.4	7	+ 2	22.6	27	Manila	50.4	- 33.6	- 57.2	12	+ 2	13.5	25
Iwahig	127.7	- 62		16	- 1	30.5	2	Antipolo	153.1	- 111		9	+ 2	37.1	20
Surigao	45	- 213	- 77.2	9	- 7	18.4	9	Iba	185.2	- 184.8		13	+ 2	51.1	22
Maasin	142.9	- 194.5	+ 26.7	7	+ 2	44.1	22	San Isidro	199	+ 4.8	+ 4.6	15	+ 1	40.4	12
Cebu	36.6	- 27.2	- 51	7	- 4	22.4	1	Tarlac	99.6	- 117.6	- 85.5	14	+ 1	26.9	21
Iloilo	131	- 132.9	- 30.1	10	- 2	57.1	13	Baler	262.4	+ 10.1	- 29.2	17	+ 1	71.6	16
San Jose Buenavista	166.5	- 244.7	+ 1.4	14	+ 1	89.9	22	Dagupan	177.5	+ 1.9	- 90.8	15	- 4	39.3	18
Cuyo	154.3	- 35.7	- 7.3	13	- 0	47	13	Bolinao	174.7	- 54.8	- 2.7	13	- 1	63.3	6
Ormoc	74	- 30.8	- 1.2	10	- 3	23.9	22	Baguio	304.1	- 132.1	- 132	18	- 6	48	19
Guiuan	75.4	- 111.4		11	- 7	28.4	23	San Fernando, Union	345.9	+ 195.4	+ 157.3	9	- 4	133.3	23
Tacloban	127.2	- 3.7	- 14.6	16	- 1	75.2	22	Echague	284.9	+ 189.5		17	+ 9	58.7	21
Capiz	76.6	- 13.7	- 89.7	11	+ 2	33.1	27	Candon	193.6	+ 101	- 24.7	13	+ 6	54.4	14
Borongan	82.2	- 87.6	- 140.4	15	- 5	18	1	Vigan	354.8	+ 276.1	+ 216.8	15	+ 5	90.2	23
Calbayog	39.5	- 132.8	- 117.8	7	- 10	20.9	23	Tuguegarao	242.9	+ 119.2	- 115.5	15	+ 8	69.1	26
Masbate	173.8	+ 109.9	+ 92.2	11	+ 5	52.1	25	Laoag	852.7	+ 775.8		20	+ 14	143.5	23
Romblon	62.9	- 37.6	- 51.2	13	- 1	16.8	3	Aparri	130.6	+ 120	+ 19.8	15	+ 13	28.4	17
Batag ^b	11.7	- 90.3		3	- 6	5.6	7	Santo Domingo,							
Gubat	48.8	- 19.7	- 55.1	8	- 2	19	15	Batanes	593	+ 338.7	+ 326.3	23	+ 9	59.7	8
Legaspi	62.3	- 5.4	- 60.8	9	- 4	23.4	16								

^a 25 days of observation.^b 30 days of observation.

DEPRESSIONS AND TYPHOONS.

Several depressions were observed during the month in the Far East. We shall mention here three of them, whose approximate tracks will be published in Plate II, monthly Bulletin for June. All of them, however, were apparently of little importance. The first of these depressions appeared on the 13th in the China Sea to the west of northern Luzon near 115° longitude E and 19° latitude N. It moved eastward on the 14th passing between Formosa and Luzon, and inclined northeastward on the 15th. Another depression was announced on the 19th to the S of the Loochoos: it moved fast to the E on the 19th and 20th. The third depression was formed on the 26th in the neighborhood of the Paracels in the China Sea; it moved NE on the 27th; passed to the S of Formosa much inclined to the E on the 28th; inclined again to the NE and N on the 29th, and probably filled up on the 30th near or over the northern part of the Loochoo Islands. We omit two other depressions on account of their short duration and ill-defined tracks. One seems to have formed on the 30th near the eastern coast of Formosa moving eastward on the 31st. The other moved probably NNW on the 20th and 21st about 300 miles to the E of Samar and Luzon, a falling of 2 mm. in 24 hours having been observed in our easternmost stations of the Visayas and northeastern Mindanao.

NOTAS GENERALES DEL TIEMPO.

Presión y temperatura.—La presión atmosférica media de este mes es ligeramente mayor que la del año pasado en Visayas y Mindanao, y ligeramente menor en Luzón. La de Manila difiere de la normal de Mayo en -0.20 mm. Las presiones más altas se observaron generalmente el 18 y 19, y las más bajas el 31.

La temperatura media de este mes es algo menor que la de Mayo, 1914, en el norte de Luzón, y algo mayor o casi igual en el sur de Luzón, en Visayas y Mindanao. La de Manila se diferencia de la normal en $+0.7$ °C. Las temperaturas extremas fueron en Manila 38.6 °C. y 22.6 °C. registradas respectivamente los días 17 y 1. Las máximas y mínimas absolutas observadas en Baguio fueron 27.2 °C., 15.0 °C. para la cumbre del Mirador y 26.6 °C., 13.6 °C. para el valle. Como no llovió en Manila absolutamente nada hasta la tarde del 17, tuvimos durante este período 11 días de temperatura máxima mayor de 36 °C., llegando a ser en 5 de estos días mayor de 37 °C. En Tuguegarao la temperatura máxima diaria fué 2 veces mayor de 40 °C. y en Tárlac se observaron 6 veces temperaturas mayores de 39 °C.

Precipitación acuosa.—Aunque hablando en general se puede decir que llovió más en Filipinas este mes que en el pasado Abril, sin embargo todavía hubo deficiencia de lluvia en gran parte del Archipiélago, y muy especialmente en la Isla de Sámar, como lo demuestran las diferencias entre la lluvia normal de Mayo y la lluvia observada este mes en las estaciones de aquella isla. Solamente en el N del Archipiélago, es decir, desde la Provincia de La Unión hasta las islas Batanes, fueron las lluvias bastante abundantes, llegando a superar notablemente la suma total del mes así a la lluvia de Mayo, 1914, como a la normal de este mes. Fueron debidas principalmente estas lluvias a tempestades eléctricas y a la influencia de algunas depresiones que pasaron por entre Luzón y Formosa, según diremos luego.

DEPRESIONES Y TIFONES.

Varias depresiones se observaron este mes en el Extremo Oriente, de las cuales mencionaremos brevemente tres, cuyas trayectorias probables publicaremos en la lámina II, boletín de Junio. Todas ellas fueron, al parecer, de poca importancia. La primera de estas depresiones apareció el día 13 en el Mar de China al W de la parte N de Luzón en los alrededores de 115° longitud E y 19° latitud N. Moviése al E el día 14 pasando por entre Luzón y Formosa en dirección al Pacífico, inclinándose luego al NE el día 15. Otra depresión apareció el día 19 al S de las islas Loochoos la cual se movió con mucha velocidad hacia el E durante los días 19 y 20. La tercera depresión se formó del 26 al 27 en los alrededores de Paracels, en el Mar de China; moviése al NE el día 27; pasó al S de Formosa el 28 moviéndose muy inclinada al E; volviése a inclinar al NE y N el 29, y se deshizo probablemente la noche del 30 en la parte N de las islas Loochoos.

Otras dos depresiones omitimos aquí por haber sido de poca duración y de trayectorias no bien definidas: la una parece haberse formado el día 30 cerca de la costa E de Formosa moviéndose luego al E; y la otra se movió probablemente al NNW los días 20 y 21 a unas 300 millas al E de Sámar y de Luzón causando una bajada de 2 mm. en 24 horas en las estaciones más orientales de Visayas y del NE de Mindanao.

METEOROLOGICAL DATA FOR MANILA CENTRAL OBSERVATORY.^a

[φ=14° 34' 41'' N; λ=120° 58' 33'' E; barometer above sea, 14.2 meters; gravity correction not applied, -1.72 mm.]

Table with columns: Day, Pressure (mean), Air temperature (Mean, Maxi-mum, Mini-mum), Underground temperature (0.25 meter, 0.50 meter, 1.50 meters, 2.50 meters), Relative humidity (mean), Vapor pressure (mean), Radiation (Minimum on grass, Maximum in sun, Black bulb in vacuo), Evaporation (Free exposure, Shelter). Rows 1-31 and Mean Total, Departure from normal.

Table with columns: Day, Wind (Prevailing direction, Total movement, Maximum hourly velocity, Direction at the time of the maximum velocity), Clouds (Amount, Form and direction: Upper, Lower), Sunshine (h, m), Rain, 24 hrs. beginning 6 a. m. (On the tower, In the park), Miscellaneous. Rows 1-31 and Mean Total, Departure from normal.

^a All the mean values given in this table are deduced from hourly observations. ^b These values are taken from instruments mounted in the Observatory Park, 1.5 meters above ground.

METEOROLOGICAL DATA FOR MIRADOR OBSERVATORY, BAGUIO.^a

[φ = 16° 25' N; λ = 120° 36' E; barometer above sea, 1,512.5 meters; gravity correction not applied, -1.65 mm.]

Main meteorological data table with columns for Day, Pressure, Air temperature at Mirador, Air temperature in the valley, Radiation, and Evaporation. Includes sub-columns for Mean, Maximum, Hour, and Minimum for various measurements.

Wind and Clouds data table with columns for Day, Wind (Prevailing direction, Total movement, Maximum hourly velocity, Direction, Amount), Clouds (Form and direction, Upper, Lower), Sunshine, Rain, and Miscellaneous. Includes symbols for cloud types and wind directions.

a All the mean values given in this table are deduced from six daily observations taken at 2, 6, 10 a. m. and 2, 6, 10 p. m.
b The barometric readings of this station are not reduced to sea level.
c Maximum of hourly observations taken from 6 a. m. to 6 p. m.
d This element is based on hourly observations taken from a quadruple register, which gives only eight possible directions of the wind.
e 30 days of observation.

DAILY RAINFALL AT THE STATIONS OF THE WEATHER BUREAU, MAY, 1915.

Station.	Day of month.															
	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.
Jolo	mm. 4.3	mm. 1.5	mm. 25.9	mm. 22.3	mm. 0.3	mm. 6.9	mm. 8.6	mm. 37.4	mm. 8.7	mm. 11.7	mm. 6.8	mm. 27.6	mm. 0.3	mm. 3.6		
Isabela, Basilan	9.7	1	15.5	6.4		3.8										51
Zamboanga																
Davao	21.3	5.3														
Cotabato	11.9		11.4	15												
Cagayan, Misamis	4.3															
Dapitan					1.3	2.8										
Butuan	(a)	(a)	(a)	(a)	(a)	(a)	46.7?	1.3	14.2			8.6	1.5	1.3	8.1	21.1
Dumaguete									(a)	1.8				1.8	16.5	
Tagbilaran	7.6								4.1							
Iwahig		30.5	2.5	.3	5	8.9			2					21.8		17.8
Surigao	5.3	.8	1.3				6.1	3.9	18.4	2.3		6.4				3.6
Maasin								7.6	11.4							
Cebu	22.4								.5				30.5	7.9		
Iloilo	1.3	7.4	2.8										2.5			5.1
San José Buenavista			9.7	1									57.1			17
Cuyo			35.3		14.5								15	1.8		1.5
Ormoc	1.3		6.9			1.8			13.5	2		6.4	12.4			
Guluan	1	1				24.9	.3	1.5	3				.3			
Tacloban		4	12.4		1.5	5.8		2	1.7	4.4			.4	5.1	9.6	2.5
Capiz			2.1												.3	17.3
Borongan	18	.3				3.6	2.8	4.8	6.9				.8		.3	3
Calbayog						3.6			5.8							
Masbate			1.5											7.9		.8
Romblon	.5	.3	16.8	8.4				3.6								1.8
Batag					(a)	5.6										
Gubat						1.8	6.1	3	5.6						19	
Legaspi		5.1			2	1	2	7.6								23.4
Sumay, Guam	10.2	1.3			3.8	1.3										
Calapan			2.8		2.5	17.2	.5		13.2				.3		3	
Virac	.3				3	1.3	4.6		4.6							
Nueva Caceres	1.9	24.6	5.8	13.7	4											
Batangas				1.5	12.4											
Atimonan			9.1				.5									.8
Ambulong, Tanauan					49.1											2.3
Paracale		8.9	1.1												1.3	17.8
Santa Cruz, Laguna				20.1			.3	5.8	.3							
Manila																
Antipolo																12.2
Iba						3.4			6.4						4.3	1.9
San Isidro		1.3		14	16								40.4	9.9		.5
Tarlac		1.3			8.9											3.8
Baler				8.4	70.4	9.7	11.9	2.6	1.3							71.6
Dagupan	14			6.9		14.7										
Bolinao					1.5	63.3									1.3	
Baguio				4.1	.8	28.9	.5								.5	
San Fernando, Union					5	7.1									.8	
Echagüe	.5	17.8		1.8	3	26.2						1.5	9.1			15.5
Candon				8.9	1.8	1	11.4	1.8							3	
Vigan			.3	5.6								70.4		54.4	20.8	1.3
Tuguegarao	1.3			2.5	21.6	3.6							1.8	35.4		5.8
Laoag			19	13.5	2.5		10.2							8.9	105.6	54.6
Aparri		1		5.6	4.8									6.6	.6	2.3
Santo Domingo, Batanes			24.8	55.9	2.5	50.7	35	59.7				3.9	12.8	21.6		

^a No observation.

Daily rainfall at the stations of the Weather Bureau, May, 1915—Continued.

Station.	Day of month.														Total.		
	17.	18.	19.	20.	21.	22.	23.	24.	25.	26.	27.	28.	29.	30.		31.	
Jolo	50	2.3	1.3	3.6										14.2	4.8	mm.	242.1
Isabela, Basilan	16.5		12.4	26.4			9.4		3	22.6						mm.	309.3
Zamboanga	3.1								3							mm.	45.7
Davao			11.7	4.6		10.2		13.7	21.1				23.6			mm.	174.5
Cotabato	2.3	.3	9.4	4.3						16	89.9	3	1	5.6	13.5	mm.	243.9
Cagayan, Misamis	2.3			.5		5.1	6.1			1.8	2					mm.	44.3
Dapitan	16.5				15.2	4.1	5.1		6.1	.5	50.8	1				mm.	125.4
Butuan	1			1.3	.8	3		.8		.8		23.4				mm.	110.1?
Dumaguete						4.1					30.5	2.8				mm.	79.1
Tagbilaran						1.3		(a)			22.6	4.1				mm.	59.3
Iwahig	4.3	1.3	1.1		1.1	25.2	15.8	4	.3							mm.	127.7
Surigao						.5										mm.	45
Maasin				19.6	21.8	44.1										mm.	142.9
Cebu						6.1	.5	.8			3.8					mm.	36.6
Iloilo		3				3.5					2.3	48				mm.	131
San Jose Buenavista	.8	11.7			7.6	89.9	9.1				1.3	.8			.5	mm.	166.5
Cuyo	2.8	6.6		8.7		19.8	3.6					1				mm.	154.3
Ormoc	2.8				2	23.9	7.4									mm.	74
Guiuan	12					1.5	28.4		1.5							mm.	75.4
Tacloban	2.4					75.2	2.8					5				mm.	127.2
Capiz	.3	17.2		.3	.8	1.5	2.9		.8		33.1					mm.	76.6
Borongon	13.2			6.6		16.5	4.1	3	1							mm.	82.2
Calbayog	3.8					2.6	20.9				2					mm.	39.5
Masbate	1.3		8.4	1.8		28.2		24.2	52.1	.3	47.3					mm.	173.8
Romblon	1.5	.5				10.7	.3	4.8	14							mm.	62.9
Batag	5.3															mm.	11.7
Gubat						10.7							.8		1.8	mm.	48.8
Legaspi				6.4		.8		14								mm.	62.3
Sumay, Guam							7.1	2.5	24.1	14.5	11.4			12.7		mm.	49.6
Calapan		.8			.5		3	6.5	2.8	1						mm.	89
Virac						3.3	51.8	3.1	1.8					1.3		mm.	73.4
Nueva Caceres	11.7				1.8		3	6.5	2.8		.5					mm.	74.5
Batangas		.5						1	4.1							mm.	21.3
Atimonan	2.5	1.3		1.5		2.5		7.1		6.4	1.5					mm.	33.2
Ambulong, Tanauan		6.1		1.3				1	27.2	11.4						mm.	98.4
Paracale	34.6	1.3	12.7	1.3		20.8	8.6		3	8.6	1.8	.5	23.3	4.1		mm.	152.8
Santa Cruz, Laguna	2	.6	1	14.8	1.3	26.2		4.1	2			23.1	3			mm.	98.8
Manila	7.1	8.4	2.3	8.4	2	3	3.6	4.8	13.5							mm.	50.4
Antipolo	15.7	5.3	1	37.1	2.5	27.7	.5	10.2	23.6	13						mm.	153.1
Iba	8.6	37.8	7.9	7.6	.5	51.1	31.7	7.7	.8							mm.	185.2
San Isidro	18.8	9.7		16.7	34.3		.3	10.2	2				22.4	2.5		mm.	199
Tarlac		2.3	.8	5.8	26.9	16.3		3	8.1	3.8	.5	6.1				mm.	99.6
Baler	2.5	13.4	4.1	5.8	2	22.9		26.4	6.1	.5	2.8					mm.	262.4
Dagupan	.6	39.3	22.1	17.5	15	.5	6.4		9.2	13	16.5		5			mm.	177.5
Bolinao	3.5	.6	16.5	19.6	7.6			19.3	4.1		5.1	1.3				mm.	174.7
Baguio	37.3	36.8	48	1.8	46.5	36	14.5	.8	3.6	9.2		6.8				mm.	304.1
San Fernando, Union		2.3				112.5	133.3	35.3	37.9			6.6				mm.	345.9
Echague	15.5	7.9	57.2	8.9	58.7	3.6	39.1	15					3.6			mm.	284.9
Candon					13		39.4	28.7	7.1	8.1		15				mm.	193.6
Vigan		4.7	.5		4.2		36.6	20.2	9.8	26.3		90.2				mm.	354.8
Tuguegarao	14.7	16.8	52.1	15.7	10.7		23.9	2.5		69.1						mm.	242.9
Laoag		58.4	75.4	53.3	6.6		8.4	24.9	54.6	65	50.8	143.5	8.3	19.6	59.7	mm.	852.7
Aparri	28.4	9.9	1.5	8.4	21.1		1.3	2		23.4		16				mm.	130.6
Santo Domingo, Batanes	20.6	.6	23.2	51.6	10.1	19.2	1.1	26.3	14.4	15	15.8	58.5		27.5	39.9	mm.	593

^a No observation.

Maximum and minimum temperatures at the stations of the Weather Bureau, May, 1915—Ctd.

Day.	Batangas.		Atimonan.		Ambulong. Tanauan.		Paracale.		Santa Cruz, Laguna.		Manila.		Antipolo.		Iba.	
	Maxi- mum.	Mini- mum.	Maxi- mum.	Mini- mum.	Maxi- mum.	Mini- mum.	Maxi- mum.	Mini- mum.	Maxi- mum.	Mini- mum.	Maxi- mum.	Mini- mum.	Maxi- mum.	Mini- mum.	Maxi- mum.	Mini- mum.
	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.
1	36.9	23.5	31.5	23.4	38	21.8	32.5	23.7		22.3	36.9	22.6	38.8	22.5	33.9	24
2	34.4	23.3	35.2	24.8	36.2	22.9	32.5	24.9	36	22.8	35.2	23.9	37.4	24.2	33.5	23.7
3	34.2	25.1	34.8	24.7	36.2	23.7	32.9	24.4	36.2?	23.7	35.5	24.6	38.1	23.8	33.5	21.9
4	35.5	24.1	33.7	23.7	36	22.7	31.7	23.5	35.7	23.3	35.7	25.1	37.4	24.6	33.7	22
5	36.8	25.6	33.4	24.8	36	23.9	32.6	24.4	35.6	23.6	36.6	25	36	24	34	23.2
6	36	25	33.4	25	34.2	24.8	32.1	24.8	34.2	24.7	37.4	24.6	37	24	33.8	25.4
7	36.3	24.6	33	24.1	33.4	23.9	32.1	25.1	33.8	23.9	37.7	23	35.2	23.3	36.2	23.9
8	36.5	24.9	33.2	27	33.2	24	31.8	26.7	32.8	23.9	36.7	24.3	35.9	24	35.7	25.5
9	34.8	25	34	27.4	33.2	24.7	32.2	26		23.7	38	23.3	36.3	23.3	36.1	25.2
10	36.3	25.8	33.9	25.1	36	23.9	33.5	24.5		24.4	37.8	25.1	37	23.3	33.7	23.6
11	34.6	25.6	35	24.5	36	23.5	33.3	24.4	34.8	23.3	35.7	24.3	36.3	23.6	34.1	24.1
12	38	24.5	35.6	25	37.8	24.4	34	25		23	37	25.3	38.8	23.5	34.5	22
13	35	25.5	34.5	25	35.3	25	33	26	37.2	24.1	36.3	27.3	38.4	25	35.6	24.1
14	34.8	26.1	35.5	26	36.2	25.4	35	25.2	35.6	24.5	35.2	26	36	24.8	33.7	24
15	35	26	35.4	25.9	34.7	25.5	36	26.1	35.3	25.1	34	26.8	33.7	25	29.8	24.4
16	35.2	25.3	34.9	25.3	35.2	24.7	31.8	26	34.8	24.3	36.1	25.1	37.4	24.2	33.1	23.8
17	36.2	25.8	32.3	25.2	35.8	24.9	33	24.4	36	24.6	38.6	24.9	35.8	23.4	33.6	24.1
18	33.5	25.1	31.8	25.2	35	25	33	24.4	33.7	24.9	33.5	25	31.6	22.4	32.8	24.2
19	34.9	25.4	34.2	25.2	35	24.9	32	24.7		24.6	34.7	25.6	34	22.4	32.1	23.5
20	34.3	25.3	34.3	24.7	35.7	24.7	33	24.4	34.7	24.3	33.3	24.3	32.2	22.7	32.5	24
21	34.3	24.1	35.5	23.8	35.7	24	34.2	24.3	34	23.6	34	24.3	33.4	22.6	32	24
22	34.9	25	33.4	25	35.9	25.3	34	24.5	34	24.7	34.6	25.1	32.7	23.5	32.4	24.1
23	33.8	25	32.9	25.4	34	26.2	33.5	24.5	33.5	23.1	32.8	26.4	31.6	23.8	30	22.8
24	35.2	24.2	34.9	23.7	34	24.8	32.2	24.8	33.3	23.4	37	24.7	34.5	24	31.7	22.5
25	36.3	24.9	34.8	24.4	35.4	24.5	32.8	24	33.3	23.7	34.9	24.9	34.6	23	31.9	24.1
26	36.5	24	35.3	24.5	35.9	23.8	32.8	24.4	33.3	23.6	35.5	24.7	34	23	32.4	24.3
27	34.8	23.9	33.8	24.2	35.1	24	32.8	25	33.3	23.6	35.5	24.7	34.1	23.5	32.4	24.5
28	35.1	24.9	34.4	23.8	36	25	33.4	25.3	34.2	23.7	34.3	25.1	33.3	24.2	32.4	23.5
29	35.1	25	36	25.4	34	24	33.2	24.9		23.6	34.4	25	34.6	24	32.4	23.2
30	35.3	25	36.7	25.4	34	24	33.3	25.2	34	23.7	34	25.5	34.3	24.3	32.5	23.5
31	35.2	24.8	36.2	24.2	35.8	23.6	34.6	25.4	33.5	23.4	34.6	24.5	34.6	24.3	32.5	22.2
Mean	35.3	24.9	34.3	24.9	35.3	24.3	33.1	24.9		23.9	35.6	24.8	35.3	23.7	33.1	23.7

Day.	San Isidro.		Tarlac.		Baler.		Dagupan.		Bolinao.		Baguio.		San Fernan- do, Union.		Echague.	
	Maxi- mum.	Mini- mum.	Maxi- mum.	Mini- mum.	Maxi- mum.	Mini- mum.	Maxi- mum.	Mini- mum.	Maxi- mum.	Mini- mum.	Maxi- mum.	Mini- mum.	Maxi- mum.	Mini- mum.	Maxi- mum.	Mini- mum.
	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.
1	39.6	24.5	38.2	23.4	34.6	22.4	35.3	24.2	35	26.5	25.8	16.7	35.2	26.3	30.7	23.4
2	39.6	23	39	23.5	35.5	23.2	34.8	24.5	34.9	25.6	26.2	16	34.8	26.5	39.7	24.8
3	38.8	24.4	39.2	23.7	35.5	22.8	35.9	24.5	33.5	24.1	26.8	15.5	36.8	24	37.3	23.7
4	37.6	24.9	38.6	23.5	37	23	35.3	25	34	25.9	26.8	15.6	36.2	25.2	38.7	23.5
5	36.5	23.9	39.2	24.6	33.2	23.2	32.7	24.4	33.6	26	24.8	15.9	34.3	25.4	35.4	24.9
6	33	24.2	35.4	24.3	33.9	23.9	38.4	23.6	38	23.1	25.2	15	35.8	24.8	35.2	22.5
7	34.8	24.9	36	24.3	34	23.9	38.4	23.8	33.5	24	23.8	15.8	33.8	24.4	32.8	22.9
8	34.4	24.9	36.4	24.4	30.9	24.5	36.8	24.9	34.5	23.9	24.6	15.8	34.1	24.7	32.4	22.4
9	35.6	23.3	36.4	24.3	33.3	23.2	37.4	24.5	35.9	25.7	24.8	15.7	35.6	24.3	34.9	21.9
10	38.1	23.1	39	22.7	32.3	22.5	37.8	24	34.5	25.6	25.8	16.1	36.6	26.1	37	21.4
11	38.7	25.5	39.6	25.5	34.7	23.7	35.2	26.4	34.5	26	26.3	16.7	36	26.6	38.8	23
12	38.5	24	39.8	23	34.8	23.9	33.8	26.1	34.6	25	27.2	16.1	35.1	24.7	37	24.3
13	37.1	24.8	39.6	25.3	36.9	24.6	35.8	26	34.6	24.9	26.8	16.7	37.1	26.1	36.3	23.8
14	36.9	25.9	39.5	24.5	37.2	24.7	36.5	25.6	35.5	25.2	26.3	16.2	37.8	26.4	39.2	23.9
15	31.8	24.9	36.2	25	37	26.1	32.1	24.9	31.1	25	22.5	16	33.6	24.5	35.1	23.5
16	36.2	25.8	36.5	24.7	35	24.3	34.3	25.5	33.1	25.5	24.6	17	34	25	35.3	23.8
17	36.6	24.4	37	24	33	23	36.9	24.6	32.5	25.6	24.3	16.9	35.4	25.8	33.4	23.4
18	33.5	24.8	35.2	24.1	34	24.3	36.3	24.4	32.5	25.6	23.6	16.7	36.9	25.6	33.9	23.8
19	34.5	24.5	34.9	24.6	33.4	23.7	34.4	24.4	31.4	25	23.9	16.6	36	25.3	35	23
20	33.9	24.1	33.2	24.5	34.5	24.1	33.5	24	31.5	24.9	23.4	16.2	36	25.8	33.3	22.6
21	33.5	23.8	33	25	34.3	24.2	35.4	24	32.1	25.2	23.8	16.2	36.2	25.8	34.7	23.8
22	33.4	23.9	34.4	23.8	37.2	24	34.9	24	33.1	25	23.9	16.8	37.1	25.8	31.4	23.1
23	32.8	24.6	33.4	24.5	38.2	23.6	34.8	25	31.5	25.4	23.8	16.6	37.5	24.1	34.9	23.6
24	34	24.5	35	23.6	35	23.8	36.9	24.4	32.5	25.2	23.7	16.9	33.2	23.7	35	23.6
25	34.4	24.6	34.6	24.4	34.6	24.9	36.5	24.5	32.5	25	23.5	16.5	33.8	23.7	32.3	23.8
26	34.7	24.7	34.6	24.4	34	24.1	35	24.5	33	24.9	23.5	16.6	34.4	24.5	35.8	23.6
27	35.4	24.4	33	23	34.3	23.7	34.9	24	33.1	24.9	24.7	16.1	34.8	25.5	36.7	22.5
28	33	24.6	35.6	23.3	35.1	23.8	34.9	24.3	32.5	24.6	24	16	35	26.2	35.3	23.9
29	35	23.9	36	23.5	36.4	24.7	34.4	25.6	32.5	24.5	24.7	16.3	33.8	24.1	34.7	24
30	34.9	25	37	24.5	36.5	23.6	33.8	25	32.7	25.3	23.4	16.3	33.5	25.8	35.4	24.1
31	35.4	23.7	37	23.4	36.5	24	33.8	25.3	32.5	24.9	25.1	16.2	34.7	24.8	36.3	22.7
Mean	35.6	24.4	36.5	24	34.9	23.9	35.3	24.7	33.4	25.1	24.8	16.2	35.3	25.2	35.6	23.4

Maximum and minimum temperatures at the stations of the Weather Bureau, May, 1915—Ctd.

Day.	Candon.		Vigan.		Tuguegarao.		Laoag.		Aparri.		Santo Domingo, Batanes.	
	Maxi- mum.	Mini- mum.	Maxi- mum.	Mini- mum.	Maxi- mum.	Mini- mum.	Maxi- mum.	Mini- mum.	Maxi- mum.	Mini- mum.	Maxi- mum.	Mini- mum.
	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.
1	33.1	26.2	33.8	26	39.5	26	36.8	24.2	32.2	24.5	31.6	25
2	33	26.5	33.5	25	39	25.6	34.8	23.5	30.8	25.2	30.6	24
3	33	26	33.5	24	38.7	24.7	35.8	23.3	32	24	31	22.7
4	33	27	33.2	24.5	38.4	23.4	34.1	23.5	31.8	24.6	26.8	23.3
5	32	25.2	32.3	23.5	35.8	23	34.7	23.4	29.9	23.8	28.6	22.3
6	33	25.7	34.4	25	34.8	23	35.6	23.8	31.4	23	29.8	23.6
7	33.2	25.1	33	24.4	35.1	22.6	36.1	23.3	30.6	23.4	26.7	23.3
8	32.1	24.4	33.9	24	34.2	23.2	35.2	22.4	30.2	23.1	27.6	22.3
9	32.5	25	33.5	25.9	37.2	23	35.1	21.8	33.6	23.9	30.3	22.4
10	32.7	26	33.7	25.5	40.1	23.3	34.8	23.9	34.7	24.4	31	25.4
11	33.3	27.1	34.2	26.1	39	25.4	35.8	25	32.6	25	30.2	23.8
12	33.3	26.2	34.7	25.2	40.4	25.2	35.5	25.1	32.9	24.5	30.2	24.9
13	33.5	25.5	35.2	24.5	39.6	25	36.5	24.2	32.4	24.7	29.7	23
14	34.5	27	34.5	22.2	39.5	24.8	35.1	24.9	35.6	24.1	29.7	23.5
15	31.2	25.4	32.5	22.9	36.3	24.3	30.7	21.1	28.5	23.5	28.3	22.2
16	31.5	25.3	32.4	24.2	37	24.5	32.2	24	30.4	24.5	29.9	21.7
17	31.9	26.5	33.1	26	35	23.7	33.1	24.9	31.5	23.8	29.7	24.1
18	33.4	26.2	33.5	25.8	35.9	23.9	34.6	24.7	32.7	23.7	29.6	23.7
19	31.7	26.1	32.7	25.5	35.2	23.1	32.7	24.5	31.4	23.8	30.2	25.1
20	32.3	26.5	32.8	26.2	33	23.5	32.3	24.6	29.5	24	28.9	24
21	32.7	26.4	33.3	25.1	35.5	23.9	34.5	24.7	33.3	24	30.1	24
22	33	25.6	33.6	25.6	32.5	23.6	34.8	24.7	32.6	23.8	30.3	24.8
23	32.5	26.5	33	23.7	36.4	24	34.8	25	33.6	24.6	31.3	26
24	31.5	25.2	32.1	24.3	35.5	24	33.6	23.4	32.7	24.6	29.9	24.7
25	30.2	25.6	32.1	23.9	35.8	25.1	32.7	23.9	33	25	29.8	24.7
26	32.5	25.5	33	24.4	33	22	34	24.4	33.6	24.6	31.3	25.5
27	32.5	26.2	32.7	25.1	36.2	23.4	33.7	24.3	33.1	24.5	28.4	24.4
28	30.5	26	28.7	21.3	32	24.1	27	24	27.6	24.2	27.6	24.3
29	32	24.6	32	24.2	34.5	23.5	33.4	23	31.5	24	29.8	24.8
30	31.7	26	31.6	25.5	35.6	25	32.7	24.4	32.9	25	29.4	23.6
31	32	25.6	31.3	25.2	36	24.6	33.2	24	31.7	25.5	29.6	24.8
Mean	32.4	25.9	33	24.7	36.5	24	34.1	23.9	31.9	24.2	29.6	23.9



SEISMOLOGICAL BULLETIN FOR MAY, 1915.

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EARTHQUAKES FELT IN THE PHILIPPINES.¹

- 1, 4^h 27^m [1, 14^h 07^m]. **Guam (Mariana Islands).** Earthquake of intensity III.
- 1, 14^h 00^m [1, 22^h 00^m]. **Butuan (N Mindanao).** Earthquake shocks of intensity IV, duration 6 seconds.
- 2, 20^h 06^m 30^{ss} [3, 4^h 06^m 30^s]. **Legaspi (SE Luzon).** Oscillatory earthquake, direction N-S, intensity III-IV, duration 5 seconds.
- 8, 5^h 13^m 19^{ss} [8, 13^h 13^m 19^s]. **Mindoro Island and S Luzon.** Earthquake of intensity V, felt throughout the southern part of Luzon and in the Island of Mindoro, affecting an extension of about 250 kilometers in E-W direction and something more in that of N-S. The origin lay some 140 kilometers distant from Manila, consequently with all probability it must be placed in the northern part of Mindoro Island, where the shocks had more intensity than in the neighbouring provinces of Luzon. Some few minutes earlier at 5^h 09^m 38^s [13^h 09^m 38^s] the seismographs at Manila had registered a very light shock originated at the same distance.
- 9, 14^h 14^m 20^{ss} [9, 22^h 14^m 20^s]. **Calapan (NE Mindoro).** Oscillatory earthquake, direction W-E, intensity III, duration 10 seconds. This earthquake must be considered as an aftershock of the preceding one, the distance of its origin to the Observatory being the same.
- 13, 6^h 40^m 08^{ss} [13, 16^h 20^m 08^s]. **Guam (Mariana Islands).** Earthquake of intensity III. The origin of this quake, felt but slightly at Guam, lay in the Pacific at a distance of about 1,500 kilometers east of Manila: it was also registered at the Zikawei Observatory.
- 16, 13^h 55^m 14^{ss} [16, 21^h 55^m 14^s]. **Sabtan and Batan Islands.** Earthquake of intensity VII-VIII, and about 6 seconds duration: accompanied with rumbling sounds. It repeated at 20^h 05^m and 22^h 15^m [17, 4^h 05^m and 6^h 15^m] with much less intensity. About this earthquake we will add some more extensive data next July, when they repeated with far greater intensity and duration.
- 16, 22^h 15^m 50^{ss} [17, 6^h 15^m 50^s]. **N Luzon.** Earthquake of intensity IV-V, duration 13 seconds. It was felt principally in the NE part of the Island in the Cagayan Province: its origin, some 400 kilometers distant from Manila, seems to have been in the Pacific not far from the NE end of Luzon. It was lightly perceptible in the Mountain and Ilocos Norte Provinces, and it must have been also felt in the Babuyan Islands.
- 18, 18^h 47^m [19, 2^h 47^m]. **NE Mindanao.** Earthquake of intensity III-IV, felt in the Peninsula of Surigao and the northern part of Agusan Valley; its origin probably lay in the Butuan Bay.
- 21, 20^h 22^m 05^{ss} [22, 4^h 22^m 05^s]. **Batangas (S Luzon).** Oscillatory earthquake, direction SE-NW, intensity III, duration 4 seconds.
- 27, 1^h 42^m 08^{ss} [27, 9^h 42^m 08^s]. **Sabtan and Batan Islands.** Earthquake of intensity IV, duration 6 seconds.

¹ The intensity of earthquakes is given in the notation known as the Rossi-Forel scale. The time is that indicated by the seismographs at the Central Observatory whenever the disturbance has been registered by them. This fact is denoted by an asterisk (*). Otherwise the time is that noted by the observer who sent the report. All time indications are in Greenwich mean time (midnight=0^h), insular time being added in brackets for the convenience of Philippine readers.

27, 15^h 42^m [27, 23^h 42^m]. Aparri (NE Luzon). Oscillatory earthquake, direction E-W, intensity III, duration 8 seconds.

28, 21^h 34^m 22^s* [29, 5^h 34^m 22^s]. Baguio (W Luzon). Earthquake of intensity II-III.

31, 13^h 50^m [31, 21^h 50^m]. Legaspi (SE Luzon). Oscillatory earthquake of intensity II-III.

RECORDS OF THE MICROSEISMOGRAPH.

[Time: Greenwich mean. Midnight=0^h. Instrument: Wiechert seismograph; 1,000 kilograms. A_N: T₀=9.0, ε=3.31, $\frac{r}{T_0^2}$ =0.039; A_E: T₀=6.2, ε=2.58, $\frac{r}{T_0^2}$ =0.082. Alluvium. 2.40 meters above sea level.]

No.	Date.	Character.	Phase.	Hour.	Period.	Amplitude.		Remarks.
						A _N μ	A _E μ	
100	1	III _r	iP	5 08 14	8-9			
			iS	14 45	9-10			
			iL	20 48				
			M _{N1}	23 44	11	949		
			M _{E1}	24 34	13		234	
			M _{N2}	28 32	14	970		
			M _{E2}	28 33	16		245	
			M _{E3}	30 07	16		202	
			M _{N3}	32 26	13	795		
			F	7 51				
101	1	I	e	8 52				
			F	9 08				
102	2	I	e	4 07				
			F	5 53				
103	2	I _v	eP	20 06 30				SE Luzon.
			L	07 20				
			F	10				
104	3	I _r	e	3 22 39				End overtaken by following earthquake.
			L	31 30				
105	3	II _r	eP	4 07 14				
			iS	11 40	6-7			
			eL	16 32	7-8			
			M _N	18 20	10	226		
			M _E	19 22	9		43	
			F	5 34				
106	3	I _r	e	12 15 19				
			L	19 34				
			F	38				
107	3	I _r	e	21 53				
			L	57 26				
108	5	I _v	eP	0 21 38				
			F	24				
109	5	I _v	eP	8 47 10				
			L	47 31				
			F	53				
110	5	I _r	eP	11 14 22				
			iS	18 47				
			eL	22 06				
			M _E	23 31	10		32	
			F	12 19				
111	6	I _v	eP	23 23 07				
			L	23 30				
			F	28				
112	8	I _v	eP	5 09 38				
			L	09 52				
			F	13				
113	8	III _v	eP	5 13 19				Mindoro Island and S Luzon. Maximum and end in N-S component lost by the force of the shock.
			iL	13 36				
			M _E	14 08	2		936	
			F	38				
114	8	I _v	eP	16 04 56				
			L	05 10				
			F	08				
115	8	I _v	eP	17 33 55				
			L	34 10				
			F	37				

Records of the microseismograph—Continued.

No.	Date.	Character.	Phase.	Hour.	Period.	Amplitude.		Remarks.
						A _N μ	A _E μ	
116	9	Iv	eP	14 14 20				Mindoro Island.
			L	14 14 37				
			M _E	14 42	2	22		
117	12	Ir	F	18				
			e	11 40				
			M _N	46 08	18	9		
118	12	Ir	M _E	47 14	19		5	
			F	12 16				
			e	16 26				
119	13	Ir	F	17 05				
			eP	6 40 08				
120	13	Iv	S	42 48				
			L	45 43				
			M _N	47 00	9	8		
121	14	I	F	7 03				
			eP	8 40 00				
			F	43				
122	16	IIv	e	6 49				Batanes Islands.
			F	7 25				
			eP	13 55 14				
123	16	Iv	iS	56 25				N Luzon.
			L	57 43				
			M _N	58 30	7	247		
124	18	Iv	M _E	58 42	5		90	
			F	14 27				
			eP	22 15 50				
125	20	Iv	L	16 35				
			M _N	18 00	5	110		
			F	27				
126	20	Iv	eP	23 48 49				
			L	49 07				
			F	52				
127	21	Iv	eP	2 27 42				S Luzon.
			L	28 05				
			F	31				
128	24	Iv	eP	23 29 40				
			L	29 52				
			F	32				
129	24	Iv	eP	20 22 05				
			L	22 16				
			M _E	23 20	5	12		
130	25	Iv	F	28				
			eP	9 21 21				
			L	21 42				
131	26	Ir	F	24				
			eP	20 10 18				
			L	13				
132	26	Iv	F	17 00 19				
			eP	20 40 04				
			L	44 03				
133	27	Iv	M _N	45 06	8	38		
			F	57				
			eP	23 27 24				
134	28	Iv	F	33				
			eP	1 42 08				
			L	44 21				
135	28	Iv	F	56				Batanes Islands.
			eP	10 55 55				
			L	56 12				
136	29	Iv	F	11 00				W Luzon.
			eP	21 34 22				
			L	34 49				
137	29	Iv	F	42				
			eP	3 33 44				
			L	34 08				
138	29	Iv	F	38				
			eP	21 11 51				
			L	14				

TEMBLORES DE TIERRA SENTIDOS EN FILIPINAS.¹

1, 4^h 27^m [1, 14^h 07^m]. Guam (Islas Marianas). Temblor de tierra de intensidad III.
1, 14^h 00^m [1, 22^h 00^m]. Butúan (N de Mindanao). Temblor de tierra de intensidad IV, duración 6 segundos.

2, 20^h 06^m 30^s* [3, 4^h 06^m 30^s]. Legaspi (SE de Luzón). Temblor oscilatorio, dirección N-S, intensidad III-IV, duración 5 segundos.

8, 5^h 13^m 19^s* [8, 13^h 13^m 19^s]. Isla de Mindoro y S de Luzón. Temblor de tierra de intensidad V, sentido en toda la parte meridional de Luzón y en la Isla de Mindoro, en una extensión de más de 250 kilómetros en la dirección E-W y otros tantos en la de N-S. El origen distaba unos 140 kilómetros de Manila y así es muy probable estuviese en la parte N de Mindoro, donde en efecto el temblor fué más intenso que en las vecinas provincias de Luzón. Pocos minutos antes 5^h 09^m 38^s [13^h 09^m 38^s] los sismógrafos del Observatorio habían registrado un ligerísimo choque procedente del mismo origen.

9, 14^h 14^m 20^s* [9, 22^h 14^m 20^s]. Calapán (NE de Mindoro). Temblor oscilatorio, dirección W-E, intensidad III, duración 10 segundos. Este temblor debe considerarse como una réplica del precedente, la distancia de su origen al Observatorio de Manila es la misma.

13, 6^h 40^m 08^s* [13, 16^h 20^m 08^s]. Guam (Islas Marianas). Temblor de tierra de intensidad III. El origen de este temblor sentido ligeramente en Guam, se hallaba en el Pacífico a poco más de 1,500 kilómetros hacia el E de Manila: fué también registrado en el Observatorio de Zikawei.

16, 13^h 55^m 14^s* [16, 21^h 55^m 14^s]. Islas de Sabtan y Batan. Terremoto de intensidad VII-VIII, y 6 segundos de duración próximamente; acompañado de ruido subterráneo. Repitió a 20^h 05^m y a 22^h 15^m [17, 4^h 05^m y 6^h 15^m] con menor intensidad. De este terremoto se tratará más por extenso en el mes de Julio, en que se repitieron otros de mayor intensidad y duración.

16, 22^h 15^m 50^s* [17, 6^h 15^m 50^s]. N de Luzón. Temblor de tierra de intensidad IV-V, duración 13 segundos. Sintióse principalmente en la parte NE de la isla, en la Provincia de Cagayán: su origen, distante unos 400 kilómetros de Manila parece deber colocarse en el Mar Pacífico no lejos del extremo NE de Luzón. Fué ligeramente perceptible en la Provincia Montañosa y en Ilocos Norte y debió serlo también en las Islas Babuyan.

18, 18^h 47^m [19, 2^h 47^m]. NE de Mindanao. Temblor de tierra de intensidad III-IV, sentido en toda la península de Surigao y en la parte N del Valle del Agusan, su origen probablemente se hallaba en la bahía de Butúan.

21, 20^h 22^m 05^s* [22, 4^h 22^m 05^s]. Batangas (S de Luzón). Temblor oscilatorio, dirección SE-NW, intensidad III, duración 4 segundos.

27, 1^h 42^m 08^s* [27, 9^h 42^m 08^s]. Islas de Batan y Sabtan. Temblor de tierra de intensidad IV, duración 6 segundos.

27, 15^h 42^m [27, 23^h 42^m]. Aparri (NE de Luzón). Temblor oscilatorio, dirección E-W, intensidad III, duración 8 segundos.

28, 21^h 34^m 22^s* [29, 5^h 34^m 22^s]. Baguio (W de Luzón). Temblor de tierra de intensidad II-III.

31, 13^h 50^m [31, 21^h 50^m]. Legaspi (SE de Luzón). Temblor oscilatorio de intensidad II-III.

¹ La intensidad de los terremotos se indica conforme a la conocida escala de Rossi-Forel. Cuando a la hora de su ocurrencia, adoptamos la indicada por los sismógrafos de este Observatorio siempre que los hayan registrado, distinguiéndola por medio de un asterisco (*). En caso contrario copiamos la apuntada por los observadores que nos envían las notas. Todas las indicaciones del tiempo se refieren al tiempo medio de Greenwich (medianoche=0^h). Para conveniencia de los lectores de Filipinas se añade también el tiempo insular.

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JAN 19 1915

THE GOVERNMENT OF THE PHILIPPINE ISLANDS

WEATHER BUREAU

MANILA CENTRAL OBSERVATORY

BULLETIN FOR JUNE, 1915

PREPARED UNDER THE DIRECTION OF

REV. JOSÉ ALGUÉ, S. J.

DIRECTOR OF THE WEATHER BUREAU

MANILA
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1915

BULLETIN FOR JUNE, 1915.

METEOROLOGICAL BULLETIN FOR JUNE, 1915.

By Rev. JOSE CORONAS, S. J.,
Chief, Meteorological Division of the Weather Bureau.

GENERAL WEATHER NOTES.

Pressure and temperature.—The mean atmospheric pressure of this month is generally higher than that of June of the preceding year in the stations of Luzon, and slightly lower in the Visayas and Mindanao. The monthly mean for Manila differs from the normal of this month by -0.04 mm. The highest pressures for almost all the stations of the Philippines were observed in the 2d and 3d, while the lowest took place on the 27th and 30th in northern Luzon, and on the 9th and 10th in the rest of the Archipelago.

The monthly mean temperature is above that of June, 1914, the differences being even greater than 1° C. in Manila, San Isidro (Nueva Ecija), and Bolinao. The monthly mean for Manila is 0.9° C. higher than the June normal. The extreme temperatures at Manila were 36.9° C. on the 6th, and 23.3° C. on the 22d. The absolute maximum and minimum temperatures for Baguio were: 26.8° C., 15.3° C. on the top of Mirador, and 27.2° C., 14.4° C. in the valley. Particularly noteworthy is the frequency with which some remarkable high temperatures were observed in a few stations of Luzon. So in Manila the maximum daily temperature was nine times higher than 36° C., and in Tuguegarao (valley of Cagayan) it was in four days even higher than 40° C.

PRESSURE AND TEMPERATURE AT THE FIRST AND SECOND CLASS STATIONS FOR JUNE, 1915.

Station.	Pressure.						Temperature.					
	Mean.	Departure from June, 1914.	Highest mean.	Day.	Lowest mean.	Day.	Mean.	Departure from June, 1914.	Highest.	Day.	Lowest.	Day.
	mm.	mm.	mm.		mm.		°C.	°C.	°C.		°C.	
Surigao.....	757.98	- 0.12	759.17	3	756.77	10	27	- 0.3	33.7	5	22	7
Cebu.....	57.96	- .14	59.05	29	56.85	10	28.8	+ .6	34	11	22.3	24
Iloilo.....	57.66	- .29	59.02	30	56.38	9	28.4	+ .9	34.6	11	23	12
Ormoc.....	58.16	- .10	59.33	30	57.02	10	27.6	+ .5	34.6	7	21.7	9
Tacloban.....	58.08	- .07	59.24	3	56.74	10	27.6	+ .4	33.8	2,8	23.3	13
Capiz.....	57.97	- .03	58.96	3	56.86	10	28.3	+ 1	35.7	5	23.2	28
Calbayog.....	58.25	+ .35	59.28	3	57.01	10	26.8	+ .2	35.4	3	22.6	6, 9
Legaspi.....	58.02	+ .50	59.07	6	56.89	9	28.7	+ .7	36	1	23.3	23
Atimonan.....	57.93	+ .49	59.04	3	56.78	10	28.4	+ .7	35	5	23.3	23
Ambulong, Tanauan.....	57.30	+ .09	58.76	3	56.18	10	28.3	+ .8	36.8	11, 19	22	28
Paracale.....	58.31	+ .80	59.50	3	57.30	9	28.3	+ .4	34.6	30	23.6	6
Manila.....	57.91	+ .29	59.20	3	56.88	10	28.8	+ 1.4	36.9	6	23.3	22
San Isidro.....	58.26	+ .56	59.66	3	57.18	9	29	+ 1.5	37.4	25	23.2	11
Dagupan.....	57.18	+ .51	58.61	3	56.12	9, 27	28.9	+ .9	38.4	18	23	11
Bolinao.....	57.46	+ .50	58.94	2	56.17	27	29	+ 1.4	36.5	16	23.9	18
Baguio ^a	636.55	+ .81	637.92	3	635.35	27	19.5	+ .8	26.8	17	15.3	10
Vigan.....	757.48	+ .61	759.04	2	755.95	27	29.1	+ .9	34.7	18	20.3	9
Tuguegarao.....	58.04	+ .98	59.94	2	56.66	30	29.4	+ 1	40.4	23, 28	23	5
Aparri.....	57.91	+ .98	59.72	3	56.60	30	28.5	+ .9	35.2	28, 29	23.4	5

^a The barometric readings of this station are not reduced to sea level.

Rainfall.—Owing to the absence of atmospheric disturbances in the Philippines, there was a lack of rain in a good number of our stations, particularly in the western part of Luzon. The total monthly rainfall for Manila is 107.1 mm. less than the normal of this month, and 241.2 mm. less than the total for June, 1914. The total rainfall for Baguio differs from the June normal by -112.6 mm., and from that of June, 1914, by -171.5 mm.

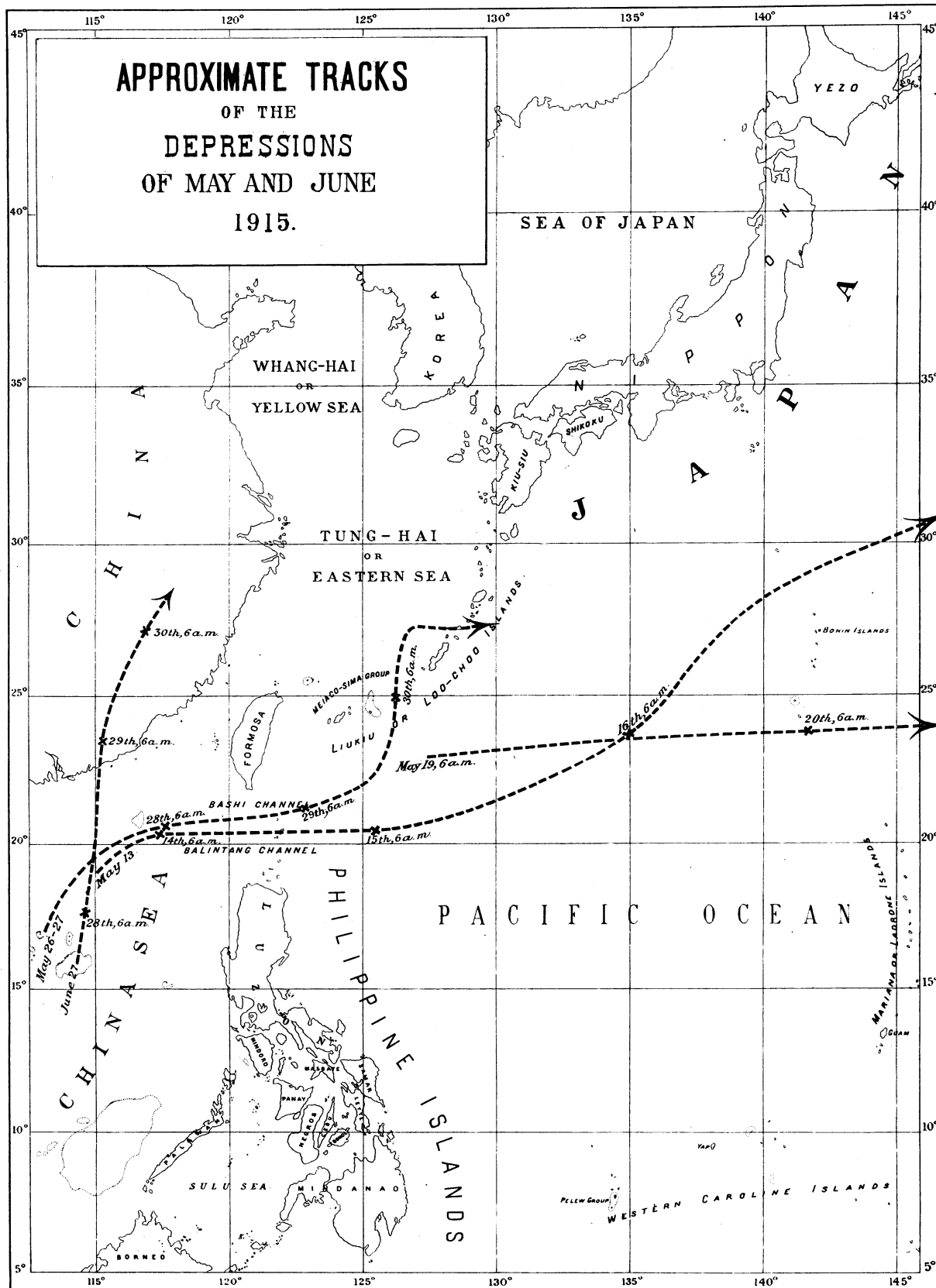
RAINFALL AT VARIOUS STATIONS OF THE WEATHER BUREAU DURING THE MONTH OF JUNE, 1915.

Station.	Total.	Departure from June, 1914.	Departure from normal.	Rainy days.	Departure from June, 1914.	Greatest rainfall in a single day.	Day.	Station.	Total.	Departure from June, 1914.	Departure from normal.	Rainy days.	Departure from June, 1914.	Greatest rainfall in a single day.	Day.
	mm.	mm.	mm.		mm.	mm.			mm.	mm.	mm.		mm.	mm.	
Jolo	434	+137.1	+220.1	24	+ 8	80.3	14	Calapan	283.3	+ 71.1	-----	23	+ 7	64.3	15
Isabela, Basilan	207.8	+ 71.8	+ 3.2	17	+ 2	34.2	21	Virac	353.5	+ 42.5	-----	26	+ 6	82.1	29
Zamboanga	110.9	+ 16	+ 9.6	20	+ 9	33	19	Nueva Caceres	76.5	-347.5	-104.8	15	- 4	29.4	9
Davao	393.8	+115.2	+151.4	18	+ 4	76.2	19	Batangas	54.3	-249.1	-----	11	- 2	20.3	26
Cotabato	363.6	+157.2	+104.8	26	+ 5	54.4	18	Atimonan	200.7	-223.7	+ 32.6	15	+ 5	37.3	15
Cagayan, Misamis	288.5	+155.5	-----	16	+ 2	50.8	23,25,26	Ambulong, Tana-uan	134.2	-225.9	-----	11	- 7	28.9	22
Dapitan	372.2	+218.2	+213.4	20	+ 3	63.5	19	Paracale	154.6	-105.2	-----	22	+10	33.5	25
Butuan	208.8	+ 60.2	+ 56	23	+ 3	34.1	13	Santa Cruz, Laguna	121	-244.7	-----	15	- 3	33.5	26
Dumaguete	98	+ 7.2	-----	12	- 3	33.8	23	Manila	126.7	-241.2	-107.1	10	- 3	53.6	26
Iwahig	353.6	+270.3	-----	23	+ 7	115.4	20	Antipolo	40.7	-583.3	-----	8	- 6	10.9	27
Surigao	205.7	-24.7	+ 76.7	18	+ 2	39.4	21	Iba	389.9	-397.2	-----	20	0	97.8	27
Maasin	137.8	-119.3	- 12.5	9	- 1	54.4	27	San Isidro	22.7	-236.4	-173.1	10	- 5	9	26
Cebu	92.2	-110.7	- 78.7	15	- 3	25.9	24	Tarlac	176.8	- 80.4	- 44.5	13	+ 1	41.1	12
Iloilo	399.9	+ 16.5	+178.5	13	- 6	90.4	23	Baler	623.9	+245.3	+341.3	29	+12	93.5	23
San Jose Buenavista	229.5	-411.3	-119.6	23	- 3	50.1	26	Dagupan	182.4	-242.2	-133.2	16	+ 2	38.6	18
Cuyo	249.8	-276.2	- 33.4	21	+ 2	68.8	26	Bolinao	285.9	-201.3	-109	19	+ 2	69.6	26
Ormoc	127.6	-169.8	- 54.6	18	+ 1	20.4	23	Baguio	286.3	-171.5	-112.6	24	+ 6	45.9	30
Guiuan	398.5	+189.9	-----	25	+10	66.6	28	San Fernando, Union	112.4	-263.9	-172.1	10	- 3	45.5	30
Tacloban	175.2	-111.8	- 26.8	20	+ 5	33.1	16	Echague	124	+ 54.8	-----	8	- 1	43.2	1
Capiz	173.9	- 43.9	-106.9	16	- 6	82.5	11	Candon	36.3	-278.9	-273.8	6	- 5	15.2	26
Borongan	427.5	+195.3	+175.1	28	+ 9	41.4	25	Vigan	85.9	-225.6?	-201.4	8	- 2	44.1	9
Calbayog	364.7	+ 62.8	+186.7	24	+ 2	90.9	26	Tuguegarao	41.6	-117.3	- 79.2	9	+ 2	12.7	2
Masbate	20.3	- 84.1	- 90.5	7	- 4	8.6	25	Laog	90.5	-200.9	-----	12	0	16.5	25
Romblon ^a	149.9	-242.6	- 31.2	13	- 9	53.8	20	Aparri	48.6	- 41	- 67.2	5	- 4	37.6	2
Batag	367.5	+ 40.5	-----	23	+14	65.8	10	Santo Domingo, Batanes	78.8	- 26.1	- 70.9	9	- 3	29	19
Gubat	135.1	-114.5	+ 1.4	17	+ 2	22.1	10								
Legaspi	283.8	+ 12	+ 94.7	23	+ 5	51.5	7								
Sumay, Guam	64.7	- 52.3	-----	17	0	16.5	9								

^a 29 days of observation only.

DEPRESSIONS AND TYPHOONS.

Only one depression was announced this month by the Observatory and even this one was of very little importance. See its track in Plate II together with those of the depressions for last May. This depression was formed on the 27th in the China Sea near the Paracels in about 16° lat. N and 114° or 115° long. E; it moved northward from the beginning, entered China between Hongkong and Swatow in the early hours of the 29th, and, having recurved to the NE, it probably filed up on the 30th near 28° lat. N and 117° or 118° long. E.



NOTAS GENERALES DEL TIEMPO.

Presión y temperatura.—La presión atmosférica media de este mes es generalmente algo mayor que la de Junio del año pasado en las estaciones de Luzón, y ligeramente menor en Visayas y Mindanao. La de Manila difiere de la normal de este mes en -0.04 mm. Las presiones más altas tuvieron lugar en casi todas las estaciones de Filipinas los días 2 y 3; las más bajas se observaron los días 27 y 30 en el norte de Luzón, y los días 9 y 10 en el resto del Archipiélago.

La temperatura media mensual es mayor que la de Junio, 1914, llegando a ser las diferencias mayores de 1°C . en Manila, San Isidro (Nueva Écija) y Bolinao. La de Manila se separa de la normal de Junio en $+0.9^{\circ}\text{C}$. Las temperaturas extremas de Manila fueron 36.9°C . el día 6 y 23.3°C . el día 22. En Baguio se registraron los siguientes valores extremos: 26.8°C ., 15.3°C . en la cumbre del Mirador, y 27.2°C ., 14.4°C . en el valle. Merece llamar la atención la frecuencia con que se registraron este mes temperaturas notablemente altas en algunas estaciones de Luzón: así en Manila se observaron hasta 9 veces temperaturas máximas diarias mayores de 36°C .; y en Tuguegarao la temperatura máxima absoluta llegó a ser en 4 días mayor de 40°C .

Precipitación acuosa.—Debido a la ausencia de perturbaciones atmosféricas en Filipinas ha habido un déficit de lluvia bastante notable en muchas de nuestras estaciones, particularmente en la parte occidental de la Isla de Luzón. Así la cantidad de lluvia caída en Manila se diferencia en -241.2 mm. de la de Junio, 1914, y en -107.1 mm. de la normal de este mes. La lluvia total de Baguio es menor que la normal en 112.6 mm., y menor también que la del año pasado en 171.5 mm.

DEPRESIONES Y TIFONES.

Sólo una depresión fué anunciada por el Observatorio durante todo este mes, y aun ésta fué de muy poca importancia. Véase su trayectoria en la Lámina II juntamente con las depresiones de Mayo. Formóse el 27 en el Mar de China cerca de las Islas Paracels en los alrededores de 16° lat. N y 114° ó 115° long. E; movióse casi al N desde su origen; penetró en China por entre Hongkong y Swatow en las primeras horas del 29; y recurvando un poco al NE dentro de China, parece haberse deshecho el día 30 cerca de 28° lat. N y 117° ó 118° long. E.

METEOROLOGICAL DATA FOR MANILA CENTRAL OBSERVATORY.*

[φ=14° 34' 41" N; λ=120° 58' 33" E; barometer above sea, 14.2 meters; gravity correction not applied, -1.72 mm.]

Table with columns: Day, Pressure (mean), Air temperature (Mean, Maximum, Minimum), Underground temperature (0.25 meter, 0.50 meter, 1.50 meters, 2.50 meters), Relative humidity (mean), Vapor pressure (mean), Radiation (Minimum on grass, Maximum in sun, Black bulb in vacuo), Evaporation (Free exposure, Shelter), and Mean Total Departure from normal.

Table with columns: Day, Wind (Prevailing direction, Total movement, Maximum hourly velocity, Direction at the time of the maximum velocity), Clouds (Amount, Form and direction: Upper, Lower), Sunshine (h. m.), Rain (24 hours beginning 6 a. m., On the tower, In the park), and Miscellaneous.

* All the mean values given in this table are deduced from hourly observations.
b These values are taken from instruments mounted in the Observatory Park, 1.5 meters above ground.

METEOROLOGICAL DATA FOR MIRADOR OBSERVATORY, BAGUIO.^a

[φ=16° 25' N; λ=120° 36' E; barometer above sea, 1,512.5 meters; gravity correction not applied, -1.65 mm.]

Day.	Pres- sure ^b (mean).	Air temperature at Mirador (on the top of the mountain).					Air temperature in the valley (near the city hall).					Relative humid- ity (mean).	Vapor pres- sure (mean).	Radiation.		Evaporation.	
		Mean.	Maxi- mum.	Hour.	Mini- mum.	Hour.	Maxi- mum.	Hour.	Mini- mum.	Hour.	Mini- mum on grass.			Maxi- mum in sun. Black bulb in vac- uo. ^c	Free ex- posure (total)	Shel- ter (total)	
		mm.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	Per ct.			mm.	°C.	°C.	mm.
1	636.56	20.3	25.9	2.00p.	16.1	5.55a.	25.6	2.05p.	15	6.00a.	80	15	14.2	46	3.8	1.7	
2	37.84	18.6	24	9.20a.	16.7	1.30p.	26.1	10.40a.	16.4	2.45p.	85	13.6	16.1	42.5	2.3	1.7	
3	37.92	20.1	25.2	9.50a.	16.2	2.50a.	25	2.40p.	15.2	5.00a.	77.5	13.6	14.5	47.5	4.2	2.1	
4	37.16	19.4	25.1	0.35p.	15.6	4.50p.	24.1	10.25a.	15.6	12m.n.	77.8	13.1	16?	47.7	3.4	2	
5	36.70	19.5	25.2	11.40a.	16.1	5.50a.	25.3	1.00p.	14.4	6.00a.	82.7	14	14.3	45.9	3.3	1.3	
6	37.36	19.5	25	0.35p.	16.4	6.00a.	25.9	Noon	14.8	12m.n.	85.5	14.3	16	47.3	4.7	2.2	
7	37.34	19.3	24.6	10.25a.	16	5.20a.	25.5	10.50a.	14.5	4.50a.	83.5	13.8	14.7	42.2	4.2	2	
8	36.55	19.3	24	1.35p.	16.4	5.15a.	23.8	10.10a.	15.3	6.10a.	86.3	14.4	15	46.3	1.9	1	
9	35.68	18.5	22.8	11.00a.	16.6	3.50p.	22.5	1.55p.	15.5	5.30a.	91.2	14.4	15.2	48.5	1.6	1.1	
10	35.64	18.5	23.3	11.20a.	15.3	5.10a.	23.6	11.40a.	14.7	5.20a.	86.8	13.8	14.3	47	2.3	1.4	
11	36.13	19.3	23.5	10.20a.	16	5.50a.	24.3	10.40a.	15	3.55a.	85	14.2	14.6	44.5	2	1.2	
12	36.33	18.7	22.9	11.50a.	16.7	11.50p.	22.8	10.10a.	16	6.10a.	90.5	14.5	15.3	43.1	1.3	1	
13	36.61	19.6	25.4	0.45p.	16.7	0.20a.	24.5	1.40p.	16.6	3.00a.	83.7	14.1	16.1	47.7	3.2	1.7	
14	36.42	20.2	24.1	1.20p.	16.7	5.30a.	24.5	1.30p.	16.5	5.50a.	79.8	14	16	43.1	4.8	1.9	
15	36.71	19.8	24.8	Noon	17.6	5.55a.	25.6	0.15p.	17.6	6.10a.	80.3	13.7	16.6	47.8	5.2	3.1	
16	37.58	20.3	25.4	0.40p.	17.4	12m.n.	26.6	0.50p.	17.5	5.50a.	81.5	14.3	16.8	44.7	4.8	2.8	
17	37.31	20.9	26.8	1.20p.	16.8	4.30a.	27.2	2.25p.	16.4	5.20a.	79.5	14.2	15.4	47.2	4.6	2.7	
18	36.70	20.8	25.9	11.20a.	17.1	5.40a.	26.6	11.30a.	16.3	5.45a.	82.2	14.8	15.9	48.2	3.2	2	
19	36.40	19.5	25	9.50a.	17.5	6.00a.	25.2	10.45a.	17.4	6.00a.	90.8	15.3	16.8	41.5	1.4	1	
20	36.14	18.8	23.8	1.00p.	16.7	9.00p.	23.7	11.35a.	16	5.50a.	93.8	15.1	15.5	45	8	1	
21	36.31	18.9	23.7	9.45a.	16.2	2.00a.	24.1	10.15a.	15.2	6.00a.	90.2	14.6	14.3	40	5	.3	
22	36.34	20	24.5	2.10p.	16.3	5.45a.	24.3	11.00a.	15.7	6.40a.	85.8	14.7	15.5	48	1.4	1.2	
23	36.16	19.2	24.2	9.20a.	16.7	5.45a.	24.2	10.30a.	16.2	6.10a.	93.8	15.6	15.4	46.2	7	.8	
24	36.08	19.8	25.2	1.55p.	17.1	5.40a.	25.2	11.10a.	16.7	5.55a.	87.8	15.1	16.2	44	2.3	1.5	
25	36.18	20	25.8	11.55a.	16.8	5.50a.	26	1.20p.	16.5	5.55a.	89.2	15.3	16.1	43.5	2.6	1.1	
26	35.95	20.5	25.5	2.20p.	17.2	5.45a.	25.7	2.10p.	16.4	5.55a.	81	14.2	16	48.5	4.3	2.2	
27	35.35	19.2	23.3	2.10p.	17.1	6.00a.	23.9	1.00p.	17.1	12m.n.	90.2	14.8	16.6	48	2.9	1.2	
28	36.08	18.8	23.3	1.25p.	16.4	3.00a.	23.6	11.20a.	16.4	2.55a.	93.5	15	15.7	46	1.7	.8	
29	36.39	18.8	22.7	9.30a.	16.7	5.55a.	22.8	4.40p.	16.5	6.05a.	86.8	14	15.4	44	2.1	1.1	
30	36.58	19	24	0.55p.	16.7	5.25a.	23.6	1.05p.	16.5	6.00a.	88.3	14.5	15.3	42.3	2.3	1	
Mean	636.55	19.5	24.5		16.6		24.7		16		85.7	14.4	15.5	45.5	2.8	1.5	
Total															84.3	45.6	

Day.	Wind.				Clouds.		Sun- shine.	Rain, 24 hours begin- ning 6 a. m.	Miscellaneous.
	Prevailing direction. ^d	Total move- ment.	Maxi- mum hour- ly veloc- ity.	Direction at the time of the maximum velocity.	Form and direction.				
					Upper.	Lower.			
		Km.	Km.		0-10.				
1	W	339.3	25.4	W	6.4	Ci.-S.	Cu.-N. WNW	h. m.	
2	NE quad.	232.6	17.7	SW	7.7	A.-Cu.	Cu.-N. SE	9 05	38.8
3	E	323.5	29.5	W	4.1	Ci.	Cu.-N. W	8 30	1.3
4	E, W	337.9	29.2	NE	5.1	A.-Cu.	Cu.-N.	6 45	32.3
5	SE	213.2	19.9	W	7.9	A.-Cu.	Cu.-N.	6 35	
6	E, SE	322.8	23.1	E	6.3	Ci.	Cu.-N. SE	7 30	
7	E	422.3	32.7	E	7.4	Ci.	Cu.-N.	7 10	15.5
8	E	255.2	23	NW	5.7	Ci.	Cu.-N. ESE	6 25	12.5
9	SE				9	Ci.	Cu.-N. WSW	2 55	8.9
10	E				7.9	Ci.-S.	Cu.-N.	4 00	26.7
11	E	305.9	18	E	6.9	Ci.	Cu.-N.	5 50	5.3
12	E	273.2	17.9	SE	7.9	Ci.	Cu.-N.	5 15	17.3
13	SE	313.2	21.4	SE	7.7	Ci.-S.	Cu.-N. SSW	7 05	
14	E	330.2	25.9	E	6.6	Ci.-S.	Cu.-N. SE	5 35	
15	E	566.9	42.6	E	5.4	Ci.	Cu.-N.	7 10	.3
16	E	441.9	34.1	E	4.7	Ci.	Cu.	8 15	
17	SE, E	333.5	32	E	5.1	Ci.	Cu.-N.	9 25	1.3
18	E	331.9	22.5	E	5.1	Ci.	Cu.-N. SW	7 30	13.2
19	E	300.8	23.5	SE	6.4	Ci.	N. ESE	4 25	
20	W	261	26.6	W	8.4	Ci.-S.	Cu.-N. NEbyN	5 15	21
21	E		23.5	W	7.4	Ci.	Cu.-N. S	4 50	7.2
22	E	264.8	22	SE	4.6	Ci.	Cu.-N. WSW	4 25	1.6
23	W, E	239.7	22.3	W	6	Ci.	Cu.	7 50	3.3
24	SE	324.1	21.4	W	5.1	Ci.	Cu.	7 00	5.1
25	E	278	23.5	NW	4.9	Ci.	Cu.-N. SE	8 30	4.1
26	E	294.3	25.7	E	4.9	Ci.	Fr.-Cu. SE	8 50	1.8
27	E	649.9	34.4	E	9.1	A.-Cu.	Fr.-Cu. SE	6 30	9.2
28	SE, S	274.6	26.4	SE	7.4	A.-Cu.	N. SW, SbyE	7 05	8.6
29	SE	346.7	30	W	5.6	A.-Cu.	Cu.-N. SW	7 25	4.1
30	W	454.5	36	W	6.4	Ci.	Fr.-Cu. S	7 25	45.9
Mean		334.1	26.1		6.5			6 40	
Total								199 45	286.3

^a All the mean values given in this table are deduced from six daily observations taken at 2, 6, 10 a. m. and 2, 6, 10 p. m.
^b The barometric readings of this station are not reduced to sea level.
^c Maximum of hourly observations taken from 6 a. m. to 6 p. m.
^d This element is based on hourly observations taken from a quadruple register, which gives only eight possible directions of the wind.

METEOROLOGICAL BULLETIN.

DAILY RAINFALL AT THE STATIONS OF THE WEATHER BUREAU, JUNE, 1915.

Station.	Day of month.															
	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.
Jolo	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.
Isabela, Basilan	38.1	4.3	30	2.5	11.2	28.2	8.6	45.4	19.3	4.8	4	20.5	30.3	2	1.5	
Zamboanga	0.2	1	1.3	8.9	2.3	6.9	13.7	1.3	12.2	1	12.7	14	1.5	10.4	43.2	
Davao	3.3	20.8	12.2	2.8	46.5	6.9	2.8	38.9	.3	4.3	9.7	2.3	15	13.7	8.4	
Cotabato	12.2	2.8	46.5	9.9	5.3	2	4.6	12.7	1.3	12.2	1	12.7	2.5	13.5	11.9	
Cagayan, Misamis	35.1	4.3	6.9	2.8	43.2	8	48.5	44.2	1.3	.5	8	7.4	27.4	13.7	1.8	
Dapitan	.8	.3	8.6	4.6	17.8	17.3	1	1	1.3	12.9	1	2.3	34.1	8.6	3.3	
Butuan	1.3	10	1	4.3	1.3	1	1	9.6	5.9	6.9	4.7	7.2	16.7	.7	9	
Dumaguete	10	6.4	4.3	1.3	17.3?	1	7.7	5.8	2.5	16	4.1	16	4.1	2.3	17.3	
Iwahig	17.3	6.4	4.3	1.3	17.3	1	7.7	5.8	2.5	16	4.1	16	4.1	2.3	17.3	
Surigao	17.3	6.4	4.3	1.3	17.3	1	7.7	5.8	2.5	16	4.1	16	4.1	2.3	17.3	
Maasin	17.3	6.4	4.3	1.3	17.3	1	7.7	5.8	2.5	16	4.1	16	4.1	2.3	17.3	
Cebu	6.4	4.1	2.3?	3.8	3	2	8	1.8	16	16	4.6	5.6	6.6	1.8	1.8	
Iloilo	3	34.5	5.9	7.3	8	2.1	8	3.8	4.1	2.1	10.2	17	5.6	6.6	1.8	
San Jose Buenavista	3	34.5	5.9	7.3	8	2.1	8	3.8	4.1	2.1	10.2	17	5.6	6.6	1.8	
Cuyo	3	34.5	5.9	7.3	8	2.1	8	3.8	4.1	2.1	10.2	17	5.6	6.6	1.8	
Ormoc	28.7	58.2	.6	5	30.2	3.1	26.4	14.2	24.6	10.4	.8	7.6	2.3	2.3	2.1	
Guiuan	28.7	58.2	.6	5	30.2	3.1	26.4	14.2	24.6	10.4	.8	7.6	2.3	2.3	2.1	
Tacloban	27.4	8	8	3.3	3	5.1	1.6	18.8	4.1	18.8	7.1	32	8.7	19.6	36.3	
Capiz	8.1	23.1	4.6	3.6	13.5	4.1	22.4	1	9.1	40.4	47	3.8	2.5	8	8	
Borongan	8.1	23.1	4.6	3.6	13.5	4.1	22.4	1	9.1	40.4	47	3.8	2.5	8	8	
Calbayog	2.5	21.1	1.8	1.8	1.8	3	2	65.8	22.1	6.4	14.2	1.3	15.7	17.6	17.6	
Masbate	(a)	1.3	1.5	18	6.3	3	2	65.8	22.1	6.4	14.2	1.3	15.7	17.6	17.6	
Romblon	(a)	1.3	1.5	18	6.3	3	2	65.8	22.1	6.4	14.2	1.3	15.7	17.6	17.6	
Batang	(a)	1.3	1.5	18	6.3	3	2	65.8	22.1	6.4	14.2	1.3	15.7	17.6	17.6	
Legaspi	(a)	1.3	1.5	18	6.3	3	2	65.8	22.1	6.4	14.2	1.3	15.7	17.6	17.6	
Gubat	(a)	1.3	1.5	18	6.3	3	2	65.8	22.1	6.4	14.2	1.3	15.7	17.6	17.6	
Sumay, Guam	1.3	1.3	1.3	22.6	51.5	9.7	2.8	8	1.3	8.6	8.8	11.7	33.6	2.5	2.5	
Calapan	1.3	1.3	1.3	22.6	51.5	9.7	2.8	8	1.3	8.6	8.8	11.7	33.6	2.5	2.5	
Virac	25.4	2.1	17.8	5.1	2	7.1	4.1	13.7	1.3	13	52.1	64.3	11.9	11.9	11.9	
Nueva Caceres	13	1.4	3.4	1.4	2.3	29.4	.5	14.7	.5	14.7	.5	14.7	.5	14.7	.5	
Batangas	13	1.4	3.4	1.4	2.3	29.4	.5	14.7	.5	14.7	.5	14.7	.5	14.7	.5	
Atimonan	13	1.4	3.4	1.4	2.3	29.4	.5	14.7	.5	14.7	.5	14.7	.5	14.7	.5	
Ambulong, Tanauan	13	1.4	3.4	1.4	2.3	29.4	.5	14.7	.5	14.7	.5	14.7	.5	14.7	.5	
Paracale	13	1.4	3.4	1.4	2.3	29.4	.5	14.7	.5	14.7	.5	14.7	.5	14.7	.5	
Santa Cruz, Laguna	13	1.4	3.4	1.4	2.3	29.4	.5	14.7	.5	14.7	.5	14.7	.5	14.7	.5	
Manila	6	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	
Antipolo	10.7	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	
Iba	10.7	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	
San Isidro	10.7	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	
Tarlac	2.3	13.7	2.3	26.2	9.7	1.3	4.3	13.5	3.3	5.8	66.5	6.6	13.8	10.7	46	
Baler	2.3	13.7	2.3	26.2	9.7	1.3	4.3	13.5	3.3	5.8	66.5	6.6	13.8	10.7	46	
Dagupan	2.3	13.7	2.3	26.2	9.7	1.3	4.3	13.5	3.3	5.8	66.5	6.6	13.8	10.7	46	
Bolinao	2.3	13.7	2.3	26.2	9.7	1.3	4.3	13.5	3.3	5.8	66.5	6.6	13.8	10.7	46	
Baguio	38.8	1.3	32.3	1.8	30.7	1.5	15.5	12.5	8.9	26.7	5.3	17.3	13.5	.3	.3	
San Fernando, Union	38.8	1.3	32.3	1.8	30.7	1.5	15.5	12.5	8.9	26.7	5.3	17.3	13.5	.3	.3	
Echague	43.2	36.6	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	
Candon	43.2	36.6	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	
Vigan	4.6	12.7	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	
Tuguegarao	4.6	12.7	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	
Laog	3.6	37.6	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	
Aparri	3.6	37.6	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	
Santo Domingo, Batanes	19.5	.1	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	

^a No observation.

MAXIMUM AND MINIMUM TEMPERATURES AT THE STATIONS OF THE WEATHER BUREAU, JUNE, 1915.

Day.	Jolo.		Isabela, Basilan.		Zamboanga.		Davao.		Cotabato.		Cagayan, Misamis.		Dapitan.		Butuan.	
	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.
	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.
1	30.4	21.7	33.8	23.1	31.8	24.5	32.5	23.5	33.1	23.7	34.5	24	37.1	23.6	34.3	24.6
2	27.8	22.6	33.1	22.6	31	24.3	32.2	24	33.9	22	33.7	24.8	35.4	23.6	33.6	24.8
3	29.9	20.3	34.1	23.5	30.9	24.4	32.7	22.9	34.4	23.8	33.8	25	35	23.5	33	24.4
4	30.6	22.1	30.6	23.6	31.5	24.3	31.7	22.5	31.8	22.3	33.7	23.5	33	22.8	33.1	23.2
5	30.5	21.8	30.1	22.4	28.9	23.6	31.8	22.4	34.1	22.7	33.6	23	37	22.9	34.3	24.3
6	29.9	21.9	34	22.1	29.8	21.1	31.2	22	34	23.3	34	23	34.2	23.4	31.5	23.4
7	28.8	21.2	34.1	22.8	31	22.9	31.8	22.4	34.4	22.1	34	23.5	34.4	22.4	34	23.5
8	30.4	22	30.1	22.1	28.1	23.2	31.7	22.8	30.4	23.6	33.7	23.7	34	23.8	34.3	23.7
9	30.8	21.6	32.4	22.1	30.8	23.2	31.8	21.9	31.9	22.2	32.7	22.6	33	22.5	34.3	22.5
10	30.7	21.5	31.6	22.6	29.9	23.8	31.2	22.6	32.3	23.1	33.4	23.1	34.4	23.1	33	23.2
11	33.4	22.3	30.6	22.6	29.5	23.8	31.2	23.5	33.6	24	33.4	23	33.5	23.7	34	23.9
12	30	23.1	30.1	22.8	29	24	32.2	23.6	33.7	24.2	33.5	25.3	31.8	24.4	33.1	24.9
13	30.2	21.8	33.6	22.6	29.7	23.6	31.7	22.5	34.1	23.7	32.1	23.3	34.6	23.8	33.4	24.5
14	29.4	23.3	33.1	23.1	31.5	22.9	32.2	23.3	33.9	22.9	32.3	23.9	34.1	23.4	33.1	23.1
15	31.9	22.3	32.6	23.3	29.5	24.4	32.2	23.8	33.5	24.6	33.2	25.5	33	23	32.5	24.8
16	28.4	23	31.6	23.1	28.5	24.9	27.7	23.5	30.8	24.3	30.5	24.5	32	26.1	28.2	24.4
17	30.9	22.8	34.8	22.8	31.5	24.4	31.7	21.7	33.3	22.9	34	24.4	34.5	23	33.5	23.8
18	27.4	23	32.1	23.9	30.4	25.5	31.7	23.1	34.4	24.3	34.7	24.6	35.2	26.6	31.6	24.3
19	30.4	22.9	29.2	24.1	27.9	23.5	30.2	24	30.1	24.2	33.8	25.4	31.2	23.8	31.8	24.4
20	30	22.8	32.1	23.5	29.4	23.9	30.2	23.1	29.6	24	31.6	24	31.6	22.9	30.7	24.4
21	28.9	22.5	29.1	23.1	27.5	23.9	29.7	23.3	28	23.4	28.9	23.8	32.9	22.9	27.8	23.7
22	28.8	21.2	32.8	22.1	29.7	23.4	26.2	23.4	29.1	23	28.9	24.5	30.6	22.8	27.3	23.2
23	29.4	23	32.6	22.6	29.8	23.8	30.7	21.9	30.7	23.2	31.7	24.4	33	23.3	31.8	23.6
24	30.2	21.8	31.8	22.4	29.9	22.8	28.7	23.5	32.1	23.2	30.7	23.1	31.5	23.7	31	23.2
25	31.5	21.8	31.6	23.1	30.7	23.7	30.9	23	32.2	23.2	32.2	23.5	33.1	22.8	31.3	22.9
26	32.8	22.3	32.8	22.6	30.5	24	29.7	23.3	30.9	23.4	31.2	23	33.2	22.6	33.4	23.4
27	30.6	23.2	32	22.3	30.4	24.3	32.2	22.7	31.9	24	31.7	22.5	34.8	23.1	33.6	23.7
28	31.1	23	32.6	22.6	30	23.1	30.7	23	30.2	23.2	31.1	24	31.9	22.7	31	23.9
29	31.4	22.9	31.6	23.1	30.4	23.6	30.3	22.9	32.4	23.8	33.1	23.8	33.5	22.6	33.6	23.2
30	32.4	22.1	33.2	22.9	30.9	24.3	31.2	22.2	32.1	23.6	32.4	23	35.4	22.2	33.7	23.3
Mean	30.3	22.3	32.1	22.8	30	23.8	31	22.9	32.2	23.4	32.6	23.9	33.6	23.4	32.4	23.8

Day.	Dumaguete.		Tagbilaran. ^a		Iwahig.		Surigao.		Maasin.		Cebu.		Iloilo.		San Jose Buenavista.	
	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.
	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.
1	31	25.3	32.8	24.6	33.6	23.4	33	23	33.8	25.1	33	26.9	34.1	25.6	34.7	24.8
2	31.3	26	33.5	23.7	33.8	23.6	32.3	23.8	33.5	25	33.3	26	34.2	27	35.5	24
3	30.3	25.9	33	24.7	32.8	23.9	29.6	24.3	32	25.2	33	26.9	32.6	25.9	35.4	25.5
4	31.6	25.7	31.4	24.3	32.6	23.8	32.6	22.6	33.1	25	32.5	25.5	32.3	23.9	34.2	25
5	30.8	25.5	32.8	24.3	30.9	23.6	33.7	23.5	32	26	33.1	27.1	34.4	23.5	33.2	23
6	30.8	25.1	32.3	23.4	31.4	23.8	31.1	22.8	32.5	24.8	32.2	25.7	33.6	24	33.4	22.1
7	31.7	26	33.3	23.2	31.6	22.4	31.8	22	34	24.9	33	25.5	33.6	25.4	34.1	24.4
8	30.8	26.1	33.3	23.4	32.7	23	30.8	23.3	32.9	24.7	33.3	25	33.4	25.5	34.1	24.6
9	30.3	24.4	32.5	23.5	33	23.4	31.7	22.5	33.8	24.1	32	24.8	33	25.1	34.2	23.1
10	30.7	24.5	31.6	23.7	32.5	24	31.4	23.3	33.5	24.4	33.6	25.9	32.5	25	33.7	24.1
11	31.6	24.5	31.9	24.5	32.8	23.9	31.6	23.7	34.3	24.6	34	26.3	34.6	24.8	34.8	24
12	31.8	23.7	32.1	25.3	33.4	23	32.2	24	32.5	24.7	33.1	26.3	31.5	23	31.7	25.1
13	30.6	24.8	31.7	24.2	32.4	24.3	31.5	23.2	32.8	25.6	32.1	25.4	32.5	23.7	32.7	24.2
14	30	25.8	31.3	24.4	32	24.5	30.8	23.2	33	24.6	32.1	25.8	32.1	25.3	33.3	24.1
15	32	25.4	32.4	24.6	30.6	24.7	31.9	24.5	34	25	32.5	26.6	33.6	25.8	34.1	24.6
16	31	27.3			32.2	23.1	31.2	24.3	31.8	26.2	32	24.5	33	25.7	34.3	25.3
17	30.7	27.4			30.3	24.5	32.3	24.2	33	26.5	32	26.9	33.1	26	33.3	24.5
18	32.1	27.6			31.2	23.4	31.4	24	32.5	26.8	32.6	26	32.9	25.5	34.3	25
19	31.2	27.6			29.8	23.8	31.9	24.2	33	25.8	32.5	26.6	34.1	23.8	34.8	25.4
20	30.6	25.4			31.5	22.9	31.5	23.7	33.2	26.6	32.6	23.4	32.4	24.8	34.2	24.6
21	31.1	25.2			32	22	30.4	23.5	30.3	26	33	25.5	33	24.5	32.7	24.6
22	30.4	24			31.8	22.2	25.8	23.1	29	24.6	32	25.7	32.5	23.2	32.7	23.5
23	30.8	24.6			32.5	23.5	28.8	22.4	30	23.6	32.1	23	31.6	24.2	32.2	24.5
24	29.7	23.5			31	23	30.2	23.4	29.6	24.6	31	22.3	31.9	24	32.2	24.4
25	29.4	23.6			29.5	23.1	31.8	23.6	31.1	24.1	29	23.1	29.1	24.5	30.7	24
26	32.2	23.5			30.5	22.6	33.3	23.3	33	25.8	31.7	23.4	27.5	23.4	27.7	23.6
27	30.9	24			32.6	22.8	32.3	23.3	32	25	32.4	25.1	31	24.3	31.7	23.5
28	29.8	23.8			31.8	22.9	30.8	23.3	30	23.2	28.5	24.7	30.1	24.3	31.7	23.1
29	31.9	23.6			32.1	22.3	32.5	22.4	32.5	24.5	32	25.4	30.4	25.5	31.7	24.5
30	32	23.6			31.8	23.3	32.3	23.4	30.5	24.8	31.3	25.5	31.9	25.9	31.8	24
Mean	31	25.1	32.4	24.1	31.9	23.4	31.4	23.4	32.3	25.1	32.2	25.4	32.4	24.8	33.2	24.2

^a This station was temporarily closed from the 16th to 30th.

Maximum and minimum temperatures at the stations of the Weather Bureau, June, 1915—Continued.

Day.	Cuyo.		Ormoc.		Guiuan.		Tacloban.		Capiz.		Borongan.		Calbayog.		Masbate.	
	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.
	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.
1.	33.8	25.8	32.8	22.8	32.8	24.6	33.7	24.5	34.8	24.8	34.6	23.2	34.9	23.4	35.4	25.8
2.	33.8	25.5	33	22.5	33.7	24.4	33.8	24.6	35	25	33.7	23.3	33.8	23.6	35.6	27.2
3.	33.8	25.4	31	24.3	28.8	24.5	32.1	25.2	35.2	26.7	33.2	23.7	35.4	23.8	35.4	25.2
4.	30	26.1	32	23.9	32	25	32	24.1	34	25.1	33.3	23.9	29.6	23.7	33.6	24.6
5.	31	25.4	33.8	22.4	33.4	24.3	32.5	24.7	35.7	24.5	33.5	23	33.2	22.9	35	26.2
6.	33	25.2	33.7	22.2	30.3	24.2	32	24.5	34.5	24.5	32.6	23.2	33.1	22.6	34.4	25
7.	33.7	25.9	34.6	23.2	33.6	24.3	33	24.1	34.8	26.5	33.6	23.7	31.7	22.8	34.5	25.5
8.	32.8	25.2	32.7	23.3	32.3	23.9	33.8	24.6	33.9	25	33.1	23.2	32.2	22.9	34.6	27.2
9.	33.6	25	32	21.7	30	23.5	33.4	24	34.4	26	32.9	22.7	32.7	22.6	34.5	25.6
10.	32.2	24.8	32.2	22.2	32.2	24.4	32.5	24.2	33.4	25.5	32.6	23.7	32.1	23.9	33.4	25.5
11.	32.3	24.9	32.4	23.5	29.8	25.3	32.3	25	33.9	26.1	32.7	23.7	31.6	24	34.4	25.4
12.	31.6	24.9	31.8	24.4	31	25.3	31.8	24.6	31.8	23.3	30.5	23.7	32.5	23.4	32.2	25.8
13.	31.8	25.2	33.1	23.4	32.8	25.3	33.3	23.3	32.6	25.1	33.6	23.9	32.2	23.1	34.2	
14.	32.8	24	33.6	23.6	32.5	24.5	33.3	24.1	32.5	24	33.1	23.9	31.8	24.3	35	
15.	31.7	24.9	33	24.4	32.8	25.7	32.4	25.5	33.7	26.7	34.1	23.9	33.5	24.4	35.2	25
16.	32.5	27.5	32.6	25.1	32.6	26.2	31.5	24.8	33.7	26.2	33.6	24.4	33.1	24.3	34.4	25.6
17.	31.5	26.9	34.4	24.5	32.3	25	32.3	24.8	32.9	26.4	31.8	23.3	33.4	24.8	34.6	26.6
18.	33.5	26.5	33.9	24.4	32.1	26.1	31.4	24.9	33.7	27.1	32.1	24.5	33.9	23.8	34.8	24.8
19.	31.8	27	32.7	24.2	32.9	26	32.8	24.7	33.6	26.3	32.7	24.5	31.8	23.6	35.6	23.6
20.	31.2	25.2	33.6	24.1	32.5	23.8	32.5	24	34.2	25.4	33.1	23.4	30.6	24.2	32.2?	23.4
21.	30.9	25.6	32.4	23.2	33	25	32.7	24.7	32.3	24.8	32.6	23.7	30.7	23.2	33.6	25.6
22.	32.3	25.7	31.1	23.2	31.9	25.1	31.5	24.9	33.8	25.4	32.3	23.9	30.7	23.6	36	24
23.	31.3	25.3	31.9	23.9	32.4	24	32.5	24.8	33.6	25.4	32.6	23	30.9	23.5	35	27.2
24.	31.3	24.9	29.3	24.3	28.5	24.9	30.7	24	32.3	24.6	31.5	23.8	31.7	24.3	32.4	25.6
25.	28.7	24.5	31	23.4	28.5	22.5	32.2	23.5	31.5	24.4	31.6	23	30	23.5	34.4	21.8?
26.	27.8	24.1	31.6	24.1	34.1	26.1	32.7	23.6	30.8	23.8	33.2	23.3	32.3	23.3	31.8	24.2
27.	31.4	23.5	32.1	23.5	33.2	24.2	32.6	24.4	33.1	24	33.1	23.6	31.7	23.4	34.2	24.8
28.	31.7	24.2	27.9	23.5	30.3	23.9	27.3	24	32.9	23.2	29.8	23.9	31.9	23.8	34.2	24.4
29.	31.2	23.8	31.2	24.4	33.5	26.1	32	24.6	33.7	25.4	33.1	23.4	31.6	24.7	32.8	25.5
30.	32.4	26.1	30.8	23.4	30.6	25.5	31	23.8	34.3	24.6	31.5	23.1	30.6	23.8	32.6	26
Mean	31.9	25.3	32.3	23.6	32	24.8	32.3	24.4	33.6	25.2	32.7	23.6	32.2	23.6	34.2	25.3

Day.	Romblon.		Batag.		Gubat.		Legaspi.		Sumay, Guam.		Calapan.		Virac.		Nueva Caceres.	
	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.
	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.
1.	38.2	25.9	34	24	33.8	24.7	36	24.2	31.8	24.8	35	23.4	35.2	25	35.7	23.1
2.	36.5	25.8	34	25	33.5	26.4	35.4	26.1	32	24.9	35.2	24	35.9	23	35.1	21.7
3.	36.7	25.7	33.6	24.6?	33.8	26	35.7	27.2	31.8	25.2	35.5	26	35.6	22.1	35.5	21.6
4.	36.5	25.7	33.6	24.6?	31.5	25.3	34.2	24.7	31.6	25	35.1	25	32.7	22	33.9	21.5
5.	36.5	24.8	33.5	24	33.5	24.7	34.4	24.3	31.8	24.4	33.6	24.6	33.1	24.4	34.5	21.5
6.	36.5	25	32.7	24.6	32.6	25.5	32.4	25.7	31.6	23.8	35.6	23.5	33.4	22.1	34.3	21
7.	37.1	27	32.2	23.8	33.5	24.3	34	24.2	31	24.8	34.1	23	33.2	22.4	33.8	21.3
8.	36.4	26.5	33	24	33	24.5	32.7	24.2	32.4	25	34.4	24.2	33	22.6	34.5	21.5
9.	38	25.8	32.3	24	32	25.2	33.7	25.6	30	24.4	33.5	23.6	31.9	21.5	35	21
10.	37.1	27.1	29	24	33.6	24.3	31.1	25.1	30.2	23.4	33.6	23.5	29.8	21.9	33.1	21
11.	36.7	27	31.4	24.9	32.8	25.3	33.2	25.7	29.8	23	33	24.1	33.7	23	33.7	21.4
12.	34.7	25.7	27.3	23.2	30.8	25	31.5	24.7	31.2	25.6	32	24.1	30.5	23.9		22.7
13.	37.1	25.1	31.8	24	33	26	33.8	26.4	31	24.8	33.2	24.1	30.6	23.5	34	21.7
14.	35.6	25.5	29.9	22.7	32.6	24.5	33.2	24.1	31	24.8	33.2	23.1	31.6	22.5	33.8	23
15.	36	25.6	31	24	32.5	26.4	33.6	25.5	30	25.2	33	23.5	32.5	23.8	33.7	23.2
16.	37.2	27.5	31.4	24.2	32	25.8	33.1	25.7	31.2	24.4	34.7	24.7	33.6	24.3	34	23.7
17.	34.1	27.9	29	23	30.5	26.2	33.4	26.2	31.4	25.2	32.8	26.1	33.8	22.2	35	22.5
18.	36.7	27.5	31	25.1	32.2	26.8	33.2	25.7	31.6	24.4	33.1	25.1	30	24.7	34	22.3
19.	36.2	26.9	31.2	24.6	32.7	25.9	33.6	26.2	31.6	25.2	33.6	23	32.4	23.4	34.8	22.9
20.	34.7	23.8	31.4	24	32.2	25	33.9	25	31.8	24.8	32.7	24.1	31.5	23.5	34.9	22.4
21.	32.7	24.2	30.5	25.5	32.4	27.4	33.6	25.7	31.4	25	32.5	24	32.7	21.8	34	21.7
22.	35.1	24.2	31.6	25	32.4	25.1	32.6	26.1	32.8	24.6	33.3	23.8	32	22.3	33.5	20.9
23.	35.4	24.8	31	23.6	31.8	25.3	34	25.1	31.6	25.6	33.5	24	33.1	22.4	34.5	22
24.	33.6	24.5	30.4	24	31.2	25	31.7	25	32.4	25.2	33.4	22.5	31.6	22.6	33.8	22.6
25.	36	24.8	30.9	23	31.7	24.5	33.9	25.1	32.4	25	34	24.3	32.5	22.8	34.5	22.1
26.	33.5	24.3	31	23.5	31.5	26	33.6	24.5	32	25.6	30.5	23.4	32.3	23.8	33.5	22.6
27.	34.5	24.1	31	23	32.1	25	33.8	24.7	31	25.2	32.2	23.6	32.8	24.4	34	23.2
28.	35.2	23.9	32	23.4	33	23.6	34.6	23.3	31.2	24.4	33	23.2	33.5	21.6	34.9	21.7
29.	34	25.3	31	23	33	25.4	32.2	25.3	31.4	24.4	33.2	23	28.5	24	35	22.5
30.	34.6	24.9	31	23	31.7	25	33	25.1	31.8	24.6	33.6	23.8	32.9	22.1	33.4	22
Mean	35.7	25.6	31.5	24	32.4	25.3	33.5	25.2	31.4	24.8	33.5	23.9	32.5	23	34.3	22.1

Maximum and minimum temperatures at the stations of the Weather Bureau, June, 1915—Continued.

Day.	Candon.		Vigan.		Tuguegarao.		Laoag.		Aparri. ^a		Santo Domingo, Batanes.	
	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.
	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.
1.....	32.3	26.1	33	23.8	36.4	25	34.2	23.8	31	24.2	28.6	22.2?
2.....	32.5	26	32.3	24.5	36.8	23.6	34	24.4	31.6	23.8	29	23.3
3.....	32.7	25	33.8	25.2	36.5	23.5	34.3	24.5	31.4	23.5	30.1	21.9
4.....	32.1	26	33	25.5	36.7	23.9	34.5	24.5	31.8	24.3	31.8	23.5
5.....	32.7	25.7	32.8	24.5	36.4	23	34.2	24	33.9	23.4	30.8	24.5
6.....	33.2	26.8	33.5	25.5	38	24.3	34.6	24.6	33.4	24.8	32.2	24.6
7.....	33	25.5	32.9	25	38	23.2	34.2	25.2	33.8	24.6	32.5	26.4
8.....	33	25.6	33.7	24.8	38.4	23.8	34.6	24.5	33.1	25.4	32.4	27
9.....	32.6	25.2	33.2	20.3	39.1	24	34.4	24.2	33.6	24.5	32.4	26.7
10.....	32	25	32.3	23.8	36.8	23.5	34.3	23.2	33.6	24	32.3	26.6
11.....	32.6	25	32.7	25	38.5	24	34.8	23.1	33	23.8	32.4	27.2
12.....	33	25.9	33.2	25	36.7	24.3	35	24.4	34.1	24	32	26.8
13.....	32	25.7	33.8	25	38	24.8	34.7	23.9	33.8	24.2	32.5	25.4
14.....	33.1	26	33.5	25.3	37.8	24.3	35.4	24.3	33.9	24.5	32.5	27.2
15.....	33	25.5	33.8	24.7	36.4	23.7	35.3	24	34.2	24.6	32.4	27.4
16.....	33.1	25.5	33.8	24.5	38.6	24.3	35	24	35.1	25.8	32.4	27.1
17.....	33.5	26.5	33.7	26	38.1	24.5	35.2	24.5	33.7	25.1	32.6	27.9
18.....	33.4	27.5	34.7	24.3	38.6	24.3	35.2	25.4	33.6	25.2	32.5	27.3
19.....	33.5	26.6	34.2	25.8	38.5	25	35.4	24.8	32.2	25.5	32.3	26.1
20.....	33.5	26	33.3	25.5	38.4	24	34.7	25	31.8	25.2	31.8	25
21.....	32.6	25.6	33.3	25.2	39.3	24.2	35.2	24.4	33.4	24.8	32	27.5
22.....	32.7	26	33.7	25.8	39	23.8	34.4	24.6	32.3	25.4	32.6	27.3
23.....	33.5	27	33.9	25.5	40.4	24.5	35.2	24.8	33.6	25.2	32.7	27.4
24.....	33.6	26.4	33.9	25.7	40.1	24.6	35	24.6	34.4	25.5	32.6	26.9
25.....	33.5	27.5	34.2	26.1	40.1	24.1	35.1	25.5	34.4	24.7	32.9	27.9
26.....	33.5	26.7	33.8	25.7	39.1	25	34.7	24.3	34.8	25.1	32.9	27.7
27.....	32.5	26.4	33.5	25.3	36.2	25.9	35.3	25	34.6	26.6	32.5	28
28.....	33	26.5	33.7	26	40.4	25	35.4	25.5	35.2	25.2	32.3	28.2
29.....	33.9	25.4	33.5	26.3	39	24.9	35.3	25	35.2	25.4	32.9	27.5
30.....	33.7	26.8	32.9	23.7	38.7	25.2	35.1	25.4	34	25.6	31.9	28.2
Mean.....	33	26	33.5	25	38.2	24.3	34.8	24.5	33.5	24.8	32	26.4

^a The maximum temperatures for June 16 to 22 have been taken from a self-recording instrument.

SEISMOLOGICAL BULLETIN FOR JUNE, 1915.

By Rev. MIGUEL SADERRA MASÓ, S. J.,
Assistant Director of the Weather Bureau.

EARTHQUAKES FELT IN THE PHILIPPINES.¹

8, 2^h 39^m 00^{s*} [8, 10^h 39^m 00^s]. **N Luzon.** Earthquake felt in the Provinces of Ilocos Norte and Sur, Mountain and Cagayan: its intensity reached number V in the most septentrional part of them. The origin lay some 450 kilometers from Manila, probably in the Babuyan Islands. It was registered only some seconds latter by the seismographs of Taihoku (Formosa).

8, 5^h 05^m 00^{s*} [8, 13^h 05^m 00^s]. **Butuan (N Mindanao).** Oscillatory earthquake, direction ENE-WSW, intensity III, duration 3 seconds.

13, 8^h 00^m [13, 16^h 00^m]. **Zamboanga (W Mindanao).** Oscillatory earthquake, direction E-W, intensity III-IV.

16, 7^h 39^m 27^{s*} [16, 15^h 39^m 27^s]. **Calbayog (NW Samar).** Earthquake of intensity III-IV, duration 4 seconds.

16, 19^h 15^m [17, 3^h 15^m]. **Masbate and N Leyte.** Earthquake of intensity III-IV, chiefly felt in the eastern part of Masbate Island: its origin probably lay near to the Island of Biliran.

17, 14^h 20^m [17, 22^h 20^m]. **Guiuan (SE Samar).** Oscillatory earthquake, direction S-N, intensity III.

17, 23^h 33^m 50^{s*} [18, 7^h 33^m 50^s]. **Mindoro Island and S Luzon.** Earthquake of intensity IV-V felt principally in the whole Island of Mindoro and with less intensity in the southern provinces of Luzon. Its origin seems to have been within the Mindoro Island. It was registered at Taihoku (Formosa), Osaka (Japan) and Batavia.

18, 0^h 05^m 56^{s*} [18, 8^h 05^m 56^s]. **Guiuan (SE Samar).** Oscillatory earthquake, direction SE-NW, intensity III-IV, duration 7 seconds.

19, 4^h 18^m [19, 12^h 18^m]. **Butuan (N Mindanao).** Oscillatory earthquake, direction SE-NW, intensity III, duration 2 seconds.

19, 13^h 30^m [19, 21^h 30^m]. **Iba (W Luzon).** Earthquake of intensity II-III.

20, 1^h 05^m 52^{s*} [20, 9^h 05^m 52^s]. **Butuan (N Mindanao).** Oscillatory earthquake, direction E-W, intensity III, duration 5 seconds. The origin of this earthquake was in the Pacific, E of Mindanao.

20, 13^h 26^m 29^{s*} [20, 21^h 26^m 29^s]. **Baguio (W Luzon).** Earthquake shocks of intensity II-III, duration 4 seconds. The origin of this earthquake, strongly registered by the seismographs at Manila, was at a distance of about 160 kilometers probably in the Province of Nueva Vizcaya; a vast region without any meteorological station and wherefrom it is very difficult to obtain any records.

22, 21^h 28^m 32^{s*} [23, 5^h 28^m 32^s]. **E Samar and NE Mindanao.** Earthquake felt along the oriental part of Samar and Mindanao, in an extension of about 500 kilometers, but with

¹ The intensity of earthquakes is given in the notation known as the Rossi-Forel scale. The time is that indicated by the seismographs at the Central Observatory whenever the disturbance has been registered by them. This fact is denoted by an asterisk (*). Otherwise the time is that noted by the observer who sent the report. All time indications are in Greenwich mean time (midnight=0^h), insular time being added in brackets for the convenience of Philippine readers.

an intensity not superior to the IV degree. Its origin, some 800 kilometers distant from Manila, must be placed in the Pacific between 10° and 11° latitude N, off the coasts of Samar and Mindanao; it had a very long duration; the observer at Butuan gives 50 seconds, the movements felt there being gentle but apparently in different directions, with an aerial peculiar sound. It was registered by all the seismographs of the Far East.

24, $16^{\text{h}} 20^{\text{m}} 53^{\text{s}}$ * [$25, 0^{\text{h}} 20^{\text{m}} 53^{\text{s}}$]. **NE Mindanao.** Earthquake of intensity V in the peninsula of Surigao. Its origin was in the great Pacific Deep, east of the island.

25, $0^{\text{h}} 08^{\text{m}} 48^{\text{s}}$ * [$25, 8^{\text{h}} 08^{\text{m}} 48^{\text{s}}$]. **E Samar.** Earthquake shocks felt along the eastern part of Samar with intensity IV: its origin was 620 kilometers distant from Manila probably in the northern part of the above mentioned Deep.

RECORDS OF THE MICROSEISMOGRAPH.

[Time: Greenwich mean. Midnight= 0^{h} . Instrument: Wiechert seismograph; 1,000 kilograms. A_N : $T_0=9.0$, $\epsilon=3.31$, $\frac{r}{T_0^2}=0.039$;
 A_E : $T_0=6.2$, $\epsilon=2.58$, $\frac{r}{T_0^2}=0.082$. Alluvium. 2.40 meters above sea level.] T_0^2

No.	Date.	Character.	Phase.	Hour.	Period.	Amplitude.		Remarks.
						A_N μ	A_E μ	
138	1	Iu	eP	14 56 45				
			eS	15 06 36				
			L	17 55				
			M_N	23 55	34	3		
			M_E	24 00	38		2	
			M_N	27 22	31	8		
			M_E	29 18	22		3	
		F	16 10					
139	2	Iv	eP	8 36 18				
			L	36 46				
			F	41				
140	4	Iv	eP	5 33 38				
			L	34 18				
			M_E	34 56	3		8	
			F	41				
141	4	Iu	eP	22 05 00				
			S	11 54				
			L	18 34				
			M_N	21 59	17		9	
			F	44				
142	6	Iv	eP	12 28 00				
			F	34				
143	6	IIr	e	21 49 45				
			M_N	22 19 50	11		120	
			F	23 47				
144	7	Ir	eP	22 05 45				
			eS	09 23				
			L	13 11				
			M_N	17 30	11		4	
			F	47				
145	8	IIv	eP	2 39 00				N Luzon.
			L	40 00				
			M_N	40 13	7		178	
			M_E	40 14	6		109	
			F	57				
146	8	Iv	eP	5 05 00				N Mindanao.
			F	17				
147	9	Iv	eP	14 48 15				
			L	48 36				
			F	51				
148	11	Iv	eP	6 27 51				
			F	41				
149	13	Iv	eP	8 01 36				
			L	01 56				
			M_E	02 10	2		10	
			F	07				
150	13	I	e	12 52				
			F	13 09				

Records of the microseismograph—Continued.

No.	Date.	Character.	Phase.	Hour.	Period.	Amplitude.		Remarks.
						A _N μ	A _E μ	
151	14	I	e F	<i>h. m. s.</i> 3 41 4 06				
152	15	Iv	eP L F	10 59 02 59 18 11 02				
153	16	Iv	eP L M _E F	7 39 27 40 33 40 53 48	3		16	NW Samar.
154	17	IIIv	iP iL	23 33 50 33 57				Mindoro and S Luzon. Maxima in both components lost for the recording needles were dismounted by the force of the shock.
155	18	Iv	eP F	0 05 56 46				New slight earthquake. SE Samar.
156	18	Iv	eP F	2 26 36 30				
157	18	Iv	eP F	3 23 44 27				
158	18	Iv	eP F	21 45 28 47				
159	19	Iv	eP F	5 26 36 29				
160	20	Iv	eP F	1 05 52 17				E Mindanao.
161	20	IIv	eP iL M _N M _E F	13 26 29 26 47 27 22 27 34 34	3 4	102	63	Central Luzon.
162	22	Ir	e F	3 44 4 23				
163	22	IIv	eP S L M _E M _N F	21 28 32 30 10 31 28 32 07 32 18 22 03	5 8		69 36	E Samar and NE Mindanao.
164	23	Iv	eP L F	20 23 34 23 46 27				
165	24	Iv	eP L F	15 32 14 32 34 35				
166	24	Iv	eP L F	16 20 53 22 29 31				NE Mindanao.
167	25	Iv	eP L F	0 08 48 09 56 13				E Samar.
168	26	Iv	eP L M _N M _E F	13 35 52 36 10 36 15 36 22 44	1 1	133	87	
169	27	I	eP F	15 31 57 49				
170	29	Ir	e M _E F	13 46 55 24 14 26				

TEMBLORES DE TIERRA SENTIDOS EN FILIPINAS.¹

8, 2^h 39^m 00^{s*} [8, 10^h 39^m 00^s]. N de Luzón. Temblor de tierra sentido en las Provincias de Ilocos Norte y Sur, Montañosa y Cagayán; su intensidad llegó a V en la parte más septentrional de la isla. El origen se hallaba entre 400 y 500 kilómetros de distancia de Manila, probablemente hacia el grupo de las Islas Babuyanes. Registróse también pocos segundos más tarde en Taihoku (Formosa).

8, 5^h 05^m 00^{s*} [8, 13^h 05^m 00^s]. Butúan (N de Mindanao). Temblor oscilatorio, dirección ENE-WSW, intensidad III, duración 3 segundos.

13, 8^h 00^m [13, 16^h 00^m]. Zamboanga (W de Mindanao). Temblor oscilatorio, dirección E-W, intensidad III-IV.

16, 7^h 39^m 27^{s*} [16, 15^h 39^m 27^s]. Calbayog (NW de Sámar). Temblor de tierra de intensidad III-IV, duración 4 segundos.

16, 19^h 15^m [17, 3^h 15^m]. Masbate y N de Leyte. Temblor de tierra de intensidad III-IV, sintióse principalmente en la parte E de Masbate. Su origen se hallaría tal vez hacia la Isla de Biliran.

17, 14^h 20^m [17, 22^h 20^m]. Guiuan (SE de Sámar). Temblor oscilatorio, dirección S-N, intensidad III.

17, 23^h 33^m 50^{s*} [18, 7^h 33^m 50^s]. Mindoro y S de Luzón. Temblor de tierra de intensidad IV-V, sentido principalmente en toda la Isla de Mindoro y con menor intensidad en las provincias meridionales de Luzón. Su epicentro se hallaba al parecer en el interior de Mindoro. Fué también registrado en Taihoku (Formosa), en Osaka (Japón) y en Batavia.

18, 0^h 05^m 56^{s*} [18, 8^h 05^m 56^s]. Guiuan (SE de Sámar). Temblor oscilatorio, dirección SE-NW, intensidad III-IV, duración 7 segundos.

19, 4^h 18^m [19, 12^h 18^m]. Butúan (N de Mindanao). Temblor oscilatorio, dirección SE-NW, intensidad III, duración 2 segundos.

19, 13^h 30^m [19, 21^h 30^m]. Iba (W de Luzón). Temblor de tierra de intensidad II-III.

20, 1^h 05^m 52^{s*} [20, 9^h 05^m 52^s]. Butúan (N de Mindanao). Temblor oscilatorio, dirección E-W, intensidad III, duración 5 segundos. El origen de este temblor se hallaba en el Pacífico al E de Mindanao.

20, 13^h 26^m 29^{s*} [20, 21^h 26^m 29^s]. Baguio (W de Luzón). Temblor de tierra de intensidad II-III, duración 4 segundos. El origen de este temblor, intensamente registrado por los sismógrafos de Manila y distante poco más de 150 kilómetros, probablemente se hallaba hacia la Provincia de Nueva Vizcaya, que constituye una región muy extensa de la que son muy escasas las noticias por no existir allí estación ninguna meteorológica.

22, 21^h 28^m 32^{s*} [23, 5^h 28^m 32^s]. E de Sámar y NE de Mindanao. Temblor de tierra sentido a lo largo de la parte oriental de Sámar y de Mindanao en una extensión de cerca de 500 kilómetros, con intensidad no superior a IV. Su origen distante unos 800 kilómetros de Manila debía hallarse algo internado en el Pacífico entre los paralelos 10° y 11° N. Tuvo en todas partes larga duración. El observador de Butúan la hace llegar a 50 segundos, con vaivenes suaves, pero de varias direcciones y un ruido aéreo peculiar. Registráronlo todos los sismógrafos del Extremo Oriente.

¹ La intensidad de los terremotos se indica conforme a la conocida escala de Rossi-Forel. Cuanto a la hora de su ocurrencia, adoptamos la indicada por los sismógrafos de este Observatorio siempre que los hayan registrado, distinguiéndola por medio de un asterisco (*). En caso contrario copiamos la apuntada por los observadores que nos envían las notas. Todas las indicaciones del tiempo se refieren al tiempo medio de Greenwich (medianoche=0^h). Para conveniencia de los lectores de Filipinas se añade también el tiempo insular.

24, 16^h 20^m 53^s** [25, 0^h 20^m 53^s]. NE de Mindanao. Temblor de intensidad V en toda la península de Surigao. Su origen se hallaba en el Pacífico, en el grande abismo submarino al E de la isla.

25, 0^h 08^m 48^s** [25, 8^h 08^m 48^s]. E de Sámar. Temblor oscilatorio de intensidad IV, sentido a lo largo de la parte oriental de Sámar. Su origen se hallaba a unos 620 kilómetros de Manila, sin duda en el grande abismo que se abre a poca distancia de las costas del E de dicha isla.



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THE GOVERNMENT OF THE PHILIPPINE ISLANDS

WEATHER BUREAU

MANILA CENTRAL OBSERVATORY

BULLETIN FOR JULY, 1915

PREPARED UNDER THE DIRECTION OF

REV. JOSÉ ALGUÉ, S. J.

DIRECTOR OF THE WEATHER BUREAU

MANILA
BUREAU OF PRINTING
1915

BULLETIN FOR JULY, 1915.

METEOROLOGICAL BULLETIN FOR JULY, 1915.

By Rev. JOSÉ CORONAS, S. J.,
Chief, Meteorological Division of the Weather Bureau.

GENERAL WEATHER NOTES.

Pressure and temperature.—The mean atmospheric pressure of this month for the Philippines is somewhat higher than that of the preceding year, the differences being greater in northern Luzon. The highest pressures were recorded on the 9th, and the lowest on the 29th. The monthly mean for Manila is 0.23 mm. higher than the mean for July, 1914, but is 0.22 mm. lower than the normal of this month.

The mean temperature for the month is likewise higher than that of the preceding year, particularly in northern Luzon. That of Manila is 0.5° C. above the normal of July. The extreme temperatures recorded in the Central Observatory were 36.3° C. on the 7th, and 22.1° C. on the 16th. The absolute maximum and minimum for Baguio were: 26.3° C., 15.3° C. on the top of Mirador, and 26.8° C., 14.8° C. in the valley.

PRESSURE AND TEMPERATURE AT THE FIRST AND SECOND CLASS STATIONS FOR JULY, 1915.

Station.	Pressure.						Temperature.					
	Mean.	Departure from July, 1914.	Highest mean.	Day.	Lowest mean.	Day.	Mean.	Departure from July, 1914.	Highest.	Day.	Lowest.	Day.
	mm.	mm.	mm.		mm.		°C.	°C.	°C.		°C.	
Tagbilaran	757.61	-0.16	759.78	9	754.74	29	27.4	-0.5	33.6	20	22.7	16
Surigao	57.47	+ .04	59.90	9	53.65	29	27.7	- .4	33.3	1, 4, 31	22.1	14
Cebu	57.53	+ .02	59.90	9	53.70	29	28.5	+ .4	34.2	9	23	3
Iloilo	57.31	- .20	59.60	9	53.36	29	27.7	+ .4	33.4	6	22.2	11
Ormoc	57.70	- .03	60.02	9	53.94	29	27.5	0	33.9	15	22.2	13
Tacloban	57.30		59.95	9	52.76	29	27.5		35.1	5	23.1	31
Captiz	57.37	+ .09	59.99	9	53.36	29	27.5		35.1	5	23.1	31
Calbayog	57.44	+ .23	60.26	9	52.62	29	27.3	+ .3	34.8	4	23	12
Legaspi	56.92	+ .39	60.06	9	51.42	29	28.4	- .4	34.7	21	22.5	13, 16
Atimonan	56.74	+ .48	59.98	9	51.21	29	28	+ .8	36.6	5	21.6	15
Ambulong, Tanauan	56.32	+ .01	59.07	9	50.92	29	27.6	+ .4	35.2	4	23.5	12
Paracale	56.95	+ .68	60.40	9	50.94	29	28.2	+ .2	37	5, 6	22.9	19
Manila	57.01	+ .23	60.02	9, 10	51.23	29	27.6	0	35.8	4	23.7	16
San Isidro	57.19	+ .39	60.33	9	51.14	29	27.6	+ .6	36.3	7	22.1	16
Dagupan	56.18	+ .47	59.49	9	49.78	29	28	+ .8	37.6	10	21.9	16
Bolinao	56.39	+ .52	59.97	9	49.84	29	27.7	+ .9	38.2	7	23.1	3, 18
Baguio ^a	635.48	+ .83	638.66	9	630.03	29	18.9	+ .8	35	8	22.9	2
Vigan	756.30	+ .54	759.88	9	749.78	29	28.3	+ 1.2	26.3	9	15.3	2
Tuguegarao	56.59	+ 1.20	60.30	10	50.69	29	28.9	+ .5	33.8	11	22.2	15, 25
Aparri	56.44	+ 1.34	60.40	16	50.55	30	28.3	+ .4	41	9	22.4	18
									35.5	4, 8	23.2	17

^a The barometric readings of this station are not reduced to sea level.

Rainfall.—If we compare the actual rainfall of this month with the normal for July, a remarkable lack of rain shall be noticed in the Archipelago with the exception only of Samar and Mindanao. This was due, no doubt, to the absence of well-developed typhoons in the neighborhood of the Philippines. The total amount of rainfall for Manila and Baguio differs from the normal of this month by -123.2 mm. and 573.1 mm. respectively. That of Baguio is 1,043.1 mm. less than the monthly total for July, 1914.

RAINFALL AT VARIOUS STATIONS OF THE WEATHER BUREAU DURING THE MONTH OF JULY, 1915.

Station.	Total.	Departure from July, 1914.	Departure from normal.	Rainy days.	Departure from July, 1914.	Greatest rainfall in a single day.	Day.	Station.	Total.	Departure from July, 1914.	Departure from normal.	Rainy days.	Departure from July, 1914.	Greatest rainfall in a single day.	Day.
	mm.	mm.	mm.		mm.	mm.			mm.	mm.	mm.		mm.	mm.	
Jolo	261.3	+196.6	+ 98.5	23	+14	41.1	20	Sumay, Guam	365.7	- 278	-----	21	- 5	64.8	25
Isabela, Basilan	327.5	+162.4	+113.3	21	+10	80.8	10	Calapan	247.8	+169.4	-----	19	+ 7	38.9	6
Zamboanga	156	+22.5	+ 51.5	20	+11	32.3	29	Virac	315.6	+256.1	-----	25	+15	74.5	14
Davao	178.6	+140.2	- 22.6	8	+ 2	59.7	12	Nueva Caceres	174.4	+ 87.4	- 73.3	16	+ 5	45.7	29
Cotabato	346.5	+101.1	+ 52.7	24	+11	67.5	29	Batangas	245.6	+104.8	-----	21	+ 6	52.8	28, 30
Cagayan, Misamis	181.2	- 18.8	-----	19	+ 5	50.8	20	Atimonan	125.9	+ 67.7	- 92.2	15	+ 3	29.5	7
Dapitan	319.3	-----	+173.9?	22	-----	54.1	16	Ambulong, Tanauan	224.8	+ 5.7	-----	13	- 8	56.9	28
Butuan	142.9	+117.8	+ 20.9	21	+14	37.6	18	Paracale	199.5	+113.6	-----	17	+ 5	46	10
Dumaguete	140.8	+ 80.5	-----	15	+ 6	43.2	10	Santa Cruz, Laguna	164	- 47.5	-----	19	0	43.2	28
Tagbilaran	133.1	-----	-131.3	13	-----	84.1	29	Manila	276.3	123	-123.2	20	- 3	80	28
Iwahig	204.9	+135.3	-----	24	-----	49.5	21	Antipolo	333.5	280	-----	18	- 3	108.7	23
Surigao	43.9	- 53.1	-103.8	14	+ 6	14.8	12	Iba	889.2	- 68.8	-----	23	- 4	149.9	29
Maasin	169.5	+ 31.3	- 94.3	7	+ 1	53.8	20	San Isidro	309	- 63.6	- 44.5	22	0	56.7	30
Cebu	120.4	+ 86	- 48.1	16	+ 6	32	2	Tarlac	191.5	220.6	-224.9	18	- 3	29	21
Iloilo	403.4	+ 13.5	- 46.1	17	0	106	25	Baler	228	+ 66.2	- 71.8	19	+ 7	44.2	14
San Jose Buenavista	482.4	-193.2	-104	25	+ 2	65.6	29	Dagupan	239.8	-453.6	-315.5	22	0	67.9	30
Cuyo	360.2	- 17.6	- 52.6	25	+ 2	85.1	26	Bolinao	414.3	-385.6	-252.8	25	0	134.7	28
Ormoc	169.2	+ 15.4	-132.3	17	+ 6	54.1	5	Baguio	421.6	-1043.1	-573.1	26	- 1	40.9	22, 24, 28
Guiuan	143.3	+ 44.4	-----	21	+13	29.2	14	San Fernando, Union	390.3	-575.7	-169.8	22	- 6	108	25
Tacloban	127.4	-----	- 68	19	-----	23.9	23	Echague	206.3	- 23.9	-----	17	+ 2	47.8	22
Capiz	277	+157.6	- 74.7	19	+ 4	54.1	11	Candon	242.5	-761.2	-434.1	22	0	59.9	25
Borongan	257.8	+130.7	+ 60.9	17	+ 5	64.5	13	Vigan	259.8	827	-395.3	20	- 9	76.2	1
Calbayog	272	+163.9	+ 56.9	18	+ 9	46.5	26	Tuguegarao	134.7	+ 36.2	- 95.8	11	0	41.4	29
Masbate	125.4	+ 1.9	- 74.9	20	+ 2	18.5	25	Laogo	343.4	-755.4	-----	18	- 3	70.6	20
Romblon	409.6	+294	+100.4	21	+ 6	65.5	30	Aparri	83	+ 48	- 89.5	11	+ 3	26.2	20
Batag	248.2	+207.1	-----	11	+ 5	87.6	14	Santo Domingo, Batanes	193.8	+ 74.6	- 85.7	19	+ 5	62.3	15
Gubat	221.6	+161.8	+ 49	16	+ 8	47	16								
Legaspi	186.2	- 5.5	- 64.6	16	0	44	14								

DEPRESSIONS AND TYPHOONS.

There has been this month a complete absence of typhoons near the Philippines. No depression or typhoon was announced by Manila Observatory before the 19th, and those announced during the last twelve days were either depressions of little importance or very distant typhoons which had hardly any influence on the weather of the Archipelago.

Depressions of July 19 to 25.—One of these depressions seems to have formed on the 19th about 500 miles to the east of Luzon near 15° latitude N and 130° longitude E. At 6 a. m. of the 20th it appeared east of Balintang Channel between 19° and 20° latitude N and near 125° longitude E, having moved to NW during the preceding 24 hours. On the early morning on the 21st the depression passed near Meiacosima, 100 miles to the east of Formosa moving northward, and it probably filled up in the Eastern Sea on the 22d.

The other depression was probably forming on the 19th and 20th 200 miles west of the Ladrone Islands near 16° latitude N and 142° or 143° longitude E. It moved almost west until the 22d, when it began to incline gradually to NW; on the 24th it moved NW to the east of Balintang Channel; and in the early morning of the 25th it appeared to the NE of Santo Domingo, Islas Batanes, not far from Bashi Channel, where it probably filled up on the same day.

Typhoon of July 22 to 30.—This was a very severe typhoon and was felt with great intensity in the vicinity of Shanghai on the 28th. We copy here the following note published by Zikawei Observatory on July 29:

The typhoon, which has cut off most part of the telegraphic communications with the remainder of China and prevents us to give any particulars of its path in the country, has certainly raged with an extraordinary violence in our regions.

A rough estimate of the wind's velocity from 4^h 30^m to 9^h 30^m a. m. leads to an evaluation of nearly 130 kilometers per hour (80 miles per hour). This would give above 19 pounds per square foot. Such figures, of course, give but a mere average of the wind during the early morning. Besides, the graduation of the instruments is not so reliable under so exceptional circumstances as for the ordinary cases.

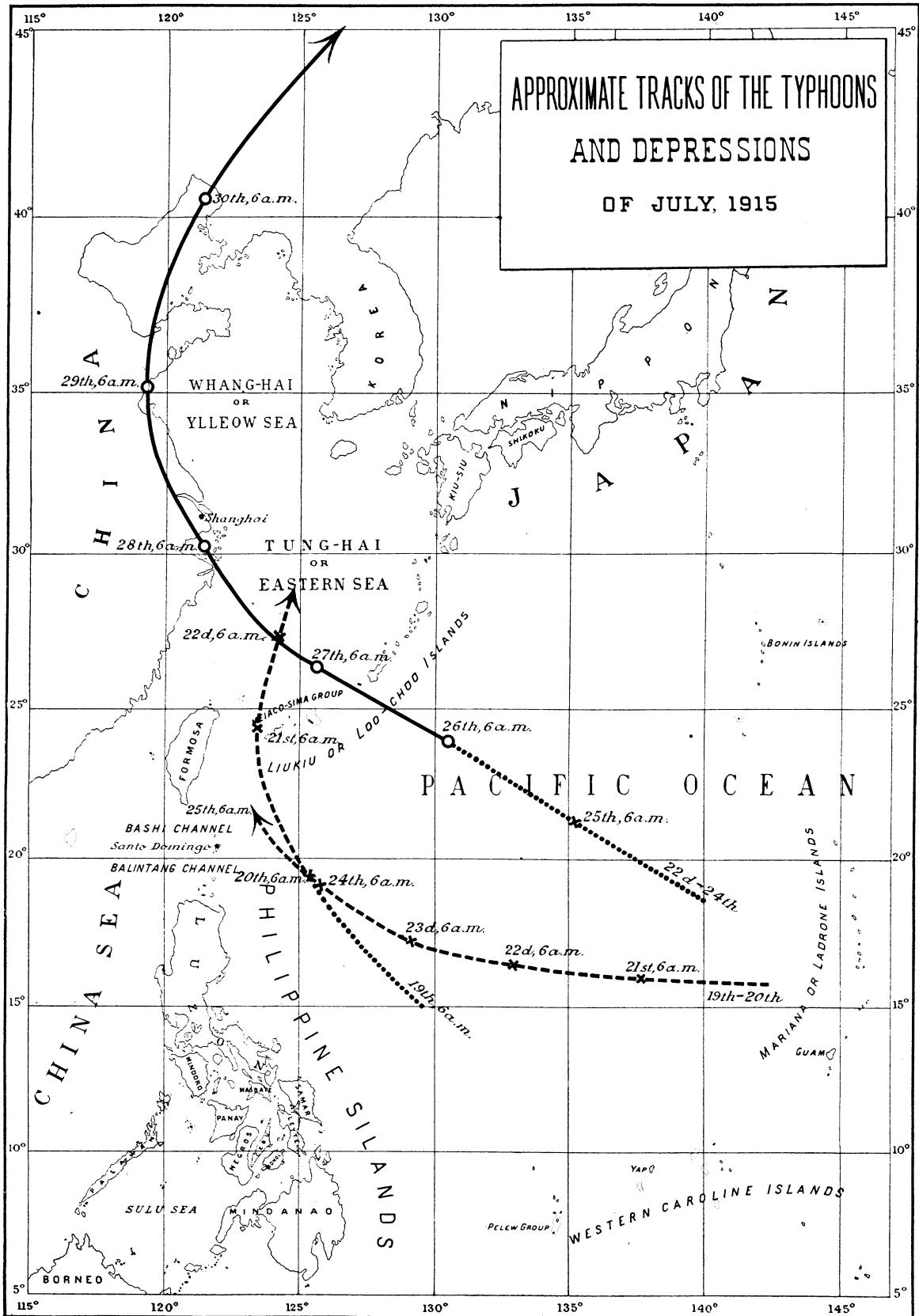
However, a more accurate record would perhaps not be far from the truth by concluding to a velocity of about 75 miles per hour during five hours in the morning, and by admitting blows above 20 pounds per square foot at frequent intervals, especially before and after 5^h, and at 7^h 30^m.

After having struck the coast very close to Ningpo, the typhoon seems to have recurved across Lake T'aihu and rapidly reached the W and NW of Shanghai by the E of Chinkiang.

The center passed nearer Shanghai at about 11^h 30^m a. m., when the barometer read 736.3 mm.

As there is no telegraphic communication with Yap this year, and as the communication with Guam was also interrupted for many days during this month of July, it was impossible to forecast this typhoon or follow its track until it appeared to the southeast of the Loochoos. From the observations of Guam received later, it would seem that this typhoon was forming on the 22d to 24th to the west of the Ladrone Islands between 18° and 19° latitude N and near 140° longitude E. Yet, as it was over 400 miles away from Guam we cannot give but a probable value to the track of this typhoon from the 22d to 25th, inclusive. On the 26th, at 6 a. m., the center of the storm was situated south-east of the Loochoos near 24° latitude N and 130° longitude E: the typhoon was moving then WNW. This direction of the track to WNW was kept until the 27th when the typhoon began to incline to NW and NNW, thus entering the China coast near 29° latitude N. It passed south and west of Shanghai on the 28th, the barometric minimum 736.3 mm. being registered there at 11.30 a. m. The typhoon continued recurving on the 28th, and it moved NNE on the 29th, and NE on the 30th. See in Plate III the track of this typhoon together with those of the two preceding depressions.

Toward the end of the month there appeared in the Far East three other typhoons far away from the Philippines: one in the China Sea and the other two in the Pacific. We will discuss and publish their tracks in the BULLETIN for next month.



NOTAS GENERALES DEL TIEMPO.

Presión y temperatura.—La presión atmosférica media de este mes en Filipinas es algo mayor que la del año pasado, siendo mayores las diferencias en el N de Luzón. Las presiones más altas se registraron el día 9, y las más bajas el 29. La media mensual de Manila es 0.23 mm. mayor que la media de Julio, 1914, pero es 0.22 mm. menor que la normal de este mes.

La temperatura media de este mes es también mayor que la del año pasado, especialmente en el N de Luzón. La de Manila es 0.5° C. superior a la normal de Julio. Las temperaturas extremas registradas en el Observatorio Central fueron 36.3° C. el día 7, y 22.1° C. el 16. Las máximas y mínimas absolutas observadas en Baguio fueron: 26.3° C., 15.3° C. para la cumbre del Mirador, y 26.8° C., 14.8° C. para el valle.

Precipitación acuosa.—Comparando la cantidad de lluvia de este mes con la normal de Julio, se echa de ver una notable escasez de lluvia en el Archipiélago, a excepción únicamente de Sámar y Mindanao. Esto se debe, sin duda, a la ausencia de tifones bien desarrollados en los alrededores de Filipinas. La cantidad total de lluvia caída en Manila y Baguio se diferencia de la normal de este mes en -123.2 mm. y 573.1 mm. respectivamente. La de Baguio es 1,043.1 mm. menos que la total mensual de Julio, 1914.

DEPRESIONES Y TIFONES.

Hubo este mes una completa ausencia de tifones cerca de Filipinas. Ninguna depresión o tifón se anunció por el Observatorio de Manila antes del 19, y los anunciados durante los doce últimos días fueron o depresiones de poca importancia o tifones muy lejanos que apenas influyeron en el tiempo del Archipiélago.

Depresiones del 19 al 25 de Julio.—Una de estas depresiones parece haberse formado el día 19 a unas 500 millas al E de Luzón, cerca de 15° latitud N y 130° longitud E. A 6 a. m. del 20 apareció al E del Canal de Balintang entre 19° y 20° latitud N, y cerca de 125° longitud E, habiéndose movido al NW durante las veinticuatro horas precedentes. En la madrugada del 21 la depresión pasó cerca de Meiacosima, 100 millas al E de Formosa, moviéndose hacia el N, y probablemente se deshizo en el Mar del Este el día 22.

La otra depresión se estuvo, al parecer, formando del 19 al 20 a unas 200 millas al W de las Islas Marianas, cerca de 16° latitud N y 142° ó 143° longitud E. Se movió casi al W hasta el día 22, cuando empezó a inclinarse gradualmente al NW; el 24 se hallaba al E del Canal de Balintang, moviéndose al NW; y en la madrugada del 25 aparecía al NE de Santo Domingo, Islas Batanes, no lejos del Canal de Bashi, donde probablemente se deshizo el mismo día.

Tifón del 22 al 30 de Julio.—Este fué un tifón muy intenso y se sintió con gran intensidad en las cercanías de Shanghai el día 28. Copiamos aquí la siguiente nota publicada por el Observatorio de Zikawei el 29 de Julio:

El tifón, que ha cortado la mayor parte de las comunicaciones telegráficas con el resto de China: impidiéndonos dar detalles de su paso dentro de China, se ha dejado sentir ciertamente con una extraordinaria violencia en esta región.

De un ligero cálculo de la velocidad del viento desde 4^h 30^m a 9^h 30^m a. m. se obtiene una aproximación de unos 130 kilómetros por hora (80 millas por hora), lo cual da sobre 19 libras por pie cuadrado. Tales cifras, en verdad, sólo son un mero promedio de la velocidad del viento durante las primeras horas de la mañana. Además, los aparatos no funcionan tan exactamente en circunstancias tan excepcionales como en casos ordinarios.

Sin embargo, no estaría quizás lejos de la verdad el suponer una velocidad de unas 75 millas por hora durante cinco horas de la mañana, y una fuerza de más de 20 libras por pie cuadrado a intervalos frecuentes, especialmente antes y después de las 5, y a las 7^h 30^m a. m.

Después de haber tocado en la costa muy cerca de Ningpo, parece que el tifón ha recurvado a través del Lago T'aihu, avanzando rápidamente al W y NW de Shanghai por el E de Chinkiang.

El centro pasó a la menor distancia de Shanghai próximamente a las 11^h 30^m a. m., cuando el barómetro estuvo a 736.3 mm.

No habiendo este año comunicación telegráfica con Yap. y habiéndose también interrumpido la de Guam por algunos días durante el mes de Julio, fué imposible anunciar este tifón o seguir su trayectoria hasta que apareció al SE de Liukiu. Según las observaciones de Guam recibidas más tarde, parece que este tifón estuvo formándose del 22 al 24 al W de las Islas Marianas entre 18° y 19° latitud N y cerca de 140° longitud E. Con todo, como estaba a más de 400 millas de distancias de Guam, sólo podemos dar un valor probable a la trayectoria de este tifón del 22 al 25 inclusive. El día 26, a 6 a. m., el centro de este baguio se hallaba al SE de Liukiu, cerca de 24° latitud N y 130° longitud E: el tifón se movía entonces al WNW. Esta dirección de la trayectoria al WNW se conservó hasta el día 27, cuando el tifón comenzó a inclinarse al NW y NNW, entrando así en la costa de China cerca de 29° latitud N. Pasó por el S y W de Shanghai el día 28, habiéndose registrado allí la mínima barométrica 736.3 mm. a las 11^h 30^m a. m. El tifón continuó recurvando el día 28, y se movió al NNE el 29, y al NE el 30. Véase en la Lámina III la trayectoria de este tifón juntamente con las de las dos depresiones anteriores.

Hacia el fin del mes aparecieron en el Extremo Oriente otros tres tifones distantes de Filipinas: uno en el Mar de China y los otros dos en el Pacífico. Estudiaremos y publicaremos sus trayectorias en el BOLETÍN de Agosto.

METEOROLOGICAL DATA FOR MANILA CENTRAL OBSERVATORY.^a

[$\phi=14^{\circ} 34' 41''$ N; $\lambda=120^{\circ} 58' 33''$ E; barometer above sea, 14.2 meters; gravity correction not applied, -1.72 mm.]

Day.	Pressure (mean).	Air temperature. ^b			Underground temperature.				Relative humidity (mean)	Vapor pressure (mean)	Radiation.			Evaporation. ^b		
		Mean.	Maximum.	Minimum.	0.25 meter.		0.50 meter.				1.50 meters.	Minimum on grass	Maximum in sun. Black bulb in vacuo.	Free exposure (total)	Shelter (total).	
					8 a.m.	2 p.m.	8 a.m.	2 p.m.			8 a.m.					8 a.m.
1	758.30	27.6	32	24.4	30.8	31.8	31.2	31.4	30.3	29.2	82.1	22.3	23	51	3	2.2
2	56.86	28.2	32.8	25	30.8	31.6	31.2	31.3	30.4	29.1	82.2	23	23.5	55	4.2	3.1
3	56.44	28.6	33.3	24.6	30.7	31.8	31.2	31.3	30.4	29.1	80.7	23.3	22.5	54.8	4.9	3.3
4	57.75	29.2	32.9	25.2	31.2	32.3	31.3	31.4	30.5	29.2	80.8	24.1	23.2	52.7	4.9	3.3
5	58.32	29.5	33.3	26.2	31.5	32.5	31.6	31.8	30.4	29.2	80.8	24.6	24.5	54	4.4	3.1
6	58.42	29	33.9	25.5	31.7	32.9	31.8	32.1	30.5	29.2	80	23.5	23.5	54.3	4.8	3.3
7	58.73	29.4	36.3	25.5	32	33.4	31.9	32.2	30.5	29.2	76.2	22.8	23.2	59	5.2	4.1
8	59.60	29.3	35.5	25.7	32.2	32.8	32	32.2	30.5	29.2	74.1	22.1	24.3	52	5.7	4.5
9	60.02	28.9	34.7	25.2	31.8	32.7	32	32.1	30.6	29.3	76.3	22.3	22.7	54.5	4.5	3.9
10	60.02	28.4	34.4	24.6	31.5	32.4	32	31.9	30.5	29.2	77.3	21.9	22.4	56.4	3.1	3.2
11	59.35	27.5	32.5	24.7	31	31.7	31.8	31.8	30.6	29.1	83.3	22.5	23	52	2.5	2
12	58.71	27.3	33.2	24.4	30.6	31.6	31.5	31.6	30.6	29.1	83.5	22.4	22.3	47	2.5	2.4
13	57.93	27.1	32.5	23.6	30.4	31.1	31.3	31.3	30.6	29.2	83.3	22	21.7	50	2.3	2.1
14	57.66	27.2	32.1	24.3	30	30.9	31	31.1	30.6	29.2	80.4	21.3	22.3	46.3	3.3	2.6
15	58.11	25.7	29.6	24	29.8	29.9	30.9	31	30.6	29.1	87.5	21.4	21.7	42.7	.7	1.1
16	58.47	26.6	31.9	22.1	29.3	29.9	30.5	30.6	30.6	29.1	82.5	21.2	20.6	48	2.8	2.5
17	58.14	26	30.5	23.6	29.3	29.8	30.3	30.4	30.6	29.1	89.2	22.2	21.6	42.8	1	1.2
18	57.28	26.7	32.8	22.6	29.2	30.5	30.2	30.3	30.5	29.1	84.4	21.8	20.5	52.5	2.5	2.1
19	56.24	27.5	33.1	23.2	29.5	31.1	30.2	30.5	30.5	29.1	81	21.8	21.2	53.2	4	2.8
20	56.32	28.1	33.7	24.2	30.4	31.7	30.6	30.8	30.5	29.2	80	22.4	22.3	53.5	4	2.8
21	57.43	28.2	33.1	24.6	30.5	32	30.8	31.1	30.5	29.2	82.9	23.4	22.4	55	3.8	2.9
22	58.55	28.4	32.5	24.6	30.5	31.7	31	31.1	30.4	29.1	83.6	23.8	23.1	54.5	4	3
23	58.11	28.3	32.8	24.7	31	32.2	31.1	31.5	30.4	29.1	86	24.3	23	54.2	2.9	2.5
24	56.27	27.6	31.9	24.4	30.5	31.5	31.1	31.3	30.4	29.1	84.1	22.9	22.9	54.7	3.4	2.7
25	55.31	27	31.6	24.1	30.5	31.5	31.1	31.2	30.3	29.2	85	22.4	22.3	51.5	3.4	2.5
26	54.85	26.5	30.1	24.8	30.6	30.9	31.1	31.2	30.4	29.1	88.7	22.8	23.4	45	.7	1.7
27	53.75	26.9	30.4	24.1	29.7	30.7	30.8	30.9	30.4	29.2	85.9	22.6	22.7	53.5	3	2.8
28	52.93	25.7	27.7	24.3	29.8	29.8	30.8	30.7	30.4	29.2	91.2	22.4	22.8	36	0	.6
29	51.23	26.6	31	24.2	28.7	29.8	30	30.1	30.5	29.2	89.8	23.2	23.2	55	1.5	1.3
30	51.98	26.1	30.5	24.2	29.3	29.9	30	30.1	30.5	29.1	91.3	22.8	23	46.2	.4	1.1
31	54.23	25.3	27.3	23.8	28.6	28.4	29.8	29.6	30.3	29.2	94.9	22.7	22.8	34	0	.3
Mean Total	757.01	27.6	32.3	24.4	30.4	31.3	31	31.2	30.5	29.2	83.5	22.7	22.7	50.7	3	2.5
Departure from normal	-0.22	+0.5	+1.4	+0.7							-1.3	+0.3				

Day.	Prevailing direction.	Wind.			Amount (mean).	Clouds.			Sunshine.	Rain, 24 hrs. beginning 6 a. m.			Miscellaneous.
		Total movement.	Maximum hourly velocity.	Direction at the time of the maximum velocity.		Form and direction.				On the tower.	In the park.		
						Upper.	Lower.	Sunshine.					
												mm.	
1	W quad.	Km. 197	Km. 25	WSW	0-10. 9.7	Ci.-S.	S.-Cu. SW	h. m. 1 00	mm. 7.9	mm. 8.1	d o a. ● □ p.		
2	WSW	244.5	29	WSW	9.7	Ci.-S.	S.-Cu. NW	2 10			⊕ a.		
3	WSW	252.5	28	WSW	3.2	Ci.	Cu.	8 30			⊕ p.		
4	WSW	360	33.5	WSW	3.3	Ci.	Cu. E	10 00			d o a.		
5	WSW	261	30	WSW, SW	3.2	Ci.-S.	Cu. WSW	9 05			□ p.		
6	NE, W	200	25	WSW	4.4	Ci., Ci.-S.	Cu. E	8 40			□ p.		
7	SE quad.	134	18.5	NW	5.2	Ci.	Cu. E	7 50			□ p.		
8	SE quad.	232.5	22.5	SSE	6.7	Ci.	Cu. E	8 10			□ p.		
9	SE, NNE	163.5	19	SE	6.1	A.-Cu. SE	Cu. E	8 05	.8	.8	d o a. □ d p.		
10	ESE	160	18.5	NE	8.2	Ci.-S.	Cu. E	4 15	13.3	16.3	□ p.		
11	E quad.	89	15	W	9.4	Ci.-S.	Cu.-N.	3 00	1.5	1.9	□ p.		
12	N quad.	120.5	17	WNW	8.8	Ci.-S.	Cu. E	4 15	2.8	2.5	□ p.		
13	W quad.	99.5	15	SE	7.4	Ci. S quad.	Cu. E	5 40	1.7	1.8	□ p.		
14	N quad.	107.5	14	E	8.3	Ci.	Cu.-N.	1 40			d o a. p. □ p.		
15	N quad.	120	12	N by E	9.6	Ci.-S.	Cu.-N.	0 00	8.9	8.4	□ p.		
16	N quad.	113	12.5	E	9.7	Ci.-S.	Cu. E	0 00	.5	.6	□ p.		
17	ESE	79	11	ESE	9.3	Ci.-S.	Cu.-N.	0 00			d a. □ d p.		
18	Variable	113	14	SW	6.8	Ci.-S.	Cu.-N.	5 40	2.3	2.3	□ p.		
19	W, ESE	120	14.5	W	4.4	Ci.	Cu. E	8 00			□ p.		
20	SW	187	16.5	SW	6.8	Ci. N, NNW	Cu. E	7 15			□ p.		
21	SW	220.5	22	SW	6.5	Ci.-S. SE	Cu. E, W	7 35	12.7	13.2	□ p.		
22	SW	326	28	SW	6.7	Ci.	Cu. E	8 15	12.5	11.7	□ p.		
23	SW	299	31	SW	7.9	Ci. E quad.	Cu. SW	7 30	31.1	32	d a. □ p.		
24	SW, WSW	296	25	SW	6.9	A.-Cu. NW	Cu. W	6 45	7.4	6.5	□ p.		
25	SSW	236	20	SSW	8.9	Ci.-S.	Cu. SW	2 45	.3	.2	d a.		
26	SW	302	31	SW	9.6	A.-Cu.	Cu.-N. WSW	1 25	11.5	13.3	□ p.		
27	SW, WSW	442	36.5	SW	9.6	Ci.-S.	Cu.-N. SW	1 55	3.3	3.9	p a. d a. p.		
28	W quad.	373	30	WSW	10	Ci.-S.	N. W	0 00	80	80.5	□ p.		
29	ESE, SSW	230.5	19.5	WSW	9.6	Ci.-S.	N.-cf. WSW	2 00	7.6	7.7	□ p.		
30	SSE	218.5	19	S	10	Ci.-S.	Cu.-N. SW	0 00	48.9	53	□ p.		
31	SE quad.	187	16.5	SSE	10	Ci.-S.	Fr.-N. SW	0 00	21.3	22	□ p.		
Mean Total		209.2	21.6		7.6			4 34	141 25	276.3	286.7		
Departure from normal		-2, 035.9			-0.2			-3 58	-123.2				

^a All the mean values given in this table are deduced from hourly observations.
^b These values are taken from instruments mounted in the Observatory Park, 1.5 meters above ground.

METEOROLOGICAL DATA FOR MIRADOR OBSERVATORY, BAGUIO.*

[φ=16° 25' N; λ=120° 36' E; barometer above sea, 1,512.5 meters; gravity correction not applied, -1.65 mm.]

Main meteorological data table with columns for Day, Air temperature at Mirador, Air temperature in the valley, Radiation, and Evaporation. Includes sub-tables for Wind and Clouds.

* All the mean values given in this table are deduced from six daily observations taken at 2, 6, 10 a. m. and 2, 6, 10 p. m.
b The barometric readings of this station are not reduced to sea level.
c Maximum of hourly observations taken from 6 a. m. to 6 p. m.
d This element is based on hourly observations taken from a quadruple register, which gives only eight possible directions of the wind.

DAILY RAINFALL AT THE STATIONS OF THE WEATHER BUREAU, JULY, 1915.

Station.	Day of month.															
	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.
Jolo	mm. 1.5	mm.	mm. 38.6	mm. 11.7	mm. 0.6	mm. 5.3	mm. 20.3	mm. 0.8	mm. 23.9	mm. 13.2	mm. 24.6	mm. 12	mm.	mm. 1	mm. 2.5	mm. 2.1
Isabela, Basilan		1	13.5	16.6	11.7	1.3	16.8	.8		80.8		.8		26.9	6.6	7.1
Zamboanga	1.5	1		2.3		19.2		.5	1	4.3	8.4			10.4	1.8	.8
Davao							44.2		11.7	10.2		59.7	11.2			
Cotabato		8.4	1.8	10.2	23.6	5.6	9.9	6.1	9.7	33.5		.3		3.3	2.3	.5
Cagayan, Misamis		2.8		.3		.5	3	1.5	.3	7.6	.3	3.8	.8			
Dapitan		9.4					15.7	3	1.8	2.3	3.3	4.3	5.8	11.7	.8	54.1
Butuan	.8		4.8			7.4		10.7	9.7	9.4	.3	3.3	1.9	34.5	2.3	1.3
Dumaguete		2.5			1.8	1		1.4		43.2				9.3		
Tagbilaran		4.3			.8	1.5	3.3						.5			
Iwahig	3.1	3		2.5	1	1	1.4	2.6		2.8	.9	3.1		4.1	.3	6.6
Surigao						.5			2.5	2.3	1.3	14.8	5.9	.8		
Maasin					25.9							4.6				
Cebu		32				9.7				.5	2.3	.8	8.6	1.5		
Iloilo		.8				8.6			2	3.8	33	2	12.7	40.9	1.3	
San Jose Buenavista	10.7	3.3			.3	19.3	22.9	6.4	7.9	3	5.6	27.7	2	6.4	65.5	2.5
Cuyo			1.5			3			1.5	2.3	6.6	2.3	4.6	1	26.4	6.4
Ormoc	11.4				54.1				21.8	.8	.5		1.8	.8	2.8	
Gutuan					.3		6.9	12.2	.8	6.3	1.5	15.5	28.7	29.2	2.3	19.1
Tacloban					.5		9.7	2.2	10.7	3	2.1	10.6	16	5.3	.8	3.1
Capiz	5.9			1.5		41.9		8.6	.8	7.6	54.1		2.5	46.8	32.2	1
Borongan				.3			10.9	7.2	2.1	26.4	26.2	15	64.5	63	9.7	23.2
Calbayog			3	2			14.7	39.6	1.6	9.1	4.1	20.8	13.7	27.7	34.3	21.4
Masbate	4.6				.5	.3	5.1			4.8	.5		5.6	16.7	9.2	7.4
Romblon	2.8					25.7	18	18.8	13	.8		15.2	3	47.5	14.5	
Batag								5.3	6.9	71.6	14.2	9.1	18.8	87.6	6.6	17.2
Gubat		7.1							3.6	15.5		10.2	24.1	31.8	5.1	47
Legaspi									11.5	27.7			2.3	44	3.5	1.3
Sumay, Guam					2.5	5.1		36.8	1.3	8.9		26.7	27.9	12.7	20.3	
Calapan						38.9	2.3	.3	33	7.1	5.8	.5	14.3	36.8	26.7	13.7
Virac				15.5	1.3	9.9	2.5	20.6	20.6	5.1	4.6	4.1	4.3	74.5	21.6	22.1
Nueva Caceres		2.6				5.5			5.7	7.2		2.8	21.8	11.4	4.8	
Batangas						.3	1.8	1		2	16	.5	1.6	16.2		
Atimonan						.5	29.5			.5	15.5	3.6	10.9	1.3	6.4	8.7
Ambulong, Tanauan	1.5					27.5	6.6					7.9				
Paracale	16								14	46	3	6.6	16.8	33.1	17	13.5
Santa Cruz, Laguna	.8						25.9		7.6	4.4		.3	3.6	3.6	7.4	6.4
Manila	7.9								.8	13.3	1.5	2.8	1.7		8.9	.5
Antipolo	6.6					.5	.8				2.3		.5	.8	14.2	2
Iba	21.9	44.5	4.3	1.3	12.9		8.1	8.4	1	10.9		6.1	1.5		6.7	
San Isidro					.5	2.8	.8				.3			3.3	35	1.5
Tarlac	2.6	8.9				15.7						2.3			11.7	
Baler		1				6.6	1.5	2.1	19.3	1		27.2	8.9	44.2	39.9	26.7
Dagupan	.8	1.8	.3			4.6	3.6		.8		7.4	29.4	1.8			12.7
Bolinao	19.6	50.5	2.3		11.2	.3	10.2		1	2.5		25.4	5.1		.3	2.8
Baguio	38.9	24.1	2.6	.8		6.1			3.6		.5	17.6	1.3	.5	7.1	20.4
San Fernando, Union	23.9	22.6					7.1	.8				17	1.8	3.8	5.6	5.3
Echague						19.6		1		5.6				.5	9.1	1.3
Candon	37.8	12.7								2.5	3.8	3	10.2	5.1	2.3	4.1
Vigan	76.2	17.2	.3				29.4						9.4	.1	40.4	.2
Tuguegarao	2.5			21.1					3.6							
Laoag	50.8	26.2								.8	1.8		2.5	.3		
Aparri	.5					6.9								3	4.9	12.7
Santo Domingo, Batanes	4.8	11	8.6							.5			.8	25.4	62.3	18.7

Daily rainfall at the stations of the Weather Bureau, July, 1915—Continued.

Station.	Day of month.														Total.	
	17.	18.	19.	20.	21.	22.	23.	24.	25.	26.	27.	28.	29.	30.		31.
	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	
Jolo	0.5	10.7	15.2	41.1		1.3	11.9	17	2	3						261.3
Isabela, Basilan	20.8	.8	41.9	16.3	12	1		21.8			0.5		28.5			327.5
Zamboanga				4.1			23.9	28.4	5.4	2.3	.5	7.1	32.3			156
Davao				35			3.8		2.8							178.6
Cotabato				22.1	9.9	2.3	11.9	9.2	1.3	17.8	27.4	45.9	67.5	16		346.5
Cagayan, Misamis		3.3		50.8	11.9		1.5	11.7	5.3	8.4	13.5				3.9	131.2
Dapitan	39.6	10.7		5	38.4		39.9	33.3	.5		17.5	2.6	14	5.6		319.3
Butuan	.5	37.6	.5	11.2		3			1	.5	5.8	.5				142.9
Dumaguete				11.4			5.1		7.1	10.2	20.1	10.3	7.1	8.4		140.8
Tagbilaran		2.8		5.3	12.7						8.4	3.3	84.1	5.1		133.1
Iwahig				8.6	49.5	5.8	15.7	44.7	8.3	2.2	19.7	11.2	7.1	3.3		204.9
Surigao	.3	.5		.5	.5			5.6					2	6.4		43.9
Maasin				53.8	51.6					9.7	10.2		13.7			169.5
Cebu	2			10.2	2.5			.5	.8		24.4	15.5	5.3	3.8		120.4
Iloilo		9.4						3.8	106	7.4	71.9	20.8	70.6	8.4		403.4
San Jose Buenavista				1.8	1.3	.3	45.5	36.3	34.6	31.7	37.8	34.8	65.6	11.9		482.4
Cuyo	1.3	2	30.2	13.7	4.8	8.6	20.3	14.2	11	85.1	27.4	33.4	41.9	4.6	6.1	360.2
Ormoc				23.6		2	16	1.8	11.9	2.5	7.2	.8	9.4			169.2
Guiuan	2.3	.3	1	2.5	6.1					3	5.6	.3	1.8	.3		143.3
Tacloban				5.6	5.6		23.9	.9		2.8	6.8	2.3	19.6	1.5		127.4
Capiz	.3			.5	2.6				11.7		1.3	16.3	32.8	8.6		277
Borongan	.3			.3	3.8	1						2.6	1.3			257.8
Calbayog	5.1								12.1	46.5		7.4	7.1	1.8		272
Masbate				3.8	1.8	6.6	1.8		18.5	8.4	4.8	11.7	4.1	9.2		125.4
Romblon	25.2	53.3	8.9		.3				25.7	28.5	2	3.6	35.3	65.5	2	409.6
Batag									8.4				2.5			248.2
Gubat	15.5				17			4.8	1.5	9.7	22.1	4.1	2.5			221.6
Legaspi	9.1					.8	2.5	1.5	26.2	1.8	2.3	30.3	8.7	12.7		186.2
Sumay, Guam	3.8	17.8	31.7	3.8	3.8			1.3	64.8	6.4	13.9	36.8	38.1	1.3		365.7
Calapan	3.3								9.7	16.3	2.3	8.1	7.6	20.6	.5	247.8
Virac	3.6	.8		15.7	3	3.8	3.6	.5	2	.5		4	62.5	8.9		315.6
Nueva Caceres				1.8				6	14	.7	1.2	27.2	45.7	16		174.4
Batangas		.6	8.6		1.5	.5	14.7	.5	7.2	12.7	30.2	52.8	20	52.8	4.1	245.6
Atimonan	4.8						20.6	1.5				6.3		14.7	1.1	125.9
Ambulong, Tanauan		2.5	18.3						8.7	25.2	12.7	56.9	2.8	47.3	6.9	224.8
Paracale	2.3			16	.5	6.6				1.5	.8		2.8	3		199.5
Santa Cruz, Laguna	.8			4.6	.5			1.8		8.1	12.5	43.2	.3	28.2	4	164
Manila		2.3			12.7	12.5	31.1	7.4	.3	11.5	3.3	80	7.6	48.9	21.3	276.3
Antipolo		2.3			8.9	108.7			1	26	16.2	50.5	10.4	60.2	21.6	333.5
Iba	35.6				2.3	61.3	6.6	104.1	50.3	115.4	90	149.9	26.7	119.4		889.2
San Isidro	1.5	13.2	6.3	1.3	.3	.5	26.4	13.2	28.4	2	35.3	26.6	2.3	56.7	50.8	309
Tarlac		9.7		3.6	29	1.5	5.1	17	3.8	2.8	5.8	22.8	7.8	14.2	27.2	191.5
Baler	.5	3.8						1.3		3.8		6.4	16	6.9	10.9	228
Dagupan	.3			1.3		.3	11.5	4.8	22.6	1.6	1.8	34.3	4.3	67.9	25.9	239.8
Bolinao			1	2.5	24.9	9.9	4.1	.3	25.6	16.5	22.1	134.7	.8	3.1	37.6	414.3
Baguio	30.8	5.1	3		4.3	40.9	3.8	40.9	33.3	28.2	20.3	40.9	15.2	3.1	25.3	421.6
San Fernando, Union		2.3	18.8		2.8	18.8	4.1	4.7	108	54.9	8.6	64.5	7.1	3.5	4.3	390.3
Echagüe	5.3		11.2	26.2		47.8	11.4	5.1	1.8	20.8			23.9	12.7	3	306.3
Candon	1.8	2.5				39.9	17.8	1.3	59.9	17	1.3	2.5	3	10.4	1.8	242.5
Vigan	7.4	1			7.4	12.5	3.8	8.1	30.9	2.2	4.9	1.2	4.1		3.1	259.8
Tuguegarao				4.5	6.1	20.3	9.1			15.7	13.2		41.4	.5	.3	134.7
Laogag			3	70.6		59.7	25.1	2	4.9	36.1	3		2.5	48	2.5	343.4
Aparri		.5		26.2							1		9.2	10.2	7.9	83
Santo Domingo, Batanes	3.5	3.8	5.4	1.3		6.1		10.2		.5		1.3	3.7	25.3	.6	193.8

Maximum and minimum temperatures at the stations of the Weather Bureau, July, 1915—Ctd.

Day.	Candon.		Vigan.		Tuguegarao.		Laoag.		Aparri.		Santo Domingo, Batanes.	
	Maxi- mum.	Mini- mum.	Maxi- mum.	Mini- mum.	Maxi- mum.	Mini- mum.	Maxi- mum.	Mini- mum.	Maxi- mum.	Mini- mum.	Maxi- mum.	Mini- mum.
	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.
1	33	26.2	32.3	22.3	36.8	24.7	33.6	23.7	32.4	26	30.8	26.9
2	30.6	24.7	31	22.7	33.5	24.9	33	23.3	29.8	25	29.9	24.4?
3	32.6	24.4	32.4	24.5	38	24	33.9	23.5	33.1	25	31.3	23.6?
4	33.5	27	32.9	25.8	40.9	23.2	34.8	26	35.5	25.4	31.1	26.4
5	33.2	25.9	33.2	26.5	38.4	25	34.7	25.4	33.6	25.5	31.3	27
6	33	26.2	33.5	25.7	40	24.7	35.5	24.4	34.2	25.8	31.9	27.8
7	33.1	26.4	33.7	26	39.9	23.5	35.2	25.3	35.3	23.8	33.5	26
8	33.1	27	33.1	24	40	25	35.3	24.6	35.5	26	33.2	28
9	33	26	33.1	25.7	41	24.5	35	25.4	35.2	26	33.5	28.2
10	33	26.5	33.2	25.7	40.5	25.2	35.6	24.6	34	25.8	33.7	27.9
11	33.1	26	33.8	26.3	40.4	24.1	35.3	24.4	34.5	25.3	33.1	28
12	33	26	33.3	25.7	40.2	23.5	35.2	24.9	33.7	25.6	33.4	28.3
13	32.6	25.9	32.5	24.1	39	24.2	34.5	25	33.6	25.6	33.7	27.9
14	32.5	26	33.4	24.7	38.7	24.4	35	24.5	33.6	25.2	33.5	28
15	33.3	25.8	33.3	22.2	33.2	24.5	37.8	23.9	28.7	24.8	32.7	25.3
16	31.5	25	32	24	33.1	23.5	36.7	24.5	29.5	23.8	32.7	23.1
17	32	24	32.7	23.5	35	22.7	35.2	25.4	31.8	23.2	32.5	24.4
18	32	24.5	33.4	23.8	37.5	22.4	34.5	24	31.6	23.8	31.8	24.6
19	32.1	25	33	24.3	39.1	24	34.8	23.5	31.8	23.8	31.9	26.1
20	33.1	26.9	33	25.5	39.1	24.2	35.3	24.6	31.6	24.8	31.9	25.2
21	32.7	26	33.4	25.3	38.5	24.5	34.6	24.4	32.9	24.4	31.6	25.6
22	33.4	26.5	32.6	23.7	38.6	24.8	35.1	24.9	33.7	25.3	31.6	27
23	31.4	25.9	31.3	23.9	37	23.5	33.4	24	32.2	24.6	31.6	27
24	30.1	25.4	30.1	24	36.4	23.8	32.6	24.5	32.2	24.4	31.6	26.9
25	30.9	25.6	32.1	22.2	36.7	24	32.8	25	31.7	25.6	31.9	27
26	30	25	31.2	23.2	37.2	24.6	33.1	24.4	31.6	25.4	32.1	25.2
27	31	25	31.3	24.2	36.3	24.2	33.2	24.5	32.6	25	31.6	26.5
28	29.7	26	29.5	24	34.4	24.5	34	24.6	33.7	25	31.6	27.8
29	32	25	32	24.7	34.6	25	34.6	24.9	32.5	25.4	32.9	25.4
30	31.5	27	32.3	24.8	33	23	35	-----	31.2	24.7	32.6	27.5
31	31.1	25.5	32	24.5	32.7	25.7	32	24.9?	31.2	24.7	30.4	26
Mean	32.2	25.8	32.5	24.4	37.4	24.2	34.6	24.6	32.7	25	32.2	26.4

SEISMOLOGICAL BULLETIN FOR JULY, 1915.

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EARTHQUAKES FELT IN THE PHILIPPINES.¹

2, 0^h 04^m 56^{s*} [2, 8^h 04^m 56^s]. **N Samar.** Earthquake felt in the northern part of the island with intensity IV and 8 seconds' duration. Its origin lay at a distance of 410 kilometers from Manila in the eastern side of St. Bernardino Strait, not far from the Samar coasts.

4, 13^h 56^m [4, 21^h 56^m]. **Legaspi (SE Luzon).** Oscillatory earthquake, direction N-S, intensity III, duration 4 seconds.

4, 21^h 40^m [5, 5^h 40^m]. **Maasin (S Leyte).** Oscillatory earthquake, direction ENE-WSW, intensity III, duration 3 seconds.

7, 3^h 45^m [7, 11^h 45^m]. **Masbate Island.** Earthquake shocks of intensity III.

8, 0^h 54^m [8, 8^h 54^m]. **Samar and Leyte Islands.** Earthquake of intensity III-IV, duration about 6 seconds. This shock was the beginning of a series of seismic movements, which lasted until 5 o'clock in the evening: fortunately none of the strongest shocks surpassed intensity V, they caused some panic on account of their number rather than by their intensity. The origin probably lay near the SE end of the strait which separates the two islands of Samar and Leyte, somewhere to the NE of the St. Pedro Bay. They were felt in the southern part of Samar and northern of Leyte, in an extension of some 150 kilometers diameter. The strongest occurred at the following hours:

0^h 54^m [8^h 54^m] intensity III-IV. Repetitions at 3^h 45^m [11^h 45^m] intensity II-III.

4^h 43^m 54^{s*} [12^h 43^m 54^s] intensity V. Repetitions at 4^h 46^m [12^h 46^m] and 4^h 49^m [12^h 49^m] intensity III.

7^h 17^m 23^{s*} [15^h 17^m 23^s] intensity IV-V. Repetitions at 7^h 19^m [15^h 19^m] and 9^h 05^m [17^h 05^m] intensity III.

The seismographs of the Observatory situated at a distance of about 700 kilometers registered only the two principal ones; while a Wiechert seismograph, in operation at Butuan, some 200 kilometers distant, registered ten different disturbances originated in the same region, the first occurred at 0^h 32^m [8^h 32^m] and the last at 10^h 47^m [18^h 47^m].

9, 23^h 16^m (10, 7^h 16^m). **Borongan (E Samar).** Oscillatory earthquake, direction E-W, intensity III, duration 5 seconds.

10, 10^h 30^m 23^{s*} [10, 18^h 30^m 23^s]. **W Luzon.** Earthquake of intensity IV, felt along the occidental part of Luzon in the provinces of Ilocos Sur, Union and Mountain: its origin apparently lay in the China Sea, close to the La Union coasts.

11, 16^h 39^m 27^{s*} [12, 0^h 39^m 27^s]. **NE Mindanao.** Earthquake shocks of intensity III-IV: its origin was probably to the east in the Pacific Ocean.

¹ The intensity of earthquakes is given in the notation known as the Rossi-Forel scale. The time is that indicated by the seismographs at the Central Observatory whenever the disturbance has been registered by them. This fact is denoted by an asterisk (*). Otherwise the time is that noted by the observer who sent the report. All time indications are in Greenwich mean time (midnight = 0^h), insular time being added in brackets for the convenience of Philippine readers.

12, 20^h 08^m 07^{s*} [13, 4^h 08^m 07^s]. **Bolinao (W Luzon)**. Oscillatory earthquake, direction W-E, intensity III. It repeated with intensity IV at 20^h 24^m 54^s [13, 4^h 24^m 54^s], and later at 22^h 40^m 37^s [13, 6^h 40^m 37^s] with intensity III-IV. The origin of these shocks was some 240 kilometers far away from Manila presumably in the China Sea, W of the Bolinao Peninsula.

16, 13^h 36^m [16, 21^h 36^m]. **Butuan (N Mindanao)**. Subsultory shocks of intensity II-III.

19, 10^h 02^m [19, 18^h 02^m]. **Ormoc (W Leyte)**. Oscillatory earthquake, direction SW-NE, intensity III, duration 8 seconds.

21, 6^h 36^m [21, 14^h 36^m]. **Butuan (N Mindanao)**. Oscillatory earthquake, direction NE-SW, intensity III-IV, duration 10 seconds.

22, 19^h 14^m 00^{s*} [23, 3^h 14^m 00^s]. **Nueva Caceres (SE Luzon)**. Earthquake of intensity III.

28, 8^h 21^m [28, 16^h 21^m]. **Butuan (N Mindanao)**. Oscillatory and subsultory earthquake of intensity III, duration 8 seconds.

RECORDS OF THE MICROSEISMOGRAPH.

[Time: Greenwich mean. Midnight=0h. Instrument: Wiechert seismograph; 1,000 kilograms. A_N : $T_0=7.10$, $\epsilon=2.08$, $\frac{r}{T_0^2}=0.042$;
 A_E : $T_0=6.40$, $\epsilon=2.31$, $\frac{r}{T_0^2}=0.039$. Alluvium. 2.40 meters above sea level.]

No.	Date.	Character.	Phase.	Hour.	Period.	Amplitude.		Remarks.
						A_N μ	A_E μ	
171	2	Iv	eP L F	h. m. s. 0 04 56 05 41 13				N Samar.
172	2	IIv	eP S L M _E M _N F	13 24 58 26 14 27 44 30 18 30 50 14 32	9 11	133 120		Batanes Islands.
173	3	Iv	eP F	9 47 02 50				
174	4	Iv	eP M _E F	1 53 13 58 51 2 12	8	12		
175	6	Iv	eP F	21 43 15 47				
176	8	Iv	eP S L M _N F	4 43 54 45 34 46 46 47 48 5 02	6	12		Samar and Leyte Islands.
177	8	Iv	eP F	7 17 23 22				Samar and Leyte Islands.
178	8	Ir	e F	22 26 34 23 12				
179	10	Iv	eP L M _N F	10 30 23 30 51 31 48 45	5	74		W Luzon.
180	11	Ir	eP S L M _N F	16 39 27 41 20 43 18 44 20 17 42	7	8		NE Mindanao.
181	12	Iv	eP F	8 51 31 54				
182	12	Iv	eP L M _N F	20 08 07 08 34 08 40 17	2	24		Bolinao (W Luzon).

Records of the microseismograph—Continued.

No.	Date.	Character.	Phase.	Hour.	Period.	Amplitude.		Remarks.
						A _N μ	A _E μ	
183	12	IIv	eP	h. m. s.				Bolinao (W Luzon).
			L	20 24 54				
			M _N	25 21				
			M _E	26 58	6	133		
184	12	Iv	F	27 25	4		30	Bolinao (W Luzon).
				37				
			eP	22 40 37				
			L	41 04				
185	14	Ir	M _N	41 12	2		27	
			F	46				
			e	4 47				
			F	5 03				
186	14	Iv	eP	8 47 09				
			F	50				
187	14	Iv	eP	20 52 16				
			F	55				
188	15	Iv	eP	3 34 48				
			F	37				
189	17	Iv	eP	19 43 56				
			F	46				
190	18	Iv	eP	5 36 09				
			F	39				
191	18	v	eP	19 07 18				
			F	09				
192	20	I	e	4 37				
			F	48				
193	20	I	e	9 47				
			F	10 08				
194	21	Iv	eP	10 39 16				
			F	42				
195	22	Iv	eP	9 50 20				Nueva Caceres (SE Luzon).
			L	50 38				
			M _N	50 41	2	42		
			M _E	50 48	2		31	
			F	54				
196	22	Iv	eP	19 14 00				
			L	14 21				
			M _E	14 24	2		36	
			M _N	14 36	2	22		
			F	18				
197	30	Iv	eP	22 28 29				
			F	30				
198	31	IIu	eP	1 40 36				
			iS	46 52	6-7			
			L	54 24	8-9			
			M _{N1}	2 04 10	19	56		
			M _{E1}	06 10	19		26	
			M _{E2}	09 26	17		30	
			M _{E3}	16 22	16		29	
			M _{N2}	23 19	15	33		
			M _{N3}	27 26	14	35		
			F	3 05				

TEMBLORES DE TIERRA SENTIDOS EN FILIPINAS.¹

2, 0^h 04^m 56^{s*} [2, 8^h 04^m 56^s]. **N de Sámar.** Temblor de tierra sentido en toda la parte septentrional de la isla, con intensidad IV y duración de unos 8 segundos. El origen se hallaba a 410 kilómetros distante de Manila en la parte oriental del Estrecho de San Bernardino, no lejos de las costas de Sámar.

4, 13^h 56^m [4, 21^h 56^m]. **Legaspi (SE de Luzon).** Temblor oscilatorio, dirección N-S, intensidad III, duración 4 segundos.

4, 21^h 40^m [5, 5^h 40^m]. **Maasin (S de Leyte).** Temblor oscilatorio, dirección ENE-WSW, intensidad III, duración 3 segundos.

7, 3^h 45^m [7, 11^h 45^m]. **Isla de Masbate.** Temblor de tierra de intensidad III.

8, 0^h 54^m [8, 8^h 54^m]. **Islas de Sámar y Leyte.** Temblor de tierra de intensidad III-IV, duración 6 segundos. Con este temblorcito comenzó una serie de movimientos sísmicos, que duró hasta las 5 de la tarde: sin embargo ninguno de los principales temblores sentidos durante el día, cuyas horas se ponen más abajo, pasó de intensidad V, causando algún sobresalto no tanto su fuerza como su repetición. El origen parece que se hallaba al SE del estrecho que separa las dos islas de Sámar y Leyte, al NE de la bahía de San Pedro. Hacíanse sentir en la mitad meridional de Sámar y en la parte septentrional de la de Leyte, en un área de unos 150 kilómetros de extensión en su eje más largo. Los citados temblores ocurrieron en las horas siguientes:

0^h 54^m [8^h 54^m] intensidad III-IV. Repetición a 3^h 45^m [11^h 45^m] de intensidad II-III.

4^h 43^m 54^{s*} [12^h 43^m 54^s] intensidad V. Repeticiones a 4^h 46^m [12^h 46^m] y 4^h 49^m [12^h 49^m] de intensidad III.

7^h 17^m 23^{s*} [15^h 17^m 23^s] intensidad IV-V. Repeticiones a 7^h 19^m [15^h 19^m] y 9^h 05^m [17^h 05^m] de intensidad III.

De estos temblores los sismógrafos del Observatorio, a unos 700 kilómetros de distancia, registraron tan sólo dos principales; mientras que un sismógrafo Wiechert de 200 kilogramos, que funciona en Butúan, distante unos 260 kilómetros hacia el S, registró hasta diez diferentes movimientos sísmicos procedentes del mismo origen: el primero ocurrió a 0^h 32^m [8^h 32^m] y el último a 10^h 47^m [18^h 47^m].

9, 23^h 16^m [10, 7^h 16^m]. **Borongán (E de Sámar).** Temblor oscilatorio, dirección E-W, intensidad III, duración 5 segundos.

10, 10^h 30^m 23^{s*} [10, 18^h 30^m 23^s]. **W de Luzón.** Temblor de tierra de intensidad IV, sentido a lo largo de la parte occidental de Luzón; comprendida por las Provincias de Ilocos Sur, La Unión y Montañosa; su origen parece se hallaba en el Mar de la China cerca de las costas de La Unión.

11, 16^h 39^m 27^{s*} [12, 0^h 39^m 27^s]. **NE de Mindanao.** Temblor de tierra de intensidad III-IV: su origen se hallaba probablemente en el Mar Pacífico.

12, 20^h 08^m 07^{s*} [13, 4^h 08^m 07^s]. **Bolinao (W de Luzón).** Temblor oscilatorio, dirección W-E, intensidad III. Repitió con intensidad IV a 20^h 24^m 54^{s*} [13, 4^h 24^m 54^s] y con intensidad III-IV a 22^h 40^m 37^{s*} [13, 6^h 40^m 37^s]. El origen se hallaba a unos 240 kilómetros de Manila en el Mar de la China al W de la península de Bolinao.

16, 13^h 36^m [16, 21^h 36^m]. **Butúan (N de Mindanao).** Temblor de tierra susultorio, intensidad II-III.

¹ La intensidad de los terremotos se indica conforme a la conocida escala de Rossi-Forel. Cuanto a la hora de su ocurrencia, adoptamos la indicada por los sismógrafos de este Observatorio siempre que los hayan registrado, distinguiéndola por medio de un asterisco (*). En caso contrario copiamos la apuntada por los observadores que nos envían las notas. Todas las indicaciones del tiempo se refieren al tiempo medio de Greenwich (medianoche = 0^h). Para conveniencia de los lectores de Filipinas se añade también el tiempo insular.

19, 10^h 02^m [19, 18^h 02^m]. Ormoc (W de Leyte). Temblor oscilatorio, dirección SW-NE, intensidad III, duración 8 segundos.

21, 6^h 36^m [21, 14^h 36^m]. Butúan (N de Mindanao). Temblor oscilatorio, dirección NE-SW, intensidad III-IV, duración 10 segundos.

22, 19^h 14^m 00^{s*} [23, 3^h 14^m 00^s]. Nueva Cáceres (SE de Luzón). Temblor de tierra de intensidad III.

28, 8^h 21^m [28, 16^h 21^m]. Butúan (N de Mindanao). Temblor de tierra susultorio y oscilatorio de intensidad III, duración 8 segundos.

EARTHQUAKES IN THE BATAN ISLANDS, MAY AND JULY, 1915.

The Batan Islands are situated in the northernmost part of the Philippine Archipelago; they are ten in number and located between $20^{\circ} 16'$ and $21^{\circ} 05'$ latitude N. Their names and order in the S-N direction are: Sabtan, Ibusos, Desquey and Batan (the largest of the group), which form the series of Batan, distributed roughly in a SW-NE direction: Imen, Isbayat, Siayan, Mabudis, Maysanga, and Iami, which belong to the series of Isbayat (the larger of this series), arranged in a SSW-NNE line. Conjointly considered the Batan Islands form a chain along the one hundred and twenty-first east meridian. Their constitution seems to be chiefly volcanic, shown by the presence of old volcanic cones and agglomerates, fringed and at places partially covered, during successive subsidences, with coralline formations. These series of volcanic islands, until recently, have been generally considered as a link between the volcanic formations of the Philippine Archipelago and Formosa, believed also volcanic, but at present, after the studies of Mr. B. Koto and other scientists, the Philippine and Batan volcanic region is regarded as independent from Formosa. In fact the Batan volcanic trend deviates toward the E of Formosa in direction to the Botel Tobagos, furthermore it is separated from that island by the deep Channel of Bashi.

The seismic history of Batan Islands is very little known on account of the scarcity of reliable data. As may be seen in the brief notes¹ published in this BULLETIN, March, 1909, the most violent earthquakes of which exist any records occurred between the 8th and 20th of March, 1892; the shocks destroyed some buildings and fissured many more, causing great panic among the inhabitants of Santo Domingo de Basco (Batan Island); but the data about this event are so meager that it is impossible to obtain from them any idea about its epicenter and affected area. In the said notes a comparison was made between the seismicity of Batan Islands and southern Formosa for the period 1903-1907, the seismicity of the former being very inferior to that of the latter region: the data gathered since 1907 up to date do not show any increase in that direction. Consequently the earthquakes felt in May and July of this year seem to be the most destructive of which any record or memory exists.

The first occurred on the 16th of May at $13^{\text{h}} 55^{\text{m}} 14^{\text{s}*}$ [$16, 21^{\text{h}} 55^{\text{m}} 14^{\text{s}}$]; it was very violent, VII-VIII intensity, in the Island of Sabtan where it destroyed some buildings and cracked many more, causing the falling of stone fences and the opening of earth fissures, generally parallel to the water courses and to the sea beaches. The houses in that region are generally one-story buildings of stone, roofed with reed or palm thatching. Only one personal accident was reported. There were no foreshocks, and only two aftershocks were felt at $20^{\text{h}} 01^{\text{m}}$ [$17, 4^{\text{h}} 01^{\text{m}}$] and $22^{\text{h}} 15^{\text{m}} 50^{\text{s}*}$ [$17, 6^{\text{h}} 15^{\text{m}} 50^{\text{s}}$]. No extraordinary disturbance was noticed in the sea. The meizoseismic area comprised evidently the whole Island of Sabtan; in the neighboring Island of Batan the shocks had less intensity and it decreased rapidly with the distance from Sabtan; so at Basco, some 15 kilometers distant from the NE coasts of Sabtan, their intensity did not exceed degree VI. In the Island of Isbayat, at a distance of 40 kilometers northward, they had intensity IV. Southward the earthquake seems to have been perceptible at greater distances, it being felt with intensity III at Aparri, a town on the northern coast of Luzon some 280 kilometers far south from Sabtan. The seismographs at Manila registered the principal earthquake and the second of the aftershocks. At Taihoku (Formosa) it was registered some 16 seconds earlier than at Manila. Taihoku is only about 105 kilometers nearer to Sabtan than Manila.

On the 27th of May at $1^{\text{h}} 42^{\text{m}} 08^{\text{s}*}$ [$27, 9^{\text{h}} 42^{\text{m}} 08^{\text{s}}$] another quake was felt in the same region with intensity IV-V. From this date to the 2d of July there were no tidings of

¹ Earthquakes of the Batanes Islands and southern Formosa.—MONTHLY BULLETIN, March, 1909.

any shock felt in the Batan Islands, nor do the seismic records of Taihoku and Manila show any disturbances likely proceeding from that quarter.

At 13^h 24^m 58^s* [21^h 24^m 58^s] of the said 2d of July a second and more violent and extensive earthquake occurred, which comprised within its meizoseismic area not only Sabtan Island but also the southern part of Batan. In Sabtan it destroyed many more houses than the one of May, opened fissures and caused landslides on the slopes and cliffs of the seacoast. Fortunately there were no personal accidents excepting one man wounded: due principally to the lightness of the roofs, which generally remained in their place even after the destruction of part of the stone walls supporting them. A report of the district engineer, who visited the ruins, states that in most of the damaged buildings the mortar was very poor and so its connection with the stones was very defective: consequently it is our opinion that the intensity of the shocks did not exceed degree IX. On the southern part of Batan where the preceding earthquake scarcely had reached degree VII, this of July had intensity VIII; destroyed some houses and stone fences and produced small fissures in the two principal towns of Ivana and Uyugan. At the town of Basco, the capital of the islands, situated about 10 kilometers farther north of Ivana, the shocks did not exceed intensity VI. In the Island of Isbayat they had intensity IV-V. At Aparri, N. Luzon, the shocks were felt with intensity III-IV; consequently like those of May they also apparently propagated farther toward the south. From such a fact noticed in the two earthquakes seems that it must be concluded that their origin extended itself towards the south or that by some cause the vibrations propagated more freely and easily in that direction. This earthquake was registered at Manila, Zikawei, and Osaka (Japan), but it is missing in the records of Taihoku.

Like in May, there were felt only two perceptible aftershocks, one at 14^h 07^m [22^h 07^m] and a second at 15^h 12^m [23^h 12^m]. After those no seismic disturbance was noticed until the 9th, at 4^h 12^m [12^h 12^m] when a shock of intensity III-IV was felt. A similar shock occurred on the 15th at 2^h 40^m [10^h 40^m], and on the 24th at 6^h 33^m [14^h 33^m] there was felt the last one, lighter than the preceding. None of these aftershocks was registered by the seismographs of Manila and Taihoku (Formosa).

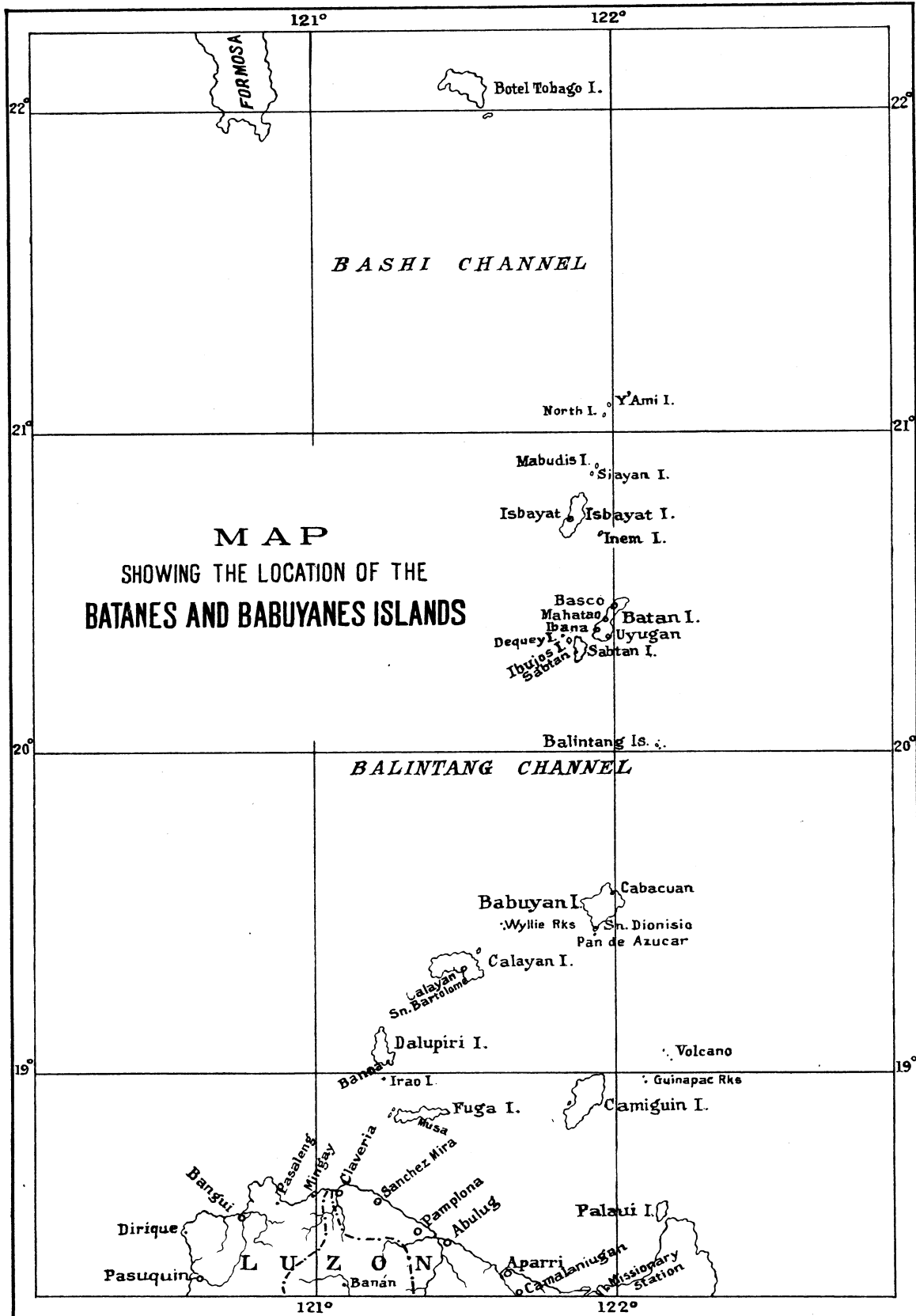
The origin of all these earthquakes lay evidently south of Sabtan and Batan Islands, the former falling always within their meizoseismic area, while in Batan, situated NE of Sabtan and separated from it by a strait of a minimum width of about 4 kilometers, only those occurring in July comprised its southern parts within the said area. Probably the shape of this area was very much prolonged in the N-S direction, as is suggested by comparing the intensities of the shocks in the Island of Isbayat and at Aparri in Luzon; may be that it even extended across the Balintang Channel in the direction of the Volcanic island of Babuyan; just following the trend of the volcanic islands of the Batan group and of the Babuyan and Camiguin islands, belonging to the Babuyan.

It is nearly certain that in such a direction runs a very important fault, which in our opinion continues southward across the eastern part of Luzon, through western Visayas and toward western Mindanao.¹ Indications of such a fault found on the Islands of Sabtan and Iujos are given by Mr. H. G. Ferguson, in his "Contributions to the Physiography of the Philippine Islands. II Batanes Islands,"² where he calls the attention to the fact that all the volcanic islands of this region, belonging to the Batanes and to the Babuyan groups, line along the eastern side of the fault while those not volcanic or doubtfully such are on the western side: the same Author states that the southern prolongation of this fault would run along the Cagayan Valley in Luzon.

¹ The Relation of Seismic Disturbances in the Philippines to the Geological Structure. (Distribution of Seismic Disturbances). The Philippine Journal of Science, August, 1913.

² The same Journal, February, 1908.

About the forces that originated these earthquakes, it is apparent that they were rather shallow; leading to such a conclusion are the small extension of the meizoseismic area, the rapid decrease of the perceptible vibrations, and the fact that only the very strongest shocks were registered at distances greater than 1,000 kilometers. It is therefore probable that all the shocks were due to some dislocations along the said fault produced at a relatively little depth, and consequently they may be considered as volcanic in their character.



LOS TERREMOTOS DE LAS ISLAS BATANES DE MAYO Y JULIO.

Las Islas Batanes están situadas en la parte más septentrional del Archipiélago Filipino y forman un grupo de diez pequeñas islas, situado entre los paralelos $20^{\circ} 16'$ y $21^{\circ} 05'$. Sus nombres en el orden de S a N son: Sabtan, Ibujos, Desquey y Batán que constituyen la serie de Batán, alineada groseramente de SW a NE; Imen, Isbayat, Siayan, Mabudis, Maysanga y I'Ami, que constituyen la de Sabtan, en dirección SSW-NNE. Consideradas en conjunto forman una cadena en las proximidades del meridiano 121° E. Su primitiva formación parece ser volcánica por la presencia de antiguos conos y de aglomerado volcánico, revestidos posteriormente y aun cubiertos en parte durante sucesivos períodos de subsidencia de formaciones coralíferas; así durante mucho tiempo esta cadena de islas se ha considerado como el lazo de unión entre las formaciones volcánicas del Archipiélago Filipino y de Formosa, considerada también como volcánica; mas actualmente, después de los estudios de Mr. B. Koto y de otros, el sistema volcánico de Filipinas se cree independiente de Formosa. El de Filipinas o dígase de Batanes se desvía hacia el E de Formosa en dirección a los Botel Tobagos, además está separado por el profundo Canal de Bashi.

La historia sísmica de las Islas Batanes es muy poco conocida, por la falta de datos precisos. Como puede verse en unas notas publicadas en Marzo de 1909¹ los temblores de tierra más violentos de que se tiene cierto conocimiento, ocurrieron del 8 al 20 de Marzo de 1892: agrietaron muchos edificios y derribaron algunos, causando grande pánico a los habitantes de Basco; los datos empero son del todo deficientes para dar una idea de la localización del epicentro. En las citadas notas se hace una comparación entre la sismicidad de Batanes y de la parte S de Formosa, durante el período 1903-1907, resultando la de Batanes muy inferior a la de Formosa, sin que los datos posteriores prueben aumento apreciable. Los terremotos de Mayo y Julio de este año parecen por consiguiente ser los más destructores de que hay memoria.

El primero ocurrió el 16 de Mayo a $13^h 55^m 14^{s*}$ [$21^h 55^m 14^s$] tuvo intensidad VII-VIII en la Isla de Sabtan, derribando algunas casas, que allí se construyen generalmente de mampostería de cal y suelen tener sólo planta baja con techo de palma, y dejó muchas otras muy quebrantadas; echó por tierra gran número de cercos de piedra y abrió grietas en el suelo, generalmente paralelas a los cursos de agua y costa del mar: desgracias personales por efecto del terremoto sólo se registró una. No parece que precediesen movimientos premonitorios, ni hubo réplicas numerosas. No se notó en el mar oleaje alguno extraordinario. A $20^h 01^m$ [$17, 4^h 01^m$] y a $22^h 15^m 50^{s*}$ [$17, 6^h 15^m 50^s$] ocurrieron repeticiones de poca intensidad. El epicentro comprendía evidentemente toda la Isla de Sabtan: en la cercana Isla de Batán se sintió el terremoto con menos intensidad a proporción de la distancia; así en Basco distante unos 15 kilómetros de las costas NE de Sabtan no pasó de intensidad VI; en la Isla de Isbayat, distante 40 kilómetros hacia el N, se sintió con intensidad IV. Por el S parece que fué perceptible a mayores distancias; puesto que se sintió con intensidad III en la estación de Aparri, en la costa norte de Luzón distante unos 280 kilómetros. Los sismógrafos de Manila registraron el principal y la segunda repetición. En Taihoku (Formosa) se registró el terremoto 16^s antes que en Manila; Taihoku dista de Sabtan tan sólo 105 kilómetros menos que Manila.

El 27 de Mayo a $1^h 42^m 08^{s*}$ [$9^h 42^m 08^s$] se sintió en la misma región otro temblor de tierra de intensidad IV-V. Desde esta fecha hasta el 2 de Julio, no hay noticia de que ocurriese ningún movimiento sísmico perceptible, ni aparecen en los registros de For-

¹ Terremotos de las Islas Batanes y de la parte meridional de Formosa por el R. P. M. Saderra Masó, S. J.

mosa y de Manila movimientos microsísmicos, cuya procedencia pueda atribuirse al centro de Batanes.

El expresado 2 de Julio a 13^h 24^m 58^{s*} [21^h 24^m 58^s] ocurrió otro terremoto de mucha mayor intensidad y extensión que el de Mayo; comprendiendo en la zona meizosísmica no sólo la Isla de Sabtan sino también la parte S de la de Batán. En la Isla de Sabtan derribó muchas más casas que el de Mayo, abrió grietas y produjo hundimientos en las costas: sin embargo no se sabe que hubiese más desgracias personales que un herido grave; debido sin duda a que los tejados por su poco peso permanecieron generalmente en su puesto, aun cayendo en gran parte las paredes laterales de mampostería. Un *report* del ingeniero del distrito, dice que la mayor parte de las paredes de las casas derruidas eran de construcción deficiente a causa de la mala preparación del mortero y de la consiguiente falta de adhesión con las piedras; así no creemos que la intensidad del terremoto pasase del grado IX. En la parte S de la Isla de Batán, donde el terremoto de Mayo apenas llegó al grado VI-VII, este de Julio fué de VIII, derribando varias paredes y cuarteando muchas más, en los pueblos de Ivana y Uyugan, y abriendo pequeñas grietas en el terreno. En la población de Basco, capital de las Batanes, situada más al N, a unos 10 kilómetros de Ivana, la intensidad del terremoto apenas pasó del grado VI. En la Isla de Isbayat tuvo intensidad IV-V. Hacia el S los movimientos fueron también perceptibles como en Mayo hasta la parte N de Luzón, sintiéndose en Aparri con intensidad III-IV. De manera que si comparamos, como hicimos al tratar de aquél, la intensidad de Aparri con la de Isbayat deduciremos que las vibraciones conservaron más su energía hacia el S o que el origen se prolongaba mucho en esta dirección. Registraron este terremoto los sismógrafos de Zikawei y de Osaka (Japón), mas nada encontramos en los registros de Taihoku.

Solamente hubo dos réplicas perceptibles, una a 14^h 07^m [22^h 07^m] y otra a 15^h 12^m [23^h 12^m]. Después ya no ocurrió temblor alguno hasta el 9 de Julio a 4^h 12^m [12^h 12^m] en que se sintió uno de intensidad III-IV. El 15 a 2^h 40^m [10^h 40^m] hubo otro de intensidad III, y el 24 a 6^h 33^m [14^h 33^m] ocurrió el último de la serie, de menor intensidad que los precedentes. Ninguna de estas repeticiones fué registrada por los sismógrafos de Manila ni por los de Formosa.

El origen de estos terremotos de Batanes, tanto de los de Mayo como de los de Julio, se hallaba evidentemente al S del grupo de Batán y Sabtan, quedando siempre esta última isla comprendida dentro del área meizosísmica, mientras que la de Batán, situada al NE de aquella y separada por un estrecho de unos 4 kilómetros de anchura mínima, sólo en los de Julio tuvo comprendida su parte S más próxima a Sabtan. La forma del área meizosísmica, no hay duda que era muy prolongada en la dirección N-S según dedujimos de las diferentes intensidades observadas en la Isla de Isbayat y en Aparri, de tal manera que es probable atravesase el canal en dirección a la isla volcánica de Babuyán: esto es; en la misma dirección N-S en que está colocada la serie de islas volcánicas que forman el grupo de las Batanes y las de Babuyán y Camiguín que pertenecen al grupo de las Babuyanes.

En esta dirección es casi cierto que corre una falla, la cual a nuestro parecer no sólo se extiende por el S hasta la Isla de Luzón, sino también a través del Archipiélago hacia la parte occidental de Mindanao.¹ Los indicios que de esta falla se encuentran en las Islas de Sabtan e Ibusos nos lo da Mr. Henry G. Ferguson en sus "Contributions to the Physiography of the Philippine Islands. II Batanes Islands,"² donde hace notar que todas las islas volcánicas, tanto del grupo de Batanes como de Babuyanes, caen al E de

¹ The Relation of Seismic Disturbances in the Philippines to the Geological Structure. (Distribution of Seismic Disturbances).—The Philippine Journal of Science, August, 1913.

² The same Journal, February, 1908.

la falla, mientras quedan al W las no volcánicas o dudosamente tales: la prolongación hacia el S de dicha línea correría a lo largo del Valle de Cagayán de Luzón.

Acerca del origen de estos terremotos, parece que era poco profundo; así lo indican la pequeña extensión del área meizosísmica, el rápido decrecimiento de los movimientos, puesto que sólo los muy intensos se registraron a más de 1,000 kilómetros de distancia, y la falta de réplicas. Es muy probable pues que fueron debidos a movimientos ocurridos en la citada falla a poca profundidad, de tal manera que pueden considerarse como volcánicos.

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THE GOVERNMENT OF THE PHILIPPINE ISLANDS

WEATHER BUREAU

MANILA CENTRAL OBSERVATORY

BULLETIN FOR AUGUST, 1915

PREPARED UNDER THE DIRECTION OF

REV. JOSÉ ALGUÉ, S. J.

DIRECTOR OF THE WEATHER BUREAU

MANILA
BUREAU OF PRINTING
1915

BULLETIN FOR AUGUST, 1915.

METEOROLOGICAL BULLETIN FOR AUGUST, 1915.

By Rev. JOSE CORONAS, S. J.,
Chief, Meteorological Division of the Weather Bureau.

GENERAL WEATHER NOTES.

Pressure and temperature.—The mean atmospheric pressure for this month in the Philippines is slightly higher than that of the preceding year, and than the normal for August. The highest pressures were observed on the 27th and 28th, and the lowest on the 1st and on the 18th to 20th.

The monthly mean temperature is either identical with, or somewhat higher than, that of August, 1914. The mean for Manila is almost identical to both the normal for this month and the monthly mean of the preceding year. The extreme temperatures registered in Manila during the month were 32.9° C. on the 1st, and 22.5° C. on the 31st. The absolute maximum and minimum for Baguio were 24.7° C., 14.7° C. on the top of Mirador, and 24.7° C., 14.2° C. in the valley.

PRESSURE AND TEMPERATURE AT THE FIRST AND SECOND CLASS STATIONS FOR AUGUST, 1915.

Station.	Pressure.						Temperature.					
	Mean.	Departure from August, 1914.	Highest mean.	Day.	Lowest mean.	Day.	Mean.	Departure from Aug., 1914.	Highest.	Day.	Lowest.	Day.
	mm.	mm.	mm.		mm.		°C.	°C.	°C.		°C.	
Tagbilaran	758.05	+0.02	760.07	27	756.46	18	28	+0.5	34.4	10, 15	22.8	16, 27, 28
Surigao	57.87	+ .19	60.08	27	56.13	19	28	- .1	34.8	9	22.3	27
Cebu	57.90	+ .09	60.16	27	56.44	18	28.2	+ .2	33.6	29	21	27
Iloilo	57.92	+ .12	59.92	27	56.27	19	27.9	+ .7	32.1	30	22.3	17
Ormoc	58.19	+ .19	60.39	27	56.58	18	27.3	- .3	32.5	29	20.8	28, 29
Tacloban	57.58		60.05	27	55.98	19	28.1		35.7	9	22.5	26
Capiz	57.83	+ .25	59.94	27	56.16	19	27	+ .3	34.2	1, 8	23.2	19
Calbayog	57.75	+ .29	60.18	27	55.87	19	28.5	+ .9	35.8	15	21.7	28
Legaspi	57.12	+ .40	59.50	27	55.42	19	27.9	+ .2	34.9	29	22.6	28
Atimonan	56.78	+ .34	59.24	28	55.16	20	28	+ .5	35.5	16, 29	22.8	29
Ambulong, Tanauan	56.73	+ .21	59.06	28	54.92	1	27	- .4	35.3	30	21.9	29
Paracale	56.90	+ .38	59.46	28	55.21	20	28.1	+ .5	35.4	4	23.5	28
Manila	57.44	+ .45	59.80	28	55.74	1	26.9	- .1	32.9	1	22.5	31
San Isidro	57.44	+ .44	59.94	28	55.68	19, 20	26.6	+ .1	33.6	30	23	14, 29
Dagupan	56.54	+ .61	58.95	28	54.63	1	27	+ .2	35.2	20	22.9	25
Bolinao	56.64	+ .56	59.26	28	54.51	1	26.6	- .2	33.1	18, 19	22.3	13
Baguio ^a	635.51	+ .89	637.66	28	634.14	1	17.9	+ .4	24.7	18	14.7	29
Vigan	756.46	+ .69	759.26	28	754.40	1	27.3	+ .7	33	20	22.4	25
Tuguegarao	56.15	+ .69	59.36	28	53.59	9	27.6	0	37.4	4	22.1?	6
Aparri	55.82	+ .60	59.16	28	53.15	9	27.6	+ .5	33.6	11	23.3	29

^a The barometric readings of this station are not reduced to sea level.

Rainfall.—Speaking generally of the whole Archipelago, the rainfall for the month was fairly good, though in a great number of stations it was somewhat less than the August normal and than the monthly rainfall of the preceding year. The greatest deficiencies were observed in Panay Island. The monthly total for Manila, 413.8 mm., is 78.5 mm. below that of August, 1914, but 51.1 mm. above the normal. At Baguio 1,120 mm. of rain were collected in the gauges, this amount being 1391.4 mm. less than that of the preceding year, and 20.5 mm. less than the normal of this month.

RAINFALL AT VARIOUS STATIONS OF THE WEATHER BUREAU DURING THE MONTH OF AUGUST, 1915.

Station.	Total.	Departure from Aug., 1914.	Departure from normal.	Rainy days.	Departure from Aug., 1914.	Greatest rainfall in a single day.	Day.	Station.	Total.	Departure from Aug., 1914.	Departure from normal.	Rainy days.	Departure from Aug., 1914.	Greatest rainfall in a single day.	Day.
	mm.	mm.	mm.		mm.	mm.			mm.	mm.	mm.		mm.	mm.	
Glan	202.2			12		58.4	5	Calapan	47.8	-96.5		11	-2	12.4	19
Jolo	143.6	+86.1	-8.7	16	+10	44.5	25	Virac	124.8	43		12	0	53.6	17
Isabela, Basilan	186	+132.5	-6.5	11	+4	59.9	25	Nueva Caceres	162.7	+62.6	+8.9	17	+2	43.5	17
Zamboanga	49.4	-60.9	-39.4	7	+1	10.7	24,25	Batangas	113.5	-92.1		13	-5	22.1	19
Davao	265.5	+93.4	+62.5	14	+5	52.1	18	Atimonan	51.2	-33.8	-98.5	5	-6	35.3	17
Cagayan, Misamis	196	+91.7		16	+5	34.5	31	Ambulong, Tana-uan	126	-170.3		19	-3	22.3	24
Dapitan	149.5		+58.8	12		43.7	18	Paracale	189.2	-3.5		14	0	52.3	17
Butuan	59.3	-73.6	-39.2	11	+2	25.1	26	Santa Cruz, Laguna	209	-111.1		19	+1	37.6	5
Dumaguete	37.7	-8.6		7	-1	18.5	31	Manila	413.8	-78.5	+51.1	23	-2	63.2	13
Tagbilaran	117.7	-74.3	-9.4	7	0	67.6	17	Antipolo	431.4	-401.4		24	-2	89.1	19
Iwahig	193.3	+82.2		19	+7	34.8	20	Iba	1254.5	+105.2		27	-2	144.7	13
Surigao	81.3	-17.1	-9	7	-3	41.7	18	San Isidro	250.6	-131.9	-38.8	24	-1	63	13
Maasin	155.1	-15.2	-47.5	9	0	54.6	4	Tarlac	409.4	-217.1	+44.5	27	+3	59.7	5
Cebu	186.1	+121.3	+41.5	11	0	47	26	Baler	77.2	-16.?	-74.2	17	-2	46	5
Iloilo	112.5	-427	-219	11	-11	42.7	17	Dagupan	509.2	-405.2	+27.9	25	0	60.9	5
San Jose Buenavista	259.8	-351.5	-244.9	21	-2	55.3	5	Bolinog	682.5	-398.6	-116.3	28	+3	113.7	24
Cuyo	219.1	-293.4	-161.7	19	-2	34	5	Baguio	1120	-1391.4	-20.5	29	-2	139.2	9
Ormoc	250.1	+1.4	-32.4	15	-1	41.7	29	San Fernando, Union	452.6	-696	-230.4	21	-4	99.5	24
Guiuan	92.4	+10.2		12	+4	45.5	31	Echague	119	-104.6		12	-1	49.5	28
Tacloban	77.3		-53.87	12		21.5	26	Candon	360.8	-1356.1	-269.3	21	-5	48.2	7
Capiz	234.9	-39.1	-24.5	20	0	98.9	5	Vigan	579.2	-816.9	-49.1	25	0	82.4	20
Borongan	115.3	-31.2	-5.8	8	+4	50.8	26	Tuguegarao	238.6	+141.1	+48.8	19	+5	47.5	5
Calbayog	75.2	-38.7	-98.4	14	+1	23.8	5	Laog	523.7	-1307.1		23	0	87.2	21
Masbate	171.4	-64.9	+31.3	12	-2	39.4	27	Aparri	140.3	-82.6	-86.4	18	-2	28.5	21
Romblon ^a	105					43.27	17	Santo Domingo, Batanes	112	-523.8	-272.4	17	-1	42	21
Batag	80.3	-100		9	+3	21.9	16								
Gubat	185.9		+84.6	10		53.3	17								
Legaspi	178.1	+94.2	+7.9	15	+1	56.2	19								
Sumay, Guam	435.9	-237		21	-5	115.6	7								

^a 27 days of observation.

DEPRESSIONS AND TYPHOONS.

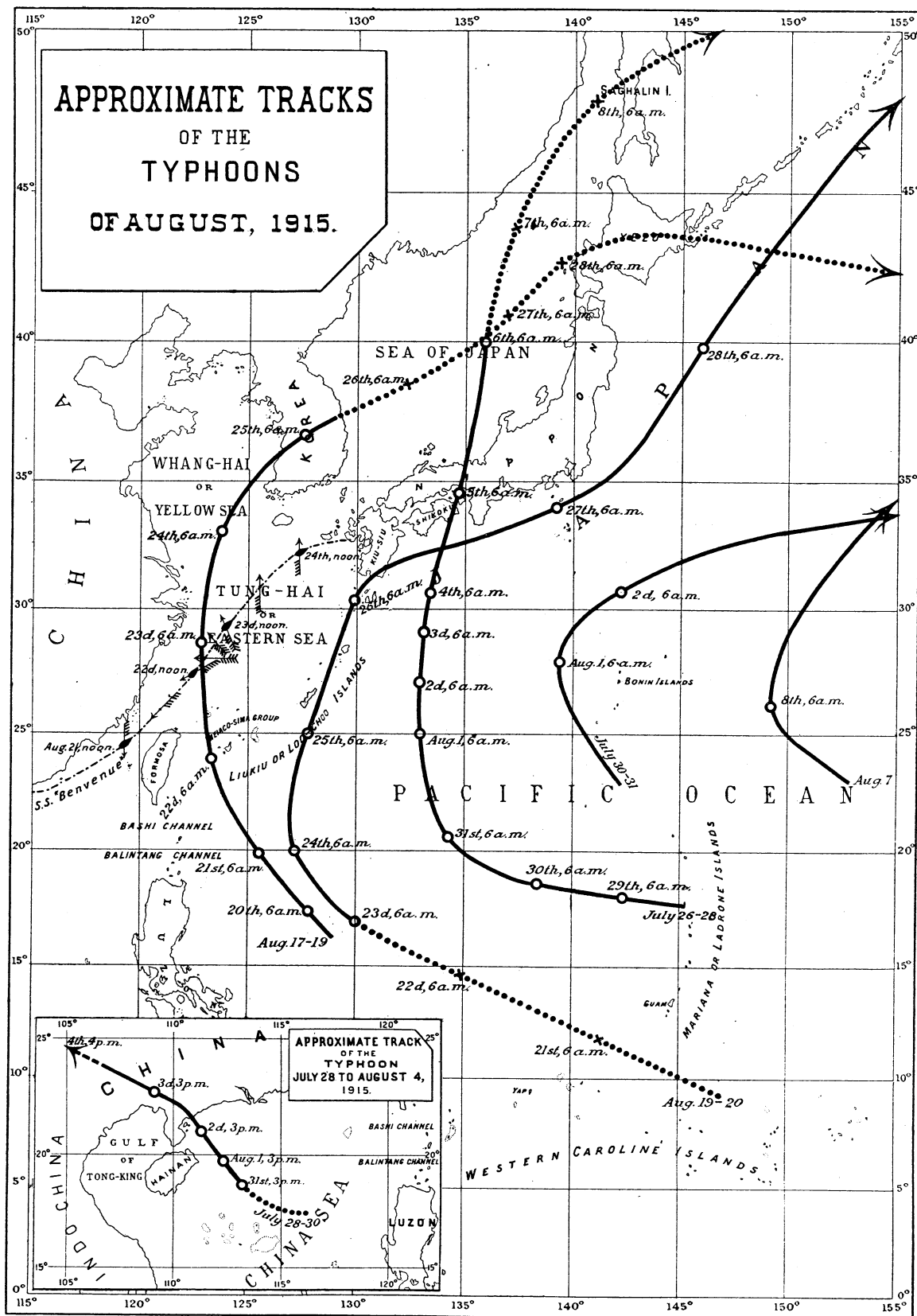
There were six typhoons in the Far East during this month, though not a single one struck our Archipelago. We will say a few words on each of them. See their tracks in Plate V.

Typhoon of July 26 to August 6, 1915.—This typhoon seems to have formed on July 26 to 28 in the neighborhood of the northern part of the Ladrone Islands. It moved WbyN until the 30th when it began to recurve northward, its center being situated at 6 a. m. of the 31st between 20° and 21° latitude N and near 134° longitude E. The rate of progress of this typhoon was very small on August 1, 2, and 3, while it was moving north to the east of the Loochoos. At 6 a. m. of the 5th the center of the storm was situated over the southern part of Japan near 35° latitude N. and 135° longitude E, the typhoon having been moving NbyE from 6 a. m. of the 4th. On the 5th and 6th it moved almost due N across the Sea of Japan.

Typhoon of July 30 to August 2, 1915.—While the preceding typhoon was recurring northward, another appeared on the 30th south of the Bonins, between 23° and 24° latitude N and near 142° or 143° longitude E. It moved first northwest, and then recurved northeastward to the west of the Bonins during the night of July 31 and the morning of August 1.

Typhoon of July 31 to August 4, 1915.—On July 28 and 29 there was a low-pressure area extended from the northern part of the China Sea to the Pacific across northern Luzon with some signs of a depression or typhoon forming in the China Sea to the west of northern Luzon. Yet, with the few data we have at hand, it is not possible to give any definite position of a typhoon center until the afternoon of the 31st, when a well developed typhoon appeared to the north of the Paracels near 113° longitude E and 19° latitude N. On July 31 and August 1 and 2 the typhoon moved NWbyN, thus entering China near 22° latitude N and 111° longitude E in the evening of the 2d. Once in China the typhoon moved WNW until it probably filled up on the 4th.

Plate V.



Typhoon of August 7 and 8, 1915.—The following observations on board the U. S. Army transport *Dix*, as compared with those of Guam and Chichijima, have enabled us to give the track of this typhoon on the 7th and 8th of this month. The center of the storm was situated in about 149° longitude E and 26° latitude N when it recurved northeastward.

METEOROLOGICAL OBSERVATIONS MADE ON BOARD THE U. S. ARMY TRANSPORT "DIX," AUGUST 7, 1915.

(Captain, CRANGLE.)

Date and hour.	Position.		Pressure.	Wind.		Remarks.
	Latitude N.	Longitude E.		Direction.	Force.	
Aug. 7:			mm.		0-12.	
4 a. m. ---	21° 00'	159° 20'	752.50	S	7-8	Rough sea; occasional squalls from SW.
7 a. m. ---			52.75	S	7-8	
Noon ----			51.20	S	7-8	
4 p. m. ---			51	-----	-----	

Typhoon of August 17 to 29, 1915.—Since the 17th of this month there were signs of a typhoon over the Pacific to the east of northern Luzon near 16° latitude N and 129° longitude E. On the 20th the typhoon was moving evidently to NW or NWbyN, and its center could be situated at 6 a. m. of the 21st in about 20° latitude N and near 125° longitude E moving NWbyN. It was in the afternoon of the same day that the typhoon began to incline northward, and in the morning of the 22d it passed between Formosa and Meiacosima moving almost due N. In the following table we publish part of the observations taken on board the steamer *Benvenue*, which happened to be near the center of this typhoon on the 22d and 23d.

METEOROLOGICAL OBSERVATIONS MADE ON BOARD THE STEAMER "BENVENUE," AUGUST 21 TO 24, 1915.

(Captain, R. KROBLE.)

Date and hour.	Position.		Pressure.	Wind.		Remarks.
	Latitude N.	Longitude E.		Direction.	Force.	
Aug. 21:			mm.		0-12.	
Noon ----	24 29	119 20	754.40	N	5	Fresh breeze, increasing in force.
Aug. 22:						
4 a. m. ---			53.07	NE	7	Moderate gale, heavy squalls.
8 a. m. ---			51.67	NE	7	Fresh gale, rough seas.
Noon ----	27 21	122 33	49.26	NEbyE	7	
4 p. m. ---			43.70	ENE	8	The weather was at its worst from 4 p. m. on the 22d to 9 a. m. on the 23d blowing hard with terrific squalls and rain from the E, SE and S, with very high waves and dangerous seas.
8 p. m. ---			42.51	E	9	
Midnight ----			38.16	ESE	9	
Aug. 23:						
4 a. m. ---			34.38	SE	10	
8 a. m. ---			33.79	SSE	9	
Noon ----	29 19	123 59	37.19	SSE	9	
4 p. m. ---			41.70	SSE	9	
8 p. m. ---			44.91	S	7	
Midnight ----			48.40	S	7	Weather moderating.
Aug. 24:						
4 a. m. ---			48.98	SSW	6	
8 a. m. ---			49.72	SSW	6	
Noon ----	32 12	127 26	52.18	S	5	Moderate and fine weather.

According to these observations and to those made along the eastern coast of China the typhoon continued moving northward until the 24th, when it recurved northeastward, its center appearing over Korea at 6 a. m. of the 25th.

Typhoon of August 19 to 28, 1915.—Judging from the observations made at Guam, it seems to us quite probable that this typhoon formed on the 19th near or over the western Carolines, to the south-southeast of Guam, in about 147° longitude E and 9° or 10° latitude N. The typhoon moved WNW until the 23d, when it began to recurve northward in about 130° longitude E and 17° latitude N. On the 25th it crossed the Loochoo Islands moving NNE, and on the 26th it took an ENE direction along the southern coast of Japan.

NOTAS GENERALES DEL TIEMPO.

Presión y temperatura.—La presión atmosférica media de este mes en Filipinas es ligeramente mayor que la del año pasado, y mayor también que la normal de Agosto. Las presiones más altas se registraron los días 27 y 28, y las más bajas el 1 y del 18 al 20.

La temperatura media mensual es en unas estaciones casi igual a la de Agosto, 1914, y en otras algo mayor. La temperatura media de Manila es casi idéntica a la normal de este mes y a la media mensual del año pasado. Las temperaturas extremas registradas en Manila durante el mes fueron 32.9° C. el día 1.º, y 22.5° C. el 31. Las máximas y mínimas de Baguio fueron: 24.7° C., 14.7° C. en la cumbre del Mirador, 24.7° C., 14.2° C. en el valle.

Precipitación acuosa.—Hablando en general de todo el Archipiélago, la lluvia de este mes fué bastante regular, aunque en buen número de estaciones fué algo menor que la normal de Agosto y que la lluvia mensual del año anterior. La mayor escasez de lluvia se experimentó en la Isla de Panay. La lluvia total del mes en Manila, 413.8 mm., es 78.5 mm. inferior a la de Agosto de 1914, pero 51.1 mm. mayor que la normal. En los pluviómetros de Baguio se recogieron 1,120 mm. de agua, siendo esta cantidad menor en 1,391.4 mm. que la del año pasado, y 20.5 mm. inferior a la normal de este mes.

DEPRESIONES Y TIFONES.

Seis tifones hubo durante este mes en el Extremo Oriente, si bien ni uno solo atravesó nuestro Archipiélago. Diremos aquí cuatro palabras sobre cada uno de ellos. Sus trayectorias pueden verse en la lámina V.

Tifón de 26 de Julio a 6 de Agosto, 1915.—Parece haberse formado este tifón del 26 al 28 de Julio en los alrededores de la parte N de las Islas Marianas. Moviése al W $\frac{1}{4}$ NW hasta el día 30 en que empezó a recurvar hacia el N, hallándose su centro a las 6 a. m. del 31 entre 20° y 21° latitud N y cerca de 134° longitud E. Se movió este tifón con suma lentitud los días 1, 2 y 3 de Agosto, mientras se dirigía hacia el N al E de las Islas Liukiu. A 6 a. m. del 5 el centro del baguio se hallaba en la parte S de Japón en los alrededores de 35° latitud N y 135° longitud E, habiéndose movido al N $\frac{1}{4}$ NE desde 6 a. m. del 4. Los días 5 y 6 se movió casi directamente al N a través del Mar del Japón.

Tifón de 30 de Julio a 2 de Agosto, 1915.—Mientras el tifón anterior recurvaba hacia el N, aparecía otro el día 30 al S de Bonín entre 23° y 24° latitud N y cerca de 142° ó 143° longitud E. Se movió primero al NW y recurvó luego al NE por el W de Bonín, durante la noche del 31 de Julio y la mañana del 1 de Agosto.

Tifón de 31 de Julio a 4 de Agosto, 1915.—El 28 y 29 de Julio se extendía un área de baja presión desde la parte norte del Mar de China hasta el Pacífico a través del N de Luzón con algunos indicios de una depresión o tifón que se formaba en el Mar de China al W del norte de Luzón. Sin embargo, con los pocos datos que poseemos, no es posible dar alguna posición definida de un centro ciclónico hasta la tarde del 31, en que apareció un tifón desarrollado al N de Paracels cerca de 113° longitud E y 19° latitud N. El 31 de Julio y 1 y 2 de Agosto el tifón se movió a NW $\frac{1}{4}$ N, entrando así en China cerca de 22° latitud N y 111° longitud E en la tarde del 2. Una vez en China el tifón se movió al WNW hasta que se rellenó probablemente el día 4.

Tifón de 7 y 8 de Agosto, 1915.—Las observaciones hechas a bordo del Transporte Americano *Dix* (las cuales publicamos en el texto inglés), comparadas con las de Guam y Chichijima, nos han hecho posible el trazar la trayectoria de este tifón el 7 y 8 de este mes. El centro del baguio se hallaba en los alrededores de 149° longitud E y 26° latitud N cuando recurvó al NE.

Tifón de 17 a 29 de Agosto, 1915.—Hubo desde el día 17 de este mes indicios de un tifón en el Pacífico al E del norte de Luzón cerca de 16° latitud N y 129° longitud E. El día 20

el tifón se movía evidentemente al NW o NW $\frac{1}{4}$ N, pudiéndose situar su centro a las 6 a. m. del 21 en los alrededores de 20° latitud N y cerca de 125° longitud E, moviéndose al NW $\frac{1}{4}$ N. La tarde del mismo día el tifón comenzó a inclinarse hacia el N, y la mañana del 22 pasó entre Formosa y Meiacosima, moviéndose casi directamente al N. En una tabla que puede verse en el texto inglés publicamos parte de las observaciones hechas a bordo del vapor *Benvenue* que se halló cerca del centro de este tifón el 22 y 23.

Según estas observaciones y las hechas a lo largo de la costa oriental de China, el tifón continuó moviéndose hacia el N hasta el 24, en que recurvó al NE, apareciendo su centro en Korea a 6 a. m. del 25.

Tifón de 19 a 28 de Agosto, 1915.—A juzgar por las observaciones hechas en Guam, parece muy probable que este tifón se formó el día 19 en, o cerca de, las Carolinas Occidentales, al SSE de Guam, en los alrededores de 147° longitud E y 9° ó 10° latitud N. El tifón se movió al WNW hasta el día 23 en que empezó a recurvar hacia el N en los alrededores de 130° longitud E y 17° latitud N. Cruzó las Islas Liukiu el día 25, moviéndose al NNE, y el 26 se dirigió al ENE a lo largo de la costa meridional de Japón.

METEOROLOGICAL DATA FOR MIRADOR OBSERVATORY, BAGUIO.^a

[$\phi=16^{\circ} 25' N$; $\lambda=120^{\circ} 36' E$; barometer above sea, 1,512.5 meters; gravity correction not applied, -1.65 mm.]

Day.	Pressure ^b (mean).	Air temperature at Mirador (on the top of the mountain).				Air temperature in the valley (near the city hall).				Relative humidity (mean).	Vapor pressure (mean).	Radiation.		Evaporation.		
		Mean.	Maximum.	Hour.	Minimum.	Hour.	Maximum.	Hour.	Minimum.			Hour.	Minimum on grass.	Maximum in sun. Black bulb in vacuo. ^c	Free exposure (total).	Shelter (total).
	mm.	°C.	°C.		°C.		°C.		°C.		Per ct.	mm.	°C.	°C.	mm.	mm.
1	634.14	18.3	20.8	Noon	16.5	9.30p.	21.6	1.15p.	16.4	9.35p.	94.3	14.7	16	42.4	1.2	1
2	35.26	18.9	24.3	11.25a.	16.9	3.20a.	23.7	Noon	16.6	12m.n.	92.3	15	15.7	43	1.5	.8
3	35.38	18	20.3	2.25p.	16.7	2.00a.	20.4	2.25p.	16.5	2.10a.	98.7	15.2	17.67	37.5	0	0
4	35.21	18.5	22.7	1.40p.	16.7	3.00a.	22.5	0.30p.	16.4	3.00a.	97.2	15.4	15.2	32.2	.2	.4
5	35.38	18.4	20.6	10.30a.	16.1	6.10p.	21	2.10p.	16.3	6.50p.	95.5	15	15.6	34.5	0	0
6	35.68	17.6	23.3	0.30p.	15.7	5.00a.	22.5	1.15p.	15.4	12m.n.	95	14.3	15	33.4	.5	.4
7	35.94	17	20.2	11.15a.	15.7	3.00a.	20.3	11.20a.	15.3	3.00a.	97.8	14.1	15	41.7	0	0
8	34.60	17.6	18.6	1.10p.	15.5	7.10a.	18.8	1.05p.	15.7	7.00a.	98.3	14.7	15.2	24.5	0	0
9	34.34	18	18.7	1.50p.	17.1	2.00a.	18.8	11.10a.	16.4	1.35a.	99.2	15.2	16.4	22.2	0	0
10	35.43	17.4	18.3	10.05a.	15.8	8.30p.	18.8	7.50a.	16	8.40p.	99.5	14.7	16.3	24.1	0	0
11	36.05	17.1	19	10.05a.	15.7	5.50p.	19.7		16.5		99.8	14.5	15.5	39	0	0
12	35.38	16.4	18.7	0.10p.	15.3	6.10p.	18.3	Noon	15.2	6.30p.	100	14	16.77	24.1	0	0
13	34.90	17.2	19.9	0.05p.	15.5	0.10a.	20.2	0.10p.	15.3	0.05a.	94.8	13.8	14.7	37	0	.2
14	35.38	17.8	20.8	9.45a.	16.2	0.35a.	20.6	9.50a.	16.2	0.40a.	95	14.4	14.5	30.2	.1	0
15	36.18	17.8	22.9	0.30p.	16	7.30p.	22.8	0.50p.	15	12m.n.	92.8	14.1	15.7	.4	0	.3
16	36.71	18.6	23.9	1.00p.	16.2	5.30a.	23.4	1.20p.	14.6	2.00a.	92.2	14.7	14.3	42.5	.9	.5
17	35.77	19.1	24	1.30p.	16.3	6.00a.	24.2	1.30p.	15.5	4.05a.	91	15	14.7	52.1	.9	.6
18	34.77	19	24.7	11.25a.	16.3	5.45a.	24.7	10.25a.	15.5	6.10a.	90	14.6	14.5	48.2	.9	.6
19	34.35	19.1	24	2.20p.	16.1	4.55a.	24.4	2.35p.	15.7	5.55a.	90	14.8	15.6	47.5	1.2	.6
20	34.16	18.5	23.3	0.50p.	16	11.50p.	22.7	2.30p.	16.3	12m.n.	95	15.1	15.5	45	.8	.5
21	34.31	17.3	19	0.10p.	16	0.45a.	19.4	11.45a.	16	1.30a.	99.3	14.6	14.5	30.5	0	0
22	35.08	17.3	20.2	9.10a.	16.5	5.55a.	20.3	9.00a.	16.7	6.00a.	96.8	14.2	15.6	30	0	.3
23	34.78	17.2	19.5	2.00p.	15.8	6.10a.	19.9	2.20p.	16	6.00a.	97.7	14.3	14.5	30.6	0	0
24	34.50	16.5	18.3	1.05p.	15.5	3.00a.	20	1.15p.	15.7	3.40a.	99	13.8	15	26.7	0	0
25	35.14	17	20.8	0.30p.	15	3.00a.	21.5	0.30p.	15.4	2.50a.	97.8	14.2	14.9	37.8	.1	0
26	36.38	17.7	21.8	11.00a.	16.2	6.00a.	22.1	1.30p.	16.3	6.00a.	97.5	14.7	15.5	33.4	.4	.4
27	37.29	18.2	24.4	1.15p.	15.5	3.00a.	23.7	1.20p.	15.2	3.00a.	98.8	14.6	13.9	49.2	1.1	.7
28	37.66	18	24.3	1.20p.	15.8	7.50p.	23.5	0.25p.	15	5.30a.	89.5	13.7	13.4	49.5	1.6	1
29	37.37	18.6	24	0.50p.	14.7	4.35a.	23.7	11.40a.	14.2	5.40a.	84	13.3	13	48.3	3.2	2.5
30	37.11	18.7	24.3	1.10p.	16.3	12m.n.	23.9	10.45a.	15	4.50a.	87.2	14	13.3	48.8	2.2	1.2
31	36.20	17.7	23.4	Noon	15.4	5.30a.	24.2	11.15a.	14.6	6.15a.	87.3	13.2	12.7	47.5	1.4	.9
Mean	635.51	17.9	21.6		16		21.7		15.7		94.8	14.4	15	38	0.6	0.4
Total															18.2	12.9

Day.	Wind.				Clouds.		Sunshine.	Rain, 24 hours beginning 6 a. m.	Miscellaneous.	
	Prevailing direction. ^d	Total movement.	Maximum hourly velocity.	Direction at the time of the maximum velocity.	Amount (mean).	Form and direction.				
						Upper.				Lower.
1	S quad.	374.5	34.8	SW	10	Ci.-S.	N. SW, WSW	3 25	11.7	● a. p. [4] ° p.
2	W	377.6	25.7	W	9.3	Ci.	Cu.-N. SW	5 00	5.3	≡ p.
3	W	431.7	34.8	W	10		N.	1 30	17.8	≡ a. p.
4	W	360.8	29.3	W	10		Cu.-N. SSW	4 10	9	d a. p. [4] ° p.
5	W	427	42.3	W	10		N.	1 55	29.3	≡ d a. p. [4] ° p.
6	W	336.6	27.6	SW	9.9	A.-Cu.	N.	4 30	69.6	≡ p.
7	W	669.6	44.1	SW	10		N.	0 50	62	≡ a. p. ° p.
8	W	1,077	62.8	W	10		N.	0 00	104.2	≡ a. p. ° p.
9	W	968.6	49.9	W	10		N.	0 00	139.2	≡ a. p. ° p.
10	W	861.2	47.3	W	10		N.	0 00	104.4	≡ a. p. ° p.
11	W	747.9	52.1	W	10		N.	0 00	75.8	≡ a. p. ° p.
12	W	948.3	59.2	SW	10		N.	0 00	57.8	≡ a. p.
13	W	486.1	44.1	W	10		Cu.-N. W	2 20	12.5	≡ a. p. < p.
14	W	365.1	34.3	W	10		cu.-n. wsw, sw	1 00	2.8	≡ a. p. d° p.
15	W	302.1	41.5	W	9.6		Cu.-N. SW	2 55	24.7	≡ d a. p. [4] ° p.
16	W	275.5	22.8	W	6.1	Ci.	Cu.-N. N	7 30?	.5	≡ p.
17	W	222.1	15.9	W	8.4	Ci.-S.	Cu.-N.	6 10	26.7	○ a. p. [4] ° p.
18	W	208.4	18.7	W	8.6	A.-Cu. SSE	Cu.-N. ENE	4 50?	25.4	a. p. [4] ° p.
19	W	224.2	20.4	W	6.7	Ci. SE	Cu. W, NE	7 30	79	≡ a. p. [4] ° p.
20	W, E	246.5	32.4	W	9.1	Ci.-S. EbyS	Cu.-N.	6 15	56.2	≡ a. p. [4] ° p.
21	W	408.1	36.4	W	10		N.	0 00	7	≡ d a. p. ° p.
22	W.	456.7	35.6	SW	9.9		Cu.-N. SW	0 40	1.9	≡ a. p. ° p.
23	W	500.5	32.7	W	9.4	Ci.-S.	Cu.-N.	0 40	20.5	≡ d a. p. ° p.
24	W	739.3	44.9	W	10		N.	0 00	84.1	≡ a. p. ° p.
25	W	580	34.8	W	10		Cu.-N. W	2 30	34.3	≡ a. p.
26	W, S	254.6	26	W	9.6	A.-Cu., Ci.-S.	Cu.-N. W	4 10	9	≡ a. p. ° p.
27	W	268.6	25.1	W	8	Ci.	Cu. WSW	6 05	2.3	≡ a. p.
28	NW, W	214.3	18.8	W	5.6	Ci.	Cu. W	7 20	4.8	≡ a. p.
29	W	283.1	22.2	W	3.6	Ci., A.-Cu.	cu. NNW, WNW	8 50		d° < p.
30	NW quad.	223.6	18.7	W	6.1	Ci.	Cu.-N. NW	7 30		≡ a. p. [4] ° p.
31	N, W	289.8	20.7	NW	6.3	Ci. ENE	N. NW	6 10	42.2	≡ p.
Mean		455.8	34.1		8.9			3 21		
Total		14,129.4						103 45	1,120	

^a All the mean values given in this table are deduced from six daily observations taken at 2, 6, 10 a. m. and 2, 6, 10 p. m.
^b The barometric readings of this station are not reduced to sea level.
^c Maximum of hourly observations taken from 6 a. m. to 6 p. m.
^d This element is based on hourly observations taken from a quadruple register, which gives only eight possible directions of the wind.

DAILY RAINFALL AT THE STATIONS OF THE WEATHER BUREAU, AUGUST, 1915.

Station.	Day of month.															
	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.
Glan	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.
Jolo		12.8	2.6		58.4	4.3	1.6							1.5	0.8	51.1
Isabela, Basilan								2.5						0.5	19.8	
Zamboanga										5.1						
Davao			11.7	6.4		1.5							1.3	16		26.7
Cagayan, Misamis					1	1.8	24.6	4.3	20.6	2.5					2.3	4.3
Dapitan					2.8	1	1.8		33	5.3						1.8
Butuan					.3	2.5	.3			5.1					.5	.5
Dumaguete					3.3											
Tagbilaran															23.9	9.4
Iwahig	4.3	6.1	2.5	1.8	20.8	4.9				3.8	16.3				14	2
Surigao																1.8
Maasin				54.6			19.8									21.1
Cebu					2.5										16.8	9.4
Iloilo					8.1		2.5	2.5			4	4.1				
San Jose Buenavista					55.3	.3	4.3		7.1	35.3	11.9	25.1		2.5	4.1	.3
Cuyo				.8	34		14.2	4.3	14	29.7	.5				2.3	4.1
Ormoc					24.4					14.5					8.2	.3
Guiuan				2.3	5		.3								29.7	.3
Tacloban									1.3						2.7	
Capiz			3	5.4	98.9	1	16	1.8	9.7	1.5	.3				3	.3
Borongan															25.4	
Calbayog					23.8	2					.3				5.1	.5
Masbate					10.9	4.6										21.1
Romblon					.8		.3		.5				12.4		10.2	5.6
Batag															4.1	21.9
Gubat					15											1.5
Legaspi				.8	38.5	5.6	5.1			.5	1.5					.5
Sumay, Guam		14	5.1	35.6		12.7	115.6	48.3		5.1					10.9	
Calapan						6.6				.3		.5	7.1		.5	5.4
Virac					5.1	.3										
Nueva Caceres					20.8	10.4									1.5	2.1
Batangas					1	1.5				16.3	6.1	16.5	8.1			
Atimonan										3.8	3				1.5	
Ambulong, Tanauan						.8	1.3	1.3	1.5	14.7	10.2	8.2	14.7	2.6	3.3	
Paracale					25.1		1.5			21.6	7.9		27.2	13.2	4.1	
Santa Cruz, Laguna			6.6		37.6	5.1	18.3	2.3		3.3	19.1	18.3	11.4	12.2		
Manila					42.1	.8	16.5	20.1	5.3	18.2	25.3	53.8	63.2	4.4		
Antipolo		1.5		1	45.7		24.1	15	4.1	2.3	23.4	43.7	47.5	.5		3
Iba	5				46		16.5	5	5			2.3	2.8			
San Isidro	19.6	11.2	22.4	20.8	61	45.2	59.2	10.2	38.1	66	119.4	107.2	144.7	73.4	49.5	
Tarlac	1.3		13	9	3.1		2.1	4.8	15.8	15.8	20.6	32.1	63	.6	1.1	12
Baler	4.1	.5	1.8	.8	59.7	8.9	7.6	.3	1.5	3.8	3.3	32.5	58.5	34.3	3.8	2.8
Dagupan	.5				46			.5	.5			2.3	2.8		.5	1
Bolinao	4.4	2.5	14.5	11	60.9	1.8	16	8.7	19.4	24.7	27.7	33.4	43.2	6.6		2
Baguio	46.4	18.6	6.8	9.5	18.8	6.8	42.8	16.6	1.5	72.4	47.6	87.3	36.1	5.9	24.4	2.8
San Fernando, Union	11.7	5.3	17.8	9	29.3	69.6	62	104.2	139.2	104.4	75.8	57.8	12.5	2.8	24.7	.5
Echagüe	3.2		11.2	14	26.4	21.6	56.4	9.6	11.4	39.4	54.8	44.1	.5			
Candon	.3		14.7	30.5	6.6	.5					.3	5	8.2			
Vigan	4.1	2	1.5	1.3	17.8	24.4	48.2	17.5	40.4	4.5	34.3	27.2				
Tuguegarao	9		3.1	1.8	21	43	75.1	31.1	48.7	12.4	64.9	25.2	18.2			
Laoag	19.8		22.4		38.4	24.9	15.2	27.6	11.9	5.1	17.8	41.9	7.1	4.1	5.8	
Aparri	4.8		9.2		14.5		.3	.8		5.6		8.9	13.2		7.1	
Santo Domingo, Batanes	3.3	1.1		.1		1.3	1	.3				.3		11.6		

Daily rainfall at the stations of the Weather Bureau, August, 1915—Continued.

Station.	Day of month.														Total.	
	17.	18.	19.	20.	21.	22.	23.	24.	25.	26.	27.	28.	29.	30.		31.
Glan	17.9	7			0.8	47				1.8		0.5				202.2
Jolo	12.2	2	5.1	1.8		4.3	13.2		44.5	2	19.8	4.1	20.8	0.3		143.6
Isabela, Basilan	54.6	6.6				.5		15.5	59.9	9.1		16.5		.5		186
Zamboanga	2.5	9.7					1	10.7	10.7			9.7				49.4
Davao	50.8	52.1			36.1		5.8	2.5		1.3	2.5				50.8	265.5
Cagayan, Misamis	29	32.7	.5			12.7		10.2	.5	14.5					34.5	196
Dapitan	43.7	11.4			17.8			4.3	15.2	11.4						149.5
Butuan	6.1	16.3						.3	2.3	25.1						59.3
Dumaguete	4	2	3.8					1		5.1					18.5	37.7
Tagbilaran	67.6	9.4								2.3				.8	4.3	117.7
Iwahig	4.7		9.1	34.8	5.6	2	14.5	17.3	17.5	4.4					8.9	193.3
Surigao	11.2	41.7	.5							7.1					17	81.3
Maasin	20.6	8.6		4.3				4.8	16	5.3						155.1
Cebu	15.7	38.9	21.6					9.1	12.7	47				11.4	1	186.1
Iloilo	42.7		8.6	7.7				4.6		26.7					1	112.5
San Jose Buenavista	2.8	.5	23.8	12.1	10.9		1	7.6	31	6.1	5.6				12.2	259.8
Cuyo	15.2	11.9	3	27.5	2.5		.5	3.8	17.3	1.5					32	219.1
Ormoc	20.3	24.3	32.2	1.3				3.6	9.9	6.9			41.7	21.8	8.4	250.1
Guiuan		3.3	.5							4.6	.5	.8		4.1	45.5	92.4
Tacloban		14.9	5.4	.3		.3		.1	5	21.5		9.4		1	15.4	77.3
Capiz	43.2	.3		6.4	17			23.9	.3	2.6	2				1	234.9
Borongan	22.4	9.1	.3	3.3			3			50.8	1					115.3
Calbayog	2.3	1.8	8.2	1.3				4.1	.5	8.1	6.6				10.6	75.2
Masbate	2.1	12	10.4	32.3	3.8			30.5		2	39.4				2.3	171.4
Romblon	43.2			12.2	8.6						9.9			1.3		105
Batag	1.3	1.5	2.8	7.4						18.5				19	3.8	80.3
Gubat	53.3	1.3		19.3	3.8					10.2	31.7			48.3	1.5	185.9
Legaspi	12.7	6.9	56.2	19.8	.5						8.9			19	1.6	178.1
Sumay, Guam		17.8	8.9	5.1	16.5	1.3	21.6	5.1	7.6	5.1	1.3	1.3	63.5	16.5	27.9	435.9
Calapan		12.4	2.8		2.6		2.8			1.3					.5	47.8
Virac	53.6	7.9	2		1					17.5	22.4			4.8	4.3	124.8
Nueva Caceres	43.5	.7	10.4	8.9	3		.6		1.3		11.7				.8	162.7
Batangas	.3	21.3	22.1	2.3	6.1		7.6	15.3							.3	113.5
Atimonan	35.3				7.6											51.2
Ambulong, Tanauan	4	.8	6.1	2	1.5		3.8	22.3						15.2	11.7	126
Paracale	52.3			5.1	1.5			5.8			15.5				1.8	189.2
Santa Cruz, Laguna	8.1	.3	2.6		3.9	11.4	14.7	17.2	4.6	16.3				1.8		209
Manila	2.2	3.6	10.2	.3	8.8	39.8	18.4	37.4	3.6			23			15.3	413.8
Antipolo	6.6	3.3	89.1	1	9.9	12.7	18.5	56.6	2.3	5.6		1			14	431.4
Iba	2.3	1.3	1	7.6	32	87.9	74.9	90.6	63.3	22.6	21.1				2	254.5
San Isidro		4.1		1.8	2.6	6.9	13	7.6	5.5			10		1.5	3.3	250.6
Tarlac		1.1		30.5	5.8	5.8	45.2	27.9	6.1	16.3	36.1	8.6			1.8	409.4
Baler	1.3	4.3		4.6	.3	.5	1.8	3.6				5.9				77.2
Dagupan			12.4	40.7	.5	1.3	48.8	55.1	26.6	26.1	.8				20.1	509.2
Bolinao	1.5	.5	.8	22.6	12	28.8	30.4	113.7	18	5.1		.3			4.5	682.5
Baguio	26.7	25.4	79	56.2	7	1.9	20.5	84.1	34.3	9	2.3	4.8			42.2	1,120
San Fernando, Union	5.6	.8		15	5.6	.8	7.9	99.5	6.5						18.3	452.6
Echagüe	1		4.1								49.5				2.8	119
Candon	25.4	7.6	2.5	32	11.7	1		36.4			19	2				360.8
Vigan	18.8	4.6	8.2	82.4	6.2	16.4	14.4	13.5	25.2	.6	.5	1.5			33.4	579.2
Tuguegarao		8.4	3.8	2.3	10.9	30	1.8	25.4	3.6	1		3.8			1	238.6
Laog		2.5	1	14.5	87.2	15.7		78.7	46.5	10.2	.3				44.4	523.7
Aparri	1.3		22.1	9.8	28.5		12.2	2.3	3	2.5		2.3			2.6	140.3
Santo Domingo, Batanes		2.4		6.9	42	.8	4.9		11.4	2.2	.3				22.1	112

Maximum and minimum temperatures at the stations of the Weather Bureau, August, 1915—Continued.

Day.	Vigan.		Tuguegarao.		Laoag.		Aparri.		Santo Domingo, Batanes.	
	Maxi- mum.	Mini- mum.	Maxi- mum.	Mini- mum.	Maxi- mum.	Mini- mum.	Maxi- mum.	Mini- mum.	Maxi- mum.	Mini- mum.
1	32.2	24.9	35	24.5	33.2	25	30.5	24.6	30.6	25.2
2	32	26	34.6	24.5	33.7	25.4	31.8	24.7	31.4	26.3
3	32.2	25.9	36.2	24.5	33.2	26.1	32.6	26	30.9	26.4
4	32.3	26	37.4	24	33.9	26	33.2	25.1	31.1	27.8
5	29.2	24	35	22.6	28.5	25	32.9	24	31.6	27.3
6	31.3	23.9	31.7	22.1?	32.6	24	30.1	23.7	30.7	27.7
7	28	22.5	34.7	23.7	32.4	23.1	32.9	25	30.2	26.3
8	29.2	22.7	33.5	24.3	30.7	23.4	32.2	25.3	30.4	27.4
9	31.5	25.2	37	24.4	32.7	25.5	33.2	25.4	30.6	24.9
10	30.5	25.1	36.6	24.7	32.5	24.8	33.3	26.1	31.7	26.4
11	30.8	23	37	23.4	32.4	24	33.6	24.8	30.8	27.4
12	29.4	24.2	36	24.5	32	24.1	32.7	24.8	30.7	27.3
13	29.8	23.4	34.6	24.3	33.1	23.9	32.9	24	31.2	26.1
14	30.1	22.5	35.7	23.1	33.7	23.1	32.8	24.4	30.4	26.3
15	31.8	24.7	37	22.7	34.2	24.4	33	24	31.3	24.8
16	31.9	24.6	35.2	23.3	34.1	23.6	32	23.8	31.9	25.4
17	31.8	23.5	32.4	24.3	34.2	23.7	30.8	24.4	32.4	26.9
18	31.8	24	34.5	24.2	33.9	24.3	32	25.2	33.4	24.7
19	32.2	24.8	33.6	24.8	34.8	25	32.3	25.2	32.1	25.3
20	33	23.3	32.6	25.5	34.2	25.3	29.4	24.9	32.5	26.9?
21	27.7	23.3	26.4	24.3	26.8	24.4	26.6	24.5	28.6	25.5
22	29.2	24.3	36	22.3	30.6	24.7	32.5	24.5	30.4	24.2
23	30.8	24.1	35.6	23	33.2	24.1	33	24.5	29.9	26
24	30	23.2	34.2	24.2	31.2	24.5	31.5	24.5	30.3	26
25	28.6	22.4	35.8	24	29.4	23.1	33	24.5	30.2	26.6
26	30.6	24	36	24.9	32.7	24.1	33.3	25	30.7	25.5
27	31.6	24.3	36.4	24.2	34.5	24.4	33.4	25	30.8	26.6
28	31.9	24.4	35.1	23	33.7	23.9	31.7	23.6	31	26.6
29	32.5	23.7	35.2	23	34	23.3	32.2	23.3	31.4	26
30	32.3	24.2	36	24	33.7	23.1	31.4	25	31.3	26.6
31	32.3	23.3	35.6	24	33	24	30.1	24.4	31.4	27.2
Mean	30.9	24	34.9	23.9	32.7	24.3	32	24.7	31	26.2

SEISMOLOGICAL BULLETIN FOR AUGUST, 1915.

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Assistant Director of the Weather Bureau.

EARTHQUAKES FELT IN THE PHILIPPINES.¹

5, 8^h 48^m *[5, 16^h 48^m]. **Central Mindanao.** Earthquake of intensity IV-V felt in the district of Cotabato and in the southern part of Agusan and Bukidnon: it had long duration. Its origin apparently lay towards the northeastern limit of the valley and district of Cotabato.

8, 14^h 37^m [8, 22^h 37^m]. **Butuan (N Mindanao).** Oscillatory earthquake, direction NNE-SSW, intensity III.

16, 6^h 09^m [16, 14^h 09^m]. **Butuan (N Mindanao).** Oscillatory earthquake, direction E-W, intensity III-IV, duration 12 seconds.

21, 19^h 30^m [22, 3^h 30^m]. **Butuan (N Mindanao).** Earthquake shock of intensity IV, duration 3 seconds.

24, 10^h 51^m [24, 18^h 51^m]. **Baguio (W Luzon).** Earthquake of intensity II-III.

24, 11^h 30^m [24, 19^h 30^m]. **Butuan (N Mindanao).** Earthquake of intensity III, direction ENE-WSW.

25, 10^h 20^m [25, 19^h 20^m]. **Glan (S Mindanao).** Earthquake of intensity III-IV. The town of Glan is situated not far from the Sarangani Islands where earthquake shocks are of frequent occurrence.

25, 23^h 16^m [26, 7^h 16^m]. **Ormoc (W Leyte).** Oscillatory earthquake, direction SW-NE, intensity III, duration 4 seconds.

26, 18^h 29^m 11^s *[27, 2^h 29^m 11^s]. **Bolinao (W Luzon).** Oscillatory earthquake, direction NW-SE, intensity III, duration 4 seconds. The origin of the shocks lay in the China Sea, at a distance of about 210 kilometers from Manila, close to the coast of Bolinao Peninsula.

27, 8^h 47^m 13^s *[27, 16^h 47^m 13^s]. **Batangas (S Luzon).** Oscillatory earthquake, direction E-W, intensity III, duration 5 seconds.

30, 7^h 16^m 53^s *[30, 15^h 16^m 53^s]. **N Luzon.** Earthquake of intensity III-IV, felt in the northernmost part of Luzon, comprising the provinces of Ilocos Norte, Apayaos and Cagayan. Its origin was some 640 kilometers far away from Manila, probably towards the Babuyan Islands.

31, 20^h 42^m 36^s *[Sept. 1, 4^h 42^m 36^s]. **Jolo Island.** Earthquake of intensity IV, duration 6 seconds; it was registered at Zikawei (China). Repetition of intensity III at 21^h 10^m 29^s *[5^h 10^m 29^s].

¹The intensity of earthquakes is given in the notation known as the Rossi-Forel scale. The time is that indicated by the seismographs at the Central Observatory whenever the disturbance has been registered by them. This fact is denoted by an asterisk (*). Otherwise the time is that noted by the observer who sent the report. All time indications are in Greenwich mean time (midnight=0^h), insular time being added in brackets for the convenience of Philippine readers.

RECORDS OF THE MICROSEISMOGRAPH.

[Time: Greenwich mean. Midnight=0h. Instrument: Wiechert seismograph; 1,000 kilograms. A_N : $T_0=7.10$, $\epsilon=2.08$, $\frac{r}{T_0^2}=0.042$;
 A_E : $T_0=6.40$, $\epsilon=2.31$, $\frac{r}{T_0^2}=0.039$. Alluvium. 2.40 meters above sea level.]

No.	Date.	Character.	Phase.	Hour.	Period.	Amplitude.		Remarks.
						A_N μ	A_E μ	
199	2	Ir	eP	7 18 46				
			L	24 13				
			M_E	25 56	13		8	
			M_N	26 06	13	17		
			F	48				
200	3	Iv	eP	12 53 31				
			S	53 55				
			L	54 24				
			M_N	55 07	6		48	
			F	13 03				
201	3	IIr	eP	13 10 06				
			iS	14 16				
			L	18 25				
			M_N	21 20	7		117	
			M_E	21 50	9		42	
			F	14 17				
202	4	Iv	eP	10 17 23				
			F	21				
203	4	Iv	eP	10 27 38				
			F	33				
204	4	Iv	eP	18 57 21				
			F	19 01				
205	5	Iv	eP	8 48 00				
			F	9 03				
206	6	Ir	eP	13 19 33				
			S	25 42				
			L	31 33				
			M_N	37 49	14		17	
			F	14 33				
207	7	Ir	e	15 19				
			F	16 33				
208	10	Iv	eP	4 38 22				
			F	41				
209	11	Iv	eP	15 15 40				
			F	18				
210	12	IIr	eP	7 40 36				
			iS	43 53				
			L	47 42				
			M_E	50 14	10		38	
			M_N	50 21	8		77	
			F	8 47				
211	12	Ir	eP	9 23 24				
			eS	27 42				
			L	31 04				
			M_E	36 12	15		12	
			M_N	37 04	11		24	
			F	10 09				
212	12	Iv	eP	13 31 16				
			L	34 32				
			M_N	35 38	8		35	
			F	14 02				
213	17	Iv	eP	5 26 00				
			F	29				
214	17	Iv	eP	14 47 32				
			F	49				
215	18	Iv	eP	5 13 10				
			F	16				
216	18	Ir	eP	12 29 05				
			L	33 28				
			F	50				
217	19	I	e	0 20				
			F	1 03				

Central Mindanao.

Records of the microseismograph—Continued.

No.	Date.	Character.	Phase.	Hour.	Period.	Amplitude.		Remarks.
						A _N μ	A _E μ	
218	26	II _v	eP	18 29 11				Bolinao (W Luzon).
			L	29 34				
			M _E	30 09	5		48	
			M _N	30 17	3	53		
			F	38				
219	27	I _v	eP	8 47 13				Batangas (S Luzon).
			L	47 26				
			M _N	48 00	6	60		
			F	59				
220	27	I _v	eP	9 03 37				
			F	07				
221	29	I _v	eP	19 19 29				
			F	22				
222	30	II _v	eP	7 16 53				N Luzon.
			eS	17 44				
			eL	19 00				
			M _N	19 20	6	78		
			M _E	20 24	5		115	
			F	47				
223	30	I _v	eP	18 30 49				
			F	34				
224	31	I _v	eP	19 48 10				
			F	50				
225	31	III _r	eP	20 42 36				Jolo Island.
			eS	44 37				
			iL	45 44				
			M _E	50 52	9		127	
			M _N	51 53	9	193		
226	31	I _v	eP	21 10 29				New earthquake. Jolo Island.
			F	22 22				

TEMBLORES DE TIERRA SENTIDOS EN FILIPINAS.¹

5, 8^h 48^m *[5, 16^h 48^m]. Centro de Mindanao. Temblor de tierra de intensidad IV-V sentido en el distrito de Cotabato y en la parte sur de los de Agusan y de Bukidnon: tuvo larga duración. Su origen parece se hallaba en la parte NE del valle y distrito de Cotabato.

8, 14^h 37^m [8, 22^h 37^m]. Butúan (N de Mindanao). Temblor oscilatorio, dirección NNE-SSW, intensidad III.

16, 6^h 09^m [16, 14^h 09^m]. Butúan (N de Mindanao). Temblor oscilatorio, dirección E-W, intensidad III-IV, duración 12 segundos.

21, 19^h 30^m [22, 3^h 30^m]. Butúan (N de Mindanao). Temblor de tierra de intensidad IV, duración 3 segundos.

24, 10^h 51^m [24, 18^h 51^m]. Baguio (W de Luzón). Temblor de tierra de intensidad II-III.

24, 11^h 30^m [24, 19^h 30^m]. Butúan (N de Mindanao). Temblor de tierra de intensidad III, dirección ENE-WSW.

25, 10^h 20^m [25, 18^h 20^m]. Glan (S de Mindanao). Temblor de tierra de intensidad III-IV. Glan está cerca de las islas Sarangani donde son frecuentes los temblores de tierra.

25, 23^h 16^m [26, 7^h 16^m]. Ormoc (W de Leyte). Temblor oscilatorio, dirección SW-NE, intensidad III, duración 4 segundos.

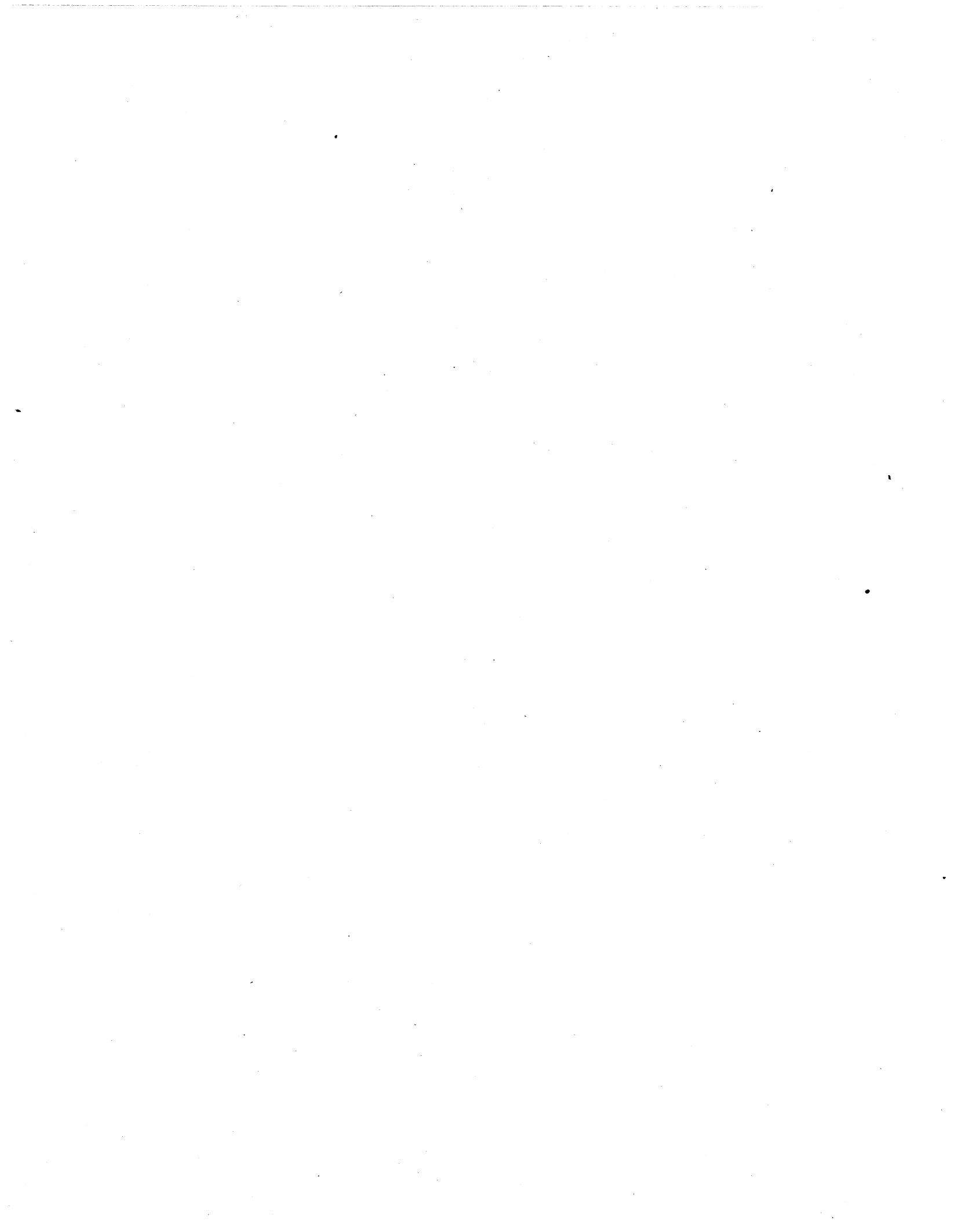
26, 18^h 29^m 11^s *[27, 2^h 29^m 11^s]. Bolinao (W de Luzón). Temblor oscilatorio, dirección NW-SE, intensidad III, duración 4 segundos. El origen de este temblor se hallaba en el Mar de China a unos 210 kilómetros de Manila, muy cerca por consiguiente de las costas de la península de Bolinao.

27, 8^h 47^m 13^s *[27, 16^h 47^m 13^s]. Batangas (S de Luzón). Temblor oscilatorio, dirección E-W, intensidad III, duración 5 segundos.

30, 7^h 16^m 53^s *[30, 15^h 16^m 53^s]. N de Luzón. Temblor de tierra de intensidad III-IV, sentido en la parte más septentrional de la isla de Luzón comprendida por las provincias de Ilocos Norte, Apayaos y Cagayán. El origen distaba cerca de 640 kilómetros de Manila, y por consiguiente estaba hacia el grupo de las islas Babuyan.

31, 20^h 42^m 36^s *[Sept. 1, 4^h 42^m 36^s]. Joló. Temblor de tierra de intensidad IV, duración 6 segundos; fué registrado en Zikawei (China). Repitió con intensidad III a 21^h 10^m 29^s *[5^h 10^m 29^s].

¹ La intensidad de los terremotos se indica conforme a la conocida escala de Rossi-Forel. Cuanto a la hora de su ocurrencia, adoptamos la indicada por los sismógrafos de este Observatorio siempre que los hayan registrado, distinguiéndola por medio de un asterisco (*). En caso contrario copiamos la apuntada por los observadores que nos envían las notas. Todas las indicaciones del tiempo se refieren al tiempo medio de Greenwich (medianoche=0^h). Para conveniencia de los lectores de Filipinas se añade también el tiempo insular.





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WEATHER BUREAU

MANILA CENTRAL OBSERVATORY

BULLETIN FOR SEPTEMBER, 1915

PREPARED UNDER THE DIRECTION OF
REV. JOSÉ ALGUÉ, S. J.
DIRECTOR OF THE WEATHER BUREAU

MANILA
BUREAU OF PRINTING
1915

BULLETIN FOR SEPTEMBER, 1915.

METEOROLOGICAL BULLETIN FOR SEPTEMBER, 1915.

By Rev. JOSÉ CORONAS, S. J.,
Chief, Meteorological Division of the Weather Bureau.

GENERAL WEATHER NOTES.

Pressure and temperature.—The mean atmospheric pressure for this month is somewhat higher than that of the preceding year in Luzon, and a little lower generally in the Visayas and Mindanao. That of Manila is entirely identical with the normal, while it differs only by +0.10 mm. from the monthly mean of September, 1914. The highest pressures were observed generally on the 30th in Luzon and on the 16th in the rest of the Archipelago: the lowest pressures were registered on the 8th.

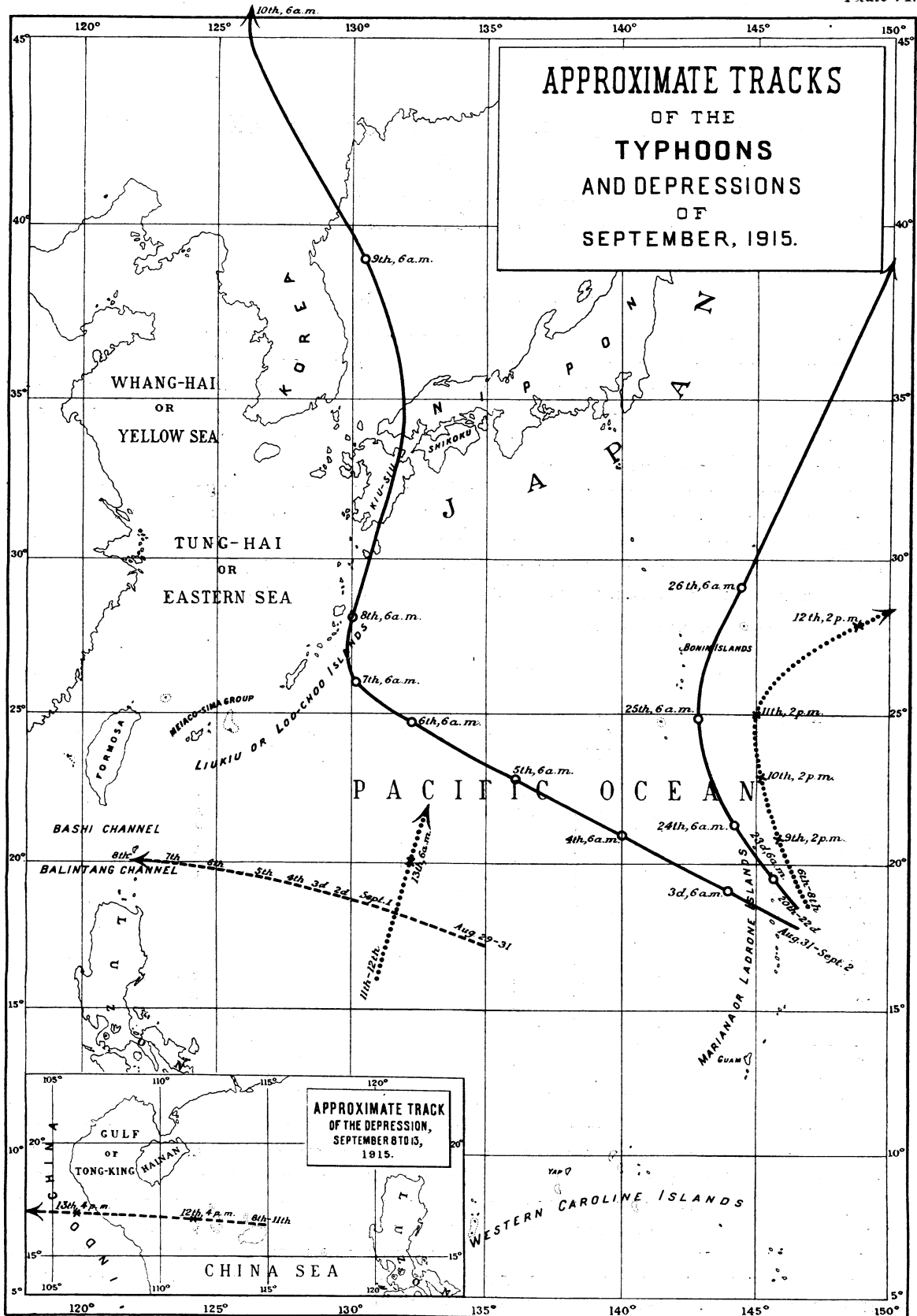
The mean monthly temperature is almost identical with, or slightly lower than, that of the preceding year in the Visayas and Mindanao, but somewhat higher in Luzon. The extreme monthly values for Manila were 33.4° C. on the 24th, and 22.4° C. on the 29th. The absolute maximum and minimum temperatures for Baguio were 26.2° C., 15° C. on the top of Mirador, and 26.2° C., 14.1° C. in the valley.

PRESSURE AND TEMPERATURE AT THE FIRST AND SECOND CLASS STATIONS FOR SEPTEMBER, 1915.

Station.	Pressure.						Temperature.					
	Mean.	Departure from Sept., 1914.	Highest mean.	Day.	Lowest mean.	Day.	Mean.	Departure from Sept., 1914.	Highest.	Day.	Lowest.	Day.
	mm.	mm.	mm.		mm.		°C.	°C.	°C.		°C.	
Tagbilaran	757.79	-0.28	759.27	16	755.91	8	27.1	-0.9	33.3	2, 9	21.6	16
Surigao	57.58	-.14	59.15	16	55.53	7	28	-.5	34.3	11	22	28
Cebu	57.72	-.11	59.42	16	55.44	8	28	-.2	33.7	29	21.3	29
Iloilo	57.58	-.29	59.04	27	55.16	8	27.2	+.4	33	20	22.6	9
Ormoc	57.93	-.11	59.46	16	55.64	8	27.1	-.6	33	20, 30	21.7	23
Tacloban	57.44	-.15	59.32	16	54.79	8	27.7	0	35.2	26.	22.4	14
Capiz	57.76	+.05	59.32	28	54.86	8	26.8	+.1	34.2	9	22.9	18, 25
Calbayog	57.61	+.02	59.60	16	54.76	8	27.2	-.2	34.4	23	22.4	30
Legaspi	57.15	+.25	59.13	30	53.54	8	27.5	+.6	34.5	22	22.7	29
Atimonan	57.08	+.34	59.66	30	53.24	8	27	+.7	33.9	6	22.7	4
Ambulong, Tanauan	56.78	-.11	58.99	30	53.39	8	26.7	+.4	34.8	24	22	28
Paracale	57.26	+.53	59.80	30	53.19	8	27.5	+.4	34.2	11	23.3	30
Manila	57.45	+.10	59.76	30	53.95	8	26.8	+.6	33.4	24	22.4	29
San Isidro	57.55	+.24	59.89	30	53.72	8	27	+.8	33.9	22, 23	22.8	29
Dagupan	56.58	+.32	59.08	30	52.62	8	27.7	+.9	35.5	17, 22	22.6	29
Bolinao	56.83	+.30	59.29	30	52.81	8	27.3	+.7	34.5	19	23.1	11
Baguio*	635.58	+.59	637.87	17	631.98	8	18.4	+1	26.2	20	15	27
Vigan	756.78	+.37	759.41	30	752.70	8	27.6	+1.1	33.5	24	22.5	11
Tuguegarao	57.23	+.95	60.04	30	52.48	8	27.6	+.4	38	27	21.9	29
Aparri	57.17	+1.05	60.08	30	52.27	8	27.5	+.7	33.3	27	23	28, 29

* The barometric readings of this station are not reduced to sea level.

Rainfall.—Generally speaking and with a few exceptions the rainfall for this month was less than the normal, particularly in central and northern Luzon. Yet, as compared with that of September, 1914, the total rainfall of the month was generally greater this year in the Visayas and Mindanao, but much smaller in Luzon. The monthly rainfall for Manila was 478.7 mm., and it differs from that of the preceding year by -409.0 mm. and from the normal by +106.2 mm. The amount of rain collected in the gauges of Baguio during the month, 602.8 mm., is 591.4 mm., and 266.8 mm. below that of September, 1914, and below the normal respectively.



RAINFALL AT VARIOUS STATIONS OF THE WEATHER BUREAU DURING THE MONTH OF SEPTEMBER, 1915.

Station.	Total.	Departure from Sept., 1914.	Departure from normal.	Rainy days.	Departure from Sept., 1914.	Greatest rainfall in a single day.	Day.	Station.	Total.	Departure from Sept., 1914.	Departure from normal.	Rainy days.	Departure from Sept., 1914.	Greatest rainfall in a single day.	Day.
	mm.	mm.	mm.		mm.	mm.			mm.	mm.	mm.		mm.	mm.	
Glan	111.1			13		38.1	14	Sumay, Guam	306.2	-200.7		21	-5	162.9	1
Jolo	134.7	+ 44.1	- 30	19	+10	19.3	15	Calapan	150.6	-340.6		21	+4	39.6	9
Isabela, Basilan	236.5	+ 77.9	+ 35.5	18	+10	53.1	28	Virac	139.9	+ 58.7		22	+6	25.4	15
Zamboanga	104.1		+ 5.2	13		25.4	28	Nueva Caceres	183.9	+ 13.8	- 59.4	23	+3	34.3	24
Davao	126.9	+ 65.	- 59.2	8	+ 5	43.7	14	Batangas	245	-431.8		22	+2	65	9
Cagayan, Misamis	236	+ 58.4		19	+ 8	50.8	24	Atimonan	238	- 42.1	- 38.5	17	-1	56.9	19
Butuan	110.7	- 40.7	- 24.7	17	+12	18.8	21	Ambulong, Tanauan	320.9	-701.9		19	0	113.3	8
Dumaguete	164.5	+129.7		14	+ 8	53.6	17	Paracale	213.1	+ 97.6		18	+1	48.2	26
Tagbilaran	293.8	+209.7	+116.5	14	+10	61.5	25	Santa Cruz, Laguna	242.2	-390.4		23	+3	46.7	13
Iwahig	260.3	+168.4		18	0	55.6	25	Manila	478.7	-409	+106.2	21	0	108.3	11
Surigao	76.4	- 3.1	- 81.4	12	+ 3	31.3	27	Antipolo	540.5	-560.4		23	+2	97.3	7
Maasin	239.2	+ 87.5	- 39	13	+ 6	72.4	14	Iba	434.2	-973		22	+1	100.9	8
Cebu	207.1	+117.9	+ 34.4	16	+ 5	47.8	14	San Isidro	169	- 39.5	-156.6	22	-3	35	2
Iloilo	233.8	-382.6	- 93.7	15	- 6	51.6	9	Tarlac	260.2	- 57	- 81.5	22	+3	47.7	10
San Jose Buenavista	317.8	-141.7	-206.2	23	0	46	6	Baler	181.2		-112.9	18	0	40.4	1
Cuyo	220.3	+ 25.6	-163.6	26	+ 4	19.3	14	Dagupan	214.7	-451	-246.8	19	+2	74.5	10
Ormoc	172.4	+ 84.7	-110.6	20	+ 6	47.3	12	Bolinao	391	-175.6	-153.4	21	-3	90.4	7
Guiuan	208.4	+ 49.2		12	0	138.9	14	Baguio	602.8	-591.4	-266.8	25	-3	67	21
Tacloban	123.9	- 21.6	- 29.6	17	+ 3	43.9	6	San Fernando, Union	351.6	-244.1	96.3	19	0	46.1	3
Capiz	212.2	+ 28.5	- 93.9	23	+ 5	37.6	25	Echague	221	- 59.5		17	-1	85.3	4
Borongan	114.5	+ 54.2	- 85.1	15	- 1	31.7	13	Candon	266.4	-431.3	-221.2	12	-7	91.2	1
Calbayog	264.4	+150.3	- 8.3	19	+ 2	81.9	13	Vigan	183.8	-471.2	-347.1	14	-6	52.5	8
Masbate	119.2	+ 34.7	- 57.8	20	+ 3	63.3	13	Tuguegarao	144.8	+ 39.8	-128.1	11	-1	59.7	28
Romblon	214.8	- 50.4	+ 11.4	20	+ 1	28.9	24	Laog	473.2	+ 81.1		16	+3	100.6	3
Batag	113			7		53.3	12	Aparri	75.2	-133.4	-208.4	10	-1	44.7	4
Gubat	220.6	+ 27.9		17		50.8	17	Sante Domingo, Batanes	147.2	-207	-202.2	17	-3	21.9	14
Legaspi	261	+ 32.9	+ 11.5	22	- 1	82.2	17								

DEPRESSIONS AND TYPHOONS.

There were in all six depressions or typhoons in the Far East during this month: but none of them was of any great importance for the Philippines. See their approximate tracks in Plate VI.

Typhoon of August 31 to September 10, 1915.—This was a big typhoon which struck the southwestern part of Japan on the 8th of this month. According to the observations made at Guam there seems to be no doubt that it formed in the neighbourhood of the northern part of the Ladrone Islands from August 31 to September 2. At 6 a. m. of the 3rd its center could be situated near 144° longitude E and 19° latitude N. The typhoon moved WNW until the 7th when it recurved northward to the east of the Loochoos, its center being situated at 6 a. m. of that day in about 130° longitude E and 26° latitude N. As can be seen in the track, the typhoon moved very slowly from 6 a. m. of the 6th to 6 a. m. of the 8th: but on the 8th it moved with so extraordinary velocity that, while at 6 a. m. of that day the center lay in about 130° longitude E and 28° latitude N, at 6 a. m. of the next day we find it near 39° latitude N and 130° longitude E. The change in the direction of the storm was also extraordinary on that day, particularly if we take in consideration the great velocity with which it was moving. The typhoon moved NNE across the southwestern part of Japan from 6 a. m. of the 8th up to 10 p. m. of the same day, when it began to move NNW toward Manchuria.

It was on the 9th that the violence of the storm was experienced by the S. S. *Benvenue* while in the Sea of Japan, the barometer having fallen to 727.32 mm. at 6 a. m. of the 9th. Here we publish some of the observations taken on board this steamer on September 8 to 10.

METEOROLOGICAL OBSERVATIONS MADE ON BOARD THE STEAMER "BENVENUE," SEPTEMBER 8 TO 10, 1915.

Captain, R. KROBLE.

Date and hour.	Latitude north.	Longitude east.	Pressure.	Wind.		Remarks.
				Direction.	Force.	
Sept. 8:	o /	o /	mm.		0-12.	
4 a. m.			753.63	NE	3	Threatening appearance of the weather.
8 a. m.			52.43	NE	4	
Noon	39 43	131 26	45.73	ENE	4	
4 p. m.			42.05	E	5	
8 p. m.			37.09	E	6	Wind and sea increasing. Clear at intervals. Ugly appearance.
Midnight			34.68	ESE	7	
Sept. 9:						Remarkable clearness of the sky. Blowing a moderate gale. Lowest barometric reading remaining stationary for some time, then shows signs of rising. The center must have passed the vessel at this time mostly to the westward at a distance of about 60 miles according to the hourly fall and height of the barometer when it ceased to fall.
4 a. m.			31.20	SE	9	
6 a. m.			27.32	SSE		
8 a. m.			30.59	S	10	
Noon	39 19	132 15	33.64	SSW	9	
4 p. m.			44.76	SbyW	8	
8 p. m.			46.39	SbyW	7	The sea is still rough. Weather moderating gradually.
Midnight			49.64	SSW	7	
Sept. 10:						Wind variable and abating.
4 a. m.			51.42	SW	5	
Noon	37 30	132 22	55.46	WSW	4	

Depression or typhoon of August 31 to September 8, 1915.—Simultaneously with the big typhoon, of which we have just spoken, there was another depression or typhoon of much less importance over the Pacific to the east of the northernmost part of the Philippines. From the 29th to the 31st of August there were signs of this depression or typhoon in about 135° longitude E and near 17° or 18° latitude N: it moved first WNW and then W toward the Balintang Channel until it probably filled up on the 9th south of Santo Domingo, Batanes Islands, near 20° latitude N and 122° longitude E. The observations made in our station of Santo Domingo show clearly the existence of this depression, particularly on the 7th and 8th. It was only a depression of little importance on these two days, but it remains doubtful whether it had been a real typhoon on the first days of September.

Depression of September 8 to 13, 1915.—While the preceding depression was filling up in the Balintang Channel, there appeared another in the China Sea half way between Luzon and Indo-China in the neighbourhood of 115° longitude E and 16° latitude N. It remained almost stationary until the 11th; then it moved west across the Paracels on the 12th, and it entered Indo-China north of Tourane on the 13th.

Typhoon of September 6 to 12, 1915.—The observations of Guam show the existence of a new typhoon near the northern part of the Ladrone or Mariana Islands from the 6th to the 9th of this month. According to the observations taken at Chichijima, Bonin Islands, this typhoon moved probably NNW until the afternoon of the 11th when it appeared at its least distance from that station near 145° longitude E and 25° latitude N. We cannot give but a probable value to the track of this typhoon. It would seem that it recurved northeastward after 2 p. m. of the 11th.

Typhoon of September 11 to 13, 1915.—Owing to the lack of observations from the large extension of the Pacific between the Philippines and the Ladrone Islands, we can

only say about this typhoon that its probable existence and track is based in the observations of the Philippines as compared with those of Guam and the Loochoos. The typhoon seems to have been almost stationary on the 11th and 12th between 130° and 132° longitude E and near 16° latitude N. It seems that it moved NNE probably filling up on the 13th in about 21° latitude N and 132° longitude E.

Typhoon of September 20 to 26, 1915.—The observations of Guam gave the first signs of this typhoon on the 20th, the center of the storm being approximately situated on that day between 18° and 19° latitude N and near 146° or 147° longitude E. The typhoon remained almost stationary until the 23rd when it moved NNW toward the Bonin Islands; it recurved northeastward on the 25th; and it passed very near to the east of the Bonins during the night of the 25th, the barometer at Chichijima being as low as 738 mm. at 10 p. m. of that day.

NOTAS GENERALES DEL TIEMPO.

Presión y temperatura.—La presión atmosférica media de este mes es algo mayor que la del año pasado en Luzón, y ligeramente menor en general en las Visayas y Mindanao. La de Manila es enteramente igual a la normal, en tanto que difiere solamente en +0.10 mm. de la media mensual de Septiembre, 1914. Las presiones más altas se registraron generalmente el 30 en Luzón, y el 16 en el resto del Archipiélago: las más bajas tuvieron lugar el día 8.

La temperatura media mensual es casi la misma o ligeramente menor que la del año pasado en las Visayas y Mindanao, pero algún tanto mayor en Luzón. Los valores extremos mensuales en Manila fueron 33.4° C. y 22.4° C., observados respectivamente el 24 y 29. Las temperaturas máximas y mínimas absolutas de Baguio fueron 26.2° C., 15° C. en la cumbre del Mirador, y 26.2° C., 14.1° C. en el valle.

Precipitación acuosa.—Hablando en general y con pocas excepciones, la lluvia de este mes en Filipinas fué menor que la normal, especialmente en el centro y norte de Luzón. Con todo, comparada con la de Septiembre, 1914, la lluvia total del mes fué generalmente mayor este año en Visayas y Mindanao, aunque bastante menor en Luzón. La lluvia total caída en Manila fué 478.7 mm., y difiere de la del año anterior en -409.0 mm., y de la normal en +106.2 mm. La cantidad de agua recogida en los pluviómetros de Baguio durante todo el mes fué 602.8 mm., la cual es menor que la del año pasado y que la normal de Septiembre en 591.4 mm. y 266.8 mm. respectivamente.

DEPRESIONES Y TIFONES.

Seis depresiones o tifones hubo durante este mes en el Extremo Oriente: pero ninguno de ellos fué de mucha importancia para Filipinas. Véanse sus trayectorias en la Lámina VI.

Tifón de 31 de Agosto a 10 de Septiembre, 1915.—Este fué un tifón de grandes proporciones que desfogó en la parte SW de Japón el 8 de este mes. Según las observaciones hechas en Guam, parece fuera de duda que se estuvo formando este tifón en los alrededores de la parte norte de las Islas Marianas del 31 de Agosto al 2 de Septiembre. Su centro puede situarse a 6 a. m. del 3 cerca de 144° longitud E y 19° latitud N. El tifón se movió al WNW hasta el día 7 en que recurvó al N por el E de Liukiu, hallándose su centro a 6 a. m. de dicho día en los alrededores de 130° longitud E y 26° latitud N. Como puede verse en la trayectoria, el tifón se movió muy lentamente desde 6 a. m. del día 6 hasta 6 a. m. del 8; pero el 8 se movió con tan extraordinaria velocidad que, hallándose a 6 a. m. de este día cerca de 130° longitud E y 28° latitud N, a 6 a. m. del día siguiente lo encontramos ya cerca de 39° latitud N y 130° longitud E. La dirección del tifón fué también extraordinaria en dicho día, particularmente si se tiene en cuenta la suma velocidad con que se movía. Efectivamente, desde las 6 a. m. hasta 10 p. m. del 8 se dirigió al NNE atravesando con esta dirección la parte SW de Japón; pero después de las 10 p. m. y sin disminuir en velocidad, cambió de dirección, moviéndose al NNW hacia Manchuria.

Era el día 9 cuando el vapor *Benvenue*, que se encontraba en el Mar del Japón, experimentó la violencia del temporal, habiéndole bajado el barómetro a 727.32 mm. a 6 a. m. del citado día. Publicamos en el texto inglés algunas de las observaciones tomadas a bordo de este vapor del 8 al 10 de Septiembre.

Depresión o tifón de 31 de Agosto a 8 de Septiembre, 1915.—Simultáneamente con el gran tifón de que acabamos de hablar hubo otra depresión o tifón de mucho menos importancia en el Pacífico al E de la parte más septentrional de Filipinas. Desde el 29 al 31 de Agosto se notaron indicios de esta depresión o tifón en los alrededores de 135° longitud E y cerca de 17° ó 18° latitud N: se movió al principio al WNW y luego al

W hacia el Canal de Balintang hasta que se deshizo probablemente el día 9 al S de Santo Domingo, Islas Batanes, cerca de 20° latitud N y 122° longitud E. Las observaciones hechas en nuestra estación de Santo Domingo demuestran claramente la existencia de esta depresión, singularmente los días 7 y 8. Era sólo una depresión de poca importancia en estos dos días, pero es dudoso si había sido o no un verdadero tifón en los primeros días de Septiembre.

Depresión de 8 a 13 de Septiembre, 1915.—Mientras la depresión anterior se deshacía en el Canal de Balintang, apareció otra en el Mar de China a la mitad de distancia entre Luzón e Indochina, en los alrededores de 115° longitud E y 16° latitud N. Esta depresión permaneció casi estacionaria hasta el día 11; se movió luego al W a través de Paracels el día 12, y penetró en Indochina al N de Tourane el 13.

Tifón de 6 a 12 de Septiembre, 1915.—Las observaciones de Guam demuestran la existencia de un nuevo tifón cerca de la parte N de las Islas Marianas del 6 al 9 de este mes. Según las observaciones tomadas en Chichijima, Islas Bonín, este tifón se movió probablemente al NNW hasta la tarde del 11, en que apareció a su menor distancia de dicha estación cerca de 145° longitud E y 25° latitud N. No podemos dar más que un valor probable a la trayectoria de este tifón. Parece haber recurvado al NE después de 2 p. m. del 11.

Tifón de 11 a 13 de Septiembre, 1915.—Debido a la falta de observaciones de la considerable extensión del Pacífico entre Filipinas y las Islas Marianas, sólo podemos decir acerca de este tifón que su probable existencia y trayectoria está basada en las observaciones de Filipinas comparadas con las de Guam y de Liukiu. El tifón parece haber estado casi estacionario los días 11 y 12 entre 130° y 132° longitud E y cerca de 16° latitud N. Parece haberse movido al NNE, y probablemente se deshizo el 13 cerca de 21° latitud N y 132° longitud E.

Tifón de 20 a 26 de Septiembre, 1915.—Las observaciones de Guam dan los primeros indicios de este tifón el día 20, pudiéndose situar su centro en dicho día en los alrededores de 18° ó 19° latitud N y cerca de 146° ó 147° longitud E. El tifón permaneció casi estacionario hasta el 23 en que se movió al NNW hacia las Islas Bonín; recurvó al NE el 25, y pasó muy cerca al E de Bonín durante la noche del 25, hallándose el barómetro de Chichijima a la altura de 738 mm. a las 10 p. m. de dicho día.

METEOROLOGICAL DATA FOR MANILA CENTRAL OBSERVATORY.*

[φ=14° 34' 41" N; λ=120° 58' 33" E; barometer above sea, 14.2 meters; gravity correction not applied, -1.72 mm.]

Table with columns: Day, Pressure (mean), Air temperature (Mean, Maximum, Minimum), Underground temperature (0.25 meter, 0.50 meter, 1.50 meters, 2.50 meters), Relative humidity (mean), Vapor pressure (mean), Radiation (Minimum on grass, Maximum in sun, Black bulb in vacuo), Evaporation (Free exposure (total), Shelter (total)).

Table with columns: Day, Wind (Prevailing direction, Total movement, Maximum hourly velocity, Direction at the time of the maximum velocity), Clouds (Amount (mean), Form and direction (Upper, Lower)), Sunshine (h, m), Rain, 24 hrs. beginning 6 a. m. (On the tower, In the park), Miscellaneous.

* All the mean values given in this table are deduced from hourly observations.
b These values are taken from instruments mounted in the Observatory Park, 1.5 meters above ground.

METEOROLOGICAL DATA FOR MIRADOR OBSERVATORY, BAGUIO.*

[φ=16° 25' N; λ=120° 36' E; barometer above sea, 1,512.5 meters; gravity correction not applied, -1.65 mm.]

Table with columns: Day, Air temperature at Mirador (on the top of the mountain), Air temperature in the valley (near the city hall), Radiation, Evaporation, Relative humidity, Vapor pressure, Minimum on grass, Maximum in sun, Free exposure, Shelter. Includes daily data from 1 to 30 and mean/total values.

Table with columns: Day, Wind (Prevailing direction, Total movement, Maximum hourly velocity, Direction at the time of maximum velocity), Clouds (Form and direction: Upper, Lower), Sunshine (h. m.), Rain, 24 hours beginning 6 a. m. (mm.), Miscellaneous. Includes daily data from 1 to 30 and mean/total values.

* All the mean values given in this table are deduced from six daily observations taken at 2, 6, 10 a. m. and 2, 6, 10 p. m.
b The barometric readings of this station are not reduced to sea level.
c Maximum of hourly observations taken from 6 a. m. to 6 p. m.
d This element is based on hourly observations taken from a quadruple register, which gives only eight possible directions of the wind.

DAILY RAINFALL AT THE STATIONS OF THE WEATHER BUREAU, SEPTEMBER, 1915.

Station.	Day of month.															
	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.
Glan	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.
Jolo		2.8		3.3	1.8	10.9	4.1		1.5					38.1	19.3	4.1
Isabela, Basilan				8.9			8.1							5	4	4.1
Zamboanga			11.7				5	6.1			2			24.6		8.4
Davao									4.6					43.7		2.5
Cagayan, Misamis		7.9	4.8	27.2	13	28.4	13.2							22.1	2.3	5.5
Butuan			8	1.3					3.6					4	8	14.4
Dumaguete			2.8	3	5.6	2.3							2.3	14.9	36.8	4.6
Tagbilaran				2						2		8	8	13.7	4.6	49.3
Iwahig		16.3		13.4	7.4	23.2	17.4			27.5	3.8			27.4	5	2
Surigao	8	1	4.8		8							5.1		8.1	9.9	
Maasin			41.7	14.2	36.1	13.2				3.6	7.4	13.7		72.4		4.1
Cebu	2.3		5.6	4.8	11.2	8					1.3	1.3	28.7	47.8	34	
Iloilo			7.4	1	13.5	21	23.1	43.2	51.6	6.4	8	2.5		23.4		
San Jose Buenavista	11.2	6.3	6.1	31.8	31.8	46	11.7	12.4	21.4	10.7	11.7	9.7	26.9	10.7	4.3	
Cuyo	4.8	4.3	2.8	1.5	5.1	1	12.7	8.9	9.7	12.7	7.9	4.4	8.4	19.3	16.7	
Ormoc	3	1.3	3.3	31.8	1	18				1.5		47.3	3	4.1	1.8	1
Guiuan												3.1	12.5	138.9	2.5	5.6
Tacloban	6.1	.5		3.8		43.9						5.6		13.7		12.6
Capiz	2.6	2.8			3.9	3	1	3.1	9.7	35.6			3.8	25.9		11.2
Borongon	14.5	.8	.3	1.3		6.4							6.9	31.7	1	24.1
Calbayog	17			1.5		2.3	2.1	2					25.1	81.9	1	9.9
Masbate		.8		3.6		1		3.3	2.3	2.3	3.3	3.3	2.8	63.3		5
Romblon	6.6						11.4	20.5	20.5			7.1	5.6	7.1		.3
Batag										20.1			53.3	2.8		
Gubat		13.7	18.3	6.1					3.3	1.5			25.1	8.9	3.3	
Legaspi	5.1	6.9	2	18	1.3	1.8	12.5	30.5	4.3	17.5	3.8		6.7	16.7	.3	
Sumay, Guam	102.9	30.5	2.6			2.5	2.5	38.1	11.4	16.5	17.8		1.3	16.5	3.8	11.4
Calapan	3		.3				17.8	9.2	39.6	15.2	1.8		3	16.8	4.8	2.8
Virac	3	13.5	6.6					7.6	6.8				2.5	3		4.5
Nueva Caceres				.5	5	3.3		8	14.8	10.9	1.6		21.1	1.1	10	.3
Batangas		.5	13.9	.5		6.6	3.3	19	65	21.8	2		41.4	7.4	4.6	3
Atimonan		10.9	15.2	21.8						2.5	1	8.9	5.8	9.3	24.4	17.5
Ambulong, Tanauan	4.3		3.3		1.3		6.9	113.3	43.3	21.9	15.7	2.5	11.7	18.3	8.6	
Paracale	.5					5.6			3	6	1		34	1		
Santa Cruz, Laguna	10.4	3.1		.5	5.1	5.3	8.1	20.1	34.3	3.5	6.1	16.3	46.7	25.4	5.1	.3
Manila	7.3			5.1	.1		67.6	47.6	85.6	11.8	103.3	4.5	46.9	23	.2	
Antipolo	6.9	1.5		3.6	3.8	3.3	97.3	67.6	72.1	6.9	56.6	5.3	53.8	40.9	5	1.3
Iba	31.7	.8	13.2	5.8	11.2	12.4	66.3	100.9	44.7	41.6	34.3	5	3	3	11.4	
San Isidro	2.5	35		8.2	8	.5	3.3	13.2	5.8	27.2	8.6		16.6	5	6.8	.5
Tarlac		19.8		25.4		30.5	6.6	5.9	19.8	47.7	12.4		3.6	32.5	3.6	5.5
Baler	40.4	.3							3.1	5	2		23.4	18.5		1.5
Dagupan	1.8	10.2	13.5		1.8	.5	11.5	.5	23.3	74.5	8.4	17.2	14.9		2.8	
Bolinao	24.7	2.4	23.5	34	18.5	15.3	90.4	23.2	22.7	25.2	16.5		22.3		1.3	
Baguio	50.1	64.8	14.9	12.2	21.9	35.1	46.3	47.8	49.7	33.6	7.4		15.7	12.6		
San Fernando, Union	38.6	20.8	46.1	18	15.5	2.3	45.5	36.3	4.3	16.6			17	16.5		
Echagüe				85.3	.5		1	24.4	41.7	4.1		5			4.1	3.8
Candon	91.2	1.8		4.8	1.8	20.1	10.7	67.8	8.1							
Vigan	41.7	.5		4.7	23.6	22.7	4.8	52.5	.8	13.1					.1	
Tuguegarao	2					1		12.2	30.4	9.2		4.8				
Laoag	33.3	9.4	100.6	50.8	8.1	16.6	57.9	43.9	6.3	63.8	7.1				50.8	12.4
Aparri	.5			44.7					3	8.3		8				6.4
Santo Domingo, Batanes	16	6.2	9.4	17.3	14.1	3.8	17.8							21.9	3.6	1.8

Daily rainfall at the stations of the Weather Bureau, September, 1915—Continued.

Station.	Day of month.														Total.
	17.	18.	19.	20.	21.	22.	23.	24.	25.	26.	27.	28.	29.	30.	
	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.
Glan		5.1		11.9	4.3			9.3		7.1	4	2.5		16	111.1
Jolo	15.2	14.3	4.3	1.8	1.5	13	2.5	3.1	16	6.1		6.9	0.5	3.1	134.7
Isabela, Basilan	5.6	17	19	20.6	16.3	1.3	1	.8	47.7	6.6	12.5	53.1	3	13.7	236.5
Zamboanga	14.2			1.3	7.6			8	2.3	4.3	1.3	2.5	25.4		104.1
Davao	9.1	8.6			6.1			39.6	12.7						126.9
Cagayan, Misamis	28.2	14	3.8		1.5	1.5		50.8	13.5	.5	2.3		.5		236
Butuan	2.5	3.8	.8	4.3	18.8			5.1	10.7		10.7	17.3	11	.8	110.7
Dumaguete	53.6	6.4		2.2			6.1				4.8	22.9	.8		164.5
Tagbilaran	42.2	9.4			16.8	1			61.5		33.3			56.4	293.8
Iwahig				.6		2.9	19.6	17	55.6		9.3	15.9	.5		260.3
Surigao	13			.3		1					31.3			.3	76.4
Maasin	7.9				11.7				6.1		7.1				239.2
Cebu	3.8	25.7	1.8								17.3	2	18.7		207.1
Iloilo	5.1	1.3							32.2		1.3				233.8
San Jose Buenavista						12		.3	1.5	1.5		1.3	25.9	17	317.8
Cuyo	3.8	1.3		12.7				5.1	1.5	12.7	13.2	6.9	18.8	11.4	220.3
Ormoc	13.7	2			2	.8		8.7			2.3				172.4
Guiuan	28.7	.6	1					7.6					9.4	2.8	208.4
Tacloban	1.3	11.9	8.2		1.3						.6	4	.9		123.9
Capiz	5.9	26.7		.3	1	15.7	2.8		37.6		3.8	2.3	13.7	1.5	212.2
Borongan	8.4	5.1			.5		2.5		9.7			1.3			114.5
Calbayog	14	1.3			17.8	9.6		30.2	4.6			4.5	12.2	26.9	264.4
Masbate	8.1	5.1			.3	.5	16.3	3.6	1		.3	.3			119.2
Romblon	19.3	27.9	2		2.8	.5	21.3	28.9			1.3	1	1.5	2.3	214.8
Batag	14.2	2.8		2					17.8						113
Gubat	50.8	17.8			1.3	3	4.8				45.7	5.1	3	8.9	220.6
Legaspi	82.2	23.9			2	7.9			11.4		1.8			4.1	261
Sumay, Guam			2.5	3.8			1.3		6.4		10.2	5.1	10.2	8.9	306.2
Calapan		11.9	.3		2.3	1.8	16.8			.5	.3			1.8	150.6
Virac	16.3	21.3	2.5	1	3.6	.8	2.8		4.1	1.8	2.8	7.9	4.6		139.9
Nueva Caceres	9	5.1	1		17.5	3.6	.2	34.3		3	.5	8.8	24.2	11.8	183.9
Batangas		3			11.4	2	3	.3	2	28.2	3.8	2.3			245
Atimonan	15.3	6.1	56.9								10.9	2.3	8.6	20.6	238
Ambulong, Tanauan		6.9		3.8	10.9			2		1.3	25.1	19.8			320.9
Paracale	11.4	20.8	30	3	7.1	.8	32			48.2				9.7	213.1
Santa Cruz, Laguna	2.3	3.3	6.6			.3					32.3	2.3	3.8	1	242.2
Manila	2.5	8.9	8.1		5.8			8.1	4.1	2.6		35.3		.3	478.7
Antipolo	10.4	18.3			27.7		15	20.1	2.5			12.4		12.7	540.5
Iba				29				1.8	2.8	1		5.3	8.4	5.1	434.2
San Isidro	1.5		.5			4.3	1	22.3		4.4	4			1.5	169
Tarlac	2.8	9.7			8.6	12.2	3.8	.5	3.8	1.3		5.6			260.2
Baler	4.8		8.4			20.1		8.6	9.1	.5		7.1	1.8	9.1	181.2
Dagupan	14	5.1	4.3	2					4.9		3.5				214.7
Bolinao			.8	25.2	5.1			3.5	20.8			6.9	6.4	2.3	391
Baguio				4.3	67	.8	34	5.7	32.8	19.2	1	20.9	.5	1.5	602.8
San Fernando, Union	17.3			3.3	3.2				14			.8	34	1.5	351.6
Echague	.3	1	6.3		1			5.8		8.9	24.9	7.4			221
Candon				17.2				15.2	1						267.4
Vigan										1.3			.4	.8	183.8
Tuguegarao			5.6	3.5	2.5						10.9	59.7			141.8
Laosag				8.1	1.3						2.8				473.2
Aparri		4.1				.5	2.5				7.1				75.2
Santo Domingo, Batanes	4.7	4.4		2.5						4.5		2.5	3.8	12.9	147.2

Maximum and minimum temperatures at the stations of the Weather Bureau, September, 1915—Continued.

Day.	Ormoc.		Guiuan.		Tacloban.		Capiz.		Borongan.		Calbayog.		Masbate.		Romblon.	
	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.
	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.
1	30.6	23.4	32.2	23.47	31	22.8	32.9	24	22.4	32.4	23.3	32.6	25.4	33.4	23.8	
2	31.3	23.5	31.9	24.3	32.2	23.2	33.3	23.3	22.5	33.2	24.2	31.6	26.6	34.5	23.4	
3	31.6	23.8	30.4	25.5	31.6	24	32.2	23.3	22.8	33.4	27	31.8	26.6	34.8	25.7	
4	31.2	22.8	31.8	27.5	32.6	23.1	32.2	23.9	23.8	32.3	26.3	28.8	26.5	33.5	25.7	
5	31.4	23.8	31.3	27.2	32.9	23.5	33.1	23.9	23.2	32.2	26.8	31.4	26.6	34.8	24.9	
6	31.8	24.6	33	28	34	23.8	32.7	23.6	24.3	31.6	27.2	31.5	26.8	34.6	25.9	
7	30.9	27.3	31.9	25.5	33	24	31.5	24	23.5	30.8	26	29.8	26	32.6	25.4	
8	31.2	27.8	31.3	28.1	33.9	24.1	33.4	24	24	31.2	24.9	31	26.5	33.2	25.6	
9	31.3	26.5	32.4	28.2	33.1	24.4	34.2	24.6	23.8	32.4	27.6	31.8	26.8	33.3	23.7	
10	32.2	25	32.2	28.3	34.3	24.2	32.5	24.3	25.5	33.8	25.6	31.8	24.6	28.6	23.1	
11	31.7	24	31.7	25.5	32.6	24	33.3	23.3	25.5	34	25.4	31.8	24.5	31.8	24.7	
12	31.5	23.8	32.5	27.4	33	24.5	33.6	23.9	24.9	33.1	25	32.8	24.7	32.2	24.1	
13	30.8	23.7	32.2	24.2	31.9	24.8	32.9	23.3	23.6	32.6	24.4	31.2	24.6	33.6	25.4	
14	31.8	24.2	31.8	24.5	33.2	22.4	32.6	24.7	23.4	33.5	23.7	32.2	23.8	33	24.2	
15	30.7	23.4	31.5	23	31.7	23.2	30.3	24	23	30.7	23.4	32.6	24.6	32.7	23.6	
16	30.2	22.9	28.7	22.5	30.5	24	31.9	23.6	22.6	31.1	22.6	32.6	24.9	34.2	23.1	
17	32.3	23	32.5	24.7	32.5	23.9	32.3	24.4	23	31.4	22.8	33.6	26.2	34.7	24.8	
18	30.9	24	30.6	24	30.4	23.7	28.8	22.9	23.2	30.3	24.3	34.2	24.6	31.2	23.4	
19	31.7	22.5	32.8	23.7	32.1	23.9	31.8	23.6	22.9	31.4	22.9	30.2	25.8	33.6	23	
20	33	22.5	34.3	23.9	32.5	24.2	30.3	24.3	23.2	32.1	23.1	30.6	22	33.3	23.8	
21	32.9	21.9	33.4	23.4	33.5	25	33	24.3	23.2	32.8	23	33.6	26.2	34.2	24	
22	32.5	22.8	33.2	24	33	24.9	32.8	25.5	23.9	33.3	23.2	32.5	23.2	34.5	24.2	
23	32.4	21.7	34.1	23.8	34.4	24.4	32.7	24.4	22.8	34.4	23.3	33.8	23.5	34.1	23.9	
24	32.4	22.5	34.2	25	33.6	24.5	32.9	23.6	23	32.6	23.5	31.6	25	33.1	23.4	
25	31.1	24.2	33.1	25.5	34	25	32.8	22.9	22.8	34.1	23.9	29.8	24.8	35	23	
26	31.7	23.8	34	26	35.2	24.4	32.7	24.1	22.8	31.8	24.3	32.2	25.5	33.7	24.2	
27	32.5	22.8	32	23.6	34.5	24	32.4	23.2	22.8	32.1	23.4	33.8	24	34.6	24.2	
28	31.8	22.1	33.9	23.4	33	24.1	31.4	23.7	22.9	30.4	23.5	29.4	23	32.7	24.2	
29	32.7	23.2	33.2	25	32.8	24.7	32.2	23.3	23.6	32.1	23.1	34.4	23.5	33.7	23.5	
30	33	22.4	33.3	24.2	34.5	24.4	33.2	23.9	23	33.6	22.4	33.6	24.5	35.1	24.2	
Mean	31.7	23.7	32.4	25.1	32.9	24	32.4	23.9	23.4	32.4	24.3	32	25	33.5	24.2	

Day.	Batag.		Gubat.		Legaspi.		Sumay. Guam.		Calapan.		Virac.		Nueva Caceres.		Batangas.	
	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.
	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.
1	30	32.4	32.4	24.5	31.6	25	28	23.6	33.4	24.1	32.5	21.3	33	22.7	32	24.4
2	31	23.5	33.5	24.2	31.1	24.4	27.4	23.1	31.7	23.4	34.1	22.1	33.5	22	31.8	23.5
3	30.5	24.4	30.8	24.7	32.4	24.8	31	21.6	32	22.1	31.7	22.8	33.2	22.7	30.4	24.5
4	29.5	25	28.5	24.6	30.6	25.2	31	25.6	32.6	22.5	31.7	23	32.9	23	32.3	23.6
5	31.9	24.4	32.5	25	31.8	25.2	31.4	25.4	34.8	21.5	32.6	23.3	33.1	23.1	32.1	24.8
6	32.5	24.7	33	25	31.9	25.1	31.2	25.8	33.5	23	34.7	23.9	33.1	23.8	32.3	24.9
7	32	24.8	30.5	26.1	31.1	25.6	30.8	24.27	32.5	24.4	32	24.2	32.5	23.8	31.3	24.9
8	32	25.4	30.7	25.9	31	24.4	30.4	23.4	30.5	23.8	32.4	24	31.8	24.9	30.1	24.1
9	33.4	24.3	32.7	25.4	30.7	24.3	30	22.8	27	23.5	32.2	23.4	31.1	24.3	26.5	24.3
10	31.9	25	31	24.5	30.7	23.8	29.2	23.8	29	23.6	30.7	23.2	31.1	23.6	27.2	22.5
11	31.8	24	34	25.1	31.1	24.7	29.6	23.47	31.1	22.8	32.4	23.5	32.5	23.2	30.9	23
12	31.6	24.5	33.8	25.2	31.4	24.7	30.8	24.6	33.1	23.2	32.5	23.1	32	22.6	32.4	23.5
13	30.2	23.5	31.5	24.4	32.2	23.6	30	24.4	32.5	24.5	30.8	22.7	31.6	21.9	31.8	24
14	31.5	22.6	31.4	23.7	32.7	23.6	31.2	22.8	30.8	24.1	33	22.2	33	22.5	29.1	23.6
15	30.4	22.5	31.2	23.6	33.6	24.2	30.2	24.6	31.6	23	30.7	21.8	33	22.5	32.7	23.3
16	30	23.4	31.2	23	32.6	23.6	30.4	24.8	31.9	23.6	29	22	32.6	21.9	32.8	23.4
17	31	24.6	32.7	23.2	33.2	25.2	30	24.4	32.8	24	33.6	21.2	33	21.5	33.4	24.8
18	30.9	23	32.2	23.2	31.1	22.9	30.2	24.4	32	23.5	30.8	21.9	30	22.4	31.2	24
19	31	24	32.5	23.8	32.4	23.7	30.2	24.2	31.4	24.4	32.5	21	33.2	21.5	32.8	23.5
20	30.9	24.5	32.8	24.6	33	25.3	30.6	25.2	32.1	23.6	31.6	21.4	32.8	21.8	34.2	23.7
21	31	24	33.2	24.9	33	24.3	30.4	24.4	31.8	23.6	28.9	21.3	32	21.7	34.1	24.1
22	31.5	25.4	33	24.5	34.5	24.7	30.6	24.6	32.5	23.8	28.8	21.1	32.3	20.6	31.8	23.3
23	31.4	24.8	33.6	24.4	34.1	23.6	31	24.6	33.5	24	30.5	21.2	33.2	21.2	32.3	23.1
24	32.9	23.9	32.5	23.9	33.6	24	31.6	24.8	32.6	23.4	32.8	21.6	34	21.4	33	23.3
25	32.5	23.5	33.4	24.2	32.9	24.2	30.6	23.8	33.1	22.7	33.7	22.6	33.5	22	32.8	23.6
26	32	23.4	31.9	24	31.8	24	31	24.8	32.1	22.3	33.6	22.5	33.1	22	33	23.7
27	32.5	23.5	33	24	33.6	23.5	30.2	25	32.9	23.5	33.4	22.4	34	23	32.8	23.3
28	31.5	24	31.9	23.1	34.1	24	30.4	25	32	23	30.7	21.7	33.2	22.3	31.8	23.1
29	31.5	23.5	32.2	23.3	33.7	22.7	30.4	23.87	33	22	32.9	21.2	32.5	22.3	34.4	22.5
30	32	24.4	32.9	24.1	33.2	25.2	29.4	24.4	33	23	33.8	21.5	31.4	19.9	34	23.4
Mean	31.4	24	32.2	24.3	32.4	24.3	30.3	24.3	32.1	23.3	32	22.3	32.6	22.4	31.9	23.7

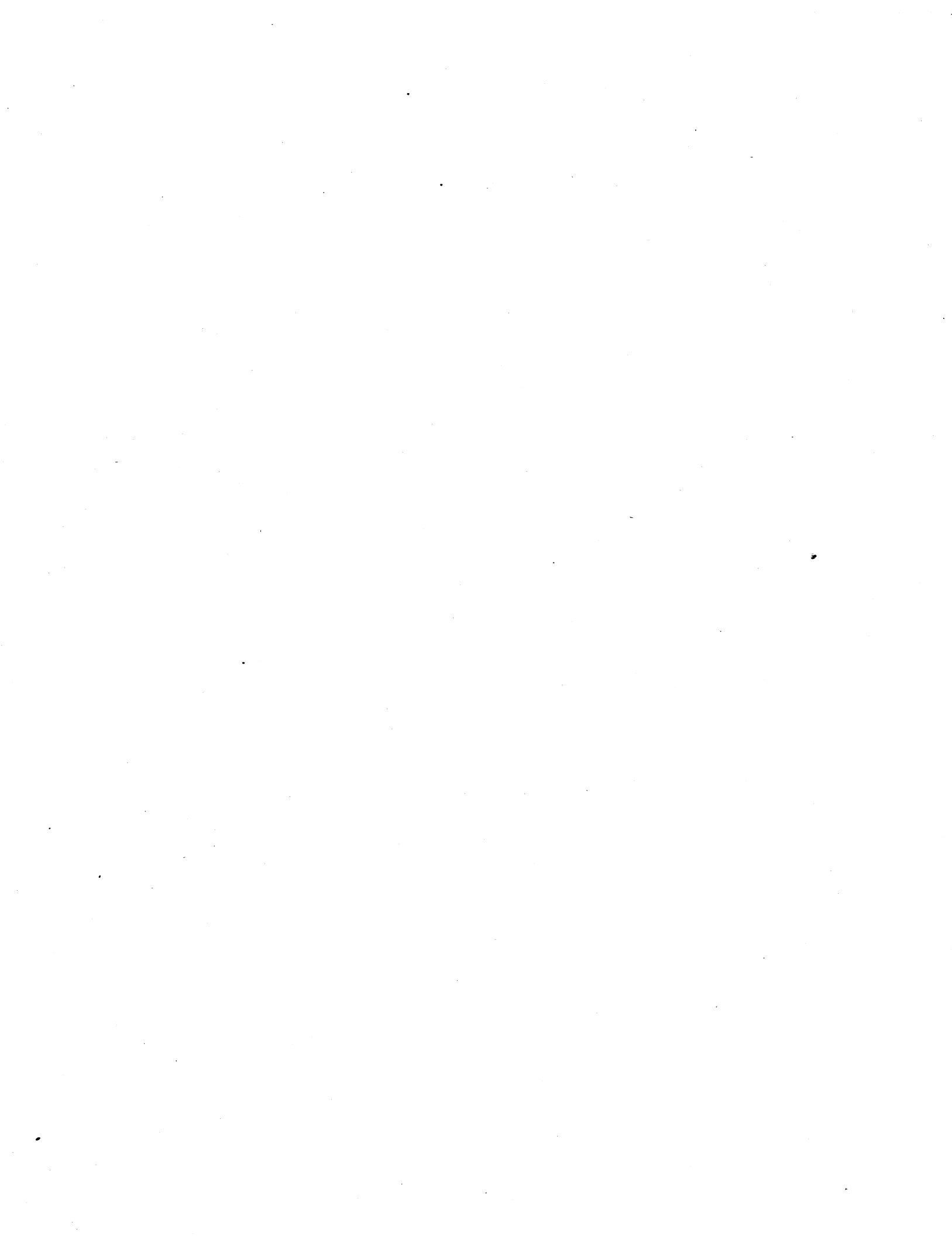
Maximum and minimum temperatures at the stations of the Weather Bureau, September, 1915—Ctd.

Table with columns for stations: Atimonan, Ambulong, Tanauan, Paracale, Santa Cruz, Laguna, Manila, Antipolo, Iba, San Isidro. Rows for days 1-30 and a Mean row, showing maximum and minimum temperatures in °C.

Table with columns for stations: Tarlac, Baler, Dagupan, Bolinao, Baguio, San Fernando, Union, Echagüe, Candon. Rows for days 1-30 and a Mean row, showing maximum and minimum temperatures in °C.

Maximum and minimum temperatures at the stations of the Weather Bureau, September, 1915—Ctd.

Day.	Vigan.		Tuguegarao.		Laog.		Aparri.		Santo Domingo, Batanes.	
	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.
	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.
1	31.7	23.5	33.2	24	33.1	23.1	29.8	24.6	30.8	25.3
2	30	23.3	35.4	24	33.2	24.2	32	24.1	31	24.2
3	29.8	23.6	31.6	24.6	32.2	23.2	28.8	24.8	31.1	26.2
4	31.4	24.1	34.6	24.6	32.8	23.7	30.1	24.5	32	25.2
5	31.5	24.1	35.8	24.2	33.2	24	30.6	24.9	31.4	25.3
6	30.1	24.2	36.6	23.8	32.9	24.7	31.1	24.7	30.8	25.4
7	30.2	23.8	34.8	24.6	30.6	24.5	30.2	25	30.5	24.9
8	28.4	23.1	35.2	23.9	29.8	23.6	29	25	31.2	24.7
9	31	22.8	33.8	22.6	32.7	22.3	30.3	23.7	29.8	23.8
10	31.3	24	34.6	23.2	32.5	24.1	31.2	23.7	31.7	25.5
11	30.8	22.5	30.6	23.3	32.2	24	30.6	24	30.9	24
12	32.4	23.6	32	24.2	33.2	23.1	31	24.7	31	23
13	32.5	25.5	33.8	24.9	33.5	24	31	24.4	31.5	23.5
14	32.3	24.5	35	22.2	36.4	23.7	31.8	23.5	31.4	24
15	31.6	24.3	35	24.1	33.2	24.5	32.4	24	31.5	25
16	31.9	24.4	34.2	24	33.3	24.4	32.8	24	32.3	26.7
17	32.5	24.6	37	22.7	33.2	23.4	32.9	24.6	32.5	27
18	32.8	24.3	35.7	23.1	36.3	24.3	32.4	25	31.4	25
19	33	25.2	34.3	24.2	37.7	25.3	32.7	25.2	31.7	25.5
20	32.7	25.6	37.4	24.4	33.6	25.5	31.7	25.1	32.5	26.1
21	33	24.7	36.6	23.5	33.1	24.6	32.6	24.6	32.6	26.8
22	32.6	24.5	36.8	23.3	33.8	23.4	32.1	25.4	32.2	25.8
23	32	24.1	34.2	23	36.2	24.5	31.7	25.5	32	24.8
24	33.5	24.5	35.7	23.7	35.1	23.6	31.8	24.5	31.8	25
25	32.2	24.7	37.1	23.5	34.5	23.9	33	24.3	31	24
26	32.8	24.1	37.8	23.3	33.7	24	32.7	24.8	30.7	23.3
27	32.5	24.6	38	23.5	34.4	23.5	33.3	23.8	32	23.3
28	32.5	24.7	35	22.2	34.6	23.3	32.4	23	32.1	23.6
29	33.1	23.6	34.9	21.9	33.7	22.5	32.7	23	30.6	23.5
30	32.1	23	34.8	23.2	34.2	23.9	32	24.7	31.7	25.5
Mean	31.8	24.1	35	23.6	33.6	23.9	31.6	24.4	31.5	24.9



SEISMOLOGICAL BULLETIN FOR SEPTEMBER, 1915.

By Rev. MIGUEL SADERRA MASÓ, S. J.,
Assistant Director of the Weather Bureau.

EARTHQUAKES FELT IN THE PHILIPPINES.¹

5, 12^h 19^m 11^{s*} [5, 20^h 19^m 11^s]. Agusan Valley (E Mindanao). Earthquake of intensity VI-VII. Its origin lay near to the center of the Valley towards the parallel 12.°4 N latitude; the shocks were also felt through the provinces of Davao, Cotabato and Bukidnon, the total area shaken being about 400 kilometers long in the N-S and some 180 kilometers wide in the E-W direction. The Governor of Butuan Hon. Teopisto Guingona who felt it at Bunauan, some few kilometers south of the epicenter, reports that the shocks were there very sharp and caused great consternation among the people. From Butuan some 50 kilometers north of the epicenter the observer reported that the movements of the ground were of great amplitude but slow and the earthquake had a total duration of about 60 seconds. One of the artesian wells of the town was obstructed by sand during many hours but it flowed again. This earthquake is reported in the Seismological Bulletin of Zikawei, China.

12, 0^h 01^m 34^{s*} [12, 8^h 01^m 34^s]. S Mindanao. Earthquake of intensity III felt in the provinces of Davao and Cotabato. It probably originated in the Celebes Sea far off the southern coasts of Mindanao.

13, 20^h 10^m [14, 4^h 10^m]. Butuan (N Mindanao). Earthquake of intensity III.

14, 6^h 27^m [14, 14^h 27^m]. Aparri (NE Luzon). Oscillatory earthquake direction N-S, intensity III-IV, duration 6 seconds.

14, 20^h 21^m [15, 4^h 21^m]. Jolo Island. Earthquake of intensity III, duration 3 seconds.

15, 19^h 56^m [16, 5^h 26^m]. Guam (Mariana Islands). Earthquake of intensity III.

18, 20^h 07^m [19, 4^h 07^m]. NE Mindanao. Earthquake of intensity IV felt in the peninsula of Surigao and northern part of the Agusan Valley. Repeated with the same intensity and extension at 4^h 10^m [12^h 10^m] on the 19th.

21, 14^h 52^m 00^{s*} [21, 22^h 52^m 00^s]. Batangas (S Luzon). Oscillatory earthquake, direction S-N, intensity III, duration 4 seconds.

24, 9^h 30^m [24, 17^h 30^m]. NW Luzon. Earthquake of intensity IV felt along the provinces of Ilocos S; its origin lay in the China Sea close to the western coast of Luzon.

24, 13^h 09^m [24, 21^h 09^m]. Surigao (NE Mindanao). Earthquake of intensity II-III.

26, 1^h 16^m 30^{s*} [26, 9^h 16^m 30^s]. Legaspi (SE Luzon). Oscillatory earthquake, direction N-S, intensity III-IV, duration 2 seconds.

28, 14^h 04^m [28, 22^h 04^m]. E Samar and NE Mindanao. Earthquake of intensity III and great extension; the island of Samar being some 150 kilometers distant from the peninsula of Surigao.

¹The intensity of earthquakes is given in the notation known as the Rossi-Forel scale. The time is that indicated by the seismographs at the Central Observatory whenever the disturbance has been registered by them. The fact is denoted by an asterisk (*). Otherwise the time is that noted by the observer who sent the report. All time indications are in Greenwich mean time (midnight=0^h), insular time being added in brackets for the convenience of Philippine readers.

RECORDS OF THE MICROSEISMOGRAPH.

[Time: Greenwich mean. Midnight=0h. Instrument: Wiechert seismograph; 1,000 kilograms. $A_N: T_0=7.10, \epsilon=2.08, \frac{r}{T_0^2}=0.042;$
 $A_E: T_0=6.40, \epsilon=2.31, \frac{r}{T_0^2}=0.039.$ Alluvium. 2.40 meters above sea level.]

No.	Date.	Character.	Phase.	Hour.	Period.	Amplitude.		Remarks.
						A_N μ	A_E μ	
227	1	I	e L F	h. m. s. 1 12 20 19 52				
228	3	I	e F	11 09 49				
229	3	IIv	eP S L M _E M _N F	22 51 19 52 55 55 20 55 36 55 39 23 40	5 6	72		
230	5	IIr	eP S L M _N M _E F	12 19 11 21 24 23 21 25 17 26 15 13 15	7 6	115 80	E Mindanao.	
231	6	Iu	e F	17 37 18 16				
232	7	IIu	eP S L M _E M _N F	1 40 20 55 31 2 16 07 47 18 47 44 3 44	7-8 8-9 23 24	17	24	Central America.
233	7	Iv	e L F	15 24 24 24 44 27				
234	8	Iv	eP F	21 37 39 39				
235	10	Iv	eP L M _E F	11 27 57 28 14 28 31 31	3	23		
236	12	IIr	eP S L M _E F	0 01 34 03 26 06 13 07 35 1 06	6	154	South Mindanao. Maximum lost in N-S component by the force of the shock.	
237	12	Iv	eP F	3 04 53 07				
238	12	Iv	eP L M _E F	16 14 11 17 00 18 03 24	6	9		
239	13	Iv	eP F	16 32 19 35				
240	14	Iv	eP L F	13 59 38 14 00 18 10				
241	14	Iv	eP F	16 10 51 13				
242	17	Iv	eP F	4 28 00 51				
243	17	Iv	eP L M _E F	9 11 34 12 11 12 15 19	3	45		
244	17	Iv	eP F	9 36 52 57				
245	21	Iv	eP L F	14 52 00 52 12 56				S Luzon.

Records of the microseismograph—Continued.

No.	Date.	Character.	Phase.	Hour.	Period.	Amplitude.		Remarks.
						A _N μ	A _E μ	
246	21	Iv	eP F	<i>h. m. s.</i> 16 38 41 41 -				
247	21	I	e F	18 48 19 07				
248	24	Iv	eP F	9 28 02 31				
249	26	Iv	eP L F	1 16 30 17 12 20				SE Luzon.
250	26	IIv	eP L M _E F	18 46 40 46 55 47 20 54	3		120	
251	27	Iv	eP L F	9 55 42 56 06 10 06				
252	29	Iv	eP L F	22 08 44 08 57 14				
253	30	Iv	eP F	4 06 42 10				
254	30	Iv	eP F	6 45 00 48				
255	30	Iv	eP F	6 56 52 59				
256	30	I	e F	8 42 51				

TEMBLORES DE TIERRA SENTIDOS EN FILIPINAS.¹

5, 12^h 19^m 11^{s*} [5, 20^h 19^m 11^s]. Valle del Agusan (E de Mindanao). Temblor de tierra de intensidad VI-VII. Su epicentro se hallaba hacia el centro del valle, cerca del paralelo 12.°4 latitud N: sintióse también en el distrito de Dávao y en la parte oriental de los de Cotabato y Bukidnon, en un área que se extendía cerca de 400 kilómetros en la dirección N-S y unos 180 de E a W. El gobernador de Butúan D. Teopisto Guingona que se hallaba en Bunauan, a pocos kilómetros al sur del epicentro informa que se sintieron allí sacudidas muy bruscas con espanto de los habitantes pero sin efectos en los edificios por ser todos de caña y nipa o de madera. De Butúan, 50 kilómetros al N del epicentro escriben que los movimientos del suelo eran de grande amplitud, pero lentos y duraron muy cerca de 60 segundos. Uno de los pozos artesianos de la población quedó cegado por la arena dejando de manar el agua durante algunas horas. En los boletines sísmicos de fuera de Filipinas encontramos registrado este temblor solamente en el de Zikawei.

12, 0^h 01^m 34^{s*} [12, 8^h 01^m 34^s]. S de Mindanao. Temblor de tierra de intensidad III, sentido en los distritos de Dávao y Cotabato y originado probablemente hacia el Mar de Célebes.

13, 20^h 10^m [14, 4^h 10^m]. Butúan (N de Mindanao). Temblor de tierra de intensidad III.

14, 6^h 27^m [14, 14^h 27^m]. Aparri (NE de Luzón). Temblor oscilatorio, dirección N-S, intensidad III-IV, duración 6 segundos.

14, 20^h 21^m [15, 4^h 21^m]. Isla de Joló. Temblor de tierra de intensidad III, duración 4 segundos.

15, 19^h 56^m [16, 5^h 26^m]. Guam (Islas Marianas). Temblor de tierra de intensidad III.

18, 20^h 07^m [19, 4^h 07^m]. NE de Mindanao. Temblor de tierra de intensidad IV, sentido en la península de Surigao y en la parte N del valle del río Agusan. Repitió con la misma intensidad y extensión a 4^h 10^m [12^h 10^m] del día 19.

21, 14^h 52^m 00^{s*} [21, 22^h 52^m 00^s]. Batangas (S de Luzón). Temblor oscilatorio, dirección S-N, intensidad III, duración 4 segundos.

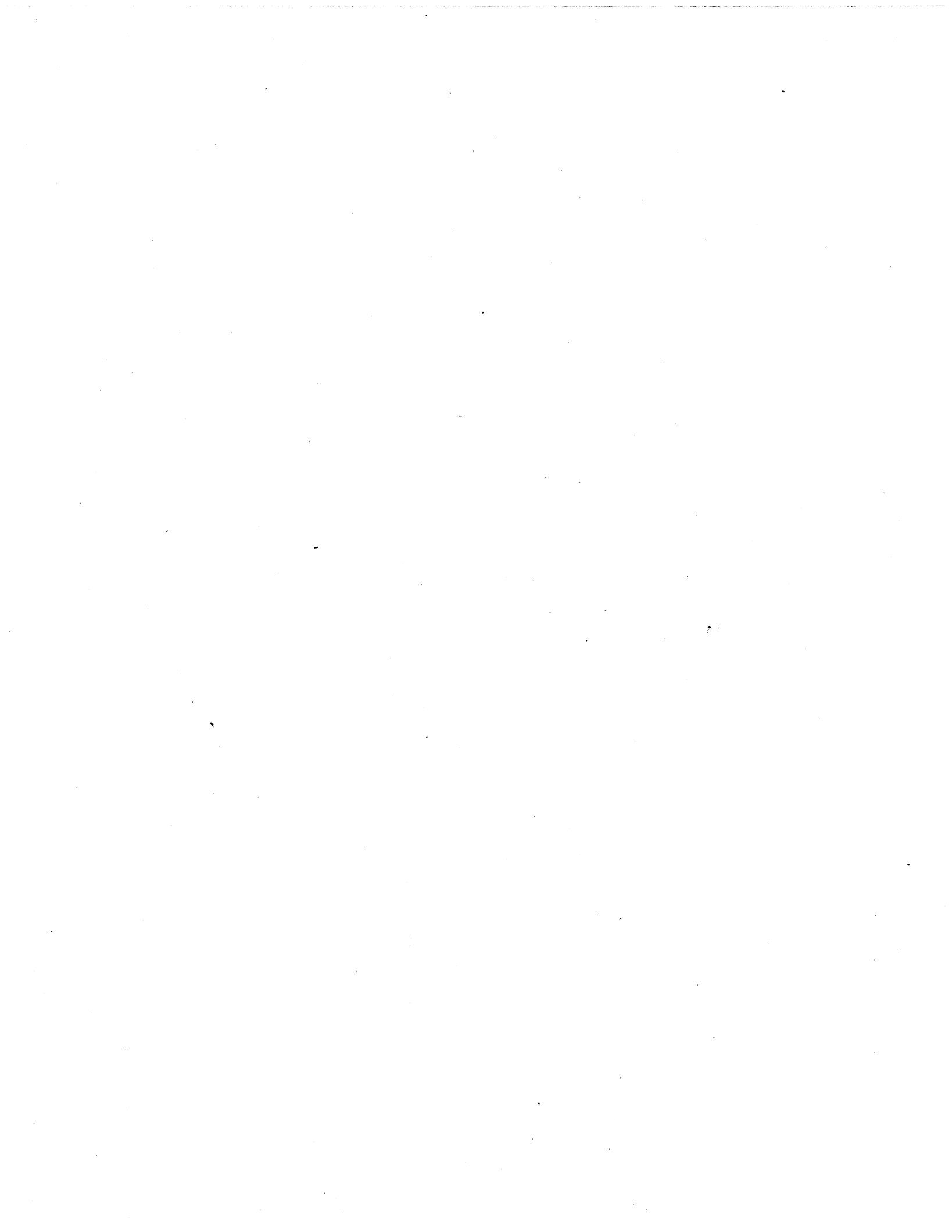
24, 9^h 30^m [24, 17^h 30^m]. NW de Luzón. Temblor de tierra, intensidad IV, sentido en la Provincia de Ilocos Sur; su origen se hallaba en el Mar de la China muy cerca de la costa occidental de Luzón.

24, 13^h 09^m [24, 21^h 09^m]. Surigao (NE de Mindanao). Temblor de tierra de intensidad II-III.

26, 1^h 16^m 30^{s*} [26, 9^h 16^m 30^s]. Legaspi (SE de Luzón). Temblor oscilatorio, dirección N-S, intensidad III-IV, duración 2 segundos.

28, 14^h 04^m [28, 22^h 04^m]. E de Sámar y NE de Mindanao. Temblor de tierra de intensidad III, de grande extensión, como lo indica el haberse sentido en la isla de Sámar y en la península de Surigao, distantes entre sí 150 kilómetros.

¹ La intensidad de los terremotos se indica conforme a la conocida escala de Rossi-Forel. Cuanto a la hora de su ocurrencia, adoptamos la indicada por los sismógrafos de este Observatorio siempre que los hayan registrado, distinguiéndola por medio de un asterisco (*). En caso contrario copiamos la apuntada por los observadores que nos envían las notas. Todas las indicaciones del tiempo se refieren al tiempo medio de Greenwich (medianoche=0^h). Para conveniencia de los lectores de Filipinas se añade también el tiempo insular.



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WEATHER BUREAU

MANILA CENTRAL OBSERVATORY

BULLETIN FOR OCTOBER, 1915

PREPARED UNDER THE DIRECTION OF

REV. JOSÉ ALGUÉ, S. J.

DIRECTOR OF THE WEATHER BUREAU

MANILA
BUREAU OF PRINTING
1915

BULLETIN FOR OCTOBER, 1915.

METEOROLOGICAL BULLETIN FOR OCTOBER, 1915.

By Rev. JOSÉ CORONAS, S. J.,
Chief, Meteorological Division of the Weather Bureau.

GENERAL WEATHER NOTES.

Pressure and temperature.—As we shall see presently, the last part of the month was a stormy one for the Philippines; hence the mean atmospheric pressure for all our stations is considerably below that of the preceding year and the normal for October. The monthly mean for Manila differs from the normal by -2.26 mm., and from the mean of October, 1914, by -4.73 mm. The highest pressures were observed in almost all our stations on the 11th, and the lowest on the 23d and 24th in southern Luzon, the Visayas and Mindanao, and on the 29th in northern Luzon.

The mean monthly temperature is either almost identical with, or somewhat higher than, that of the preceding year. The highest and lowest temperatures registered at Manila were 33.9° C. on the 8th, and 22.4° C. on the 22nd. The extreme values for Baguio were: 25.6° C., 14.4° C. on the top of Mirador, and 25.7° C., 13.5° C. in the valley.

PRESSURE AND TEMPERATURE AT THE FIRST AND SECOND CLASS STATIONS FOR OCTOBER, 1915.

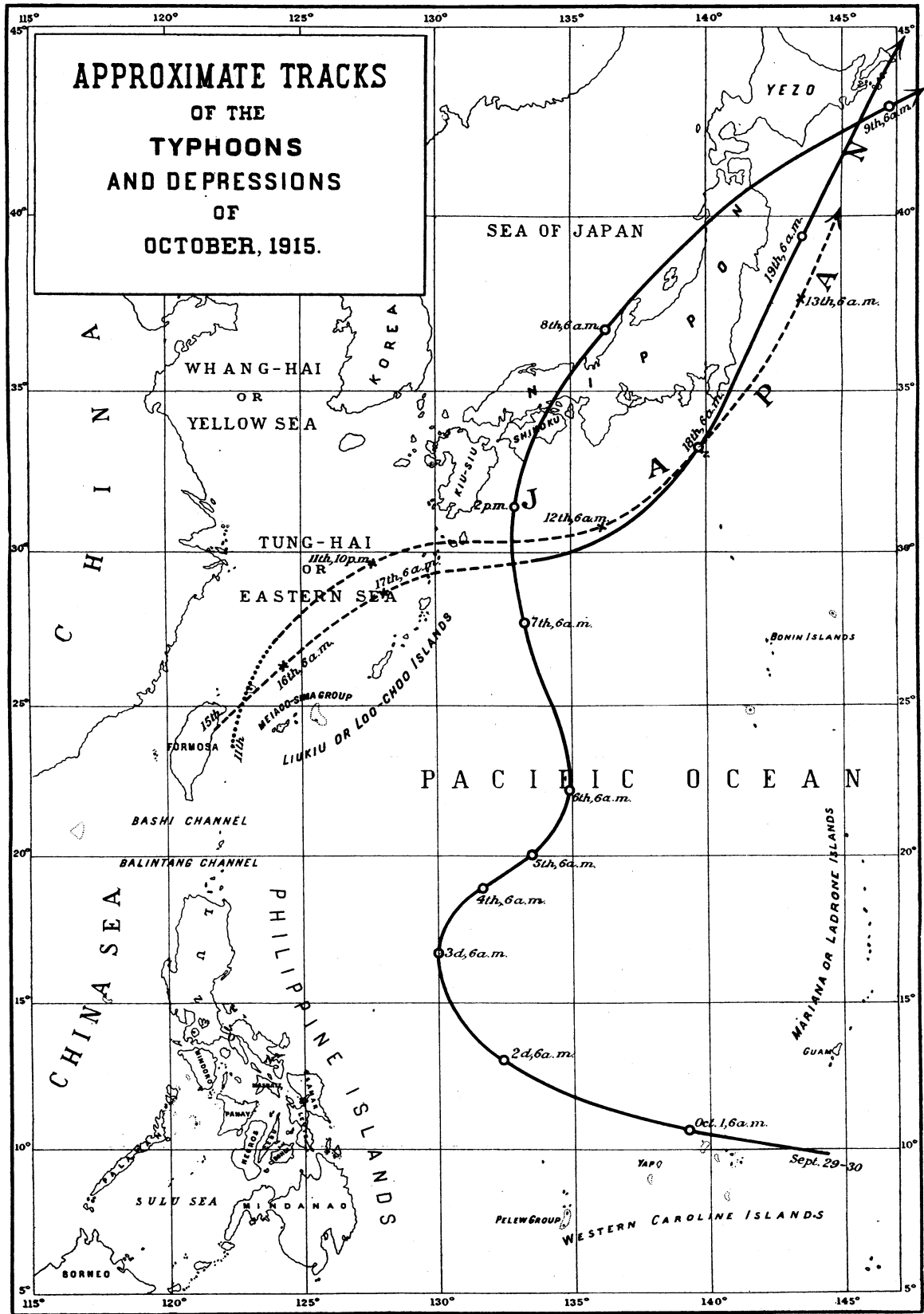
Station.	Pressure.						Temperature.					
	Mean.	Departure from October, 1914.	Highest mean.	Day.	Lowest mean.	Day.	Mean.	Departure from Oct., 1914.	Highest.	Day.	Lowest.	Day.
	mm.	mm.	mm.		mm.		°C.	°C.	°C.		°C.	
Tagbilaran	757.10		759.54	11	754.87	23	26.9	+0.67	32.7	11	22.9	16
Surigao	56.88	-3.40	59.44	11	54.34	23	27.5	+1.1	35.1	30	21.8	14
Cebu	56.90	-3.31	59.47	11	54.05	23	27.9	0	33.5	10	22.3	15
Iloilo	56.77	-3.31	59.69	11	53.41	24	26.9	-0.2	33	2	22.8	9
Ormoc	57.13	-3.33	59.81	11	54.01	23	26.9	+0.8	33	11	22.1	14
Tacloban	56.59	-4	59.63	11	53.07	23	27.1	+0.6	34.5	16	22.9	14
Capiz	56.86	-3.67	59.94	11	52.91	23	26.8	-0.3	33.9	31	23.2	10, 14, 17
Calbayog	56.67	-3.90	59.72	11	51.97	23	26.9	+1	35.4	19	22.3	14
Legaspi	56.16	-4.43	59.66	11	47.61	23	^a 27.6	0	^a 35.1	17		
Atimonan	56.14	-4.65	59.80	11	49.04	23	26.8	-0.2	32.9	19	22	26
Ambulong, Tanauan	55.67	-4.89	59.43	11	46.43	24	26.4	-0.1	34.1	7	20.3	26
Paracale	56.36	-4.82	60.13	11	49.67	23	27	0	32.8	25, 30	22.5	7
Manila	56.40	-4.73	60.13	11	47.66	24	26.6	+0.7	33.9	8	22.4	22
San Isidro	56.61	-4.76	60.25	11	48.98	24	26.6	+0.2	33.6	11	21.4	26
Dagupan	55.62	-4.63	59.42	11	48.22	24	27.8	+0.4	35.9	19	22.5	31
Bolinao	55.86	-4.77	59.70	11	48.55	24	27.8	+0.3	34	10	22.7	26
Baguio ^b	634.68	-3.77	638.12	11	626.45	29	18.5	+0.4	25.6	9	14.4	30
Vigan	755.59	-5.01	759.66	11	746.62	29	^c 28.1	+0.7	^c 37.1	25		
Tuguegarao	56.28	-5.69	60.29	1	37.48	29	27.1	+1.3	38.2	20	21.7	6
Aparri	56.18	-5.76	60.46	1	34.65	29	27.2	+1.2	33.4	31	22.8	31

^a 28 days of observation.

^b The barometric readings of this station are not reduced to sea level.

^c 29 days of observation.

Rainfall.—The amount of rainfall collected during the month in the gauges of our stations is generally greater than that of the preceding year, and greater also than the normal for October. The monthly rainfall for Manila differs from the normal by -36.1



mm., and from that of October, 1914, by +125.2 mm. In Baguio the total rainfall of the month amounted to 882.8 mm., which is 819.6 and 423.7 mm. above that of the preceding year and the October's normal, respectively. In one day alone, namely the 29th, there was a fall of 650.1 mm.

RAINFALL AT VARIOUS STATIONS OF THE WEATHER BUREAU DURING THE MONTH OF OCTOBER, 1915.

Station.	Total.	Departure from Oct., 1914.	Departure from normal.	Rainy days.	Departure from Oct., 1914.	Greatest rainfall in a single day.	Day.	Station.	Total.	Departure from Oct., 1914.	Departure from normal.	Rainy days.	Departure from Oct., 1914.	Greatest rainfall in a single day.	Day.
Glan	238.1			19		58.4	12	Calapan	316.2	+ 152.7		23	+ 7	77.4	23
Jolo	213.2	+ 68.8	+ 5.9	18	+ 2	36.6	6	Nueva Caceres	280.2						
Isabela, Basilan	259.6	+ 187.4	+ 12.6	17	+ 7	68.8	2	Batangas	570.7	+ 507		27	+ 17	167.9	23
Zamboanga	170.8	+ 112.5	+ 56.4	19	+ 12	36.9	6	Atimonan	556.2	+ 351.8	+ 178.3	22	+ 2	114	23
Davao	281.5	- 28.3	+ 32.6	13	- 5	54.6	17	Ambulong, Tana-							
Cagayan, Misamis	257.1	+ 228		18	+ 10	51.1	3	usan	325.6	+ 277.9		17	+ 12	141.6	23
Butuan	253.2	+ 199	+ 91.7	21	+ 6	75.1	21	Paracale	484.9	+ 233.5		20	- 6	97	22
Dumaguete	190.3	+ 98.2		19	+ 5	23.1	19	Santa Cruz, La-							
Tagbilaran	212.4		51.3	16	-	116.9	2	guna	303.6	+ 261.2		22	+ 8	143.6	23
Iwahig	187.7	- 166.1		24	+ 2	30.6	13	Manila	165.4	+ 125.2	- 36.1	19	+ 7	27.5	2
Surigao	216.8	- 34.1	- 20.9	18	0	41.2	22	Antipolo	213	+ 171.6		21	+ 13	41.2	23
Masain	310	+ 205	+ 78.4	12	+ 2	58.1	5	Iba	189.5	+ 139.2		21	+ 15	49.3	25
Cebu	199.1		- 8	17	-	57.1	6	San Isidro	164.5	+ 150.9	- 11.4	21	+ 13	46.5	14
Hoilo	331.9	+ 281.9	+ 81.3	22	+ 16	106	8	Tarlac	155.2	+ 104.9	- 23.5	14	+ 7	34.5	22
San Jose Buenavista	1064.4	+ 1023	+ 714.1	29	+ 23	191.3	8	Baler	430.4	-	+ 85.7	23	-	106.9	23
Cuyo	551.1	+ 528.5	+ 314.2	21	+ 18	95.3	6	Dagupan	160.8	- 40.7	- 35.5	18	+ 10	58.2	5
Ormoc	256.1	+ 100.4	+ 6	20	+ 1	66.5	3	Bolinao	253.4	+ 211.6	+ 71.8	18	+ 7	60	29
Guituan	318.8	- 41.4		22	+ 2	72.6	13	Baguio	882.8	+ 819.6	+ 423.7	25	+ 13	650.1	29
Tacloban	239.2	+ 27.5	+ 29.8	23	+ 1	46.7	6	San Fernando,							
Capiz	221.6	+ 119.4	- 236.7	22	+ 7	49	13	Union	420.5	+ 398.1	+ 268.1	16	+ 13	251.6	29
Borongon	237.7	+ 34	- 82.8	19	- 7	70.3	22	Echague	248.4	+ 188.4		18	+ 7	81.3	17
Calbayog	471.5	+ 374.5	+ 211.5	24	+ 6	176.7	15	Candon	529.5	+ 529.5	+ 331.2	12	+ 12	393.7	29
Masbate	249.4	+ 230.9	+ 112.5	17	+ 10	36.1	15	Vigan	543.5	+ 525.4	+ 364.9	11	+ 8	243.3	29
Romblon	428.3	+ 228.8	+ 120.8	24	+ 3	136.9	23	Tuguegarao	509.6	+ 408.1	+ 238.8	9	+ 1	201.4	29
Batag	364.1	+ 216.4		15	- 2	143.5	22	Laog	484.9	+ 467.8		11	+ 9	239.1	29
Gubat	263.2		- 9.7	17	-	111.3	22	Aparri	170.1	- 6.6	- 116.6	17	+ 7	49.7	29
Legaspi	364.7	+ 214.2	+ 34	18	+ 1	120.5	22	Santo Domingo,							
Sumay, Guam	416.7	+ 33.4		23	+ 3	120.7	1	Batanes	478	-	+ 153.1	27	-	167.2	29

* 22 days of observation.

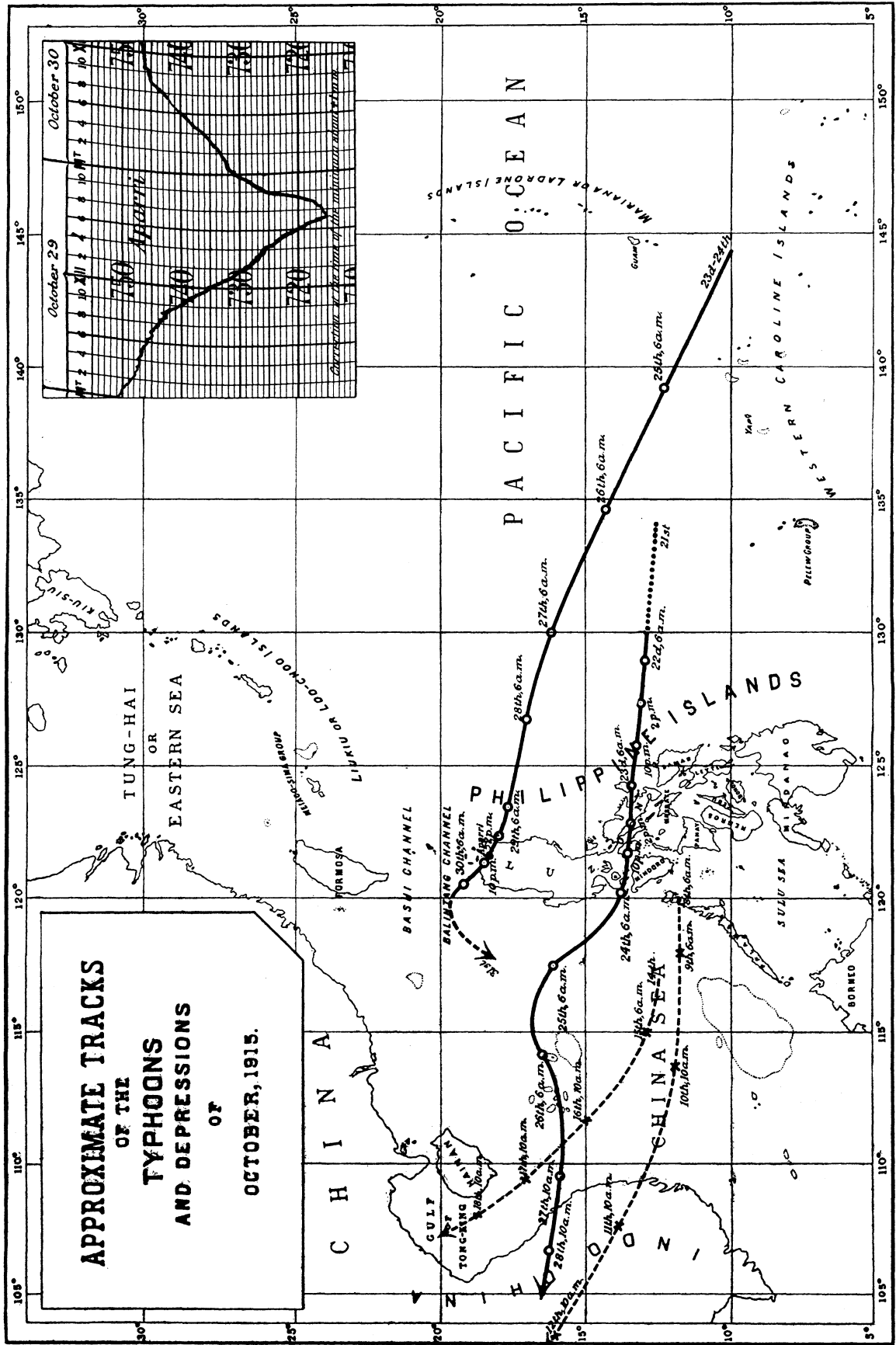
DEPRESSIONS AND TYPHOONS.

There were seven depressions or typhoons in the Far East during this month, two of them having crossed the Island of Luzon in five days. After saying a few words on the less important depressions and typhoons, we shall study more in detail the two typhoons of Luzon.

THE TYPHOON OF SEPTEMBER 29 TO OCTOBER 9, 1915.

The lack of observations from Yap makes it impossible to give with certainty the place of origin of this typhoon: yet the observations from Guam seem to show that it formed on September 29 to 30 over the Western Carolines near 10° latitude N and 144° longitude E. On the 2d there was a general falling of the barometers in the Philippines, it being more pronounced in the eastern Visayas and southeastern Luzon; a moderate falling continued on the 3d in northern Luzon; and then there was a tendency to rise again on the 4th. The typhoon had been moving probably W by N and with rather great velocity during the 1st; but it inclined northwest on the 2d, and recurved N and NE on the 3d. It seems probable that it kept moving northeastward on the 4th and 5th; then it inclined N and NNW on the 6th, and reached the southern part of Japan on the 7th, recurving again northeastward in the afternoon of the same day. See the track of this typhoon in Plate VII.

Plate VIII.



TWO DEPRESSIONS IN THE CHINA SEA: OCTOBER 8 TO 18, 1915.

The first of these depressions appeared at 6 a. m. of the 8th to the N of, and not far from, Palawan Island, near 120° longitude E and 12° latitude N. It moved W on the 8th, 9th, and part of the 10th; it inclined somewhat to the N on the latter day, and entered Indochina in the early morning of the 11th between 109° and 110° longitude E and near 13° latitude N. Once in the Continent, it inclined still more to the N.

The other depression could be situated on the 14th to the W of Mindoro between 12° and 13° latitude N and near 117° longitude E; it moved W on the 14th, NW by W on the 15th, and NW or NW by N on the 16th and 17th. It would seem that it filled up on the 18th in the neighborhood of the Gulf of Tongking.

A DEPRESSION AND A TYPHOON NEAR JAPAN: OCTOBER 11 TO 19, 1915.

On the 11th a depression of little importance appeared to the E of Formosa: it moved first N and NE, then E, and finally NNE along the eastern coast of Japan.

On the 15th another depression was formed near the eastern coast of Formosa. It followed a track almost identical with that of the preceding one: but, although of little importance at the beginning, it developed later into a real typhoon on the 17th. It moved NNE on the 18th and 19th near the eastern coast of Japan.

TWO TYPHOONS IN FIVE DAYS OVER LUZON.

The Island of Luzon was hard hit toward the end of the month, two typhoons having struck it in five days; one to the S and the other to the N of Manila. Both were severe typhoons, but the first was undoubtedly much worse than the second; it was a typical destructive typhoon, of not so great extension, but of a extremely severe character. We shall endeavor to study very carefully the track of these typhoons, giving at the same time as many observations and details as they may be of special interest to our readers, particularly to those who suffered most from these storms.

THE TYPHOON OF AMBOS CAMARINES: OCTOBER 21 TO 28, 1915.

Origin of this typhoon.—Having no observations from Yap this year, we find it impossible to ascertain whether this typhoon was formed far from, or rather near to, the Philippines. As to the observations from Guam, they did not give any definite signs of this typhoon; hence, we assume that it was probably formed nearer to the Philippine than to the Ladrone Islands, or at least about half way between Guam and the Philippines.

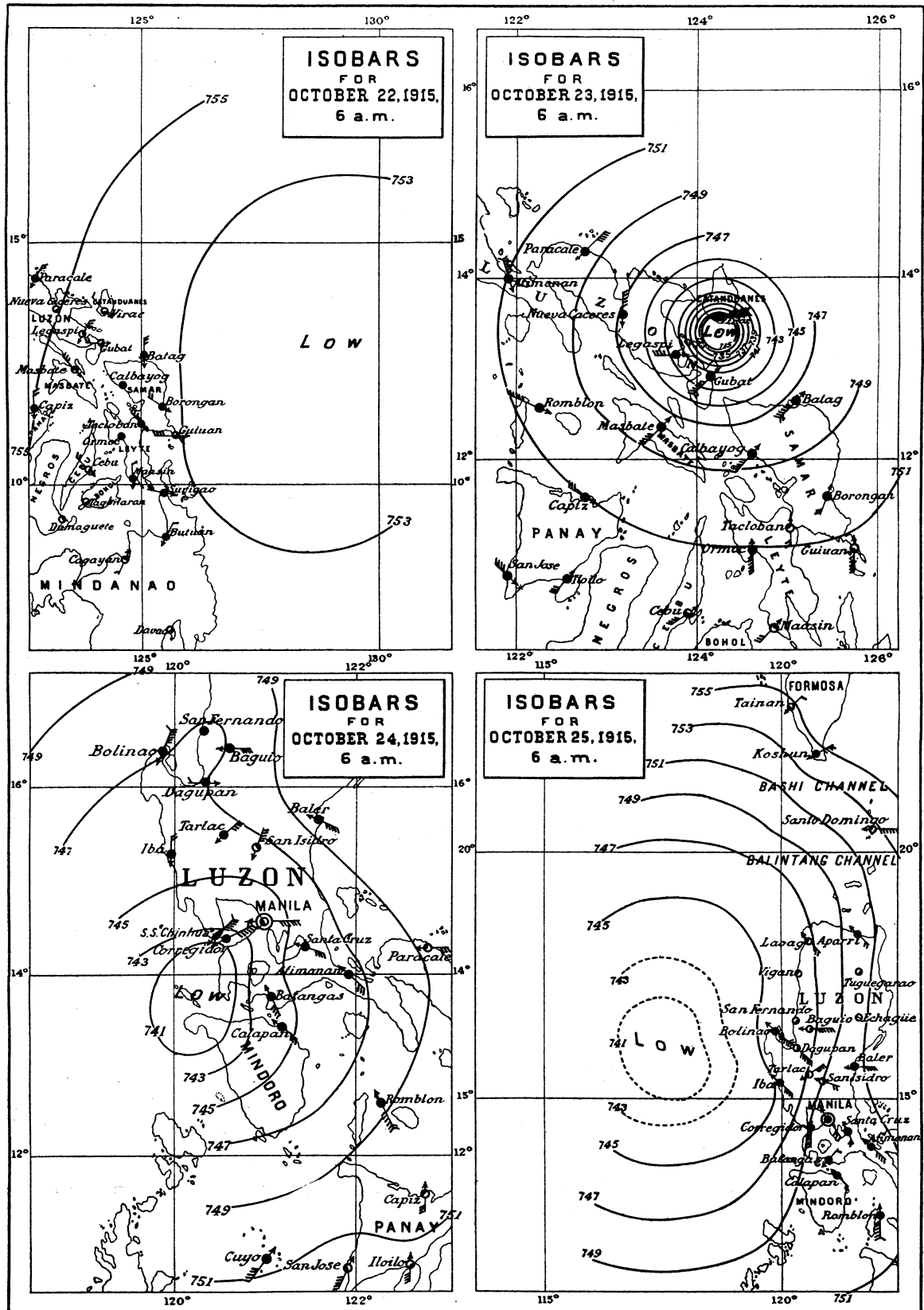
The typhoon in the Philippines.—As it happens usually with typhoons of this kind which can not be forecasted from observations of Guam or Yap, the first warnings to the easternmost provinces of the Archipelago could be sent only about one day before the typhoon reached the Islands. Yet the Observatory was able to spread urgent typhoon warnings throughout the Philippines with sufficient time to take all possible precautions against the storm.

Our weather maps showed for the first time the existence of this typhoon at 6 a. m. of October 22, its center being situated at that time to the east of San Bernardino Strait or of the southernmost part of Luzon, in about 129° longitude E and 13° latitude N. The following warning was distributed in Manila at 8.35 a. m. of the 22d:

There is a typhoon over the Pacific to the E of northern Samar or of southeastern Luzon; its actual direction can not yet be ascertained.

ISOBARS FOR THE TYPHOON OF OCTOBER 22 TO 25, 1915.

Plate IX.



N.B.—The barometric readings have been reduced to standard gravity.

The same warning was immediately wired to all our stations throughout the Archipelago, and typhoon signals were ordered to be hoisted in southeastern Luzon and the Visayan Islands. As soon as the 2 p. m. observations were on hand, it was realized that the typhoon was moving much inclined to the west, and hence it was dangerous for the southern part of Luzon. Accordingly, the following warning was distributed in Manila at 4 p. m. of the 22d:

The typhoon was situated at 2 o'clock this afternoon about 200 miles E of San Bernardino Strait moving apparently to W or W by N. Unless it changes its actual direction, it may be dangerous for the southern part of Luzon.

This warning was confirmed at 9.45 p. m. as follows:

The typhoon seems to be approaching at present the southern part of Luzon. Probably stormy weather to-morrow in the southeastern part of Luzon; insecure and rainy for the present with thunder-showers in the southwestern and central part of Luzon.

During the same afternoon and in the evening very definite warnings were being transmitted to our observers and to the provincial governors of the Archipelago, particularly to those who were likely to be near or in the path of the storm. At 9.51 p. m. this alarming warning was sent to the observer at Legaspi:

Hoist typhoon signal No. 4. Typhoon approaching southern Luzon. Warn authorities, especially governor, to take precautions.

Similar warnings were sent to the observers at Virac, Gubat, Naga, or Nueva Caceres, and to the provincial governors of Sorsogon, Lucena, and Boac. As the typhoon was not moving very rapidly, the Observatory waited until next morning to warn of the immediate danger the other provinces of southern Luzon to the S of Manila. We will only mention here the following telegram sent at 9.37 a. m. of the 23d to the provincial governors of Pasig, Lucena, Cavite, and Balanga:

Typhoon signal No. 4 hoisted. Typhoon dangerous. Take precautions. Warn municipios.

The same warning was sent also to the observer at Batangas and, through him, to the governor of that province.

Let us now examine the track of the typhoon through the southern part of Luzon, and the terrific havoc wrought by the storm along this path. In order that our readers may easily see day by day the different position of the cyclonic center, we give in Plate IX the isobars at 6 a. m. for October 22, 23, 24, and 25. It was at 6 a. m. of the 23d when the typhoon was passing close to the southern coast of Catanduanes Island, the barometric minimum at Virac being as low as 715 mm. at 6.10 a. m. Although all the telegraphic lines of the Visayas and southeastern Luzon were down in the early morning of the 23d, no observation having been received from that region since 9 p. m. of the 22, yet the Manila Observatory gave out the following statement concerning the position and movement of the storm:

The typhoon was situated at 6 o'clock this morning near Catanduanes moving apparently W by N toward southern Luzon.

At 9 a. m. the vortex passed to the north of Tabaco with a barometric minimum 710 mm. as observed on board the steamer *Gabrielle Poizat* anchored at Tabaco Bay. In the following table we publish some of the observations taken there during the typhoon:

METEOROLOGICAL OBSERVATIONS MADE ON BOARD THE STEAMER "GABRIELLE POIZAT" ANCHORED AT
TABACO BAY, OCTOBER 22 TO 24, 1915.

Captain, LUIS RENTERIA.

Date and hour.	Pressure.	Wind.		Remarks.
		Direction.	Force.	
October 22:	<i>mm.</i>		<i>0-12.</i>	
7 p. m.	75.4	NW	4	Barometers falling rapidly. Sea increasing.
9 p. m.	53.7	WNW	3	
11 p. m.	53.3	WNW		
Midnight	51.5	NW	4	
October 23:				
1 a. m.	49.2	NW		3.30 a. m. Sea still increasing. Squally weather. Lowest barometric reading in dial. Winds abating. Weather clearing up. The center must be passing very near or over the locality. The sea waves swept the deck. The two larboard boats were filled and the two starboard boats, the railings, the fixed canvas of the bridge were destroyed.
2 a. m.	48	NW	5	
3 a. m.	46.5	NW		
4 a. m.	45.2	NW		
5 a. m.	44.2	WNW	6	
6 a. m.	40.4	W	7	
7 a. m.	35			
8 a. m.	21.5			
9 a. m.	10			
10 a. m.		S	12	
11 a. m.		SE	12	
Noon		SE	12	
3 p. m.	45.2			
4 p. m.	46.5	S		
6 p. m.	48.8	SE	5	
8 p. m.	51.1			
10 p. m.	51.3	SSW		
Midnight	52.2	SSE	6	
October 24:				
2 a. m.	52			At 0.45 a. m. the shore was sighted and recognized as the Tiwi rock, having been forced by the winds and tides 9 miles off the Tabaco landing.
4 a. m.	52	S	4	Almost at the same time San Miguel Point was sighted, and the winds and waves having abated, we directed our course to it at 0.51 a. m.
6 a. m.	52.1	S	5	
8 a. m.	53	SE	4	

At about noon the vortex was at its nearest distance from, and to the S of, Naga or Nueva Caceres, having moved almost due W from the southern coast of Catanduanes and with a rate of progress of about 10 miles per hour. In Plate X we give the position of the center at 2 p. m. of the 23d and the barographic records obtained at our stations of Virac and Nueva Caceres. Both stations were completely destroyed by the storm, and hence no direct observations are available from those places. On board the steamer *Ban-Yek*, which was anchored at the Bicol River, 1 mile to the SW of Nueva Caceres, very interesting observations were made by Capt. F. Fabregas. They are embodied in the following table:

METEOROLOGICAL OBSERVATIONS TAKEN ON BOARD THE STEAMER "BAN YEK" ANCHORED AT BICOL RIVER, NUEVA CACERES, OCTOBER 22 TO 25, 1915.

Captain, F. FABREGAS.

Date and hour.	Pressure.	Wind.		Remarks.
		Direction.	Force.	
October 22:	<i>mm.</i>		0-12.	
4 a. m. -----	756.0	NE	3	10 a. m. squalls from N, NE, and E.
4 p. m. -----	53	N,NE	4	
9 p. m. -----	53.9	N	3	Squalls from N.
October 23:				
2 a. m. -----	47.9	N	4	Rain squalls increasing.
4 a. m. -----	47.9	N	4	Do.
5 a. m. -----	48	N	4	Do.
6 a. m. -----	47	N	4	The barometric oscillation disappears and pressure begins to fall rapidly.
7 a. m. -----	45	N	5	
8 a. m. -----	44.5	N	6	Continuous squalls and threatening weather.
9 a. m. -----	40	N	8	Do.
10 a. m. -----	35	N	10	Hurricane winds; nipa houses begin to be blown down.
11 a. m. -----	26	N	11	Strong houses are being destroyed.
Noon -----	20	N	12	
12.05 p. m. -----	17			Lowest barometric reading. Weather clearing up a little, while the terrific winds abate for a while; then wind veers rapidly to the E and blows with even greater violence from E, ESE, SE, SSE, and S. The vortex passed to the S.
3.30 p. m. -----	42.6	ESE	10	Destruction continues.
5.30 p. m. -----	46.2	SE	6	
8 p. m. -----	49	SE	4	The current of the rivers run with frightful speed.
10 p. m. -----	49.6	SE	4	Part of the town flooded.
October 24:				
4 a. m. -----	50	SSE	3	
10 a. m. -----	51	SSE	3	Squalls abating.
4 p. m. -----	48.8	SSE	2	
9 p. m. -----	50	SE	2	
October 25:				
4 a. m. -----	50.5	SSE	2	
10 a. m. -----	52.5	S	2	

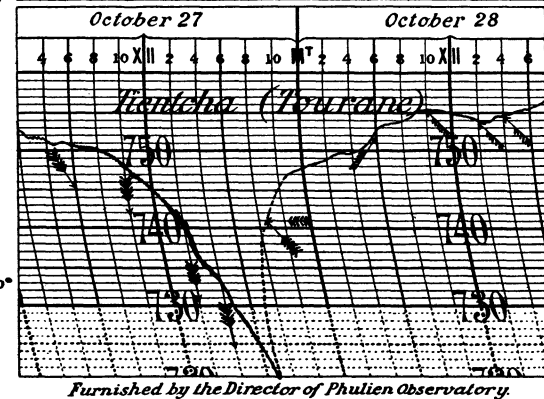
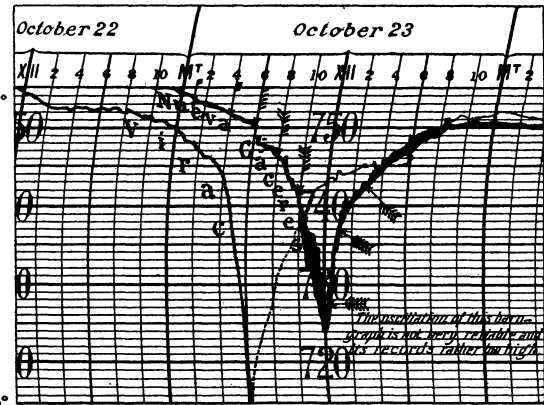
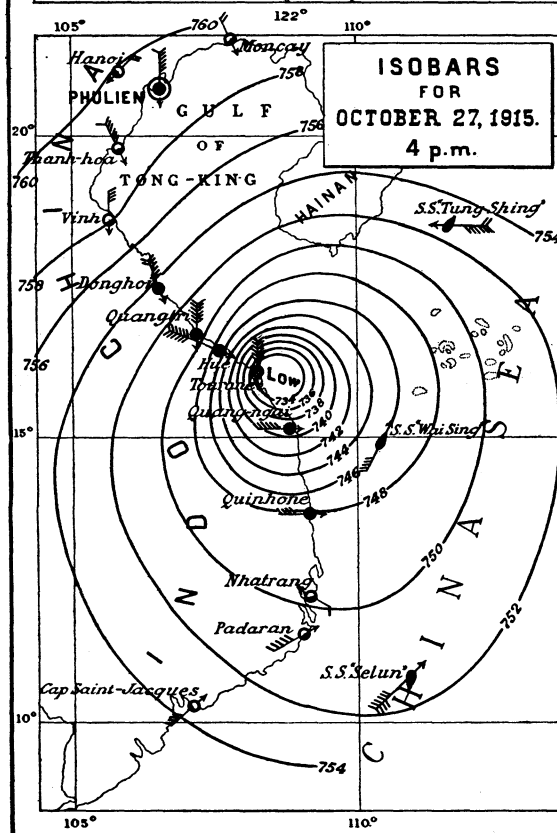
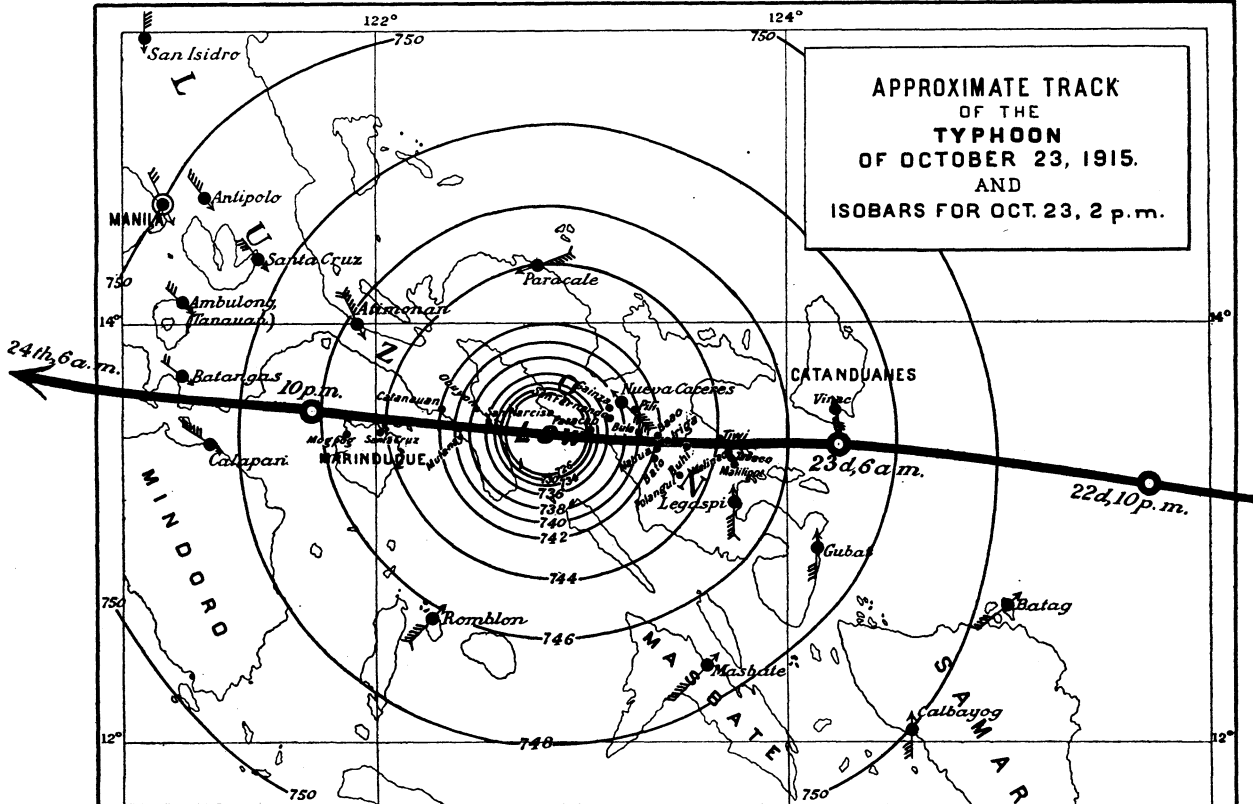
The Manila Observatory made the following statement referring to this part of the track of this typhoon in the afternoon of the 23d:

The typhoon is now in Ambos Camarines moving W by N * * *. The center of the storm will in all probability pass to the S of Manila by to-night or to-morrow morning.

The following observations made at our stations of Batangas and Calapan will show clearly how the typhoon passed to the S of Manila and close to the capital of Batangas Province at about 2 a. m. of the 24th.

ISOBARS AND BAROGRAPHIC RECORDS
TYPHOON OF OCTOBER 21 TO 28, 1915.

Plate X.



N. B. - The barometric readings have been reduced to standard gravity.

METEOROLOGICAL OBSERVATIONS FOR OCTOBER 23 TO 25, 1915.

Date and hour.	Batangas.					Calapan.				
	Pressure.	Wind.		Weather.	Rainfall.	Pressure.	Wind.		Weather.	Rain, 24 hours beginning 6 a. m.
		Direction.	Force.				Direction.	Force.		
October 23:	<i>mm.</i>		<i>0-12.</i>		<i>mm.</i>	<i>mm.</i>		<i>0-12.</i>		<i>mm.</i>
6 a. m. -----	754.54	NW	1	o, r	^a 30	754.30	W	3	o, r	-----
10 a. m. -----	55.19	NW	1	o, r	17.3	-----	-----	-----	-----	-----
2 p. m. -----	50.65	WNW	2	o, r	9.9	50.06	WNW	6	o, q, r	-----
4 p. m. -----	49.32	WNW	3	o, r	6.1	48.54	WNW	6	o, q, r	-----
6 p. m. -----	48.26	WNW	4	o, r	10.2	48.11	W	7	o, q, r	-----
7 p. m. -----	48.13	WNW	5	o, r	7.1	47.46	W	8	o, q, r	-----
8 p. m. -----	47.78	WNW	5	o, r	8.6	47.19	W	8	o, q, r	-----
9 p. m. -----	47.49	WNW	4	o, r	6.1	46.23	W	9	o, q, r	-----
10 p. m. -----	46.48	WNW	5	o, r	8.1	45.31	W	9	o, q, r	-----
11 p. m. -----	44.49	NW	6	o, r	10.7	43.35	W	10	o, q, r	-----
11.30 p. m. -----	42.44	NNW	7	o, q, r	-----	42.98	W	10	o, q, r	-----
Midnight -----	39.99	N	9	o, q, r	13.7	42.21	W	10	o, q, r	77.4
October 24:										
12.30 a. m. -----	38	NNE	9	o, q, r	-----	41.91	W	11	o, q, r	-----
1 a. m. -----	34.20	NNE	8	o, q, r	-----	42.13	WSW	7	o, q, r	-----
1.30 a. m. -----	33.15	NNE	9	o, q, r	-----	-----	-----	-----	-----	-----
1.45 a. m. -----	32.70	NNE	9	o, q, r	-----	-----	-----	-----	-----	-----
2 a. m. -----	33.15	NE	8	o, q, r	-----	41.99	WSW	5	o, q, r	-----
2.30 a. m. -----	33.89	E	4	o, r	-----	-----	-----	-----	-----	-----
3 a. m. -----	34.96	ESE	2	o, r	^b 43.7	42.19	S	3	o, q, r	-----
4 a. m. -----	36.32	SSE	1	o, r	-----	43.89	Calm	-----	o, r	-----
5 a. m. -----	40.50	SSE	5	o, r	-----	-----	-----	-----	-----	-----
6 a. m. -----	46.14	SSE	4	o, r	^b 26.4	46.04	SE	3	o, r	-----
8 a. m. -----	-----	-----	-----	-----	-----	47.30	SE	1	o, r	-----
10 a. m. -----	-----	-----	-----	-----	-----	48.39	Calm	-----	o, r	-----
2 p. m. -----	47.24	NE	1	o, r	32.3	47.30	SE	1	o, d	16.2
October 25:										
6 a. m. -----	52.16	NE	1	o, r	6.6	52.34	SE	1	o, d	-----
2 p. m. -----	52.11	SSW	1	o, r	24.9	52.32	Calm	-----	o, d	24.9

^a Rain since last night.

^b Rain in three hours.

As to the destructive effects of the typhoon throughout the southern provinces of Luzon, they are so well known to our readers that it will suffice to say a few words about them. The regions which were supposed to have suffered most from the storm were indicated in the following note given out by Manila Observatory at 7.15 a. m. of the 24th:

This typhoon has passed early this morning within 60 miles to the S of Manila, probably through the Province of Batangas. The storm must have been felt severely in the Provinces of Sorsogon, Albay, Ambos Camarines, and Batangas, in the southern part of the Provinces of Tayabas, Laguna, and Cavite, in Catanduanes, Marinduque, and northern Mindoro.

The reports which were received later at Manila fully confirmed this statement of Manila Observatory. It can be safely stated that most of the towns in the southern coast of Catanduanes, in the northern part of Albay Province, in the southernmost part of Ambos Camarines, and in the northern coast of Marinduque were almost a complete destruction after the passing of the typhoon, over 95 per cent of the houses having been blown down by the hurricane according to official reports we have on hand. Some of the towns within 5 or 7 miles from the cyclonic center, like Buhi, Iriga, Baao, Bula, Nabua, were said to have been almost wiped out by the terrific force of the wind. The intensity of the storm was severely felt also in the southern part of Batangas Province and the northern part of Mindoro, although it would seem that the typhoon by the time it reached Batangas Province had slackened considerably in its violence.

The area of complete or almost complete destruction of this typhoon while it was passing through the provinces of Albay and Ambos Camarines had a radius of about 15 to 20 miles including the vortex which had an approximate diameter of 5 to 7 miles. The fact that the two meteorological stations of southeastern Luzon, which happened to be nearer to the center of the typhoon were completely destroyed, as stated above, makes it impossible for us to enter into more details as to the velocity of the wind, amount of rainfall etc. in the southern part of Catanduanes Island and of the Province

of Ambos Camarines when the storm was raging there with all its fury. Yet it will not be an exaggeration to suppose that the winds blew within the region of almost complete destruction with a velocity of more than 110 miles or 180 kilometers per hour during the height of the storm.

In towns like Iriga (see Pl. IX) situated on the path of the typhoon absolute calm and a clear sky was observed for half an hour or a little more before the winds jumped from NW to SE. And as the typhoon was moving at a rate of about 10 miles per hour, hence we have said that the diameter of the vortex was of 5 to 7 miles.

In Plates XI, XII, XIII, and XIV we reproduce several photos showing the effects of the typhoon at Virac, Tabaco, Malilipot, Polangui, and Naga or Nueva Caceres. Thanks are due for these photos to the courtesy of our observers at Virac and Nueva Caceres, to Col. C. Smith of the Philippine Constabulary, and to Mr. Guy Walford, agent of Smith Bell & Co. at Tabaco.

The typhoon in the China Sea and in Indochina.—The typhoon followed a queer track in the China Sea after it left the Philippine Islands on the 24th. From its position as shown in the isobars of October 25, 6 a. m., given in Plate IX, it is evident that the storm had moved northwestward since 6 a. m. of the preceding day; yet it inclined again W in the afternoon of the 25th, it moved WSW in the evening and night of the same day and part of the 26th, and finally moving once more W, it entered Indochina S of, and close to, Tourane on the 27th.

Our readers may see in the lower part of Plate X the isobars for October 27, 4 p. m., when the vortex was approaching the coast of Indochina, together with the barographic record obtained at Tourane. It is quite clear from these data that the typhoon was very severe when it reached Indochina, possibly as severe at least as when it struck the Island of Luzon on the 23d. This is fully confirmed by the following report received from M. Cadet, the director of Phulien Observatory:

The center of the typhoon passed on October 27, 6.45 p. m., close to the S of Tourane; so that the barometric minimum (in the vortical region) must have been lower than that (721.3 mm., observed, but not registered) of cape Tien-Tcha at the entrance of Tourane. The hurricane wave dashing against the shore caused a very extraordinary rising of the sea and the sudden and destructive floods from the S of Taifoo to Tourane and on the seashore from Thua-Thien to Hue. This wave, on the open sea, was an effect of an uplifting of the water of more than 0.50 m. in the central region of the typhoon, the extension of which (probably of over 10 miles) has not yet been determined.

The typhoon raged with extraordinary violence in the mountainous region of central Annam near Tourane. The telegraphic lines went down; the trees were twisted, broken, or uprooted; the roofs, doors, and windows of many houses were carried off with violence, the native houses were in a great number blown down or simply wiped out by the sea, and their inhabitants drowned; the boats were destroyed and the launches and one steamer thrown into the shore or inland. The rising of the rivers helped to increase the floods and caused the destruction of the crops and great damages to the roads. The abundant rains extended from Quang-Ngai to Donghoi and even to Vinh.

Before finishing these notes on this typhoon, we wish to call the attention of those more interested in the study of meteorology to the barographic curve of Tientcha (Tourane). To our opinion, it can be considered as a typical curve of those typhoons the axis of rotation of which is remarkably inclined backward; hence the rapidity in the rising of the barometer as compared with its falling in the first part of the storm. This barogram reminds us of another very similar of the French cruiser *Descartes*, August, 1901, reproduced by Rev. Louis Froc in his valuable pamphlet "The 'De Witte' Typhoon," page 6. The barogram of Virac, on the contrary, shows a greater rapidity in the falling than in the rising, thus tending to show that the typhoon, when still in the Pacific had a marked inclination of the axis headwards. It is to be regretted, however, that the second part of the curve of Virac can only be given as probable; it was so much spoiled by the rain which got into the instrument, that it was very difficult to distinguish a few traces left of the second part of the typhoon record.

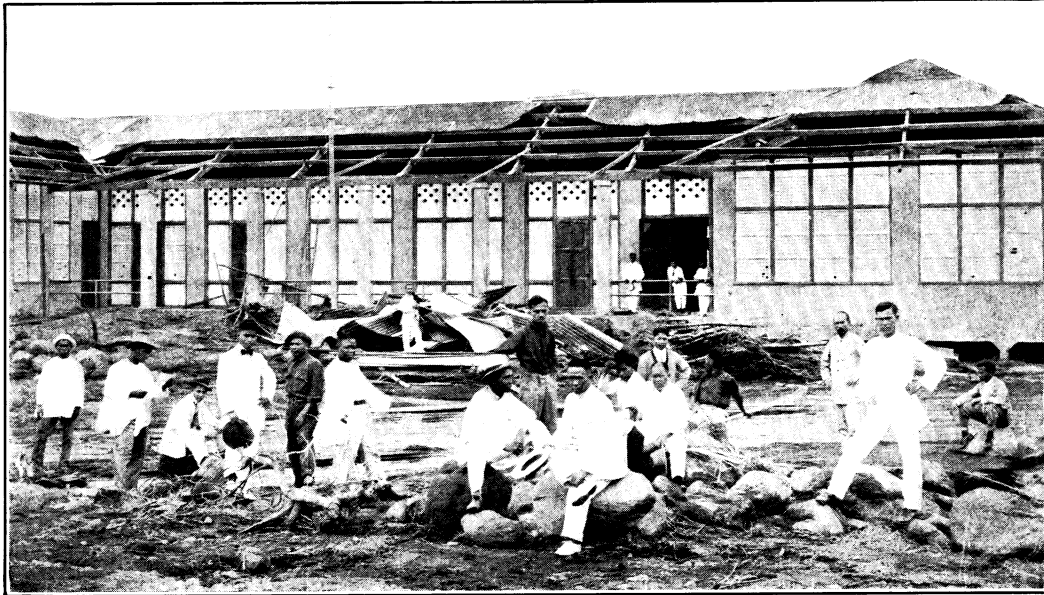


Subprovincial building.

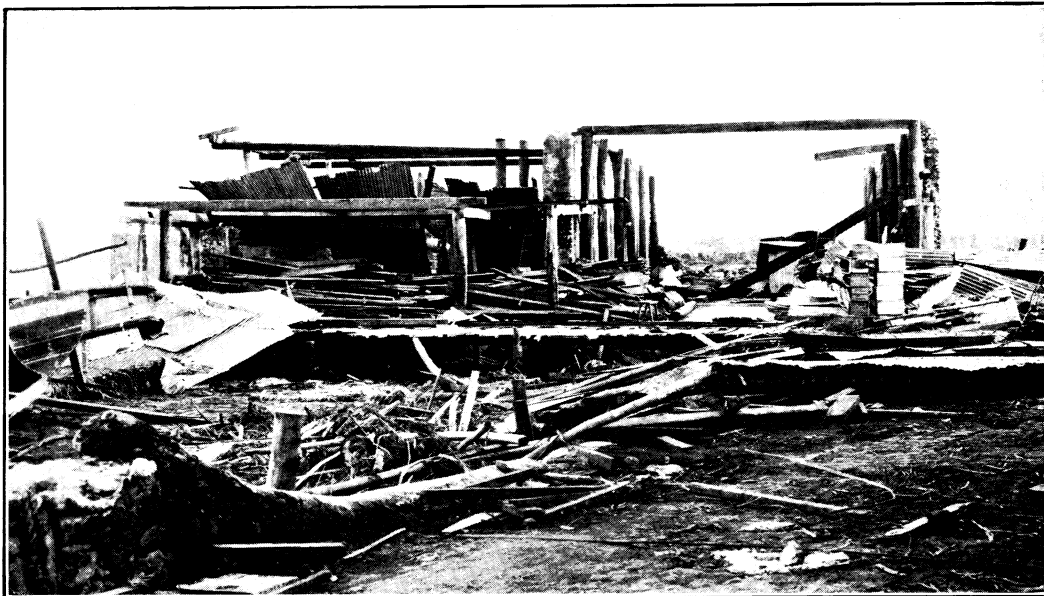


Domestic science.

EFFECTS OF THE TYPHOON OF OCTOBER 23, IN VIRAC, CATANDUANES ISLAND.

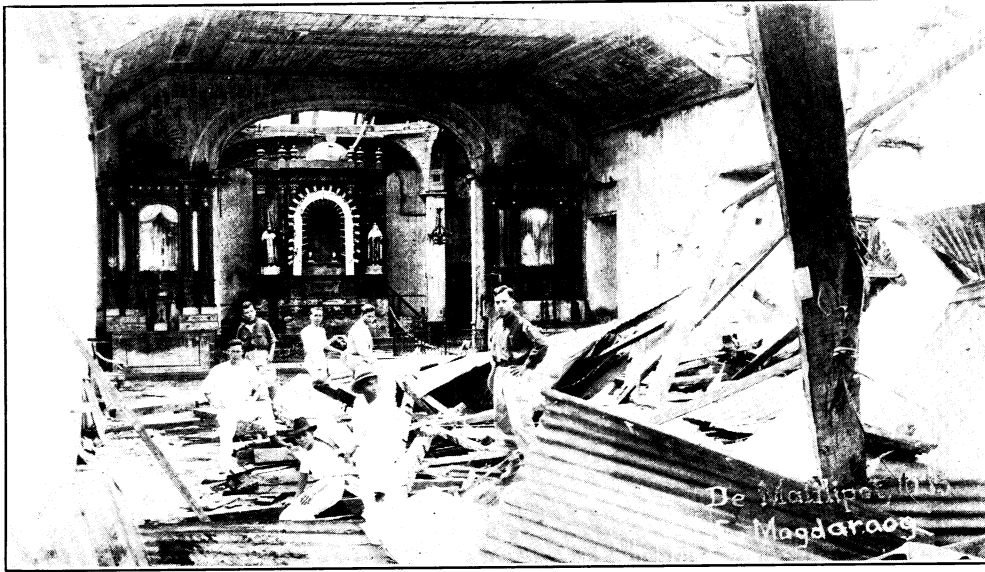


Intermediate school; photo taken seven days after the typhoon.



Smith Bell & Co., water front bodega.

EFFECTS OF THE TYPHOON OF OCTOBER 23 IN TABACO, ALBAY PROVINCE.



Catholic Church of Malilipot: photo taken seven days after the typhoon.



View in the town of Polangui, where 97 per cent of the houses were seriously damaged.

EFFECTS OF THE TYPHOON OF OCTOBER 23 IN ALBAY PROVINCE.



St. Francis Catholic Church.



Municipal building.

EFFECTS OF THE TYPHOON OF OCTOBER 23 IN NAGA OR NUEVA CACERES, PROVINCE OF
AMBOS CAMARINES.

THE TYPHOON OF APARRI, OCTOBER 23 TO 31, 1915.

Origin of this typhoon and its track across the Pacific.—While the preceding typhoon was raging in the Philippines on the 23d, a new one appeared to be forming to the S of Guam, between 144° and 145° longitude E and in about 10° latitude N. Hence, the first warnings referring to this typhoon could be given out on the 24th, more than five days before it struck northern Luzon. These warnings read as follows:

October 24, 11.55 a. m. There is a new distant typhoon forming S of Guam.

October 24, 6 p. m. The new distant typhoon appears this afternoon to the SW of Guam moving WNW.

The observations of Guam on which the foregoing warnings were based are published in the following table:

METEOROLOGICAL OBSERVATIONS MADE AT SUMAY, GUAM, LADRONE ISLANDS, OCTOBER 23 TO 26, 1915.

Date and hour.	Pres- sure.	Wind.		State of sea.	Rain, 24 hours begin- ning 6 a. m.	Date and hour.	Pres- sure.	Wind.		State of sea.	Rain, 24 hours begin- ning 6 a. m.
		Di- rection.	Force.					Di- rection.	Force.		
Oct. 23:	<i>mm.</i>		0-12.		<i>mm.</i>	Oct. 24:	<i>mm.</i>		0-12.		<i>mm.</i>
6 a. m.	756.65	ENE	4	Moderate		5:30 p. m.	752.22	ESE-se	4		66.1
2 p. m.	54.65	ENE	5	do		Oct. 25:					
8 p. m.	54.67	ENE	5-6		34.3	2 a. m.	52.40	SSE	6		
Oct. 24:						4 a. m.	52.60	SSE	6		
2 a. m.	53.12	ENE	1			6 a. m.	53.42	SSE	6-7	Rough	
4 a. m.	52.57	ENE	1			11 a. m.	54.80	SSE	5	Swell	
6 a. m.	52.70	ENE	1	Moderate		2 p. m.	63.47	SSE	5	do	
11 a. m.	53.32	E	4	do		7:30 p. m.	55.97	SSE	4	do	20.3
Noon.	52.69	ESE	3	do		Oct. 26:					
2 p. m.	51.77	ESE	4	do		6 a. m.	57.45	S	2	Moderate	
3 p. m.	51.82	ESE	3	do		2 p. m.	56.30	SSE	3	do	
4.30 p. m.	51.84	ESE	3	do							

The typhoon continued moving WNW with a velocity of about 12.5 miles per hour until the 27th when it inclined more to the W and decreased its rate of progress to about 8.5 miles per hour. This inclination of the track to the W was stated in a typhoon warning given out by the Manila Observatory on that day:

October 27, 12.10 p. m. The typhoon of the Pacific seems to have inclined westward since yesterday, its center being probably situated at 6 o'clock this morning about 500 miles to the E of northern Luzon, moving apparently to W by N.

Practically the same direction of the typhoon was confirmed in the afternoon with the following note:

October 27, 3.30 p. m. The typhoon over the Pacific is situated at present about 400 miles to the east of northern Luzon, between 17° and 18° latitude N. moving W or W by N.

The typhoon in the Philippines.—On the 28th there was no doubt that the typhoon was dangerous for the northern part of Luzon, and proper warnings were sent during the day to our observers and to the governors of those provinces which were more likely to be near the center of the storm. Several warnings were distributed in Manila during the 28th and in the morning of the 29th, signaling the different positions of the typhoon and the provinces of Luzon most threatened by same:

October 28, 11.45 a. m. The typhoon was situated at 6 o'clock this morning about 250 miles east of northern Luzon, between 17° and 19° latitude N. moving W.

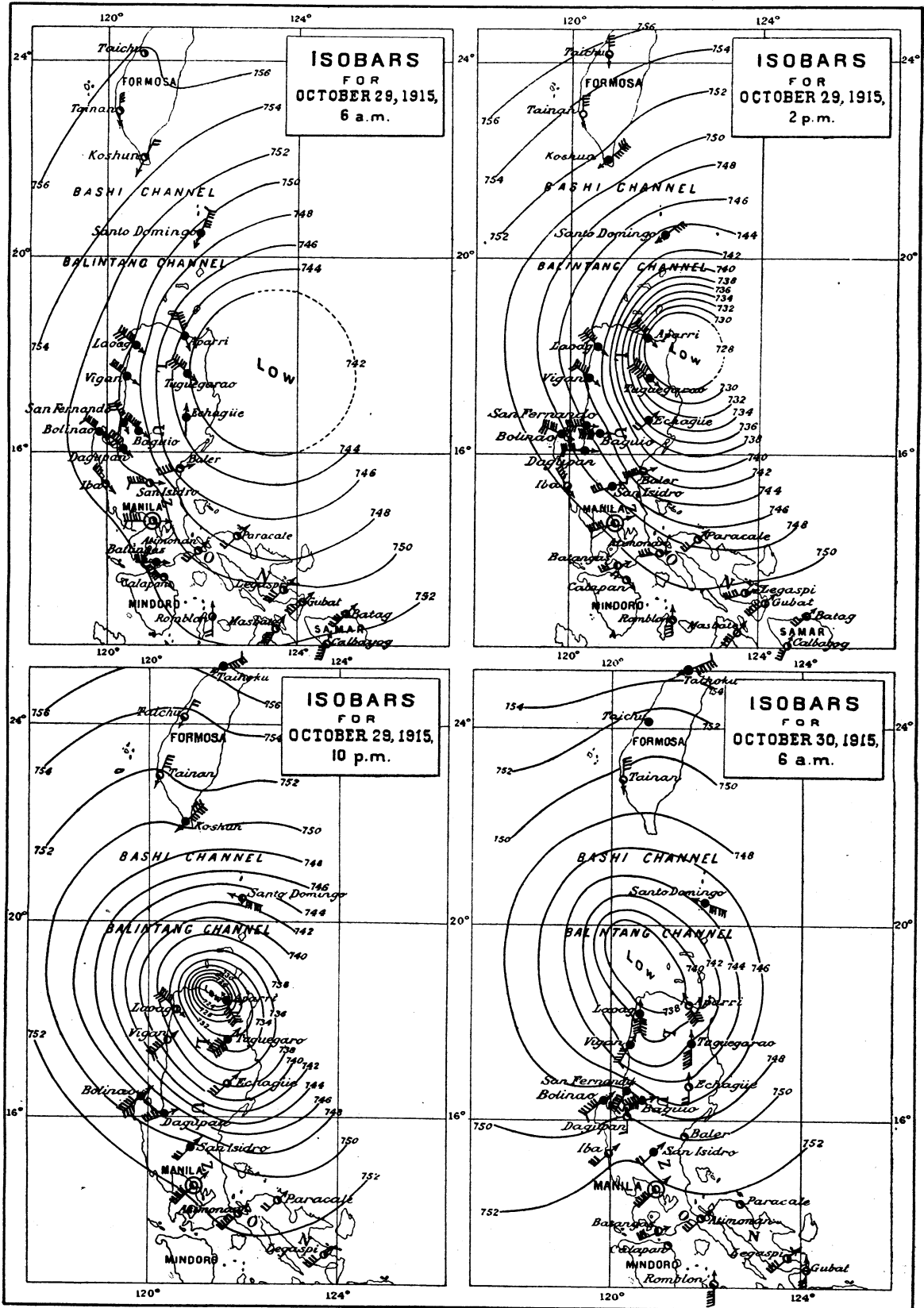
October 28, 7 p. m. The typhoon is situated this afternoon about 200 miles to the east of northern Luzon moving W or WNW.

October 29, 1.15 a. m. The typhoon will probably cross northern Luzon this morning through the Provinces of Cagayan and Ilocos Norte.

October 29, 8 a. m. The typhoon was situated at 6 a. m. to-day near the eastern coast of northern Luzon moving W or WNW. It seems to be a very severe typhoon and will be probably felt with great intensity in the Provinces of Cagayan, Isabela, Mountain, and Ilocos.

ISOBARS FOR THE TYPHOON OF OCTOBER 29 AND 30, 1915.

Plate XV



N.B. The barometric readings have been reduced to standard gravity

The typhoon entered Luzon and crossed the northern part of Cagayan Province in the afternoon and evening of the 29th, the vortical cam having been observed in Aparri with a barometric minimum as low as 716.32 mm. registered at 7.33 p. m.

In the following table we give the observations taken during this typhoon in the three stations of Luzon, which happened to be nearer to the center—Tuguegarao, Aparri, and Laoag.

METEOROLOGICAL OBSERVATIONS FOR OCTOBER 28 TO 31, 1915.

Date and hour.	Tuguegarao.					Aparri.					Laoag.				
	Pres- sure.	Wind.		Weather.	Rain- fall.	Pres- sure.	Wind.		Weather.	Rain every 4 hours	Pres- sure.	Wind.		Weather.	Rain- fall.
		Direc- tion.	Force				Direc- tion.	Force				Direc- tion.	Force		
October 28:	<i>mm.</i>		<i>0-12.</i>		<i>mm.</i>	<i>mm.</i>		<i>0-12.</i>		<i>mm.</i>	<i>mm.</i>		<i>0-12.</i>		<i>mm.</i>
2 a. m.	755.61	NW	3	o, r	^a 14.5	755.71	N	5	o, q, r	^a 7.6	756.08	N	4	o	^b 7.4
6 a. m.	55.20	NW	3	o, d	4.6	55.26	N	5	o, r	1.0	56.49	N	5	o	
10 a. m.	55.39	NW	3	o, d	3.6	56.02	N	5	o, r	0.3	54.62	N	6	o	
2 p. m.	53.33	N	4	o, d		53.82	N	6	o, r	0.3	54.77	N	6	o	
6 p. m.	52.03	NW	5	o, r	2.5	52.91	NNW	6	o, r	1.5				o, q, r, u	1.8
10 p. m.	51.08	NW	5	o, r, q	16.5	51.73	NNW	7	o, q, r	3.0					
October 29:															
1 a. m.	48.28	NNW	7	o, r, q	36.1	48.97	NNW	7	o, r						
2 a. m.	47.08	NW	8	o, r, q	10.9	48.07	NNW	8	o, q, r	2.0					
3 a. m.	45.75	NW	8	o, r, q	18.3	46.92	NW	7	o, r						
4 a. m.	45.22	NW	8	o, r, q	16.3	46.48	NW	7	o, r						
5 a. m.	45	NW	10	o, r, q	14.2	45.73	NW	7	o, q, r						
6 a. m.	44.02	NW	10	o, r, q	19.8	44.83	NNW	8	o, q, r	18.8	51.40	NW	9	o, q, r	53.3
7 a. m.	42.75	NW	10	o, d		44.16	NW	7	o, q, r						
8 a. m.	41.73	NW	10	o, r, q	8.1	43.11	NW	7	o, q, r		50.95	NW	9	o, q, r	9.7
9 a. m.	41.10	NW	12	o, r, q	19.1	41.99	NNW	8	o, q, r						
10 a. m.	39.54	NW	12	o, r, q	12.7	39.72	NNW	8	o, q, r	20.3	50.02	NW	9	o, q, r	9.1
11 a. m.	36.78	NW	12	o, r, q	5.8	37.65	NNW	9	o, q						
Noon	33.93	NW	12	o, r, q	9.1	35.43	NW	9	o, q		47.33	NW	10	o, q, r	10.2
1 p. m.	31.88	WNW	12	o, r, q	15.5	32.75	NW	10	o, q, r						
2 p. m.	30.29	NW	12	o, r, q	14.7	29.23	NW	10	o, q, r	16.3	44.69	NW	10	o, q, r	9.7
3 p. m.	29.25	NW	12	o, r, q	25.2	27.80	NW	11	o, q, r						
4 p. m.	29.30	W	10	o, r, q	13.7	26.21	NW	10	o, q, r		43.01	NW	10	o, q, r	10.9
5 p. m.	29.41	W	6	o, r	8.4	24.37	N	10	o, q, r						
6 p. m.	29.96	WSW	4	o, r	7.1	21.45	N	10	o, q, r	2.5	42.01	NW	10	o, q, r	12.7
7 p. m.	30.85	SW	5	o, d		17.88	N	10	o, q, r						
7.33 p. m.						16.32	N	1	o, r						
7.48 p. m.						16.67	NW	0	o, r						
8 p. m.	31.85	SW	8	o, r, q	10.2	16.77	NW	1	o, r		39.30	NW	10	o, q, r	13.2
9 p. m.	32.60	SSW	12	o, r, q	7.9	18.5									
10 p. m.	34.01	SW	12	o, r, q	5.3	24.59	SSE	10	o, q, r	8.1	37.20	NW	10	o, q, r	12.4
11 p. m.						28.93	SE	10	o, q, r						
Midnight						30.78	SE	10	o, q		36.07	NW	11	o, q, r	14.0
October 30:															
1.30 a. m.						33.1					35.12	WNW	11	o, q, r	29.2
2 a. m.	36.92	SSW	10	o, r, q	24.9	33.95	SSE	8	o, q	2.5	36.08	W	11	o, q, r	13.5
6 a. m.	43.70	S	6	o, r, q	13.7	40.17	SSE	9	o, q		40.85	S	12	o, q, r	94.5
10 a. m.	48.69	S	4	o		46.49	SSE	8	o, r	1.0					
2 p. m.	49.42	S	6	o		47.93	SSE	6	o		48.88	S	11	o, q, r	
6 p. m.	51.63	S	4	o		50.78	SSE	5	o						
10 p. m.	53.91	Calm		b		53.10	SSE	4	o						
October 31:															
6 a. m.	55.06	Calm		c		55.29	SSE	1	o		55.24	S	1	o	
2 p. m.	55.93	S	1	c		55.54	ESE	3	o, p	3.8	55.03	SW	1	o	

^a Rain since 10 p. m. of 27th.

^b Rain since 6 p. m. of 27th.

According to these observations the vortex reached Aparri at about 7.30 p. m. The observer states in his report on this typhoon that the force of the wind began to abate immediately after 7 p. m., it being absolute calm at 7.33 p. m. It took over an hour for the vortex to pass over Aparri, as the calm lasted until shortly after 8.38 p. m., when the winds blew again with hurricane force from the southern quadrants. The attention of our readers is called to the fact that there was relative calm observed at Tuguegarao for about three hours, with a barometer not lower than 729.30 mm., although no calm was observed at Aparri until the barometer had fallen below 718 mm. Again, the observer of Laoag mentions in his report that a relative calm lasting for only four minutes was also observed there immediately after the recording of the barometric minimum, which took place at 1.30 a. m. of the 30th, and was not lower than 735.08 mm. And as the barometer at Appari was lower than in Tuguegarao and in Laoag when the isobars 729 and 735, respectively, were passing over the latter two places,

I do not think it would be an easy task to explain in a satisfactory way the facts just mentioned, nor is it our intention for the present to undertake it. Suffice it to have called the attention to these facts, which may some day, together with other similar ones, help to the better understanding of the constitution of typhoons or of the deformations that may take place in or near their vortical region.

We offer to our readers in Plate XV the isobars for 6 a. m., 2 p. m. and 10 p. m. of the 29th and for 6 a. m. of the 30th. Besides in Plate VIII we reproduce the barographic record of Appari. This record as compared with that of Virac reproduced in Plate X will help to show the difference between the present typhoon of the 29th and that of the 23d. The curve of Aparri is not so acute as that of Virac, the falling and rising of the barometer having been by no means as rapid in one as in the other; hence, the barometric gradient was much less pronounced in the Aparri typhoon, and consequently the destructive effects of the hurricane were of less importance. In other words, the typhoon of Appari was rather an ordinary one, while that of Ambos Camarines was of extraordinary violence.

We do not think it necessary to enter into many details here on the destructive effects of this typhoon. It will suffice to say that hurricane winds were generally observed throughout the Provinces of Cagayan, Isabela, Ilocos Norte, Ilocos Sur, Mountain and La Union. The observer of Aparri says in his report that there were floods in the town caused by the rising of the water both in the river and the sea, and that many nipa houses on the seashore were wiped out by the waves. Thanks, however, to the warnings given to the people since October 27, all these houses had been abandoned in time by their inhabitants. The height of the water in the main streets was about half a meter in the higher places, and 1 meter in the lower. Similar floods are mentioned by other observers like those of Laoag, Vigan, and Tuguegarao.

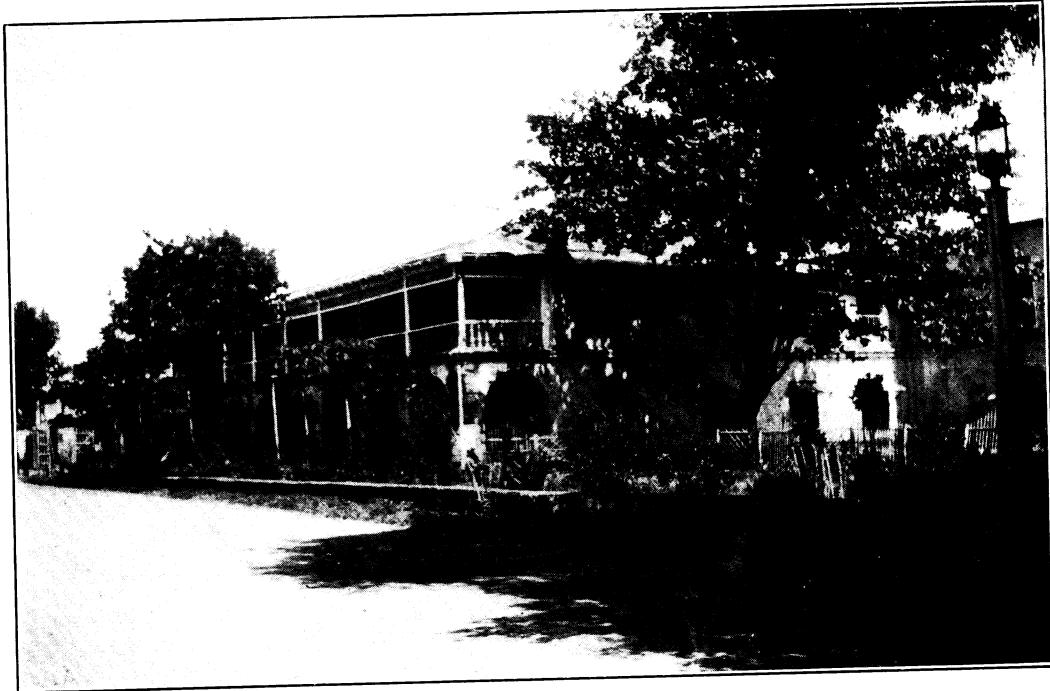
In Plate XVI a photo is reproduced showing the effects of this typhoon in the provincial building of Laoag: it was kindly presented to our observer for publication in this Bulletin by Major Theodore I. Owen of the Philippine Constabulary.

The typhoon filling up in the China Sea.—It would seem almost impossible that a typhoon so well developed when it crossed Luzon would fill up so soon within less than two days after it left the Island. Yet there is hardly any doubt that it was so in the present case; the typhoon inclined northwestward for a while, after it passed over Aparri; but, on reaching the Balintang Channel near 20° latitude N and 120° longitude E, it probably recurved southwestward beginning to fill up rapidly during the night of the 30th to the 31st.

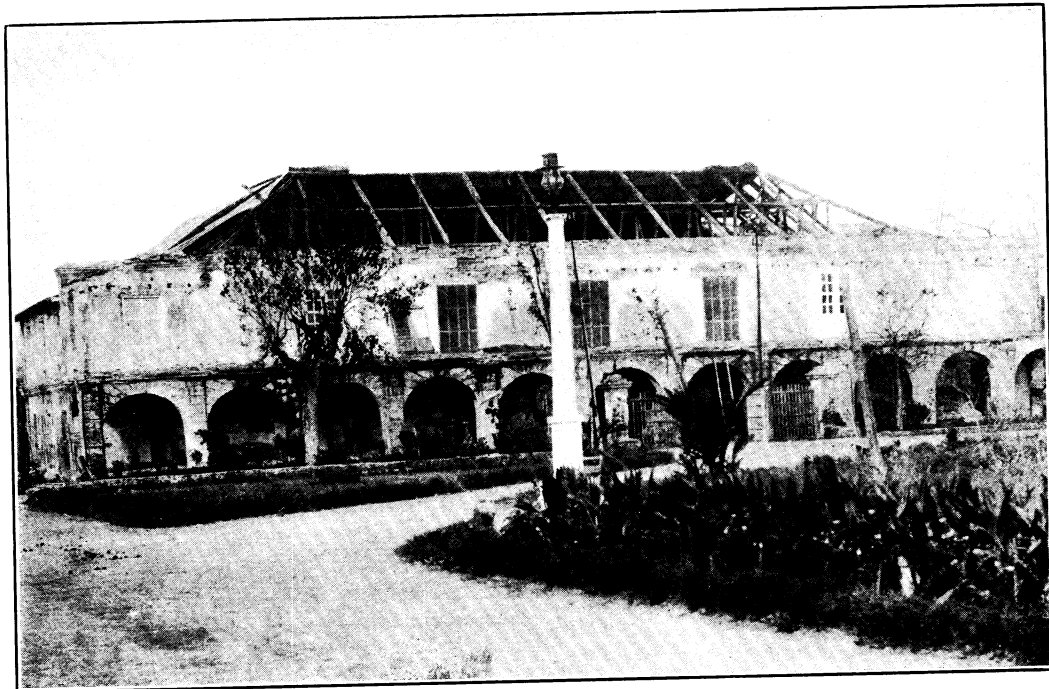
The Observatory announced the disappearance of the typhoon by means of the following warning:

October 31, 11.55 a. m. The typhoon is probably filling up near or over the Balintang Channel.

It may be remarked that a very heavy anticyclone was developing over northern China on the 30th and 31st, and it may possibly be attributed to its action the pushing down of the typhoon southwestward and even its sudden filling up in the China Sea.



Provincial building of Laoag, Ilocos Norte, before the typhoon.



Provincial building of Laoag, Ilocos Norte, after the typhoon.
EFFECTS OF THE TYPHOON OF OCTOBER 29 AND 30, 1915.

NOTAS GENERALES DEL TIEMPO.

Presión y temperatura.—Este mes ha sido en su última parte, como se verá luego, tempestuoso para Filipinas; por lo cual la presión atmosférica media de todas nuestras estaciones es considerablemente menor que la del año pasado y que la normal de Octubre. La media mensual de Manila difiere de la normal en -2.26 mm., y de la media de Octubre, 1914, en -4.73 mm. Las presiones más altas se observaron en casi todas las estaciones el día 11, y las más bajas el 23 y 24 en el S de Luzón, en las Visayas y Mindanao, y el 29 en el N de Luzón.

La temperatura media mensual es casi la misma, o ligeramente mayor, que la del año pasado. Las temperaturas máxima y mínima absolutas registradas en Manila fueron 33.9° C. el día 8, y 22.4° C. el 22. Los valores extremos de Baguio fueron: 25.6° C., 14.4° C. en la cumbre del Mirador, y 25.7° C., 13.5° C. en el valle.

Precipitación acuosa.—La cantidad de lluvia recogida durante el mes en los pluviómetros de nuestras estaciones es generalmente mayor que la del año pasado, y mayor también que la normal de Octubre. La lluvia mensual de Manila difiere de la normal en -36.1 mm., y de la de Octubre, 1914, en $+125.2$ mm. En Baguio la lluvia total del mes llegó a 882.8 mm., cantidad que es 819.6 mm. y 423.7 mm. mayor que la del año pasado y que la normal de Octubre, respectivamente. En un solo día, esto es el 29, cayeron 650.1 mm. de agua.

- DEPRESIONES Y TIFONES.

Siete tifones o depresiones hubo durante este mes en el Extremo Oriente, dos de los cuales cruzaron la Isla de Luzón en el corto intervalo de cinco días. Después de decir unas pocas palabras sobre las depresiones y tifones de menos importancia, estudiaremos más en detalle los dos tifones de Luzón.

TIFÓN DE SEPTIEMBRE 29 A OCTUBRE 9, 1915.

La falta de observaciones de Yap nos hace imposible dar con certeza el lugar de origen de este tifón: con todo, las observaciones de Guam parecen demostrar que se formó del 29 al 30 de Septiembre en las Carolinas Occidentales cerca de 10° latitud N y 144° longitud E. El día 2 hubo una bajada general de los barómetros en Filipinas, la cual fué más pronunciada en las Visayas orientales y SE de Luzón; una bajada regular continuó el día 3 en el N de Luzón; y luego se observó una tendencia a subir de nuevo el día 4. El tifón se había movido probablemente al $W\frac{1}{4}NW$ y con una velocidad bastante notable durante el día 1: pero se inclinó al NW el día 2, y recurvó al N y NE el día 3. Parece probable que continuó moviéndose al NE los días 4 y 5; después se inclinó al N y NNW el 6, y llegó a la parte meridional del Japón el 7, recurvando de nuevo al NE la tarde del mismo día. Véase la trayectoria de este tifón en la lámina VII.

DOS DEPRESIONES EN EL MAR DE CHINA: OCTUBRE 8 AL 18, 1915.

La primera de estas depresiones apareció a las 6 a. m. del día 8 al N y no lejos de la Isla Palawan, cerca de 120° longitud E y 12° latitud N. Se movió al W los días 8, 9 y parte del 10; se inclinó algo al N este último día, y penetró en Indochina en la madrugada del 11 entre 109° y 110° longitud E y cerca de 13° latitud N. Una vez en el Continente se inclinó aún más al N.

La otra depresión podía situarse el día 14 al W de Mindoro entre 12° y 13° latitud N y cerca de 117° longitud E; se movió al W el 14, al $NW\frac{1}{4}W$ el 15, y al NW o $NW\frac{1}{4}N$ el 16 y 17. Parecía haberse deshecho el 18 en los alrededores del Golfo de Tongking.

UNA DEPRESIÓN Y UN TIFÓN CERCA DE JAPÓN: OCTUBRE 11 AL 19, 1915.

El día 11 apareció una depresión de poca importancia al E de Formosa: se movió primero al N y NE, luego al E, y por último al NNE a lo largo de la costa oriental de Japón.

El día 15 se formó otra depresión cerca de la costa oriental de Formosa. Siguió casi la misma trayectoria que la anterior; pero aunque era de poca importancia al principio, llegó a ser después un verdadero tifón el día 17. Se movió al NNE los días 18 y 19 cerca de la costa oriental de Japón.

DOS TIFONES EN CINCO DÍAS SOBRE LUZÓN.

La Isla de Luzón fué duramente castigada hacia el fin del mes, habiendo desfogado en ella dos tifones en el corto intervalo de cinco días; uno al S y otro al N de Manila. Ambos tifones fueron intensos, pero el primero lo fué indudablemente mucho más que el segundo: fué uno de esos tifones típicos, que afortunadamente no ocurren con frecuencia, de no mucha extensión, pero de un carácter sumamente destructor. Procuraremos estudiar con mucho cuidado la trayectoria de estos tifones, dando al mismo tiempo todas las observaciones y detalles que pudieran ser de interés especial para nuestros lectores, particularmente para aquellos que más sufrieron los efectos de estos baguios.

EL TIFÓN DE AMBOS CAMARINES, OCTUBRE 21 A 28, 1915.

Origen de este tifón.—No teniendo este año observaciones de Yap, nos es imposible precisar si este tifón se formó lejos, o algo cerca, de Filipinas. En cuanto a las observaciones de Guam, ellas no dieron indicios de este tifón; por lo cual suponemos que éste se formó probablemente más cerca de Filipinas que de las Islas Marianas, o cuando menos hacia la mitad de camino entre Guam y Filipinas.

El tifón en Filipinas.—Como ordinariamente sucede con tifones de esta clase que no pueden ser previstos por medio de las observaciones de Guam o Yap, los primeros avisos a las provincias más orientales del Archipiélago sólo se pudieron enviar un día antes de que el tifón desfogase sobre las Islas. Con todo, el Observatorio pudo distribuir urgentes avisos de tifón por todo Filipinas con tiempo suficiente para tomar todas las precauciones posibles contra el temporal.

Nuestros mapas del tiempo señalaron por primera vez la existencia de este tifón a las 6 a. m. del 22 de Octubre, hallándose entonces su centro al E del Estrecho de San Bernardino o de la parte más meridional de Luzón, en los alrededores de 129° longitud E y 13° latitud N. El siguiente aviso de tifón se hizo público en Manila a las 8.35 a. m. del 22:

Existe un tifón en el Pacífico al E de la parte norte de Sámár o del SE de Luzón; su actual dirección no se puede aún precisar.

El mismo aviso se telegrafió inmediatamente a todas nuestras estaciones del Archipiélago, y se ordenó se izasen señales de temporal en el SE de Luzón e Islas Visayas. Tan pronto se recibieron las observaciones de 2 p. m., se vió realmente que el tifón se movía muy inclinado al W, y por tanto era peligroso para la parte meridional de Luzón; y así se distribuyó en Manila el siguiente aviso a las 4 p. m. del 22:

El tifón se hallaba a las 2 de esta tarde a unas 200 millas al E del Estrecho de San Bernardino, moviéndose aparentemente al W o W $\frac{1}{4}$ NW. Si no cambia su actual dirección, puede ser peligroso para la parte S de Luzón.

A las 9.45 p. m. se confirmó este aviso con estas palabras:

El tifón parece estar acercándose actualmente a la parte S de Luzón. Tiempo tempestuoso probablemente mañana en la parte SE de Luzón; inseguro y lluvioso al presente con chubascos de turbonada en la parte SW y central de Luzón.

Durante la misma tarde y noche se fueron trasmitiendo avisos muy terminantes a nuestros observadores y a los gobernadores provinciales del Archipiélago, particularmente a los de aquellas provincias que parecía probable se hallasen en, o cerca de, la misma trayectoria del tifón. A las 9.51 p. m. se envió al observador de Legaspi este aviso alarmante:

Ícese la cuarta señal de temporal. El tifón se acerca al S de Luzón. Avise a las autoridades, especialmente al gobernador, para que tomen precauciones.

Parecidos avisos se enviaron a los observadores de Virac, Gubat, Naga o Nueva Cáceres, y a los gobernadores provinciales de Sorsogón, Lucena y Boac. Como el tifón no se movía muy rápidamente, el Observatorio esperó la mañana siguiente para avisar del inmediato peligro a las otras provincias del S de Luzón al S de Manila. Mencionaremos aquí solamente el siguiente telegrama enviado a las 9.37 a. m. del 23 a los gobernadores provinciales de Pásig, Lucena, Cavite y Balanga:

Izada cuarta señal de temporal. Tifón peligroso. Tómense precauciones. Prevenga municipios.

El mismo aviso se envió también al observador de Batangas, y, por su conducto, al gobernador de aquella provincia.

Digamos ahora algo sobre la trayectoria del tifón a través de la parte meridional de Luzón, y sobre los estragos causados por el huracán a lo largo de esta trayectoria. Para que nuestros lectores puedan fácilmente seguir de día en día la diferente situación del centro ciclónico, damos en la lámina IX las isobaras de 6 a. m. del 22, 23, 24 y 25 de Octubre. Eran las 6 a. m. del 23 cuando el tifón pasó cerca de la costa meridional de la Isla de Catanduanes, habiendo llegado la mínima barométrica de Virac a 715 mm. a las 6.10 a. m. próximamente. Aunque estaban interrumpidas todas las líneas telegráficas de Visayas y del SE de Luzón en la madrugada del 23, no habiéndose recibido de aquella región observación alguna desde 9 p. m. del 22, sin embargo el Observatorio de Manila publicó el siguiente anuncio referente a la situación y movimiento del ciclón:

El tifón se hallaba a las 6 de esta mañana cerca de Catanduanes, moviéndose aparentemente al W½NW hacia el S de Luzón.

A las 9 a. m. el vórtice pasó muy cerca por el N de Tabaco con una mínima barométrica de 710 mm. observada a bordo del vapor *Gabrielle Poizat* anclado en la bahía de dicho pueblo. En el texto inglés publicamos algunas de las observaciones tomadas allí durante el paso del baguio.

A eso de mediodía el vórtice se hallaba a su menor distancia y al S de Naga o Nueva Cáceres, habiéndose movido casi directamente al W desde la costa meridional de Catanduanes y con una velocidad de unas 10 millas por hora. En la lámina X damos las isobaras de 2 p. m. del 23 y las curvas barográficas obtenidas en nuestras estaciones de Virac y Nueva Cáceres. Ambas estaciones fueron completamente destruidas por el tifón, motivo por el cual no podemos contar con observaciones directas de dichos puntos. A bordo del vapor *Ban Yek*, que estaba anclado en el río Bicol, a 1 milla al SW de Nueva Cáceres, se hicieron por el Capitán F. Fábregas muy interesantes observaciones, las cuales pueden verse en una tabla en el texto inglés.

El Observatorio de Manila dió la tarde del 23 el siguiente aviso referente a esta parte de la trayectoria de este tifón:

El tifón se halla ahora en Ambos Camarines moviéndose al W½NW * * *. El centro del ciclón pasará con toda probabilidad al S de Manila esta noche o mañana por la mañana.

Las observaciones hechas en nuestras estaciones de Batangas y Calapán que damos en el texto inglés demuestran claramente que este tifón pasó por el S de Manila y cerca de la cabecera de la Provincia de Batangas hacia las 2 a. m. del 24.

Los efectos destructores de este tifón en todas las provincias meridionales de Luzón son tan conocidos de nuestros lectores que nos bastará hacer unas ligeras indicaciones sobre los mismos. Las regiones que se suponía habrían sufrido más con motivo de este baguio se indicaban en la siguiente nota publicada por el Observatorio de Manila a las 7.15 a. m. del 24:

El tifón ha pasado esta madrugada a menos de 60 millas al S de Manila, probablemente a través de la Provincia de Batangas. El baguio debe haberse sentido con mucha intensidad en las Provincias de Sorsogón, Albay, Ambos Camarines y Batangas, en la parte sur de las Provincias de Tayabas, Laguna y Cavite, en Catanduanes, Marinduque y N de Mindoro.

Las noticias que más tarde se recibieron en Manila confirmaron plenamente este anuncio del Observatorio. Puede seguramente decirse que la mayor parte de los pueblos en la costa sur de Catanduanes, en la parte norte de la Provincia de Albay, en la parte más meridional de Ambos Camarines y en la costa norte de Marinduque, quedaron casi en completa destrucción después del paso del baguio, habiendo sido destruídas por el huracán un 95 por ciento o más de las casas de aquellas regiones, según los informes oficiales que tenemos a la vista. Algunos de los pueblos a menos de 5 ó 7 millas de distancia del centro ciclónico, como Buhi, Iriga, Baa, Bula, Nabua, dícese que han sido casi materialmente barridos por la espantosa fuerza de los vientos huracanados. La violencia del ciclón se sintió también con mucha intensidad en la parte sur de la Provincia de Batangas y parte norte de Mindoro, aunque al parecer el tifón había decrecido considerablemente en intensidad cuando penetró en la Provincia de Batangas.

El área de destrucción completa o casi completa de este tifón mientras pasaba a través de las Provincias de Albay y Ambos Camarines tendría un radio de 15 a 20 millas próximamente, incluyendo el vórtice, cuyo diámetro era próximamente de 5 a 7 millas. El hecho de que las dos estaciones meteorológicas del SE de Luzón, que se hallaron más cerca del centro del baguio, fueron completamente destruídas, como queda dicho, nos imposibilita entrar en más detalles sobre la velocidad del viento, cantidad de lluvia, etc., en la parte sur de la Isla de Catanduanes y de la Provincia de Ambos Camarines cuando el ciclón se dejaba sentir allí con toda su furia. Con todo, no creemos sea exagerado suponer que los vientos soplaron dentro de la región casi completamente destruída con una velocidad de más de 110 millas o 180 kilómetros por hora durante las horas en que desfogaba el temporal con más violencia.

En pueblos como Iriga (véase la lámina X) situados en la trayectoria del tifón, se observó calma absoluta y cielo despejado por media hora o algo más antes que los vientos saltasen del NW al SE. Y como el tifón se movía a razón de unas 10 millas por hora, por eso hemos dicho que el diámetro del vórtice era de 5 a 7 millas.

En las láminas XI, XII, XIII y XIV reproducimos varias fotografías que dan alguna idea de los efectos del tifón en Virac, Tabaco, Malilipot, Polangui y Naga o Nueva Cáceres. Agradecemos estas fotografías a la amabilidad de nuestros observadores de Virac y Nueva Cáceres, al Coronel C. Smith de la Constabularia Filipina y al Sr. Guy Walford, agente de Smith, Bell & Co. en Tabaco.

El tifón en el Mar de China y en Indochina.—El tifón siguió una trayectoria muy singular en el Mar de China después de abandonar las Islas Filipinas el día 24. Según su posición tal como aparece en las isobaras del 25 de Octubre, 6 a. m. (lámina IX), es evidente que el baguio se había movido al NW desde 6 a. m. del día anterior: luego se inclinó de nuevo al W en la tarde del 25, se movió al WSW por la tarde y noche del mismo día, y parte del 26; y finalmente dirigiéndose otra vez al W, penetró en Indochina por el S y cerca de Tourane el 27.

Nuestros lectores pueden ver en la parte inferior de la lámina IX las isobaras del 27 de Octubre, 4 p. m., cuando el vórtice estaba acercándose a la costa de Indochina, juntamente con la curva barográfica obtenida en Tourane. De estos datos resulta claro

que el tifón era muy intenso cuando penetró en Indochina, probablemente tanto, por lo menos, como cuando desfogó en la Isla de Luzón el día 23. Esto quedará plenamente confirmado con la siguiente relación recibida de M. Cadet, director del Observatorio de Phulien:

El centro del tifón pasó ciertamente el 27 de Octubre, a las 6^h 45^m p. m., por las cercanías del S de Tourane; de modo que la mínima barométrica (en la región vortical) debió ser inferior a la presión más baja (721.3 mm., observada, pero no registrada) en el cabo Tien-Tcha, a la entrada de Tourane. La ola del huracán fué a romper sobre la costa, produciendo una extraordinaria subida del mar, y por ende las inundaciones bruscas y desastrosas referidas por los periódicos de Tonkin, desde el S de Taifoo a Tourane, y sobre el litoral desde Thua-Thien hasta Hué. Esta ola, en mar libre, provenía de un entumecimiento del agua, probablemente de más de 0.50 m., en la zona central, cuya extensión (tal vez de más de 10 millas) no ha sido determinada.

El tifón desfogó con extraordinaria violencia en la región montañosa del centro de Annam cerca de Tourane. Los hilos y cables telegráficos quedaron rotos, los árboles fueron torcidos, tronchados y arrancados; los tejados, puertas y ventanas, de la mayor parte de las casas, arrancados; las casas de los naturales en gran número derribadas y barridas, y sus habitantes ahogados; los botes destruídos, las lanchas y un vapor anclado arrojados sobre la playa o al interior de la tierra inundada. La crecida de los ríos y avenidas generalizó las inundaciones, destruyó en gran parte las cosechas y hundió en varios puntos carreteras y vías férreas: las lluvias abundantes se extendieron desde Quang-Ngai a Donghoi y aun hasta Vinh.

Antes de terminar estas notas sobre este tifón, deseamos llamar la atención de los más interesados en el estudio de la meteorología sobre la curva barográfica de Tientha (Tourane). A nuestro parecer, puede considerarse como una curva típica de un tifón que tiene el eje de rotación notablemente inclinado hacia atrás; de aquí la mayor rapidez de la subida del barómetro si se compara con su descenso en la primera parte del ciclón. Este registro barográfico nos recuerda otro muy semejante del crucero Francés *Descartes*, Agosto, 1901, reproducido por el Rev. P. Louis Froc en su precioso folleto "The 'De Witte' Typhoon," página 6. En el registro barográfico de Virac, por el contrario, se echa de ver una rapidez mayor en la bajada que en la subida, indicio de que el tifón, cuando estaba en el Pacífico, tendría una marcada inclinación del eje en el sentido de la trayectoria. Es de sentir, sin embargo, que la segunda parte de la curva de Virac no pueda darse sino como probable: el original de esta curva quedó tan borroso, efecto de la lluvia que penetró en el aparato, que es muy difícil distinguir unos pocos trazos que han quedado en la segunda parte del registro del tifón.

EL TIFÓN DE APARRI, OCTUBRE 23 A 31, 1915.

Origen de este tifón y su trayectoria a través del Pacífico.—Mientras el tifón anterior estaba desfogando en Filipinas el 23, apareció otro formándose al S de Guam, entre 144° y 145° longitud E y cerca de 10° latitud N. Por tanto, los primeros avisos referentes a este tifón se pudieron dar ya el 24, más de cinco días antes de que llegase al N de Luzón. Estos avisos estaban concebidos en los siguientes términos:

Octubre 24, 11.55 a. m. Hay un nuevo tifón lejano que se está formando al S de Guam.

Octubre 24, 6 p. m. El nuevo tifón lejano aparece esta tarde al SW de Guam, moviéndose al WNW.

Las observaciones de Guam, en que se fundaban estos avisos de tifón, pueden verse en una tabla que publicamos en el texto inglés.

El tifón continuó moviéndose al WNW con una velocidad de unas 12.5 millas por hora hasta el 27, en que se inclinó más al W y disminuyó su movimiento de traslación a unas 8.5 millas por hora. Esta inclinación de la trayectoria al W se indicó en el siguiente aviso de tifón publicado por el Observatorio de Manila:

Octubre 27, 12.10 p. m. El tifón del Pacífico parece haberse inclinado al W desde ayer, hallándose probablemente su centro a las 6 de esta mañana a unas 500 millas al E del norte de Luzón, moviéndose aparentemente al WNW.

Prácticamente la misma dirección del tifón se confirmó por la tarde del mismo día con la siguiente nota:

Octubre 27, 3.30 p. m. El tifón del Pacífico se halla al presente a unas 400 millas al E del norte de Luzón, entre 17° y 18° latitud N, moviéndose al W o W $\frac{1}{4}$ NW.

El tifón en Filipinas.—El 28 ya no había duda de que el tifón era peligroso para la parte septentrional de Luzón, y así se enviaron durante dicho día los oportunos avisos a nuestros observadores y a los gobernadores de aquellas provincias que parecía probable se hallarían cerca del centro del ciclón. Varios avisos de tifón se distribuyeron en Manila durante el 28 y la mañana del 29, señalando las diferentes posiciones del tifón y las provincias de Luzón más amenazadas por el mismo:

Octubre 28, 11.45 a. m. El tifón se hallaba a las 6 de esta mañana a unas 250 millas al E del norte de Luzón entre 17° y 19° latitud N, moviéndose al W.

Octubre 28, 7 p. m. El tifón se halla esta tarde a unas 200 millas al E del norte de Luzón, moviéndose al W o WNW.

Octubre 29, 1.15 a. m. El tifón cruzará probablemente el N de Luzón esta mañana a través de las Provincias de Cagayán e Ilocos Norte.

Octubre 29, 8 a. m. El tifón se hallaba a las 6 de esta mañana cerca de la costa oriental del N de Luzón, moviéndose al W o WNW. Parece ser un tifón muy intenso y se sentirá probablemente con mucha intensidad en las Provincias de Cagayán, Isabela, Montañosa e Ilocos.

El tifón penetró en Luzón la tarde del 29 y atravesó la parte norte de la Provincia de Cagayán, observándose la calma vortical en Aparri con una mínima barométrica de 716.32 mm. registrada a las 7.33 p. m.

En el texto inglés insertamos las observaciones hechas durante este tifón en las tres estaciones que estuvieron más próximas al centro ciclónico: Tuguegarao, Aparri y Laoag.

Según estas observaciones, el vórtice penetró en Aparri a las 7.30 p. m. próximamente. El observador, en su informe sobre este tifón, dice que la fuerza del viento comenzó a amainar inmediatamente después de las 7 p. m., llegando a ser calma absoluta a las 7.33 p. m. Más de una hora empleó el vórtice en pasar sobre Aparri, pues la calma duró hasta poco después de 8.38 p. m., en que los vientos soplaron de nuevo con fuerza huracanada de los cuadrantes del S. Llamamos la atención de nuestros lectores al hecho de que en Tuguegarao se observó calma relativa durante tres horas próximamente con una altura barométrica de 729.30 mm., siendo así que en Aparri no se observó calma hasta que el barómetro había bajado a menos de 718 mm. Asimismo el observador de Laoag refiere en su informe haberse observado también allí calma relativa, que duró sólo cuatro minutos, inmediatamente después de haberse registrado la mínima barométrica, que tuvo lugar a la 1.30 a. m. del 30 y que no fué menor de 735.08 mm. Y como el barómetro en Aparri estaba más bajo que en Tuguegarao y en Laoag cuando las isobaras 729 y 735 respectivamente pasaban por estas dos últimas estaciones, no creo sería tarea fácil explicar de un modo satisfactorio los hechos que acabamos de mencionar, ni es nuestro ánimo intentarlo al presente. Baste haber llamado la atención sobre estos hechos, que podrán tal vez algún día, juntamente con otros semejantes, dar alguna luz para mejor conocer la constitución de los tifones o las deformaciones que pueden tener lugar en, o cerca de, su región vortical.

En la lámina XV ofrecemos a nuestros lectores las isobaras de 6 a. m., 2 p. m. y 10 p. m. del 29 y 6 a. m. del 30. Además, reproducimos en la lámina VIII la curva barográfica de Aparri. Esta curva, comparada con la de Virac reproducida en la lámina X, ayudará a hacer ver la diferencia entre este tifón del 29 y el del 23. La curva de Aparri no es tan aguda como la de Virac, siendo la bajada y subida del barómetro mucho menos rápida en la primera que en la segunda estación; por tanto, el graduante barométrico fué mucho menos pronunciado en el tifón de Aparri, y consiguientemente los

efectos destructores del huracán fueron de menos importancia. En otras palabras, el tifón de Aparri fué más bien un tifón ordinario, al paso que el de Ambos Camarines fué de extraordinaria violencia.

No creemos necesario entrar aquí en muchos detalles sobre los efectos destructores de este tifón. Bastará decir que los vientos huracanados fueron generalmente observados en las Provincias de Cagayán, Isabela, Ilocos Norte, Ilocos Sur, Montañosa y La Unión. El observador de Aparri dice en su informe que hubo inundaciones en dicho pueblo causadas por la subida del agua tanto del río como del mar, y que muchas casas de nipa situadas en la playa fueron arrastradas por las olas. Gracias, sin embargo, a los avisos de tifón dados al pueblo desde el 27 de Octubre, todas estas casas habían sido abandonadas con tiempo por sus habitantes. La altura del agua en las calles principales fué de medio metro próximamente en los lugares más altos y de 1 metro en los más bajos. Parecidas inundaciones refieren otros observadores, como los de Laoag, Vigan y Tuguegarao.

En la lámina XVI se reproduce una fotografía donde pueden verse los efectos de este tifón en el edificio provincial de Laoag. Fué facilitada esta fotografía a nuestro observador para su publicación en este Boletín por el Comandante Theodore I. Owen de la Constabularia Filipina.

El tifón deshaciéndose en el Mar de China.—Parecería casi imposible que un tifón tan bien desarrollado cuando pasó por Luzón se deshiciese tan pronto, en menos de dos días después de haber abandonado la Isla. Sin embargo, no hay apenas lugar a duda de que así sucedió en el caso presente; el tifón se inclinó al NW por algún tiempo, inmediatamente después de haber pasado por Aparri; pero en llegando al Canal de Balintang, cerca de 20° latitud N y 120° longitud E, recurvó al parecer al SW empezando sin duda a deshacerse rápidamente durante la noche del 30 al 31.

El Observatorio de Manila anunció la desaparición del tifón por medio del siguiente aviso:

Octubre 31, 11.55 a. m. El tifón está probablemente deshaciéndose en el, o cerca del, Canal de Balintang.

Debe notarse que un gran anticiclón estaba desarrollándose en el N de China el 30 y 31, y puede con probabilidad atribuirse a la acción del mismo la recurva o desvío del tifón al SW y aun su rápida desaparición en el Mar de China.

METEOROLOGICAL DATA FOR MANILA CENTRAL OBSERVATORY.*

[φ=14° 34' 41'' N; λ=120° 58' 33'' E; barometer above sea, 14.2 meters; gravity correction not applied, -1.72 mm.]

Day.	Pressure (mean).	Air temperature. ^b			Underground temperature.				Relative humidity (mean).	Vapor pressure (mean).	Radiation.		Evaporation. ^b			
		Mean.	Maximum.	Minimum.	0.25 meter.		1.50 meters.				Minimum on grass.	Maximum in sun. Black bulb in vacuo.	Free exposure (total).	Shelter (total).		
					8 a.m.	2 p.m.	8 a.m.	2 p.m.							8 a.m.	8 a.m.
	mm.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	Per cent.	mm.	°C.	°C.	mm.	mm.	
1	759.69	27.1	32.8	23.5	29.6	30.8	30.4	30.5	29.9	29.2	84.6	22.4	22.2	53.8	2.5	2.1
2	58	27.4	32.8	24.3	29.8	31	30.5	30.6	29.9	29	84	22.6	22.8	56	2.6	2.2
3	56.38	26.5	31.1	24.6	29.9	30.5	30.6	30.6	29.8	29	91.9	23.6	23.5	52.1	1.1	1
4	55.97	26.8	32.1	24.2	29.7	30.5	30.5	30.4	29.8	29	89.5	23.4	22.9	51.5	1.6	1.4
5	55.98	26.6	31.7	23	29.5	30.3	30.3	30.5	29.8	29	87.2	22.4	21.3	53.8	2	1.5
6	55.31	27.6	33	23.2	29.5	30.6	30.2	30.5	29.9	29	82.2	22.3	21.8	54.2	3	2.6
7	54.98	27.1	32.9	22.9	29.8	30.8	30.3	30.5	29.9	29	83.6	22	21.5	56.7	3	2.5
8	55.21	27.7	33.9	23.5	29.8	31.3	30.5	30.8	30	29	79.9	21.8	22	55.2	3.6	2.7
9	56.13	26.3	32.7	24.4	30.2	31	30.7	30.8	29.8	28.9	86.8	21.9	23.2	51.5	1.5	1.7
10	57.69	27.2	33.4	23.5	30	31.2	30.6	30.8	29.8	29	82.6	21.9	22.3	56.6	3.4	2.8
11	60.13	27.4	33.1	23.9	30.2	31.3	30.7	30.9	30	29.1	84.8	22.7	22.9	54.7	2.5	2
12	59.76	26.1	30.9	23.4	30	30.7	30.8	30.8	29.9	29.1	90.4	22.6	22.3	54	1.5	1.2
13	57.88	26	30.5	23.2	29.8	30.3	30.6	30.5	30	29.1	90.6	22.5	21.7	49.7	1	.9
14	57.19	24.9	26.8	24	29.5	29.5	30.3	30.3	29.9	29	94.5	22.1	23.1	35.5	0	.5
15	57.71	26.5	32.5	23.5	29	30.2	30	30.1	29.9	29	86.8	22.2	22.8	54	2.4	1.7
16	58.37	27	33	23.7	29.5	30.6	30	30.2	30	29.1	85.2	22.3	22.3	58.7	2.2	1.7
17	58.43	26.9	31.4	23.8	29.6	30.5	30.3	30.3	29.9	29	86.4	22.7	22.1	47	2.2	1.9
18	58.15	27.4	33	23.3	29.7	30.6	30.2	30.5	30	29.1	83.6	22.4	21.6	53	3	2.3
19	58.27	26.9	32.4	23.5	30	30.8	30.4	30.5	30	29.2	86.9	22.7	22.2	54	2.2	1.7
20	58.66	27.4	33.2	23.4	29.8	31.7	30.5	30.5	30	29.1	83	22.2	21.7	56.6	3.3	2.5
21	58.07	26.8	31.5	24.2	30.1	30.6	30.5	30.5	30	29	86.5	22.6	22.3	47.6	1.3	1.2
22	57.10	26.6	32.4	22	29.4	30.3	30.3	30.4	30	29.1	81.2	20.6	20.3	52	2.8	2.6
23	52.44	24.8	26	23.8	29.3	29	30.2	30	29.8	29	92	21.4	23	27	0	1.4
24	47.66	25.8	28	23.7	28	28.2	29.6	29.4	29.8	28.9	87.5	21.7	23	37.9	.5	2.1
25	52.26	24.1	26.2	22.6	27.6	27.8	28.9	28.9	29.7	28.8	92.7	20.6	20.8	36.8	.1	.7
26	55.67	26.5	33.2	23	27.5	29	28.8	28.8	29	29	81.7	20.6	21.3	56.9	2.9	2.1
27	56.83	26.4	30.2	23	28.3	29.2	28.9	29.2	29.8	29.1	86.8	22.1	21.5	48	2.4	1.9
28	54.41	27.4	31.2	24.4	28.7	29.5	28.2	29.4	29.7	29	83.4	22.5	22.8	53	4.2	3.2
29	52.18	27.4	28.7	25.7	29	29	29.3	29.4	29.7	28.9	76.3	20.7	23.5	38	6.5	4.5
30	54.80	27.3	30.7	25	28.4	29	29.2	29.2	29.7	28.9	79.1	21.3	23.6	53.3	3.4	2.3
31	57.22	25.5	30.9	24.2	28.5	29	29	29.3	29.6	29	90.5	21.8	22.6	52	.9	.9
Mean Total	756.40	26.6	31.4	23.7	29.3	30.2	30.1	30.2	29.9	29	85.9	22.1	22.3	50.4	2.2	1.9
Departure from normal	-2.26	-0.1	+0.3	+0.6							+2.3	+0.5				
Day.	Wind.				Clouds.				Rain, 24 hours beginning 6 a. m.		Miscellaneous.					
	Prevailing direction.	Total movement.	Maximum hourly velocity.	Direction at the time of the maximum velocity.	Amount (mean).	Form and direction.		Sun-shine.	On the tower.	In the park.						
						Upper.	Lower.									
	Km.	Km.			0-10.			h. m.	mm.	mm.						
1	N quad.	99	13	WSW	6.2	Ci.	E	Cu.	E	7 10	0.2	0.2	☁ d p.			
2	SW quad.	123	13	WSW	7.9	Ci.	SE	Cu.	NNE	4 20	27.5	27.6	☁ a p. ☁ p.			
3	Variable	65	13.5	W by N	9	A.-Cu.	E	Cu.-N.	ENE	2 20	5.6	5.5	☁ a p. ☁ p.			
4	Variable	74.5	13.5	NW	9.2	Ci.-S.	N	Cu.	E	3 00	.3	.5	d p.			
5	SE, NE	82.5	12	WNW	7.5	Ci.	NNE	Cu.	E	3 40	.2	.5	d a. ☁ p.			
6	NNE, SE	146	12	WSW	5.6	Ci.	E	Cu.	E	9 40	.8	.8	☁ p.			
7	NE quad.	92.5	13.5	W	5.8	Ci.		Cu.	E	8 30			☁ p.			
8	E	176.5	16	ESE	6.7	Ci.	WbyN	Cu.	E	7 30	.8	.8	☁ p.			
9	ENE	150	13	ENE, E	9.4	Ci.-S.		Cu.-N.	E	2 20	5.2	5	d ² a. ☁ p.			
10	ESE	191	19	SE	8.3	Ci.-S.	SW	Cu.	SE	5 10			☁ p.			
11	NNE, ESE	135	13.5	SE	7.7	Ci.-S.	NE	Cu.	E	7 20	24.1	25.4	☁ a p. ☁ p.			
12	N quad.	105	13	WNW	7.9	Ci.	E	Cu.	E	3 45	.6	.3	☁ d ☁ p.			
13	ESE, SSE	87	11	WSW	7.4	Ci.-S.		Cu.	E	3 10	5.7	5.7	☁ p.			
14	N, NNE	101	12	NNW	10	Ci.-S.		Cu.-N.	NNE	0 00	8.3	9.3	☁ a. ☁ a p.			
15	ESE	99	13	ESE	9.1	Ci.-S.		Cu.	E	5 05			d a. ☁ p.			
16	NE, ESE	101	11	WSW	8.2	A.-Cu.	Variable	Cu.	SSE, SE	4 10	8.9	8.9	☁ p.			
17	W quad.	101	14.5	WNW	8.6	Ci.-S.	NbyE	Cu.	SE	1 15			☁ p.			
18	W quad.	101	12	wsw, wnw	5.8	Ci.	NNE, N	Cu.	E	10 30			☁ p.			
19	E quad.	139.5	13	WNW	5.2	Ci.		Cu.	ENE, E	7 00	3.8	4.6	☁ p p.			
20	WSW	105	13.5	WSW	4.6	Ci.		Cu.	E	9 30						
21	NE quad.	85	11.5	W	8.2	A.-Cu.	E	Cu.	E	3 40			d ^o a. p.			
22	NNE, NNW	146.5	15	NNW	9.6	Ci.-S.	EbyS	Cu.	NNE	0 45	9.9	9.9	☁ a. ☁ p.			
23	NNW	552	46	NNW	10	Ci.-S.		N.	NNE	0 00	24.3	25.7	☁ a. p. ☁ p.			
24	ESE	595	39	NNW	10	Ci.-S.		Fr.-N.	ss quad.	0 00	25.7	25.2	☁ a. p.			
25	ESE	330	22.5	SE	10			Cu.-N.	S	0 00	10.8	11.4	☁ a. p.			
26	SE	175.5	18.5	SW	4.8	Ci.		Cu.	SSW	7 30						
27	W quad.	214	27.5	SW	9.4	Ci.	EbyS	Cu.	ESE, NW	0 55			☁ a. ☁ p.			
28	WNW, NW	180	25	W by N	9.4	Ci.-S.	NE	Cu.	W	1 35			☁ p.			
29	WSW	1,048	58	SW by W	10	Ci.-S.		S.-Cu.	wnw	0 00			d ^o a. p.			
30	SW	623	48	SW	9.9	Ci.-S.		Cu.	SW	0 10			☁ a. p.			
31	ESE	182	21.5	SSW	9.1	Ci.-S.		Cu.-N.	ssw	0 40	2.7	2.6	d ^o a. p.			
Mean Total		206.6	19.3		8.1					3 54						
Departure from normal		6,405.5								120 40	165.4	170.2				
		+1,079.6			+1.4					-49 20	-36.1					

* All the mean values given in this table are deduced from hourly observations.

^b These values are taken from instruments mounted in the Observatory Park, 1.5 meters above ground.

METEOROLOGICAL DATA FOR MIRADOR OBSERVATORY, BAGUIO.^a

[φ=16° 25' N; λ=120° 36' E; barometer above sea, 1,512.5 meters; gravity correction not applied, -1.65 mm.]

Day.	Pres- sure ^b (mean).	Air temperature at Mirador (on the top of the mountain).				Air temperature in the valley (near the city hall).				Relative humid- ity (mean).	Vapor pres- sure (mean).	Radiation.		Evaporation.		
		Mean.	Maxi- mum.	Hour.	Mini- mum.	Hour.	Maxi- mum.	Hour.	Mini- mum.			Hour.	Mini- mum on grass.	Maxi- mum in sun. Black bulb in va- cuo. ^c	Free ex- posure (total)	Shel- ter (total)
	mm.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	Per ct.	mm.	°C.	°C.	mm.	mm.	
1	637.96	19.2	24.2	2.20p.	15.3	5.50a.	24.2	11.00a.	14.8	6.00a.	91.3	15.2	13.2	47.5	1.2	0.8
2	36.67	19.5	25.2	2.30p.	16.3	6.00a.	25.4	2.30p.	15.1	3.10a.	88.2	14.8	14.7	48.7	1.8	1.2
3	34.98	19	24	9.20a.	16.5	5.10a.	24.7	9.50a.	15.6	6.00a.	90.7	14.9	14.5	45.3	.9	.9
4	34.69	19.3	24.5	1.50p.	16.7	5.10a.	24.7	0.10p.	16.1	6.40a.	90	14.9	15.6	43.3	1.4	.8
5	34.69	19	24.2	1.40p.	15.7	5.55a.	24.6	1.25p.	15.3	6.00a.	93.5	15.3	14.2	49.5	1.1	.7
6	34.10	19	25.1	1.35p.	16.2	5.50a.	24.2	2.00p.	16.3	6.15a.	94.2	15.3	14.7	47.5	1.1	.6
7	33.87	18.6	23.6	1.35p.	16.2	5.50a.	23.3	10.00a.	16.6	6.20a.	94.8	15.1	14.6	46.9	.7	.8
8	34	18.8	24.4	1.00p.	16	6.00a.	24.5	1.15p.	15.6	6.00a.	87.5	14	14.5	46.7	4.7	2.7
9	34.42	19.4	25.6	1.20p.	15.9	4.20a.	25.1	2.50p.	14.8	6.40a.	70.5	11.7	14.2	48.2	10	4.8
10	35.76	19.4	25.3	11.35a.	17	12 m.n.	25.1	11.30a.	16.5	6.00a.	79.3	13.2	15.3	45.2	5	2.8
11	38.12	18.7	25.5	0.10p.	16.4	6.00a.	25.4	0.40p.	16	6.30a.	88.3	14.2	14.7	51	2.2	1.4
12	37.80	18.2	24.6	9.15a.	15.9	10.00p.	24.4	10.10a.	15.2	6.25a.	91.8	14.3	14.2	45.6	1.4	.9
13	36.03	18.1	23.8	10.20a.	15.7	5.40a.	24.1	11.30a.	14.6	12m.n.	92.8	14.4	13.2	45.7	2.2	1.2
14	35.14	18	22	0.45p.	16.4	4.40a.	23	1.25p.	14.5	1.00a.	84.8	13	14.5	38.6	2.4	2.2
15	35.63	18.5	22.8	0.50p.	16.5	3.35a.	24.1	2.40p.	15.5	3.50a.	83.2	13.1	15.2	44.2	5.1	2.7
16	36.48	19.7	25.4	2.15p.	16.2	4.00a.	25.1		15.4	6.00a.	85.3	14.4	15.2	50.8	2.4	1.4
17	36.80	18.6	24.8	1.30p.	16.1	6.00a.	24.1	1.40p.	15.4	6.20a.	93.8	14.9	14.2	54.4	1	.9
18	36.70	19.2	24.3	0.50p.	16.4	6.00a.	24.8	Noon	15.5	6.30a.	90	14.9	13.9	47.6	1.3	1
19	36.80	19.3	25.1	11.00a.	16.5	1.15a.	25.4	11.15a.	15.3	6.25a.	90.7	15.1	13.9	47.3	1.1	.9
20	37.21	19.2	24.4	0.25p.	16.1	5.55a.	25.7	0.35p.	15.4	6.40a.	89.5	14.9	13.8	48	2	1.3
21	36.61	18.8	24.8	0.15p.	15.7	4.30a.	25.2	0.30p.	14.6	6.30a.	83	13.4	12.9	49.2	3.3	2.4
22	35.81	18.6	24.2	0.40p.	15	3.30a.	25.4	11.10a.	13.5	6.15a.	81	13.1	11.7	46.6	3	1.8
23	33.38	18.7	22.1	8.45a.	16.4	2.30a.	22.2	2.00p.?	15	6.00a.	79.2	12.6	14.2	28.5	5.1	3.3
24	28.79	18.2	20.3	8.25a.	16.8	8.20p.	22.3	Noon	16.3	12m.n.	87.5	13.5	15.7	31.8	1.9	1.9
25	29.38	18.8	18.4	9.35a.	15.1	11.20p.	21	10.00a.	15	12m.n.	95.7	13.6	15.1?	28	1	.5
26	33.90	18.2	23.2	1.50p.	15.2	0.05a.	23.6	2.40p.	15	1.00a.	83.7	12.8	14.1	43.5	5	2.3
27	35.25	17.4	20.4		15.7	1.30a.	21.3	1.40p.	15.1	4.00a.	96.5	14.2	13.2	28.6	.1	.3
28	32.98	18.4	23.7	9.55a.	15.5	10.40p.	23.5	10.10a.	15.4	6.20a.	91.3	14.4	14	42.4	1.4	.7
29	26.45	17	18.3		15.9	0.05a.	19.2	7.00p.	15.7	0.05a.	98.8	14.2	15	(d)	.8	.5
30	30.06	15.8	17.8	0.10p.	14.4	12m.n.	18.2	0.30p.	14.5	12m.n.	95.3	12.8	14		1.8	1
31	34.62	16.4	18.2	0.20p.	14.5	0.05a.?	18.7	3.15p.	14.2	1.00a.	93.3	13	12.7		.7	.5
Mean	634.68	18.5	23.2		15.9		23.6		15.3		88.9	14	14.2	44.3	2.4	1.5
Total															73.1	45.2*

Day.	Wind.				Clouds.			Sun- shine.	Rain, 24 hours begin- ning 6 a. m.	Miscellaneous.
	Prevailing direction. ^e	Total move- ment.	Maxi- mum hour- ly veloc- ity.	Direction at the time of the maxi- mum velocity.	Amount (mean).	Form and direction.				
		Km.	Km.			Upper.	Lower.	h. m.	mm.	
1	W	195.3	16.1	W	6.3	A.-Cu.	Cu.	6 30	2.8	☁ ² a. ☁ ² ☁ ² ☁ ² ☁ ² p.
2	W	209.2	17.4	W	6.3	Ci.	S	8 05	2.1	☁ ² a. ☁ ² ☁ ² ☁ ² ☁ ² p.
3	SW quad.	218.8	19.8	W	7.1	Ci.	ESE	5 45	10.2	☁ ² d a. ☁ ² ☁ ² ☁ ² ☁ ² p.
4	W	183.3	14.8	W	7.4	Ci.	SEbyS	6 55	3.8	☁ ² ☁ ² p.
5	SW quad.	243.4	19.1	W	5.6	Ci.	NW	7 35	14.5	☁ ² a. ☁ ² ☁ ² ☁ ² ☁ ² p.
6	W	221	19.9	W	7.1	Ci.	Cu.-NNW, WbyS	6 35	23.7	☁ ² a. ☁ ² ☁ ² ☁ ² ☁ ² p.
7	E, W	185.9	17.7	E	6.9	Ci.	Cu.	4 45	2.3	☁ ² d a. ☁ ² ☁ ² ☁ ² ☁ ² p.
8	E	390.2	30	E	5.1	Ci.-S.	WSW	6 55	1.3	☁ ² a. ☁ ² ☁ ² ☁ ² ☁ ² p.
9	E	514.3	45.4	E	5.9	Ci.-S.	Cu.	8 05		☁ ² a. ☁ ² ☁ ² ☁ ² ☁ ² p.
10	E	542.1	42	E	5.4	Ci.	Cu.	6 30	.5	☁ ² a. ☁ ² ☁ ² ☁ ² ☁ ² p.
11	E, SE	305.6	29.3	SE	7.7	A.-Cu.	Cu.	4 50	1.3	☁ ² a. ☁ ² ☁ ² ☁ ² ☁ ² p.
12	E, W	244.8	19.3	W	5.7	Ci.-S.	Cu.	5 55	21.7	☁ ² d a. ☁ ² ☁ ² ☁ ² ☁ ² p.
13	W, E	237.8	21.7	E	6	Ci.	NW	5 20	3.6	☁ ² a. ☁ ² ☁ ² ☁ ² ☁ ² p.
14	E	653.8	47.3	E	8.7	Ci.-S.	Cu.-N.	3 40	2.8	☁ ² a. ☁ ² ☁ ² ☁ ² ☁ ² p.
15	E	683.8	47.5	E	7.3	Ci.	Cu.-N. SEbyE	5 20		☁ ² a. ☁ ² ☁ ² ☁ ² ☁ ² p.
16	E	269	21.1	E, SE	7.7	Ci.	Cu.	6 40		☁ ² d a. ☁ ² ☁ ² ☁ ² ☁ ² p.
17	W, NE	167.6	14.8	W	8.6	Ci. A.-Cu.	Cu.-N. NNW	5 15	.8	☁ ² a. ☁ ² ☁ ² ☁ ² ☁ ² p.
18	E quad.	210.1	17.1	SW, E	5.9	Ci.	Cu.-N. WNW	5 55	13.8	☁ ² a. ☁ ² ☁ ² ☁ ² ☁ ² p.
19	W	158.7	18.2	W	5.9	Ci.	Cu.-N. SW	6 20	7.4	☁ ² a. ☁ ² ☁ ² ☁ ² ☁ ² p.
20	E quad.	217.5	17.2	W	4	Ci. NEbyE, NNE	Cu.-N. SW	6 50		☁ ² p.
21	E	223.3	18	E	4.3	A.-Cu.	Cu. EbyS, NE	5 40	1.8	☁ ² a. ☁ ² a. p. ☁ ² ☁ ² p.
22	SW quad.	160.9	12.4	W	6.3	Ci.-S.	Cu.-N. E	6 35		☁ ² a. p. ☁ ² ☁ ² p.
23	E	342.4	27.7	E	9.4	Ci.-S.	Cu.-N. NE	0 25	.3	☁ ² a. p. ☁ ² ☁ ² p.
24	E	1,136.7	72.4	E	10		N.	0 10	5.9	☁ ² a. p. ☁ ² ☁ ² p.
25	E	1,066.5	62.2	E	9.9	A.-Cu.	N. SSE	0 06	8	☁ ² a. p. ☁ ² ☁ ² p.
26	SE	489.5	41	SE	2.9	Ci.	Cu.-N. S, SE	8 30		☁ ² a. p. ☁ ² ☁ ² p.
27	NW	297.5	19.1	NW	8.9	Ci., Ci.-S.	N. NNW	0 45	13.7	☁ ² d a. ☁ ² a. p. ☁ ² p.
28	N, NW	399.9	43.3	NW	9	Ci.-S, NNE, NEbyN	Cu.-N. N	5 55	73.7	☁ ² a. ☁ ² ☁ ² ☁ ² p.
29	W			W	10		N.	0 00	650.1	☁ ² a. p. ☁ ² ☁ ² p.
30	SW			SW	10	Ci.	Cu.-N. WSW	0 00?	11.2	☁ ² a. ☁ ² a. p. ☁ ² p.
31	SE	444.5	32.7	SE	9.7	A.-Cu., Ci.-S.	Cu.-N. SSE	0 00	5.5	☁ ² a. p. ☁ ² ☁ ² p.
Mean		366	28.4		7.1			4 54		
Total								151 45	882.8	

^a All the mean values given in this table are deduced from six daily observations taken at 2, 6, 10 a. m. and 2, 6, 10 p. m.
^b The barometric readings of this station are not reduced to sea level.
^c Maximum of hourly observations taken from 6 a. m. to 6 p. m.
^d The black bulb actinometer was broken during a typhoon on October 29.
^e This element is based on hourly observations taken from a quadruple register, which gives only eight possible directions of the wind.

Daily rainfall at the stations of the Weather Bureau, October, 1915.

Station.	Day of month.															
	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.
Glan	10.4	4.6	21.9		4.6	1.3	11.4	2.8								
Jolo		26.1	9.9	1	2.3	36.6	29.2	15.7		2	21.3	58.4	9.9	5.8		.8
Isabela, Basilan	.5	68.8	7.1	.5	11.4	28.4	8.6	3.3						10.4		
Zamboanga	.8	8.1	5.3	6.4	20.9	36.9	17	3.1						2		
Davao	2.5	2.5	5.1				3.8			38.1	20.1					50.8
Cagayan, Misamis	1.3	15	51.1	3	2	13.4	39.4		43.7	2	15.7		12	2.3	15.7	
Butuan	.8	55.3	11.4		.3	3.3	17.8	.3			1.5	4.1	10.9	14.5	8.4	.3
Dumaguete		21	7.9	5.5	2.8	6.1	5.6	1					9.2	1.5		
Tagbilaran	3.6	116.9			.3		2.8				.3	5.6		.5	16.3	
Iwahig	6.1	3.6	3.3	1.1	13.5	3.3	4.5	.4	10	1.5			30.6	.4	3.3	6.9
Surigao	1.8	28.4	13.5		5.1		1.3	3.8			3.8	27.8	15	10.4	7.9	
Maasin	27.2	49	33.3		58.1		9.7	10.4					31.7			
Cebu	.8	25.4	45.9			57.1	2.5	9.9			.8	3.8			24.9	
Iloilo		14.2	38.9	5.1		24.4	1.5	106	25.6			21.8	1.8	10.7		
San Jose Buenavista	.3	135.1	107.4	27.5	19.8	32.6	51.3	191.3	95.3		.3	47	2.5	2.6	2.5	.5
Cuyo	6.4	35.6	35.1	4.4	8.4	95.3	30.8	52.6	86.6				11.4	8.6		
Ormoc	3.1	9.6	66.5	8.1	5	49.8	21.1	6.6				3	14.5			21.3
Guiuan	22.1	22.9	32.8	1.5	.5	3.6	4.6	.5		3.3	.8	15.2	72.6	.5	3.6	
Tacloban	3.3	5.1	2	1.5	4.3	46.7		5.8	19.6	10.6	5.3	2.9	27.3	19.5	.9	7.6
Capiz	10.5	2.8	23.9	4.8	.3	18.3		9.6		3.8	10.9	6.1	49	2.5	1.8	
Borongan	5.1	5.8	2.3		11	20.8			.8	4.6	.5	27.5	18.5	.8		.5
Calbayog	2.5	18.9	2	2.1	1.5	.8	25.6	4	10.7	10.7		44.5	40.2	.5		1
Masbate		2	3.6	31.5	20.8		13.2	34.8			17.5		13.2	6.6	36.1	
Romblon	2.8	.5	6.6	2		6.9	31	9.6	.3	5.3	3.6	15.2	13.7	2		
Batag	3.8	36.6	10.4				8.1	31.5	1.8		1.5	52.1	18.5		3.8	
Gubat	7.4	17.5	1.8		2.8		6.4		2.5		1.3	9.6	17.8	6.1		
Legaspi	15.3	3.5	.8		.5			31.5	2.5			2.5	45.8	8.2		
Sumay, Guam	120.7	40.6	11.4	7.6	1.3	1.3	11.4	1.3	10.2	2.5	8.9	1.3	8.9	1.3	8.9	
Calapan		1.5	3.3	23.4		.5	9.9	3.8	15.5	1.3		.3	29.7	24.9	30.7	
Virac	5.6	22.1	34.6	10.2	15	1.3		26.7	2.5	15.2	.3	12.2	58.9	7.6		(*)
Nueva Caceres	2	45.4	1.6	33.6				7.9	21.3		1.5	17.8	14.3	4.8	22.4	
Batangas	2.3	12.2	67.8		1		12.2	9.4	12.9	.5	6.1	4.4	31.3	34.1	7.6	36.3
Atimonan	8.6	27.7	6.1	6.1				21.3	18.5	22.6	34	13.7	32.8	27.7	31.6	4.8
Ambulong, Tanauan		.8	25.1	1.8		.8			1.3		27.9	.5	3.8	7.4	3.1	13.2
Paracale	14.8	32.5	35.4	1	.5			21.4	13.5	17.8			91.6	9.1	.5	
Santa Cruz, Laguna		4.8	7.4	.8	7.1			4.3	4.3	2.5	2.3	15	16.7	10.2	.3	
Manila	2	27.5	5.6	.3	2	.8		.8	5.2		24.1	.6	5.7	8.3		8.9
Antipolo	23.4	14.2	6.1		1.3			3.3	8.4		21.6	9.6	19.8	16.3		
Iba		.8	2.3	5.8	.3		1				32	4.8	17.3	2	1.8	.5
San Isidro		6.1	3.1		.3	.8	4.6		2	.8	.3	10.4	9.4	46.5	.8	
Tarlac	12.2	15.2	14		3	7.1				4.8	3.8	5.8	4.6	28.2		
Baler			28.4	3.1		6.1	17.8	21.1	8.1	22.4	2.8	5.1	27.9	57.4	26.9	1.1
Dagupan				.8	58.2		14.5	.8			11.4		3	5.1		3.5
Bolinao			27.7	33	12.9	1.3	5.3		12.4	1.8	43.4	20.8	1.6	2.6		.3
Baguio	2.8	2.1	10.2	3.8	14.5	23.7	2.3	1.3		.5	1.3	21.7	3.6	2.8		
San Fernando, Union				10.4	22.4	7.4		1.5		50.8	.5	11.7	2.7	1	.8	14
Echague			1.3					1.8	.5		.5		15.5	1.3	2.3	
Candon				2.5				2.5		1.3	2.5	10.2	1.5			18.5
Vigan		1.3								2.8	.8			155		33.8
Tuguegarao			2.8										4.6	9.4		
Laog										50	1.3				57.9	50.3
Aparri	.5	12.6	.5									10.7	1.3			
Santo Domingo, Batanes	2	14.7	1	5.6	1.9		.3	1.5		19.3		21.3	73.3	1	7.6	11.7

Daily rainfall at the stations of the Weather Bureau, October, 1915—Continued.

Station.	Day of month.															Total.	
	17.	18.	19.	20.	21.	22.	23.	24.	25.	26.	27.	28.	29.	30.	31.		
Glan	7.9		9.7	14.7		7.6	7.4	27			14	3.3				mm.	238.1
Jolo	22.6		20.8	.8		17			8		5.8			4.1	2.3	mm.	213.2
Isabela, Basilan			8.9	28.2		48	5.3		2.8				1.5	3.3		mm.	259.6
Zamboanga			1.8	9.4		24.1	13.4	.5	4.1				16	.5		mm.	170.8
Davao	54.6	7.6		29.5	9.7								43.2		14	mm.	281.5
Cagayan, Misamis	.8				21.8	8		.8				16.3				mm.	257.1
Butuan		25.9	11.7	.3	75.1	5		10.2								mm.	253.2
Dumaguete		1	23.1	6.4	1	13	21.3	20.8	2.2			21.6	19.3			mm.	190.3
Tagbilaran	.8	40.3	3.6	3.3	13	5	2.3	2.3								mm.	212.4
Iwahig			.6	16.8	.2		7.1	30.2	5			7.3	11.3	20.6		mm.	187.7
Surigao	4.6	18.3	17.8	5.9	6.4	41.2		3.8								mm.	216.8
Maasin		4.8				27.1	27.2	14.7			16.8					mm.	310
Cebu				12.2	1.3	1.3	5.8	4.8		.5			1.3			mm.	199.1
Iloilo	5.6			2.8		13.7	1.8	11.7	1.3	4.8	2.5	2.3	10.4	24.5	.5	mm.	331.9
San Jose Buenavista		1	3	1.8	73.5	31.5	26.1	5.9	8	7.4	13	26.7	51.6	106.5	2.3	mm.	1,064.4
Cuyo				.8	17.3	2.3	21.6	46.3	5.1			20.4	46.4	14.7	1	mm.	551.1
Ormoc		6.1	4.6	1.3	1.3	24.1	4.6				7.1				.8	mm.	256.1
Guiuan	3.6	12.7	25.7	11.9	61.8	15.5	1.6				2.5					mm.	318.8
Tacloban	23.2	4.6	3	1.3	6.3	38.8	1.6		.7							mm.	239.2
Capiz	31.7			.8	25	12.5	26	1.5			1.5	.8				mm.	221.6
Borongan		7.4	16.2	9.4	.9	70.3	4.4	2.8								mm.	237.7
Calbayog	1.1			34.6	33	176.7	38.8			2.5	.3			14.2	4.3	mm.	471.5
Masbate			5			34.3	20	4.1	1	9.7	.5					mm.	249.4
Romblon	39.4	16.2	6.6	4.6		49.5	136.9	47.7	1.8	3				8	22.3	mm.	428.3
Batag		5.6	4		19.8	143.5	23.1									mm.	364.1
Gubat			24.1	10.9	4.6	111.3	33	4.8				1.3				mm.	263.2
Legaspi			8.6	10.7	8.7	120.5	94.3	8.9				.8	8			mm.	364.7
Sumay, Guam		3.8	7.6	1.3	26.7	11.4	34.3	66.1	20.3					12.7	5.1	mm.	416.7
Calapan		3.8			8.6	21.3	77.4	16.2	24.9	.5	.3	6.4		6.4	5.6	mm.	316.2
Virac	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	mm.	280.2
Nueva Caceres			2	22.3	85.1	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	mm.	570.7
Batangas	2	33.3	1.3	.5	30	167.9	38.9	24.9			1.5	21.4	2.3	1.8	6.8	mm.	556.2
Atimonan		3.3	16.8	8.1	70.6	114	8.6	65.6						22.9	.8	mm.	325.6
Ambulong, Tanauan	3.8				20.1	141.6	36	17.3							21.1	mm.	484.9
Paracale		5		19.8	22.9	97	66.7	20.6	.5					3.1	11.2	mm.	303.6
Santa Cruz, Laguna			3	5.3	3.1	27.4	143.6	3.4	8.9	4.6				1.3	30	mm.	165.4
Manila			3.8			9.9	24.3	25.7	10.8						2.7	mm.	213
Antipolo	6.9	.8	5.6			8.4	41.2	9.4	9.2	.8	1.3	1.3			4.1	mm.	189.5
Iba		15.7			3.8	5.1	23.2	49.3	5.9	10.9	4.6	3	2.1			mm.	164.5
San Isidro	18				1.3	4.1	23.2	10.7	10.7				5.1	.8	.5	mm.	155.2
Tarlac						34.5	9.4	4.5				8.1				mm.	430.4
Baler			7.6	.5	1	6.4	106.9	52.4	20.8		1.8	2.5			2.3	mm.	160.8
Dagupan	4.1				4.6	3.9	2.3		.5	3		4.8	42.2	.3	.5	mm.	253.4
Bolinao						3.4		4.3	1	1		60	20.6			mm.	882.8
Baguio	.8	13.8	7.4		1.8		3	5.9	8		13.7	73.7	650.1	11.2	5.5	mm.	420.5
San Fernando, Union							2.8	1.8				10.6	251.6	30.5		mm.	248.4
Echague	81.3			3	.3	2.8	49.5	28.8	10.1		6.6	9.1	35.9		.5	mm.	529.5
Candon			1.3		1.3							5.3	393.7	88.9		mm.	543.5
Vigan			47.2						.3			7.3	243.3	50.3	1.4	mm.	509.6
Tuguegarao					3.8	41.9	61.8				45.7	138.2	201.4			mm.	484.9
Laogo	1.3	1				1.3	17.2				10.4	55.1	239.1			mm.	170.1
Aparri		3.3	.5	.5		2.3	13.8	18.3	.5		15.2	25.9	49.7	1	13.5	mm.	478
Santo Domingo, Batanes	1.4		8.8	1.8	20.9	.8	1	25.7	56.3	4.2	13.9	12.8	167.2	.3	2.6	mm.	

* No observation.

MAXIMUM AND MINIMUM TEMPERATURES AT THE STATIONS OF THE WEATHER BUREAU, OCTOBER, 1915.

Day.	Jolo.		Isabela, Basilan.		Zamboanga.		Davao.		Cagayan, Misamis.		Butuan.		Dumaguete.		Tagbilaran.	
	Maxi-mum.	Mini-mum.	Maxi-mum.	Mini-mum.	Maxi-mum.	Mini-mum.	Maxi-mum.	Mini-mum.	Maxi-mum.	Mini-mum.	Maxi-mum.	Mini-mum.	Maxi-mum.	Mini-mum.	Maxi-mum.	Mini-mum.
	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.
1.....	30	21.7	30.8	22.6	30.5	23.6	32.7	22	31.5	23	31.6	22.7	33	24.2	32.5	24.2
2.....	31.7	22.3	31.6	23.6	30	24.5	32.7	22.2	31.4	23.2	29.5	23.9	32.7	24.7	30.5	23.6
3.....	27.5	22.4	33.1	23.1	27.7	22.9	31.2	23.2	31.2	22.7	30.1	23.6	31.4	22.8	28.1	23.5
4.....	32.2	22.2	31.4	23.5	30.4	23.2	33.9	21.9	30.7	22.4	31.7	22.4	29.5	22.9	29.8	24.7
5.....	31.9	22.8	32.1	23.3	29.6	24	33.2	21.5	32	22	33.2	23.2	30.9	24	31.5	24.4
6.....	27.1	22.3	32.6	23.1	27.2	22.4	32.2	23.1	31	23.5	33.7	24.3	30.2	23.4	30.7	25.3
7.....	28.9	22	31.2	22.6	27.4	21.7?	32.2	23.2	31.1	23	31.6	23.3	30.2	23.8	30.3	24.8
8.....	28.4	21.4	31.1	22.3	28.1	21.6?	32.1	22.5	28.3	22.5	29.8	23.2	30.3	23	27.3	23.6
9.....	30.8	21.3	31.8	22.3	29.4	22.5	30.7	22.9	30.4?	22.7	31.3	23.4	31.7	23.3	32.1	23.8
10.....	30.4	22.3	33.6	22.5	29.4	23.4	33.7	23.4	31.3	22.4	33.9	23	30.9	23.3	31.1	24.4
11.....	29.7	22.9	31.9	23.6	30.4	24.6	32.7	22.4	30.5	22.3	34.5	22.5	31.1	24.2	32.7	23.7
12.....	32.2	21.3	29.1	24.1	29.2	24.4	28.7	22	29.5	22.5	26.5	23.4	30.8	25.3	30.4	23.4
13.....	29.4	21.8	31.2	23.1	29.9	23.9	32.2	22.1	29.7	22.7	31.4	22.6	30.5	23	30	24.1
14.....	30.3	22	31.8	23.4	29.3	23.5	32.2	22	30.6	22	32.3	22.4	29.6	22.3	30.3	23
15.....	32.2	22	32.6	22.6	29.5	23	33.2	23.6	31	23.5	33.3	22.4	32.8	23.7	31.1	24.4
16.....	32.4	22.8	32.4	22.6	30.7	23.8	32.7	22	31.1	22.5	33.8	22.9	31.4	24	31.6	22.9
17.....	31.6	22.3	32	22.8	30.7	23.5	33.7	22.2	31.5	22.4	33.6	22.4	31.5	23.7	32.3	23
18.....	30.3	21.8	33.2	23.1	31.3	23.2	33.7	22.4	31.4	23	32	23.4	32.2	23.7	31.4	23.8
19.....	29.1	22.4	32.6	24.3	30.5	24.4	33.2	22.5	31.7	23	32.5	23.4	32.2	24.4	32.4	23.7
20.....	31	21.9	32.2	23.5	30.4	24.1	32.7	23.1	31.1	23.5	32.6	23.2	31.4	24	31.5	24.4
21.....	32.4	22.1	31.6	23.3	29.6	22.8	30.7	22.5	30.5	22.7	31.1	23	30.4	23.7	30.5	23.5
22.....	30.1	22.4	32	22.4	30.4	22.6	32.2	21.5	30.7	22.1	30.5	23	31.5	23.1	29.6	23.6
23.....	31.9	23	31.4	22.5	29.5	23.6	32.2	22.5	32.9	23.4	33.5	23.7	28.6	23	28.2	25.2
24.....	31.9	23.7	30.8	24.3	29	22.4	33.5	22.5	33.2	23.5	33.3	23.7	30.1	22.9	30.2	24
25.....	31.7	24.6	32.1	23.4	29.9	23.4?	32.2	22.9	34.2	23.5	33.6	24	31.9	23.7	31.4	24.4
26.....	32.5	23.8	33.1	22.6	30.9	22.9	33.6	22.2	32.4	23.4	33.7	23.5	32.8	22.8	32.5	25.2
27.....	31.5	21.9	32.1	22.5	30.8	23.2	33.6	21.9	32	22.9	34.2	22.9	31.5	22.9	32.5	25
28.....	30.9	22.4	32.6	22.5	29.7	22.6	32.2	23.5	31.2	23.5	33.3	23.2	33.3	24.7	31.4	25.7
29.....	31.3	22.4	31.8	22.4	30.6	24.8	32.7	23.4	30.8	22.7	33.4	24	28.2	24.6	27.6	24.6
30.....	32.9	22.8	32.3	22.3	31.4	22.3	32.7	23.4	32.8	23	33.5	23.9	31.4	23.6	32.2	24.9
31.....	31.2	22.4	31.8	22.1	30.2	23.6	33	23.9	32	24.2	34.1	24.2	33.4	23.2	31.4	24.6
Mean	30.8	22.4	31.9	23	29.8	23.3	32.5	22.6	31.3	22.9	32.4	23.2	31.2	23.6	30.8	24.2

Day.	Iwahig.		Surigao.		Maasin.		Cebu.		Iloilo.		San Jose Buenavista.		Cuyo.		Ormoc.	
	Maxi-mum.	Mini-mum.	Maxi-mum.	Mini-mum.	Maxi-mum.	Mini-mum.	Maxi-mum.	Mini-mum.	Maxi-mum.	Mini-mum.	Maxi-mum.	Mini-mum.	Maxi-mum.	Mini-mum.	Maxi-mum.	Mini-mum.
	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.
1.....	32.7	22.6	32.3	23.8	31	24.7	33	24.9	32.4	24.4	32.2	23	32.4	24	31.6	22.4
2.....	30.9	22.2	31.8	23.7	30.4	24.2	31	24.2	33	24	32.4	24	32.6	25.1	30.8	24.3
3.....	28.3	23.4	28.2	24.3	28.5	23.4	28.7	23.8	29.6	24.4	29.3	23.5	28.1	23.8	28.7	23.5
4.....	29.4	23.4	28.8?	24.4	30.1	23	30.1	23.5	29.5	24.1	28.8	23.3	30	24.1	30.1	23.5
5.....	31.7	22.9	32	25.5?	30.4	24.4	30.3	24.9	30.5	24.2	31.6	23.1	31.6	25	30.5	23.7
6.....	30	23.9	31.8	23.8	29.7	22.9?	29.5	23.9	30	24.4	30.7	23.6	28.7	24.6	30.1	23.5
7.....	30.9	24.9	31.2	25.8	28.5	25.8	29.5	25.3	30.3	24.1	30.8	23.6	30.9	24.7	30.2	24.4
8.....	32.8	23.4	28.7	24	29	25	28.9	23.9	26.8	23.6	26.2	23.5	26.1	24.5	29.2	24.4
9.....	31.1	23.1	31.5	23	30.4	23.8	30.7	25	26	22.8	25.7	23.1	25.9	23.3	30.8	23.8
10.....	30.8	24	33.2	23.8	31	24.6	33.5	24.9	31.6	23	31.2	22	29.5	23.6	32.3	22.6
11.....	31.9	22.5	34.4	23.3	31	24.4	33.3	25.9	32.5	23.8	32.3	23.5	32.7	24.6	33	23.2
12.....	32.2	22.4	26.8	23.1	28	25.9	31	24.8	31.2	24	31.7	23.5	32.7	24.4	29.8	22.9
13.....	29.8	22.8	28.8	22.6	28	23.8	30.1	24	28	24.2	29.4	22.6	28.3	26.6	30.5	22.9
14.....	28.4	22.5	33.8	21.8	30	22.7	29.9	23.7	29.4	23.3	29.7	22.5	30.6	23.4	31	22.1
15.....	32.4	21.8	33.4	23.2	30.5	24.6	30.8	22.3	30.8	24.4	30.8	23.2	31.4	23.7	31.4	23.3
16.....	31.5	22.3	32.5	23	30.4	24.5	32	22.7	31.5	24.5	33.1	23.4	31.8	25	32.5	23.3
17.....	32.1	22.6	33.1	23.1	31.5	24.1	33.2	24.5	32.4	23.8	31.7	22.5	32	24.1	32.7	22.4
18.....	32.8	22	31.5	23.5	30.6	23.6	32.1	25.2	31.9	24.2	32.7	23.4	32.2	25.6	32.8	22.6
19.....	32.8	22	31.9	23.8	31	24.2	33	25.5	32	24.6	33.3	23	32.6	25.4	32.4	22.5
20.....	32.7	22.8	31.5	23.9	30.8	23.8	32.5	24.1	31.2	25.4	34.2	23.6	32.6	27.4	32.6	23.4
21.....	32.9	23.3	31.5	23.7	31	24	32	24.8	32.1	25	32.4	23.5	31.9	24.3	31.1	22.6
22.....	33	21.6	28.7	23.4	28.2	24.2	29	24.5	29.1	24.6	30.7	23	29.8	24.6	26.3	23.5
23.....	29.9	23.7	33.5	24.7	30	24	29.3	24.3	29.3	25.6	28.7	23.1	28	26	29	26.1
24.....	28.6	24.9	33.5	23.8	31.1	26.1	29.6	25.4	30.6	25	29.9	24.5	28.8	26.1	30.5	26.3
25.....	31.4	24.6	33.5	24	32.4	24.2	30.6	24.9	30.8	25.4	31.1	25.1	31.3	26.9	30.7	25.9
26.....	33.8	23.3	33.1	26.3	33.5	24.6	30.7	25.5	31	24.6	33.6	27.7	32.7	25.1	31.3	24.4
27.....	33.6	21.6	32.9	26.5	34	24.5	30.8	25.5	31	24.9	32.8	24.1	33.7	24.4	31.9	23.4
28.....	32.5	22.3	32.3	26.8	31.1	25.8	31.5	26.5	29.4	24.7	29	24	28.7	27.1	30.5	24.2
29.....	28.8	23.8	32.3	26.2	32	26.2	29.9	25.4	29.1	24	29.3	24.4	28.7	25.4	30.4	27.9
30.....	27.9	23.5	35.1	24.5	34	26	30.4	26	31.7	23.9	29.3	23.5	30	24.2	31.2	26
31.....	32.5	22.5	34.4	24.3	35	24.9	30	24.9	30	23.7	31.2	23	31.7	24.6	31.8	24.8
Mean	31.3	23	31.9	24.1	30.8	24.4	30.9	24.7	30.5	24.3	30.8	23.5	30.6	24.9	30.9	23.9

Maximum and minimum temperatures at the stations of the Weather Bureau, October, 1915—Continued.

Day.	Guiuan.		Tacloban.		Capiz.		Borongan.		Calbayog.		Masbate.		Romblon.		Batag.	
	Maxi- mum.	Mini- mum.	Maxi- mum.	Mini- mum.	Maxi- mum.	Mini- mum.	Maxi- mum.	Mini- mum.	Maxi- mum.	Mini- mum.	Maxi- mum.	Mini- mum.	Maxi- mum.	Mini- mum.	Maxi- mum.	Mini- mum.
	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.
1	33.5	25.2	32	25	32.8	24.5	23.6	23.6	32.5	23.4	34.2	26.8	33.7	24.2	30	24.8
2	32.3	24.8	33	24.8	32.3	24.4	23.5	23.5	31.4	24.2	34.4	26.6	34.6	23.5	31.9	24.5
3	30	25	31.1	24.6	30.8	24.5	23.4	23.4	29.8	23.8	30.2	26	32.2	25.8	30.8	24
4	31.8	25.5	30.5	24	30.4	24.3	23.4	23.4	30.9	23.7	31.4	25.5	32.8	23.8	29.8	23.5
5	31.6	25.7	32.6	24.7	32.2	23.5	23.4	23.4	33.1	24.4	29	25.2	33.7	23.5	30.9	23.2
6	31.5	25.4	32.6	23.7	32.8	23.5	22.6	22.6	32.6	23.6	31.2	24.8	31.6	23.4	32	23.8
7	31.4	25.8	31.5	23.5	31.4	23.7	22.3	22.3	30.8	24	31.6	23	33.2	22.9	31	23
8	29.8	26.8	29.5	23.8	30.7	23.9	22.9	22.9	30.7	24.3	30.8	23	31	23.8	30.7	23.5
9	31.8	23	32.5	23.3	30	23.3	23.4	23.4	32	23.4	31.2	21.8	33.9	23.4	31.8	22.5
10	33.1	24.3	32	23.5	32.6	23.2	23	23	31.5	23.1	32.2	24.8	33.4	23	30	23.5
11	32.7	24.4	32.7	23.7	32.9	23.5	23.7	23.7	32.3	23.6	32.5	20.4 ^a	34	23.2	31	23
12	29	24.3	27.9	23.8	32	23.5	23.7	23.7	31.3	23.8	31.2	22.5	33.7	24.2	30.2	23.7
13	27.6	23.6	29.3	23.5	27.7	23.8	23	23	31.1	23.2	28.2	21.2 ^a	32	23.3	29.5	22.6
14	33.2	21.9	30.5	22.9	31.7	23.2	21.9	21.9	30.9	22.3	29.6	21.4 ^a	33.5	23	29.6	22.5
15	33.5	25.4	31.4	23.9	32	23.3	23.2	23.2	31.1	23.6	30.8	22.6	34.5	23.2	29.5	22.8
16	33.3	24.3	34.5	24.3	32	23.8	23.1	23.1	34.4	23.6	33.6	24.8	35.3	23.1	31.9	23.5
17	33.2	23.7	33.3	23.5	32.4	23.2	22.8	22.8	33.4	22.8	32.8	25.6	34.1	23.2	31.5	24
18	32.3	24.5	31.5	24.5	32.7	24.2	23.1	23.1	34.8	23.1	34.2	24.6	34.4	23.3	31	25
19	32.4	25.1	31.6	24.5	32.4	24.5	23.7	23.7	35.4	23.5	32.6	26.6	34.2	24.3	30.5	23.6
20	33.5	25	32.4	25	32.7	25.7	24.5	24.5	33.8	24.2	34.4	27	34.2	24.6	31.5	25.4
21	32.5	24	30.7	24	32.3	25.2	23.8	23.8	30.8	22.9	33.5	24.6	34.7	24.9	31	23.5
22	29.3	23.7	26.2	23	30.8	24.7	22.7	22.7	25.2	23.3	32.8	25	31.7	24.5	26	23.5
23	31.1	23.5	30.8	23.4	26.8	23.6	23	23	27.6	24	32.2	23.2	32	23.2	26.9	23
24	33.2	27.4	31.7	24.8	32.4	23.8	23.3	23.3	32.4	25.2	31.4	26.5	32.4	23.4	31.9	23.5
25	32	26.9	33	24	33.4	24.6	23.2	23.2	31.7	25	30.5	24	33.6	20.7	32	24.6
26	31.4	27.5	33.5	23	32.8	24.3	22	22	33.5	24	33.5	26.4	33.6	24.3	31	23.5
27	31.6	27.5	31.3	25.4	32.9	23.6	23.6	23.6	31.3	25.2	31.4	26.8	34	23.3	30	25
28	31	27	31	25	30.5	24.2	24.9	24.9	28.9	26.7	31.8	24.4	32	24.6	29	25.5
29	31.6	27.7	31.5	25.8	33.2	24.2	24.4	24.4	30.2	25.9	31.4	21.8 ^a	35	25.3	30	25.5
30	34.2	27.1	32.5	24.5	32.5	24.9	23.3	23.3	32.6	26.4	32.8	25.5	32.1	25.5	31.9	24.4
31	33.4	26.6	33	24	33.9	23.6	23.3	23.3	31.2	24.3			33.4	23.4	31.5	24.6
Mean	31.9	25.2	31.5	24.1	31.8	24	23.3	23.3	31.6	24	31.9	24.4	33.3	23.7	30.5	23.8

Day.	Gubat.		Legaspi.		Sumay, Guam.		Calapan.		Virac.		Nueva Caceres.		Batangas.		Atimonan.	
	Maxi- mum.	Mini- mum.	Maxi- mum.	Mini- mum.	Maxi- mum.	Mini- mum.	Maxi- mum.	Mini- mum.	Maxi- mum.	Mini- mum.	Maxi- mum.	Mini- mum.	Maxi- mum.	Mini- mum.	Maxi- mum.	Mini- mum.
	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.
1	32	24.3	33.6	23.2	29.2	24.8	34.2	24.1	33	23	32.6	21.3	32.8	23.4	29.9	23.9
2	32.5	24.8	33.6	24.2	26.4	22.8	34.2	24.5	31.1	23.3	31.6	23.1	33.1	23.6	29.2	24.1
3	32	24.1	33.3	23.5	29.4	23.8	33	24.5	30	22.4	31.8	22	31.6	23.8	29	24.6
4	31.3	24.9	31.2	24.1	30	23.6	32.5	23.8	29.7	22.1	32.2	21.6	33.5	22.4	29.8	24.2
5	32.4	24.5	33.3	23.8	30.4	24	33.2	23.2	31.8	21.7	32.8	21.6	31.3	23.2	30.3	23.6
6	32.9	23.7	34.6	23.4	30.6	23.8	33	22.8	32.5	21	33	21.1	33.8	23	31.3	23.3
7	32.3	23.5	33.9	23.5	30.6	23.87	32.5	22.9	32.3	21.5	34.2	20.8	32.8	22.3	30.8	22.1
8	31.5	24.8	33.4	24.2	30.2	23.9	32.1	24	32.9	23.1	32.3	21.9	32.5	24.2	31.5	24.3
9	30.6	24.4	31.6	24.1	30	24	30.9	24.1	30.4	21.6	32	21	30.5	23.7	31	23.3
10	32	22.8	32.8	23	29.8	23.4	32	23.6	32.6	21.8	33.1	21.4	31.9	23.5	31	22.5
11	32.9	24.9	34.2	25.2	29.6	23.87	32	23.1	33.1	23	33.8	21.3	32.3	23.8	31.1	23.4
12	31	24.5	32.4	24.2	30.6	23.47	33	26.9	31.3	23.7	32.2	20.7 ^a	32	23.4	30.2	23.4
13	28	24.6	28.4	24.1	30	24.6	32	23.3	30.1	23.2	28.7	21	29.3	22.4	28.9	24.4
14	32	23.3	32.1	23.4	30.2	23.4	29.5	23	30.5	24.1	30.5	21.5	28.4	22.7	29.4	24.1
15	31	23.5	33	23.4	30	23.4	32.1	22.5	32.3	24	32	22	31.2	23.2	29.4	23.5
16	32	24	34.4	24.1	29.6	23.8	32	23.2			32.9	22.3	31.6	23.4	30	23.5
17	33	23.6	35.1	23	30.4	24.4	33.5	22.2			33.4	21	32	23.2	32	24
18	33.2	24	34.7	23.7	31.2	24	34.4	23.5			33.5	21.6	33.1	23.1	31.4	25
19	33.2	23.9	32.4	25.8	30	24.4	33.7	24.2			34	20.5	32.6	22.6	32.9	26.8
20	32.5	25	31.7	25.4	30.2	25.2	33.1	23.5			32.4	21.7	34	22	32	25.7
21	31.6	24.2	31.2	24.7	30	25.4	33.1	25.1			32.4	21.6	32.5	24.4	30.4	24.3
22	27	24.8	28.2	24	29.8	23.4	31.6	23.7			23.7	22.8	30.5	23.4	29	24.4
23	26.3	24.1			29	23.4	(a)	23.7	(a)	(a)	(a)	(a)	25.8	23	27.2	24.4
24	31.5	24.4			26.8	23.8		(a)					27.8	24	28.5	24.1
25	32.7	25.8			26.8	23.8							25.8	22.8	26	23
26	33.8	23.8	32.5	23.4	31	24.4							32.8	22.5	29.9	22
27	31.8	25.8	30.8	25	30.6	24							31.4	22.4	30.5	22.7
28	28.5	26.3	29.1	26.2	30.2	23.8							31.5	24.4	32.5	24.5
29	32.2	27.1	30.7	26	30.4	23.6							28.8	24.8	28.6	25.9
30	32	26.5	32	24.9	30.2	23.4							30	26.2	31.2	24.9
31	32	24.9	32.2	24.1	30	25							30.7	24	30.9	24
Mean	31.5	24.5	32.4	24.2	29.8	23.9	32.6	23.7			32.3	21.5	31.2	23.4	30.2	24

^a The thermometer shelters of these stations were destroyed by the typhoon of the 23d.

Maximum and minimum temperatures at the stations of the Weather Bureau, October, 1915—Continued.

Day.	Ambulong, Tanauan.		Paracale.		Santa Cruz, Laguna.		Manila.		Antipolo.		Iba.		San Isidro.		Tarlac.	
	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.
	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.
1	32.5	24	30.4	23.8	31.9	23.2	32.8	23.5	32.2	22.3	32.5	22.6	32.9	24.5	34.5	23.4
2	33.9	24.5	31.6	24.7	32.3	23.8	32.8	24.3	31.7	22.5	32.8	23.5	32.9	23.8	34.6	23.6
3	32.8	23.9	31.4	24.3	32.1	23.7	31.1	24.6	30.1	23.3	32.1	23	31.9	23.9	33.4	23.8
4	33	23.2	31.8	23.9	32.1	23.7	32.1	24.2	30	22.6	31.6	22.4	29.4	24	34.5	23.2
5	31.8	22.7	31.8	24.2	32.1	22.7	31.7	23	30	22.3	32.1	22.5	32	24.4	35	23.7
6	32.6	23	32.2	23.2	31.6	22.7	33	23.2	31.5	22	32.2	24	33.1	23.9	34.7	24
7	34.1	22.4	31.2	22.5	32.4	22	32.9	22.9	32.4	21.3	32.6	22.4	31.7	23.3	33.5	24.3
8	32	24.9	32	24.2	33.3	24.5	33.9	23.5	32.8	22.8	32.9	21.2	32.8	22.9	34.4	24.4
9	29.2	23.8	30.8	24.1	32.2	23.8	32.7	24.4	31	23	34.7	24	32.6	24.5	33.9	23.7
10	32.2	23.2	31.6	23.5	31	22.9	33.4	23.5	31.8	22.5	34.5	25.3	32.1	23	32.5	23.2
11	32.7	23.8	31.3	24	30.7	22.9	33.1	23.9	32.3	23	32.2	23.9	33.6	23.9	33.3	22.5
12	31.2	23.6	31.5	24.3	30.9	23.4	30.9	23.4	30	21.6	31.8	22.2	32.9	23.4	34.5	23.4
13	31.2	23.3	27.2	24.8	31.5	22.8	30.5	23.2	29.7	21.5	30.7	21.8	31	23.1	34.2	23.3
14	27.3	23.7	31	24.2	29	22.9	26.8	24	25.8	22.5	27.5	23.9	25.3	23.4	25.2	22.7
15	29.4	23.5	30.5	23.7	27.1	23.1	32.5	23.5	30.9	22.1	33.1	22.9	29	23	33.2	23.3
16	32.2	23.8	31	24.1	31.2	23.4	33	23.7	34.4	22.7	32.5	23.9	32.1	23	33.9	22.8
17	32.1	22.9	32	23	31.5	23.2	31.4	23.8	30.9	22.2	32.2	22.5	30.8	23.6	33.8	22.8
18	33.1	23.1	31.4	24.4	31.9	22.6	33	23.3	32	22.1	32	22	32.6	23.3	34.5	23.7
19	31.2	24.5	31.6	25	32.9	23	32.4	23.5	31.8	22.7	32.5	22.4	32.5	24.1	33.8	23.6
20	32.8	23.9	31.5	24.8	32.2	22.5	33.2	23.4	33.4	21.8	32.8	23.1	32.9	24.3	33.7	23.5
21	31.7	25	31.6	24.6	32.5	24.1	31.5	24.2	31.7	22.8	33	22.1	31.3	23.2	33.7	22.3
22	30.5	23.4	29.4	24.1	32.1	23	32.4	22.4	31	20.7	32.2	20.7	31.7	22.2	33.8	23.3
23	25	23.2	27	24.5	29.5	22.7	26	23.8	26.7	22.3	29.5	23.3	26.5	23.8	28	23
24	26.1	23.1	27.6	24	26.5	23.6	28	23.7	27	22.4	29.1	23.6	27.6	23.6	27.2	23
25	24.8	20.9	32.8	23.7	27.8	23.6	26.2	22.6	25.5	22.6	27.6	23	28.4	22.1	28.2	24
26	33	20.3	31	23.3	26.9	21.5	33.2	23	32.9	21.1	33.3	21.5	32	21.4	33.2	22
27	31	22.5	29.4	24.1	32	21.5	30.2	23	29	21.6	31.1	21.7	30.9	23.4	31.6	22.4
28	28.9	26.2	32.3	25.8	29.3	25	31.2	24.4	30.2	23.3	30.5	23.7	29.9	24.5	32.8	23
29	29	26.8	28.7	26.1	30.5	25.5	28.7	25.7	27	23.3	30.5	22.7	27.3	24	28.4	23
30	29	25.8	32.8	24.7	28.9	25	30.7	25	29.4	23.2	29.5	25.2	28.8	23.4	29.7	23
31	29	22.4	32.6	24.7	29.3	23.4	30.9	24.2	30.2	23	30.8	23.5	30.6	23.7	32.3	22.6
Mean	30.9	23.6	30.9	24.2	30.8	23.3	31.4	23.7	30.5	22.4	31.7	22.9	30.9	23.5	32.6	23.1

Day.	Baler.		Dagupan.		Bolinao.		Baguio.		San Fernando, Union.		Echague.		Candon.		Vigan.	
	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.
	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.
1	33.3	23.6	34.6	23.9	33.1	24.3	24.2	15.3	33.5	22.5	33.2	22	31.5	24	32.7	23.6
2	33.8	22.9	33.9	25	33.4	25	25.2	16.3	33.7	24.5	33.3	23.1	32.5	26	32.9	24
3	34.2	24.6	34.2	24.5	33	24.7	24	16.5	32	24.6	32.3	24.9	32	26.4	35	24.8
4	33.7	23.6	35.5	24.3	33	24.6	24.5	16.7	33.2	24.1	33.3	23.4	32.6	26.2	32.8	24.6
5	33.2	23.4	34.8	24.2	32.9	23.8	24.2	15.7	33	24.5	33.3	23.8	32.1	26.2	32.6	24.5
6	33.7	22.5	35	23.9	32.6	25	25.1	16.2	33.2	24	33.2	23	32.5	25.7	32.7	25
7	33	23.3	35.7	24	32.5	25.1	23.6	16.2	33.4	23.8	33.8	22.6	32.6	25.6	33.2	24.4
8	33.6	23.7	35	24	33.5	24.4	24.4	16	33.5	24	32.3	22.8	32.5	26	33.9	24.8
9	33.2	23.6	35.1	24.5	33.1	24.9	25.6	15.9	33	23.2	32.8	21.4	32	25	34	24.2
10	32.7	23	34.8	25	34	25.2	25.3	17	34.1	24.2	33	22.2	32	26.4	34	24.3
11	33.7	23.8	35.8	23.9	33.6	24	25.5	16.4	33	23.3	31.6	23	31.6	25.2	32.3	24.6
12	32.5	23	33.3	23.5	31.7	23.9	24.6	15.9	32.7	24	33.8	22	30.7	24.7	32	24
13	32.2	22.5	34.6	23.5	32.7	23.9	23.8	15.7	32.5	23.1	30.2	23.4	30.9	24.5	33.7	23.7
14	29	23.7	30.3	24	31.5	24.1	22	16.4	32	23.4	26.1	23.6	30.5	24.5	32.8	24
15	29.6	23.8	33.9	23.9	32.8	25.1	22.8	16.5	32.8	24	27.7	23.4	31.5	26.1	32.6	23.3
16	33.9	23.7	35	23.6	32.6	25.3	25.4	16.2	34.4	24.2	32.5	22.9	32	25.8	32.3	23.7
17	33	23	33.4	23.3	32.7	25.4	24.8	16.1	33.5	23.8	30.8	23.3	31	25.5	31.8	24.5
18	33	23.3	34.2	24.6	32.7	25.4	24.3	16.4	34	23.7	33.3	23.6	31.5	25.2	32.5	23.7
19	33.2	23.5	35.9	24.9	33	27	25.1	16.5	33.1	23.6	32.7	24.2	32	24.4	33.3	23.5
20	33.3	23.5	35.8	24.8	33.5	25.8	24.4	16.1	33.2	24.3	33.3	22.8	32.5	24.5	32.8	24.1
21	34.6	23.4	34	24	33.5	23.9	24.8	15.7	33.9	23.8	33.3	23.3	32	25.2	33.7	24
22	33.2	22	33.4	23	32.7	24.8	24.2	15	33.4	22.7	30.4	23.1	31.7	23.6	34.1	23.2
23	29.8	22.9	29.8	25.5	31	23.9	22.1	16.4	32.3	23	26.9	23.4	32.2	25.2	32.6	24.1
24	31.1	23.9	32.5	24.5	31.4	26.4	20.3	16.8	31.4	24.7	26	23.2	30.5	26.6	31.5	26.5
25	30.9	24.4	31.8	23.1	30	24.3	18.4	15.1	35.3	24.7	28.3	23.3	32.4	25.5	37.1	26.5
26	32.5	22.1	34.1	22.7	32.5	22.7	23.2	15.2	34.9	24	32.6	21.9	32.2	25.6	32.1	25
27	33	23	32.4	23.2	31.7	24.2	20.4	15.7	32.7	23.1	29.8	23.6	31.5	25.5	32.2	24.7
28	34.5	24.5	30.9	24.5	30	26.9	23.7	15.5	33.6	23.7	29	23.4	30.5	24.5	29.7	23.3
29	35.4	24.9	27.8	24	28	24.9	18.3	15.9	29.9	23.4	28.5	23.2	25.4	24.5	25.8	22.7
30	29.5	23.9	29.9	23	26.5	23.4	17.8	14.4	28	20.4	29.8	22.5	25.8	22.4	25.8	22
31	32.2	21.8	31.7	22.5	30.5	23.2	18.2	14.5	33	23	31.3	21.6	30.8	22		
Mean	32.7	23.4	33.5	24	32.1	24.7	23.2	15.9	33	23.7	31.2	23	31.3	25.1	32.6	24.3

Maximum and minimum temperatures at the stations of the Weather Bureau, October, 1915—Continued.

Day.	Tuguegarao.		Laoag.		Aparri.		Santo Domingo, Batanes.	
	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.
	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.
1	35.6	23.1	34.2	23.7	32	23.8	31.9	24.4
2	34.2	22.9	36	23.8	31.2	24.8	31.5	24.5
3	36	24.1	36.6	24	31.4	24.8	32	25.2
4	36.5	23.4	34.6	23.3	32	24.8	32.7	24.9
5	35	22	35.5	22.9	31.7	24.2	31.8	24.1
6	36.6	21.7	34.7	23	31.5	23	31.5	23.5
7	37.1	23	34.4	23.5	31.8	23.9	31.4	23.8
8	35.1	23	34	23.2	32	23.7	32.8	23
9	35.3	22	35.1	23.5	31.7	24.2	32	25
10	35.6	22.4	35.4	23.4	32.6	24.2	30.8	24.6
11	36.5	25	33.2	24.1	30.8	25	31.3	25.3
12	35.5	24.5	32.8	24	32	24.6	30.8	23.9
13	33	24.1	35.7	22.8	30.1	24.5	27.8	24.1
14	31.6	24.1	35.4	23.3	31.5	24.3	31.1	24.5
15	27.7	23.6	34.2	25.5	30	24.5	31	24.7
16	33.6	23.1	32.9	24.4	31.6	24.1	31.7	25.2
17	35.5	23.3	33.3	23.2	30.6	23.8	29.4	25.1
18	36.8	24.1	33	23.5	31.7	24.2	31	23.5
19	36.5	23.4	35	23	31.9	24	31.6	25.1
20	38.2	24.2	34.2	24	32.8	24.8	31.6	25.1
21	34.2	23.4	37.1	23.9	32.5	24.3	30.6	26
22	34	23.1	36.2	21.4	32.4	23.3	30.5	24.1
23	32.2	24	34	24.2	31.5	25.8	30.5	26.6
24	26	23.6	30.1	25.6	26.7	24.6	30.3	26.2
25	31.4	23.6	35.3	25.1	30.8	24	28	24.1
26	34.2	22.2	33.4	23.5	31.2	23.3	28.9	24.5
27	29.5	24	33.1	23	28.3	24.3	29	24.6
28	26.9	23.1	29.2	24.9	27.2	24.7	27.5	24.4
29	25.6	22.3	-----	23.2	27.3	23.2	27.4	24.4
30	30.6	23.7	-----	-----	30	23.4	28.7	25.6
31	33.5	23.4	-----	-----	33.4	22.8	29.5	26.2
Mean	33.5	23.3	34.2	23.7	31	24.2	30.5	24.7

SEISMOLOGICAL BULLETIN FOR OCTOBER, 1915.

By Rev. MIGUEL SADERRA MASÓ, S. J.,
Assistant Director of the Weather Bureau.

EARTHQUAKES FELT IN THE PHILIPPINES.¹

2, 19^h 30^m 03^s * [3, 3^h 30^m 03^s]. Virac (Catanduanes Island, SE Luzon). Oscillatory earthquake, direction NW-SE, intensity IV, duration 5 seconds.

5, 11^h 40^m [5, 19^h 40^m]. Surigao (NE Mindanao). Earthquake shocks of intensity III.

7, 9^h 37^m [7, 19^h 17^m]. Guam (Mariana Islands). Earthquake of intensity II-III.

10, 13^h 05^m [10, 21^h 05^m]. Zamboanga and Basilan Island (W Mindanao). Earthquake of intensity IV, duration 10 seconds. The shocks were registered by the seismograph of Butuan; the distance of this place to the origin was about 380 kilometers, consequently it lay in the sea, east of the Basilan Island and the Zamboanga Peninsula.

11, 5^h 06^m [11, 13^h 06^m]. Butuan (N Mindanao). Earthquake of intensity III.

12, 0^h 13^m [12, 8^h 13^m]. Baguio (W Luzon). Earthquake shock of intensity III.

12, 22^h 30^m [13, 6^h 30^m]. Baguio (W Luzon). Earthquake of intensity II-III. It repeated five hours later with intensity III at 3^h 37^m 30^s * [11^h 37^m 30^s].

19, 15^h 18^m [19, 23^h 18^m]. Butuan (N Mindanao). Earthquake of intensity III, duration 4 seconds.

22, 2^h 57^m [22, 12^h 37^m]. Guam (Mariana Islands). Earthquake of intensity II-III.

25, 8^h 33^m 05^s * [25, 16^h 33^m 05^s]. Batangas (S Luzon). Oscillatory earthquake, direction NW-SE, intensity III, duration 5 seconds. It is probable that this earthquake originated in the neighborhood of Taal Volcano, because the instruments of Ambulong near to it registered other two very light shocks at 0^h 20^m [8^h 20^m] and 14^h 24^m [22^h 24^m].

26, 1^h 49^m 31^s * [26, 9^h 49^m 31^s]. Ambos Camarines (SE Luzon). Earthquake of intensity IV, felt throughout the whole province. Its origin calculated from the seismographic records of Manila and Butuan lay in the Pacific not far from the northern coasts of Camarines.

26, 17^h 38^m [27, 1^h 38^m]. Ormoc (W Leyte). Earthquake shocks of intensity II-III.

28, 9^h 07^m [28, 17^h 07^m]. Iloilo (E Panay). Earthquake of intensity III.

31, 14^h 54^m [31, 22^h 54^m]. Ormoc (W Leyte). Earthquake of intensity III-IV, duration about 6 seconds.

¹ The intensity of earthquakes is given in the notation known as the Rosi-Forel scale. The time is that indicated by the seismographs at the Central Observatory whenever the disturbance has been registered by them. This fact is denoted by an asterisk (*). Otherwise the time is that noted by the observer who sent the report. All time indications are in Greenwich mean time (midnight = 0^h), insular time being in brackets for the convenience of Philippine readers.

RECORDS OF THE MICROSEISMOGRAPH.

[Time: Greenwich mean. Midnight=0^h. Instrument: Wiechert seismograph; 1,000 kilograms. A_N: T₀=7.1, ε=2.08, $\frac{r}{T_0^2}$ =0.042; A_E: T₀=6.4, ε=2.31, $\frac{r}{T_0^2}$ =0.039. Alluvium. 2.40 meters above sea level.]

No.	Date.	Character.	Phase.	Hour.	Period.	Amplitude.		Remarks.
						A _N μ	A _E μ	
257	2	I _r	e F	h. m. s. 2 09 21				SE Luzon.
258	2	I _v	eP F	19 30 03 33				
259	3	I _v	eP F	0 04 29 07				
260	3	II _u	e S L	7 11 37 23 35 34 10				Nevada, U. S. A.
			ME ₁	44 10	24	10		
			MN ₁	44 16	25	22		
			ME ₂	49 04	22	9		
			ME ₃	55 08	18	10		
			MN ₂	59 14	18	27		
			MN ₃	8 02 44	14	24		
			F	9 32				
261	5	I _r	e F	13 57 14 56				
262	5	I _v	eP F	15 05 09 07				
263	7	I _v	eP L	18 54 54 55 08				
			ME F	55 10 58	1- 2	24		
264	8	I _r	e S MN F	15 41 54 45 54 48 36 16 22		7	46	
265	9	I _r	eP S L MN F	3 37 00 40 36 43 12 46 14 4 27		8	19	
266	9	I	e F	14 48 15 06				
267	10	I	e F	5 57 6 23				
268	10	I _v	eP F	18 03 56 06				
269	13	I _v	eP L MN F	3 37 30 37 56 38 42 42		4	8	
270	15	I _v	eP F	7 21 20 24				
271	16	I _v	eP L MN F	18 33 44 38 50 38 56 42		4	25	
272	19	I _v	eP L ME F	17 44 34 45 07 45 35 49		2	12	
273	22	I _v	eP F	0 36 30 47				
274	24	I _v	eP L MN F	22 37 25 37 54 37 57 40		4	24	

Records of the microseismograph—Continued.

No.	Date.	Character.	Phase.	Hour.	Period.	Amplitude.		Remarks.					
						A _N μ	A _E μ						
275	25	IIv	eP	8 33 05	-----	-----	-----	S Luzon.					
			L						33 21	-----			
			M _N								33 45	3	127
			M _E								33 49	4	139
F	38	-----											
276	25	Iv	eP	18 17 24	-----	-----	-----						
			F						20	-----			
277	25	Iv	eP	21 12 16	-----	-----	-----						
			F						15	-----			
278	26	Iv	eP	1 49 31	-----	-----	-----	SE Luzon.					
			L						50 01	-----			
			M _N								50 26	5	78
			M _E								50 39	6	102
F	56	-----											
279	26	Iv	e	7 46	-----	-----	-----						
			F						8 02	-----			
280	27	Iv	eP	9 17 18	-----	-----	-----						
			F						26	-----			

TEMBLORES DE TIERRA SENTIDOS EN FILIPINAS.¹

2, 19^h 30^m 03^s * [3, 3^h 30^m 03^s]. Virac (Isla de Catanduanes, SE de Luzón). Temblor oscilatorio, dirección NW-SE, intensidad IV, duración 5 segundos.

5, 11^h 40^m [5, 19^h 40^m]. Surigao (NE de Mindanao). Temblor de tierra de intensidad III.

7, 9^h 37^m [7, 19^h 17^m]. Guam (Islas Marianas). Temblor de tierra de intensidad II-III.

10, 13^h 05^m [10, 21^h 05^m]. Zamboanga e Isla de Basilan (W de Mindanao). Temblor de tierra de intensidad III-IV, duración 10 segundos. Este temblor fué registrado por el sismógrafo de Butúan y su origen se hallaba a unos 380 kilómetros de distancia de dicha estación, al E de Basilan y de la península de Zamboanga.

11, 5^h 06^m [11, 13^h 06^m]. Butúan (N de Mindanao). Temblor de tierra de intensidad III.

12, 0^h 13^m [12, 8^h 13^m]. Baguio (W de Luzón). Temblor de tierra de intensidad III.

12, 22^h 30^m [13, 6^h 30^m]. Baguio (W de Luzón). Temblor de tierra de intensidad II-III. Repitió cinco horas después a 3^h 37^m 30^s * del 13 [11^h 37^m 30^s] con intensidad III.

19, 15^h 18^m [19, 23^h 18^m]. Butúan (N de Mindanao). Temblor de tierra de intensidad III, duración 4 segundos.

22, 2^h 57^m [22, 12^h 37^m]. Guam (Islas Marianas). Temblor de tierra de intensidad II-III.

25, 8^h 33^m 05^s * [25, 16^h 33^m 05^s]. Batangas (S de Luzón). Temblor oscilatorio, dirección NW-SE, intensidad III, duración 5 segundos. Probablemente el origen de este temblor se hallaba hacia el SW del volcán de Taal, puesto que los aparatos de la estación de Ambulong cercana al mismo registraron además otros dos ligeros sismos a 0^h 20^m [8^h 20^m] y 14^h 24^m [22^h 24^m].

26, 1^h 49^m 31^s * [26, 9^h 49^m 31^s]. Ambos Camarines (SE de Luzón). Temblor de tierra de intensidad IV, sentido en toda la Provincia de Camarines. Su origen calculado con los registros de Manila y de Butúan se hallaba en el Mar Pacífico no lejos de las costas septentrionales de dicha provincia.

26, 17^h 38^m [27, 1^h 38^m]. Ormoc (W de Leyte). Temblor de tierra de intensidad II-III.

28, 9^h 07^m [28, 17^h 07^m]. Iloílo (E de Panay). Temblor de tierra de intensidad III.

31, 14^h 54^m [31, 22^h 54^m]. Ormoc (W de Leyte). Temblor oscilatorio, dirección SW-NE, intensidad III-IV, duración aproximada 6 segundos.

¹ La intensidad de los terremotos se indica conforme a la conocida escala de Rossi-Forel. Cuanto a la hora de su ocurrencia, adoptamos la indicada por los sismógrafos de este Observatorio siempre que los hayan registrado, distinguiéndola por medio de un asterisco (*). En caso contrario copiamos la apuntada por los observadores que nos envían las notas. Todas las indicaciones del tiempo se refieren al tiempo medio de Greenwich (medianoche = 0^h). Para conveniencia de los lectores de Filipinas se añade también el tiempo insular.



THE GOVERNMENT OF THE PHILIPPINE ISLANDS

WEATHER BUREAU

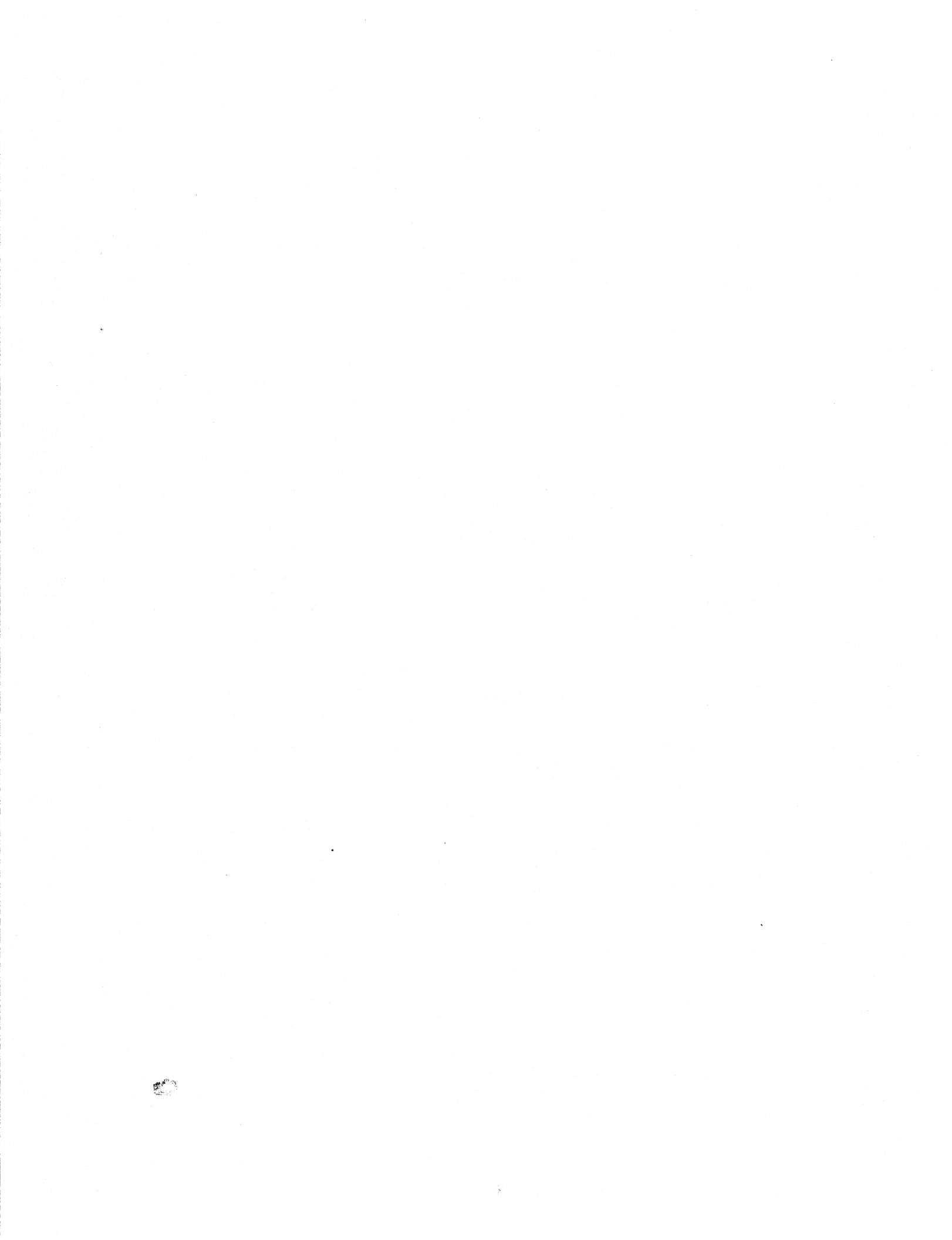
MANILA CENTRAL OBSERVATORY

BULLETIN FOR NOVEMBER, 1915

PREPARED UNDER THE DIRECTION OF

REV. JOSÉ ALGUÉ, S. J.
DIRECTOR OF THE WEATHER BUREAU

MANILA
BUREAU OF PRINTING
1916



BULLETIN FOR NOVEMBER, 1915.

METEOROLOGICAL BULLETIN FOR NOVEMBER, 1915.

By Rev. JOSÉ CORONAS, S. J.,
Chief, Meteorological Division of the Weather Bureau.

GENERAL WEATHER NOTES.

Pressure and temperature.—The first part of the month has been stormy for the Philippines, two typhoons having crossed over Luzon in seven days. Hence the mean atmospheric pressure of the month is lower than the November normal and than the monthly mean of the preceding year. The highest pressures occurred generally on the 14th and 19th, and the lowest on the 3d.

The monthly mean temperature is either identical with, or somewhat lower than that of November, 1914. The mean for Manila differs from the normal of this month by only +0.1° C. The extreme temperatures registered at the Central Observatory were 33.6° C. on the 5th, and 21.4° C. on the 16th. Those of Baguio were: 25.4° C., 13.2° C. on the top of Mirador, and 26.7° C., 11.5° C. in the valley.

PRESSURE AND TEMPERATURE AT THE FIRST AND SECOND CLASS STATIONS FOR NOVEMBER, 1915.

Station.	Pressure.						Temperature.					
	Mean.	Departure from November, 1914.	Highest mean.	Day.	Lowest mean.	Day.	Mean.	Departure from November, 1914.	Highest.	Day.	Lowest.	Day.
Tagbilaran	757.81	-1.31	759.64	14	755.82	26	26.7	+0.4	34.3	2	22	20
Surigao	57.82	-1.55	59.90	14	55.70	3	26.8	+ .4	34.5	25	21.9	20, 21
Cebu	57.83	-1.50	59.49	19	55.19	3	28	+ .2	33.8	9	23.2	12
Iloilo	57.78	-1.29	59.52	14	55.35	3	27.2	- .1	33.4	9	23.2	12
Ormoc	58.06	-1.57	59.91	14	55.20	3	26.3	0	33.5	4	20.8	17
Tacloban	57.86	-1.93	59.90	14	54.14	3	26.9	+ .3	33.7	1	23.1	10
Capiz	58.27	-1.37	60.20	19	54.87	3	27.1	- .3	34.7	4	23.2	13
Calbayog	58.05	-1.77	60.20	14	53.04	3	26.1	+ .3	34.4	5	20.4	19
Legaspi	57.99	-1.90	60.19	19	50.87	3	^a 27.6	+ .1	^a 33.6	1, 16	^b 22.2?	24
Atimonan	58.47	-1.56	61.07	19	51.86	3	26.7	- .7	32	2	22	3
Ambulong, Tanauan	57.80	-1.92	60.32	19	52.68	3	26.1	- 1	32.3	5	22.2	1, 19
Paracale	58.59	-1.92	61.33	19	49.04	3	26.8	+ .1	32.4	4	22.9	12, 13
Manila	58.48	-1.83	61.04	19	52.24	3	26	0	33.6	5	21.4	16
San Isidro	58.71	-1.86	61.33	19	51.73	3	26.4	- .2	32.7	21	19.9	19
Dagupan	57.74	-1.76	60.60	19	50.08	3	27.1	- .3	34.9	1	20.4	19
Bolinao	58.03	-1.94	60.85	19	50.87	3	27.1	- .5	32.5	5, 26	21.4	19, 30
Baguio ^c	636.42	-1.42	638.43	19	628.44	3	18.2	- .1	25.4	6, 24	13.2	19
Vigan	758.13	-1.77	760.83	19	752.18	4	27.2	+ .1	35.4	10	22.1	30
Tuguegarao	59.85	-1.38	63.46	19	54.97	3	25.7	- .2	35.5?	6	20.4	19
Aparri	60.14	-1.08	63.99	20	55.62	4	25.8	+ .2	32.4	5	21.8	18

^a 29 days of observation.

^b 23 days of observation.

^c The barometric readings of this station are not reduced to sea level.

Rainfall.—The monthly rainfall has been greater than the normal and than that of the preceding year in all the stations of Luzon. In the Visayas and Mindanao it has been generally below the normal, but greater than in November, 1914. The amount of rain collected in the gauges of Manila is 167.1 mm. and 79.4 mm. above that of the preceding year and the normal of the month, respectively.

RAINFALL AT VARIOUS STATIONS OF THE WEATHER BUREAU DURING THE MONTH OF NOVEMBER, 1915.

Station.	Total.	Departure from November, 1914.	Departure from normal.	Rainy days.	Departure from November, 1914.	Greatest rainfall in a single day.	Day.	Station.	Total.	Departure from November, 1914.	Departure from normal.	Rainy days.	Departure from November, 1914.	Greatest rainfall in a single day.	Day.
	mm.	mm.	mm.		mm.	mm.			mm.	mm.	mm.		mm.	mm.	
Glan	56			11		14.2	16	Calapan	218.5	+ 16.6		23	+ 3	87.7	10
Jolo	106.6	- 57.6	- 68.1	12	- 6	45.4	21	Virac	510.9	+ 337.3		26	+ 2	150.2	3
Isabela, Basilan	118.3	+ 49.7	- 38.6	16	+ 5	24.9	11	Nueva Caceres	383.9	+ 342.6	+ 129.4	21	+ 13	93.6	3
Zamboanga	49.6	+ 9.9	- 44.4	12	+ 5	10.9	25	Batangas	271.1	+ 262.7		20	+ 15	116.2	10
Davao	198.1	+ 149.2	+ 36.1	13	+ 3	53.3	30	Atimonan	577	+ 482.5	+ 128.7	24	+ 13	121.3	3
Cagayan, Misamis	37.4	+ 12.5		10	+ 3	15.2	9	Ambulong, Tana-uan	195.6	+ 124.2		17	+ 12	106	10
Dapitan	320.3	+ 61.4	+ 11.7	26	- 7	59.2	22	Paracale	699.9	+ 485.4		27	+ 3	177.2	3
Butuan	156.1	+ 81.4	- 103.1	18	+ 4	43.4	9	Santa Cruz, Laguna	259.2	+ 135.7		27	+ 16	88.1	3
Dumaguete	95.9	+ 14.2		17	+ 11	13.7	28	Manila	208.1	+ 167.1	+ 79.4	15	+ 8	105.4	3
Tagbilaran	74.2	- 22.9	- 101.1	12	+ 6	17.8	9	Antipolo	248.7	+ 188.3		23	+ 17	130.6	3
Iwahig	129.4	- 33.4		15	+ 5	24.9	4	Iba	126.4	+ 120		12	+ 11	61	3
Surigao	182.6	- 107.2	- 210.8	22	+ 0	58.9	2	San Isidro	136.3	+ 129.9	+ 44.7	6	+ 2	91.1	3
Maasin	135.6	+ 32	- 152.2	3	+ 1	40.1	2	Tarlac	189.1	+ 187.3	+ 105.5	11	+ 9	61.5	3
Cebu	37.9	+ 5.7	- 104.7	11	+ 4	10.2	2	Baler	512.3	+ 355	+ 168.5	17	+ 3	136.9	10
Iloilo	60.5	+ 57.7	- 110	9	+ 6	16.8	30	Dagupan	192.9	+ 187.1	+ 125.9	11	+ 9	117.1	3
San Jose Buenavista	66.3	+ 49.4	- 94.5	12	+ 8	17.8	30	Bolinao	210.5	+ 188.9	+ 161.2	9	+ 6	149.8	3
Cuyo	57.3	+ 15.2	- 64.9	11	+ 9	27	26	Baguio	145.4	+ 116	+ 55.7	13	+ 11	54.2	3
Ormoc	284.4	+ 195.3	+ 69.5	23	+ 7	91.4	2	San Fernando, Union	31.7	+ 26.6	- 7.7	7	+ 5	11.2	12
Guian	298.3	+ 120.3		27	+ 2	60.2	2	Echague	327.4	+ 266.2		19	+ 11	59.9	29
Tacloban	191.7	+ 54.7	- 77.5	22	+ 1	64	2	Candon	43.5	+ 42.5	- 4.9	6	+ 5	14.8	29
Capiz	222.9	+ 189.6	- 41	24	+ 13	56.4	10	Vigan	45.9	+ 45.9	+ 7.3	7	+ 7	13.5	13
Borongan	363.9	- 12.2	- 125.5	25	+ 3	56.7	22	Tuguegarao	545.8	+ 463.7	+ 275	21	+ 14	222.4	29
Calbayog	354.3	+ 197.8	+ 88.3	23	+ 0	61.5	2	Laoag	63.3	+ 53.9		7	+ 6	17	27
Masbate	169.5	+ 95.3	- 17.5	14	+ 4	41.1	2	Aparri	296.2	+ 109.5	+ 16.5	20	+ 10	66.3	19
Romblon	427.9	+ 355	+ 138.2	27	+ 10	119.9	3	Santo Domingo, Batanes	369.5		+ 31.4	23		85	12
Batag	468.4	+ 294.4		20	+ 4	109.5	9								
Gubat	438.5	+ 231.5	+ 43.7	23	+ 3	98.6	3								
Legaspi	346.3	+ 135.3	+ 7.6	24	+ 0	88.5	3								
Sumay, Guam	189.6	+ 75.2		19	+ 5	25.4	6								

TWO MORE TYPHOONS IN SEVEN DAYS OVER LUZON, NOVEMBER 3 AND 10, 1915.

As mentioned above, two typhoons crossed the Island of Luzon during the first part of the month. Outside of these there was only another very distant typhoon moving northeast to the south of the Bonins on the 15th to 17th of this month. See the tracks of all these typhoons in Plate XVII.

A TYPHOON ACROSS THE CENTRAL PART OF LUZON, OCTOBER 30 TO NOVEMBER 6, 1915.

It was only four days after the second big typhoon of October had left the Island of Luzon, when a third one struck the same island, this time traversing its central part near 16° latitude N. We consider it very extraordinary that three so well developed typhoons cross over Luzon in about ten days. Fortunately the other disturbance which traversed the southern provinces of the islands seven days later, on the 10th of this month, was only a small typhoon of no great importance, as we shall see later at the end of these notes.

Origin of this typhoon.—There is hardly any doubt that this typhoon formed to the south of Guam, on October 30 to 31, probably near 9° latitude N and 143° longitude E. This statement is based in the following observations made at Guam from October 30 to November 1:

METEOROLOGICAL OBSERVATIONS AT SUMAY, GUAM, LADRONE ISLANDS, OCT. 30 TO NOV. 1, 1915.

Date and hour.	Pres- sure.	Wind.		State of the sea.	Rainfall.	Date and hour.	Pres- sure.	Wind.		State of the sea.	Rainfall.
		Direc- tion.	Force.					Direc- tion.	Force.		
Oct. 30:						Oct. 31:					
6 a. m.	759.48	ENE	0-12 3	Moderate		2 p. m.	755.15	ENE	0-12 5	Slight swell	mm.
2 p. m.	57.70	E	4	do	7.6	Nov. 1:					
Oct. 31:						6 a. m.	56.83	ESE	5	do	5.1
6 a. m.	57.85	ENE	3	do	5.1	2 p. m.	56.10	ESE	3	do	

The typhoon across the Pacific.—Although it has been impossible to obtain any observation from Yap, yet with those made on board the steamship *Sheridan* we have been able to follow quite accurately the track of this typhoon over the Pacific from the Western Carolines to the Philippines. The position of the cyclonic center for the three first days of November may be given as follows:

- November 1, 6 a. m.: Between 9° and 10° latitude N; between 141° and 142° longitude E.
- November 2, 6 a. m.: Near 11° latitude N; between 134° and 135° longitude E.
- November 3, 6 a. m.: Near 13° latitude N; between 126° and 127° longitude E.

The direction in which the typhoon was moving during these days was W by N and WNW, and the rate of progress was extraordinarily great since the afternoon of the 1st. The vortex of the typhoon passed over the *Sheridan* at 3 a. m. of the 3d, the barometer having fallen at that time to 708.14 mm. and the vortical calm being observed for three minutes.

In the following table we publish some of the observations taken on board the *Sheridan* from October 30 to November 3:

METEOROLOGICAL OBSERVATIONS MADE ON BOARD THE U. S. A. T. "SHERIDAN" ON HER TRIP FROM GUAM TO MANILA, OCTOBER 30 TO NOVEMBER 3, 1915 (CAPT. J. J. MURPHY).

Date and hour.	Position.		Pressure.	Wind.		Weather.	Remarks.
	Latitude north.	Longitude east.		Direction.	Force.		
Oct. 30:	o	o	mm.		0-12		
4 a. m.			759.70	NE	2	b, c	Light breeze. Fair weather.
4 p. m.			58.68	ENE	3	c	12 noon still in harbor. (Guam.) 8 p. m. long west swells.
Oct. 31:							
4 a. m.			57.67	ENE	3	b, c	Gentle breeze. Moderate sea.
Noon	13 06	139 50	58.94	ENE	3	b, c	Gentle breeze. Following sea.
4 p. m.			57.16	NE	4	b, c	Moderate breeze and sea.
Nov. 1:							
4 a. m.			57.41	NE	3	o, z	12 midnight light rain squalls and following sea. Moderate breeze and sea; occasional light rain sprinkle.
Noon	13 03	134 33	58.18	ENE	4	c	Moderate breeze, and following sea.
4 p. m.			56.91	NE	4	c	Moderate breeze; choppy sea.
Nov. 2:							
4 a. m.			55.64	NE	5	c, q	7 to 8 p. m. frequent rain squalls. Fresh breeze. Choppy sea. Sheet lightning in the north.
8 a. m.			55.89	NE	6	b, c, q	Fresh to strong breeze with rough NE sea throughout.
10 a. m.			56.14	NE	6	c	
Noon	13 01	129 18	55.38	NE	6	o, c	Strong breeze and rough sea.
1 p. m.			53.86	NNE	7	o, q, r	
2 p. m.			53.10	NNE	7	o, q, r	
3 p. m.			52.59	NNE	7	o, q, r	Moderate gale, wind reaching force 9 during squalls; rough sea.
4 p. m.			51.83	NNE	7	o, q, r	Constant rain with numerous heavy squalls.
5 p. m.			51.32	NNE	8	o, q	
6 p. m.			51.06	NNE	8	o, q	
7 p. m.			50.56	NNE	8	o, q	
8 p. m.			50.05	NNE	8	o, q	Strong gale with blinding rain squalls. Heavy rough sea.
9 p. m.			47.25	NNE	8	o, q	
10 p. m.			44.46	NNE	8	o, q	
11 p. m.			43.19	NNE	8	o, q	
Midnight			42.68	NNE	9	o, q	Strong gale with heavy rain and sea.
Nov. 3:							
1 a. m.			38.11	Various	9 to 12	o, q, r	
2 a. m.			28.46	NE	9 to 12	o, q, r	
3 a. m.	13 00	127 25	8.14	Calm		o, r	Calm 3 minutes. After 3 a. m. wind hauled from NE to SE force 1 to 5, then about 3.30 a. m. SE wind with hurricane force 12 or 120 miles per hour.
4 a. m.			25.41	SE	9 to 12	o, q, r	Heavy sea.
5 a. m.			26.43	SSE	12	o, q, r	4.30 a. m. Winds blowing with hurricane force and blinding rain and high sea. Ship heading between SE and SE by E. Port engine full ahead keeping ship's head to the sea. Barometer rising steadily.
6 a. m.			28.46	SSE	12	o, q, r	Condition moderating.
7 a. m.			31	SSE	12	o, q, r	
8 a. m.			48.27	SSE	12	o, q, r	
9 a. m.			50.05	SSE	10	o, q, r	
10 a. m.			52.59	SSE	10	o, q, r	
11 a. m.			53.60	SSE	10	o, c	Heavy rains, blowing a hurricane force.
Noon	13 11	127 16	54.11	SSE	7	o, c	Half speed. 1.12 p. m. full ahead.
4 p. m.			54.37	SSE	6	c	Weather very cloudy but promising.
Midnight			58.18	SSE	5	b, c	Fresh breeze and rough sea.

Our observatory gave out the following warnings on November 1 and 2:

November 1, 11.45 a. m.: A new typhoon has been forming during the last two days over the Pacific to the southwest of Guam. Its center was situated at 6 o'clock this morning to the NE or NNE of Yap between 10° and 13° latitude N and about 139° longitude E¹ moving apparently to W by N.

November 2, 11.30 a. m.: Owing to the lack of communication with Yap and with the eastern Visayas and Mindanao, it is impossible to give with certainty this morning the exact situation of the new typhoon. It is probable, however, that it was situated at 6 a. m. between 10° and 13° latitude N. and in about 133° or 134° longitude E moving W by N.

The typhoon in the Philippines.—In order to follow more easily the track of this typhoon across the Philippines we offer to our readers in Plate XVIII the isobars for 6 a. m., 2 and 10 p. m. of the 3d. It was fortunate for Manila and neighboring provinces that the typhoon inclined somewhat more to the north after 6 a. m. of the 3d, the center thus passing further to the north than it had been anticipated.

The observatory gave out the following warnings on November 3:

11.45 a. m.: The typhoon was situated at 6 o'clock this morning between 125° and 126° longitude E and between 12° and 14° latitude N moving W by N. toward the southern part of Luzon. It is a severe typhoon and is moving at great speed.

3.30 p. m.: The typhoon is moving WNW. It has probably passed over or very near Catanduanes, is now passing near the northern part of Camarines, and will probably pass near Manila to the north by to-night.

6.30 p. m.: The typhoon is approaching the Province of Nueva Ecija and will probably strike to-night the Province of Pangasinan. The storm will be felt with great intensity in the provinces of Nueva Ecija, Tarlac, Pangasinan, La Union, and southern part of Nueva Vizcaya and Mountain provinces.

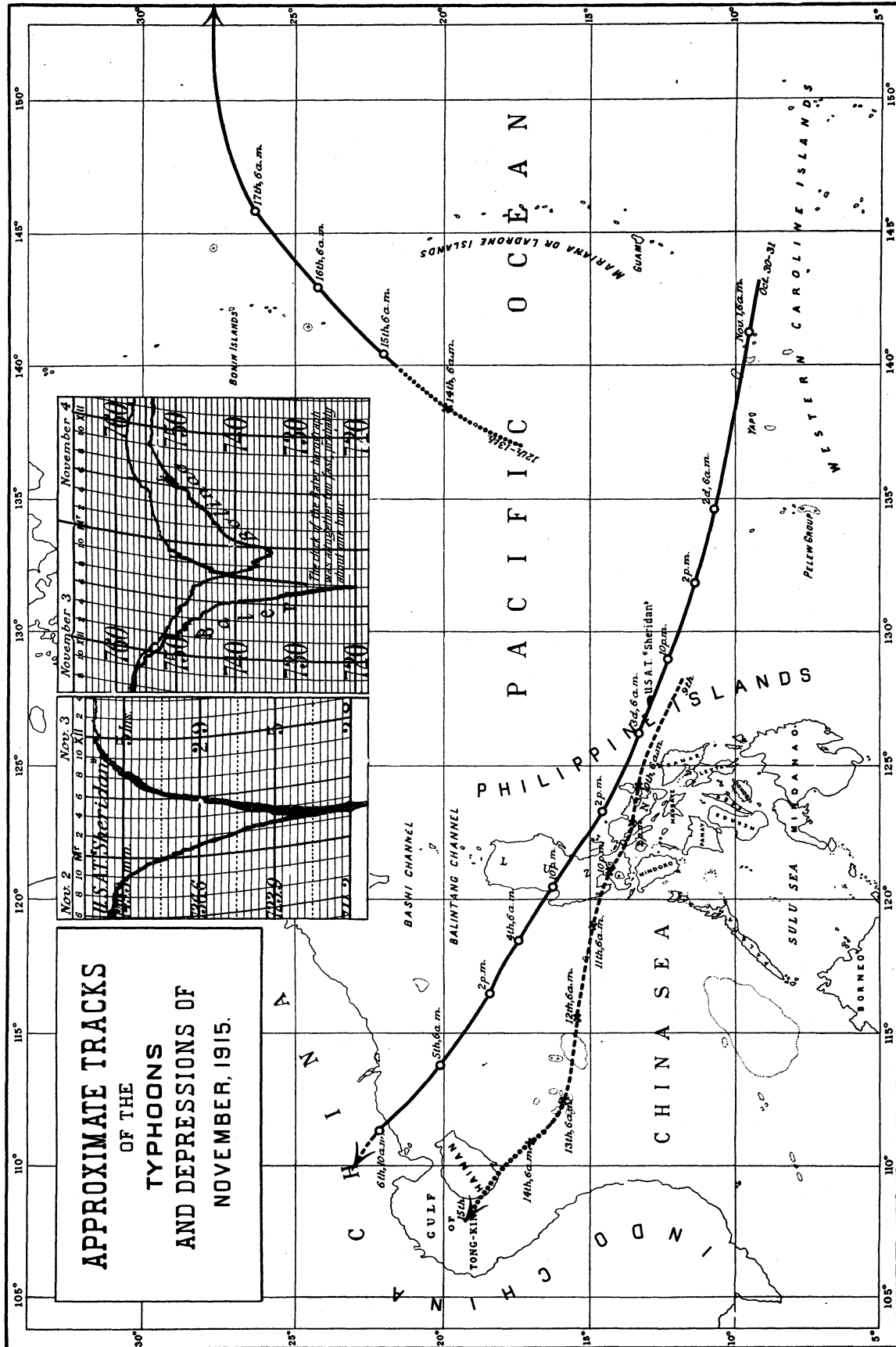
8 p. m.: The typhoon has just passed to the north of Manila at a distance of about 60 or 80 miles moving WNW. It will probably pass within a few hours over or very near Dagupan.

In fact, as shown in the track of this typhoon (*see* Pl. XVII), the center of the storm passed very close to the northern coast of Catanduanes by 10 a. m.; it entered in the evening the northern part of Tayabas province, over Baler; and, after crossing the northernmost part of the Province of Nueva Ecija, it passed between Baguio and Dagupan at about 10 p. m., and went into the China Sea to the north of Bolinao before midnight, moving NW by W.

In the following table we publish some of the observations taken during the typhoon at Dagupan, San Fernando (Union) and Bolinao. Judging from these observations it would seem that the typhoon when it left the island was far from being as well developed as when it passed over the *Sheridan* or over Baler. This is also confirmed by a comparison of the barographic curves obtained on the *Sheridan* and in Baler with that of Bolinao. They are reproduced in Plate XVII.

¹ This position had to be slightly modified after we received the observations on board the *Sheridan*.

Plate XVII



METEOROLOGICAL OBSERVATIONS FOR NOVEMBER 3 AND 4, 1915.

Date and hour.	Dagupan.					San Fernando, Union.					Bolinao.				
	Pres- sure.	Wind.		Weather.	Rain- fall every 4 hours	Pres- sure.	Wind.		Weather.	Rain- fall.	Pres- sure.	Wind.		Weather.	Rain- fall.
		Direc- tion.	Force				Direc- tion.	Force				Direc- tion.	Force		
Nov. 3:	mm.		0-12.		mm.		0-12.		mm.		0-12.		mm.		
6 a. m.-----	756.20	Calm		o	756.16	Calm		o		756.64	ESE	1	o		
2 p. m.-----	50.50	NW	3	o	50.40	NbyW	3	o, d		51.59	NNW	6	o		
3 p. m.-----										50.64	NNW	6	o		
4 p. m.-----	48.17	NWbyN	4	o	48.26	NE	4	o		49.60	NNW	5	o, q		
5 p. m.-----	46.90	NWbyN	5	o						48.93	N	7	o, q		
6 p. m.-----	45.70	NWbyN	6	o, q, d	46.09	NbyW	6	o, q		47.48	NNW	8	o, q		
7 p. m.-----	44.27	NW	8	o, q, d						46.83	NNW	8	o, q, d		
8 p. m.-----	41.51	NW	8	o, q, d	42.86	NE	7	o, q, d		45.28	NW	9	o, q		
9 p. m.-----	34.77	NW	10	o, q, d	38.31	N	11	o, q, d		40.80	NW	11	o, q		
10 p. m.-----	35.26	W	8	o, q, r	33.3	NNE	10	o, q		35.83	WNW	12	o, q, r		
11 p. m.-----	39.80	SSW	5	o, q, r	34.15	Calm		o, q		35.31	WNW	12	o, q, r		
11.15 p. m.-----					36.73	SE	11	o, q		33.87	Calm		o		
11.30 p. m.-----					37.60	SE	10	o, q					*11.2		
11.35 p. m.-----										33.78	SW	1	o		
Midnight.-----	43.30	SE	7	o, q, r	39.50	SSE	10	o, q, r	0.3	35.15	SSE	4	o, d		
Nov. 4:															
1 a. m.-----	45.32	SE	7	o, q, r	42.35	SSE	11	o, q, r	1.4	41.17	SE	8	o, q, r		
1.15 a. m.-----					42.66	SSE	12	o, q, r	0.1						
2 a. m.-----	46.63	SE	7	o, q, r	49.5					43.09	SE	8	o, q, r		
3 a. m.-----	47.90	SE	6	o, q, r									5.3		
4 a. m.-----	49.05	SE	6	o, q, r						46.37	SE	12	o, q, r		
5 a. m.-----	50.18	SE	5	o, r											
6 a. m.-----	51.73	SE	5	o, r	34.3	49.04	SSE	7	o, q, r	3.8	50.21	SE	10	o, q, r	
10 a. m.-----	55.38	SE	5	o, d	2.0					54.85	SE	9	o, q, r		
2 p. m.-----	54.38	SE	5	o, d	53.02	SSE	5	o		54.26	SE	5	o, p		
6 p. m.-----	56.47	SE	3	o	1.3					56.25	SSE	3	o, d		
10 p. m.-----	58.18	SE	3	c						58.05	SE	3	o		

* Since 10 p. m.

b Since 2 a. m.

Extraordinary rate of progress of this typhoon.—It is very seldom that a typhoon in the Philippines moves at a rate of 20 or more miles per hour. Out of so many typhoons as we have studied for fifteen years we can hardly remember more than two traveling at so great speed in our latitudes—one over Luzon in October, 1908, and another over Mindanao in November, 1912.¹ Yet, even in these few cases which we remember, the rate of progress of the typhoon was less than 22 miles per hour, while in the present case it was 23.7 miles per hour. To find out this velocity we have taken two very definite points of the track, namely when the vortex passed over the *Sheridan* at 3 a. m. of November 3, and when it was at its least distance from Baguio at 10 p. m. of the same day. The typhoon spent 19 hours in traversing the distance between these two points; and as this distance is of 451 miles, hence we say that the typhoon was moving on November 3 at an unusual rate of progress of 23.7 miles per hour.

It is not surprising therefore that the master and officials of the *Sheridan* had not expected to be caught by the storm, taking in consideration its position on November 2, as it was made known to them through a radiogram received from Manila Observatory, and the ordinary rate of progress of typhoons in the Tropics. Seafaring men ought to take notice of this and other similar cases lest they be taken by surprise because they considered themselves out of danger and sufficiently ahead of the typhoon.

The typhoon in the China Sea.—The typhoon kept practically the same direction NW by W all the way through the China Sea since it left Luzon shortly before midnight of November 3 until it reached the China coast in the early morning of November 6. The vortex had passed in the afternoon of November 5 about half way between Hongkong and Hainan. The rate of progress of the movement of the storm had decreased so much in the China Sea, that on approaching the China coast in the afternoon of the 5th it was less than a third of what it had been while crossing the Island of Luzon. We offer to

¹ See Monthly Bulletin, October, 1908, page 370, and November, 1912, page 407.

our readers in Plate XVIII the isobars for 2 p. m. of November 4. In the 5th the typhoon began to fill up even before reaching China and it rapidly disappeared after entering the Continent on the 6th.

THE SMALL TYPHOON OF SOUTHERN LUZON, NOVEMBER 9 TO 15, 1915.

After the preceding typhoon left the island of Luzon on the 3d of this month there were signs of a depression or low-pressure area, first to the east of the Visayas, and then again to the southwest of Guam. It is impossible, however, to trace their tracks or to decide whether the Luzon typhoon of the 10th, of which we shall presently speak, had any connection at all with that disturbance shown by the observations of Guam on the 4th and 5th of this month. Hence we begin our track of this typhoon of southern Luzon on the 9th, when it began to influence the barometers of southeastern Luzon, the eastern Visayas and northeastern Mindanao.

As soon as the typhoon entered the Philippines, it was realized that it was a very small one and of no great intensity. The track followed by it across the southern part of Luzon was very similar to that of October 23, though the center passed some 40 miles nearer to Manila owing to a small inclination to the north noticed in the track of this typhoon after it had left the Province of Ambos Camarines.

Manila Observatory gave out the following warnings in the afternoon and evening of November 10:

November 10, 3.15 p. m.: The typhoon has entered the Philippines and was situated at 2 o'clock this afternoon to the southwest of Naga not far from the coast of Ambos Camarines. It is a small typhoon, probably of no great intensity, and is moving at present to W by N. Unless it changes its actual direction, it will pass south of Manila to-night.

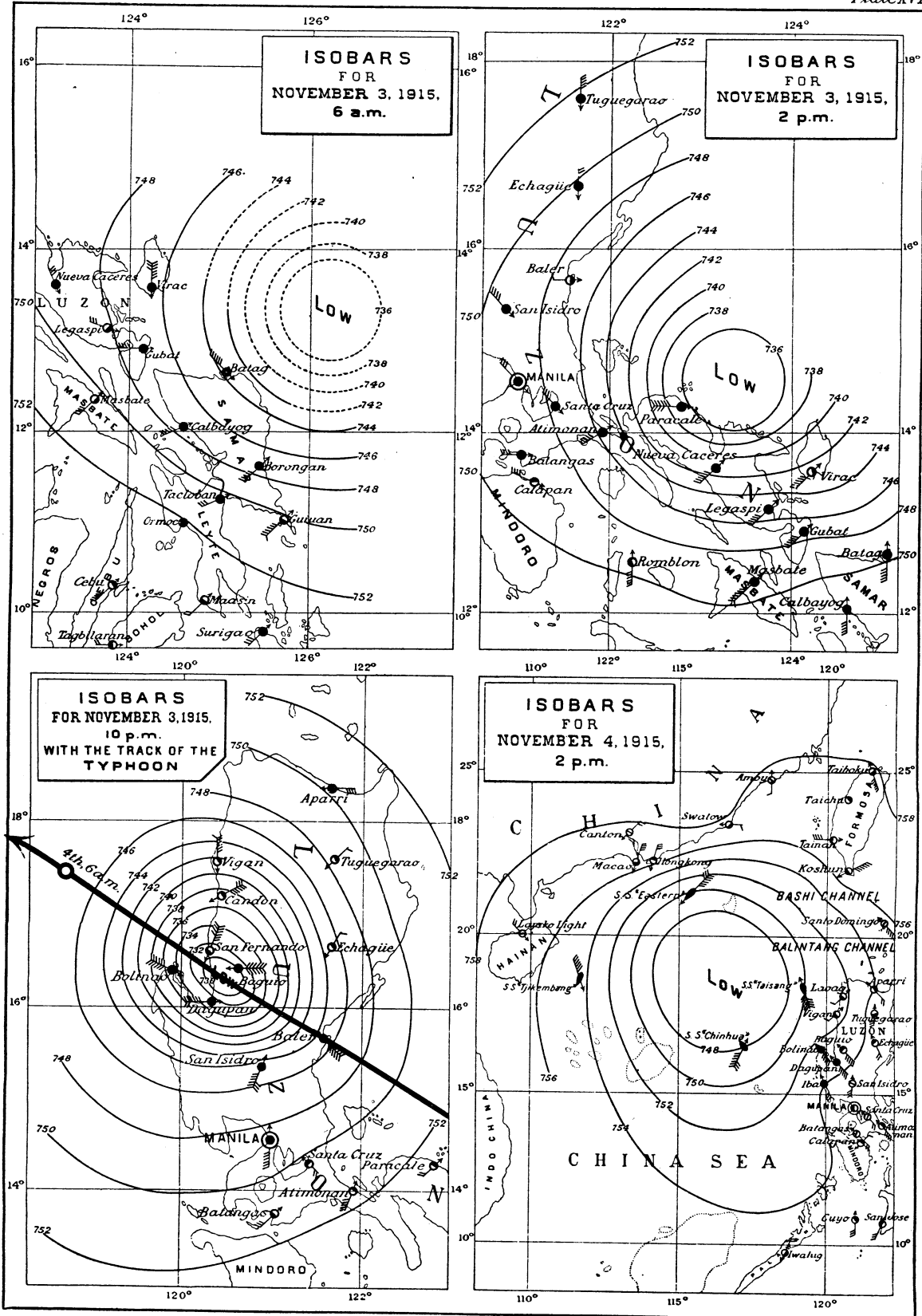
November 10, 11 p. m.: The small typhoon is passing south of Manila probably through the northernmost part of Batangas province and the southern part of Cavite province moving at present WNW. It will be in the China Sea shortly after midnight.

The lowest barometric minimum observed in our stations of southern Luzon was no lower than 749 mm., all corrections made even to standard gravity; and the winds did not reach the force of a hurricane in any of these stations.

Once in the China Sea the typhoon inclined again west on the 11th: but on the 13th and 14th it moved northwest until it filled up on the 15th near the western coast of Hainan.

ISOBARS FOR THE TYPHOON OF NOVEMBER 3 AND 4, 1915.

Plate XVIII.



N.B. - The barometric readings have been reduced to standard gravity.

NOTAS GENERALES DEL TIEMPO.

Presión y temperatura.—La primera parte de este mes ha sido tormentosa para Filipinas, habiendo cruzado la Isla de Luzón dos tifones en el intervalo de siete días. Por esto, la presión atmosférica media de este mes es más baja que la normal de Noviembre y que la media mensual del año pasado. Las presiones más altas se registraron generalmente los días 14 y 19, y las más bajas el 3.

La temperatura media del mes es igual o algo más baja que la de Noviembre, 1914. La temperatura media de Manila difiere de la normal de este mes en $+0.1^{\circ}$ C. solamente. Las temperaturas extremas registradas en el Observatorio Central fueron 33.6° C. el día 5, y 21.4° C. el día 16. Las de Baguio fueron 25.4° C., 13.2° C. en la cumbre del Mirador, y 26.7° C., 11.5° C. en el valle.

Precipitación acuosa.—La lluvia de este mes ha sido mayor que la normal y que la del año pasado en todas las estaciones de Luzón. En Visayas y Mindanao ha sido generalmente menor que la normal, pero mayor que la de Noviembre, 1914. La cantidad de lluvia recogida en los pluviómetros de Manila es mayor que la del año pasado y la normal de este mes en 167.1 y 79.4 mm., respectivamente.

DOS TIFONES MÁS EN SIETE DÍAS SOBRE LUZÓN, 3 Y 10 DE NOVIEMBRE, 1915.

Como se ha dicho arriba, dos tifones cruzaron la Isla de Luzón durante la primera parte de este mes. Fuera de estos, no hubo más que otro tifón muy lejano que se movió al NE por el S de Bonins, del 15 al 17 de este mes. Véanse las trayectorias de todos estos tifones en la Lámina XVII.

UN TIFÓN A TRAVÉS DE LA PARTE CENTRAL DE LUZÓN, OCTUBRE 30 A NOVIEMBRE 6, 1915.

Hacia sólo cuatro días que el segundo tifón de Octubre había abandonado la Isla de Luzón, cuando otro desfogó en la misma isla, esta vez atravesándola por su parte central, cerca de 16° latitud N. Consideramos muy extraordinario el que tres tifones tan bien desarrollados crucen la Isla de Luzón en el intervalo de solos diez días próximamente. Por fortuna la otra perturbación que atravesó las provincias meridionales de la isla siete días después, el 10 de este mes, fué sólo un pequeño tifón de no mucha importancia, como veremos más abajo.

Origen de este tifón.—Apenas se puede dudar de que este tifón se formó al S de Guam, del 30 al 31 de Octubre, probablemente cerca de 9° latitud N y 143° longitud E. Nos fundamos al decir esto en las observaciones hechas en Guam desde el 30 de Octubre hasta el 1 de Noviembre, las cuales damos en una tabla en el texto inglés.

El tifón a través del Pacífico.—Aunque ha sido imposible obtener observación alguna de Yap, sin embargo con las hechas a bordo del vapor *Sheridan* hemos podido seguir bastante exactamente la trayectoria de este tifón en el Pacífico desde las Carolinas Occidentales a Filipinas. La situación aproximada del centro ciclónico en los tres primeros días de Noviembre puede darse como sigue:

- Noviembre 1, 6 a. m.: Entre 9° y 10° latitud N; entre 141° y 142° longitud E.
- Noviembre 2, 6 a. m.: Cerca de 11° latitud N; entre 134° y 135° longitud E.
- Noviembre 3, 6 a. m.: Cerca de 13° latitud N; entre 126° y 127° longitud E.

La dirección en que se movió el tifón durante estos días fué $W\frac{1}{4}NW$ y WNW , y su velocidad de traslación fué extraordinariamente grande desde la tarde del día 1.° El vórtice del tifón pasó sobre el vapor *Sheridan* a las 3 a. m. del día 3, habiéndole bajado el barómetro en dicha hora a 708.14 mm., y experimentándose la calma vortical durante tres minutos.

En una tabla que puede verse en el texto inglés publicamos algunas de las observaciones hechas a bordo del vapor *Sheridan* desde el 30 de Octubre hasta el 3 de Noviembre.

Nuestro Observatorio publicó los siguientes avisos de tifón los días 1 y 2 de Noviembre:

Noviembre 1, 11.45 a. m.: Un nuevo tifón se ha formado durante los dos últimos días en el Pacífico al SW de Guam. Su centro se hallaba a las 6 de esta mañana al NE o NNE de Yap, entre 10° y 13° latitud N y en los alrededores de 139° longitud E,¹ moviéndose aparentemente al W½NW.

Noviembre 2, 11.30 a. m.: Debido a la falta de comunicación con Yap y con las Visayas orientales y Mindanao, es imposible dar con certeza esta mañana la exacta posición del nuevo tifón. Sin embargo, es probable que se hallaba a las 6 a. m. entre 10° y 13° latitud N y en los alrededores de 133° ó 134° longitud E, moviéndose al W½NW.

El tifón en Filipinas.—Con el fin de seguir más fácilmente la trayectoria de este tifón a través de Filipinas, ofrecemos a nuestros lectores en la Lámina XVIII las isobaras de 6 a. m., 2 y 10 p. m. del día 3. Afortunadamente para Manila y provincias vecinas, el tifón se inclinó algo más al N después de 6 a. m. del día 3, pasando así el centro más lejos al N de lo que se podía temer.

El 3 de Noviembre publicó el Observatorio los siguientes avisos de tifón:

11.45 a. m.: El tifón se hallaba a las 6 de esta mañana entre 125° y 126° longitud E y entre 12° y 14° latitud N, moviéndose al W½NW en dirección a la parte S de Luzón. Es un tifón intenso y se mueve con gran velocidad.

3.30 p. m.: El tifón se mueve al WNW. Probablemente ha pasado por, o muy cerca de, Catanduanes, está ahora pasando cerca de la parte N de Camarines, y pasará probablemente por el N, y muy cerca de Manila esta noche.

6.30 p. m.: El tifón está acercándose a la Provincia de Nueva Écija, y probablemente atravesará esta noche la Provincia de Pangasinán. El baguio se sentirá con mucha intensidad en las Provincias de Nueva Écija, Tárlac, Pangasinán, La Unión, y parte sur de las provincias de Nueva Vizcaya y Montañosa.

8 p. m.: El tifón acaba de pasar al N de Manila a una distancia de unas 60 u 80 millas, moviéndose al WNW. Pasará probablemente dentro de pocas horas por, o muy cerca de, Dagupan.

De hecho, como se echa de ver en la trayectoria de este tifón (Lámina XVII), el centro del baguio pasó muy cerca de la costa N de Catanduanes hacia las 10 a. m.; penetró ya de noche en la parte N de la Provincia de Tayabas, por Baler; y, después de cruzar la parte más septentrional de la Provincia de Nueva Écija, pasó entre Baguio y Dagupan a las 10 p. m., y salió al Mar de China por el N de Bolinao antes de la media noche, moviéndose al NW¼W.

En una tabla que puede verse en el texto inglés damos algunas de las observaciones hechas durante el baguio en Dagupan, San Fernando (Unión) y Bolinao. A juzgar por estas observaciones, parece que el tifón, al abandonar la isla, no estaba tan bien desarrollado como cuando pasó sobre el *Sheridan* o por Baler. Se confirma esto mismo comparando las curvas barográficas obtenidas en el *Sheridan* y en Baler con las de Bolinao, las cuales reproducimos en la Lámina XVII.

Extraordinaria velocidad de traslación de este tifón.—Es muy raro que un tifón en Filipinas se mueva a razón de 20 o más millas por hora. Después de tantos tifones como hemos venido estudiando por espacio de quince años, apenas podemos recordar más de dos que se moviesen con tan grande velocidad en nuestras latitudes: uno en Luzón en Octubre de 1908, y otro en Mindanao en Noviembre de 1912.² Y aun en estos pocos casos que recordamos, la velocidad de traslación del tifón fué menos de 22 millas por hora, mientras que en el presente caso fué de 23.7 millas por hora. Para hallar esta velocidad hemos tomado dos puntos de la trayectoria bien determinados, a

¹ Esta posición se ha tenido que modificar ligeramente después de recibir las observaciones hechas a bordo del vapor *Sheridan*.

² Véase "Monthly Bulletin," Octubre, 1908, pág. 382, y Noviembre, 1912, pág. 423.

saber, cuando el vórtice pasaba sobre el *Sheridan* a las 3 a. m. del 3 de Noviembre, y cuando estaba a su menor distancia de Baguio a las 10 p. m. del mismo día. El tifón empleó diez y nueve horas en recorrer la distancia que separa estos dos puntos; y como esta distancia es de 451 millas, de ahí que el tifón se hubo de mover este día con una velocidad tan extraordinaria de 23.7 millas por hora.

No es, por tanto, de extrañar que el capitán y los oficiales del *Sheridan* no esperasen ser alcanzados por el baguio, teniendo en cuenta su posición el 2 de Noviembre, según les constaba por un radiograma recibido del Observatorio de Manila, y la velocidad ordinaria de los tifones en los trópicos. Conviene que los marinos tengan presente este y otros casos semejantes para que no sean sorprendidos por considerarse fuera de peligro y suficientemente distantes del tifón.

El tifón en el Mar de China.—El tifón conservó prácticamente la misma dirección NW $\frac{1}{4}$ W en toda su trayectoria a través del Mar de China desde que salió de Luzón poco antes de la media noche del 3 de Noviembre hasta llegar a la costa de China en la madrugada del día 6. El vórtice había pasado la tarde del 5 a la mitad de distancia entre Hongkong y Hainán. La velocidad de traslación del baguio había disminuído tanto en el Mar de China, que al acercarse a la costa de China en la tarde del 5, era menos de un tercio de lo que había sido mientras cruzaba la Isla de Luzón. Ofrecemos a nuestros lectores en la Lámina XVIII las isobaras de 2 p. m. del 4 de Noviembre. El día 5 el tifón empezó a deshacerse aún antes de llegar a China y desapareció rápidamente después de penetrar en el Continente el día 6.

EL PEQUEÑO TIFÓN DEL S DE LUZÓN, NOVIEMBRE 9 AL 15, 1915.

Después que el tifón anterior dejó la Isla de Luzón el día 3 de este mes, hubo indicios de una depresión o área de baja presión, primero al E de Visayas, y luego al SW de Guam: es imposible, sin embargo, trazar sus trayectorias o determinar si el pequeño tifón de Luzón del día 10, de que vamos a hablar, tenía relación alguna con la perturbación atmosférica manifestada por las observaciones de Guam los días 4 y 5 de este mes. Por este motivo empezamos la trayectoria de este tifón del S de Luzón el día 9, cuando comenzó a influir en los barómetros del SE de Luzón, E de Visayas y NE de Mindanao.

Tan pronto como el tifón penetró en Filipinas, se vió que era muy pequeño y de no mucha intensidad. La trayectoria que siguió a través de la parte meridional de Luzón fué muy semejante a la del 23 de Octubre, aunque el centro pasó unas 40 millas más cerca de Manila debido a una pequeña inclinación al N observada en la trayectoria de este tifón después de haber dejado la Provincia de Ambos Camarines.

El Observatorio de Manila publicó la tarde y noche del 10 de Noviembre los siguientes avisos de tifón:

Noviembre 10, 3.15 p. m.: El tifón ha entrado en Filipinas y se hallaba a las 2 de esta tarde al SW. de Naga no lejos de la costa de Ambos Camarines. Es un pequeño tifón, probablemente de poca intensidad, y se mueve actualmente al W $\frac{1}{4}$ NW. Si no cambia su actual dirección, pasará por el S de Manila esta noche.

Noviembre 10, 11 p. m.: El pequeño tifón está pasando por el S de Manila, probablemente a través de la parte más septentrional de la Provincia de Batangas y la parte S de la de Cavite, moviéndose actualmente al WNW. Entrará en el Mar de China poco después de media noche.

La mínima barométrica más baja observada en nuestras estaciones del S de Luzón no fué menor de 749 mm., hechas todas las correcciones, inclusa la de gravedad; y los vientos no alcanzaron la fuerza de huracán en ninguna de dichas estaciones.

Una vez en el Mar de China el tifón se inclinó de nuevo al W el día 11: pero el 13 y 14 se movió al NW hasta que se deshizo el 15 cerca de la costa occidental de Hainán.

METEOROLOGICAL DATA FOR MANILA CENTRAL OBSERVATORY.^a

[$\phi=14^{\circ} 34' 41''$ N; $\lambda=120^{\circ} 58' 33''$ E; barometer above sea, 14.2 meters; gravity correction not applied, -1.72 mm.]

Day.	Pressure (mean).	Air temperature. ^b			Underground temperature.				Relative humidity (mean).	Vapor pressure (mean).	Radiation.		Evaporation. ^b					
		Mean.	Maximum.	Minimum.	0.25 meter.		0.50 meter.				1.50 meters.	2.50 meters.	Minimum on grass.	Maximum in sun. Black bulb in vacuo.	Free exposure (total).	Shelter (total).		
					8 a.m.	2 p.m.	8 a.m.	2 p.m.									8 a.m.	8 a.m.
1	758.69	26.6	31.9	23.5	28.2	29.1	28.9	29.2	29.4	28.9	88	22.7	22.3	51.5	1.6	1.3		
2	58.76	26.6	31.3	24.3	28.9	29.4	29.3	29.7	29.2	87.4	22.5	22.9	47	2.1	1.8			
3	52.24	25.1	26.4	22.3	28.5	28.6	29.2	29.2	29.6	29	88.1	20.9	21.7	33.2	.3	1.2		
4	57.03	26	31.2	23.3	27.3	27.9	28.5	28.5	29.4	28.9	88.7	22	22.7	47.5	1.6	1.2		
5	59.19	27.7	33.6	23.6	27.5	28.5	28.3	28.5	29.4	29	83.9	22.9	21.7	55.5	2.8	2.1		
6	58.57	26	30.6	23.4	28.3	28.6	28.7	28.8	29.4	28.9	88.3	21.9	21.2	43.7	1.4	1.2		
7	58.55	26	31.7	22.2	28	29.1	28.8	28.9	29.3	29	86.4	21.4	20	54.5	2.2	1.9		
8	58.84	26.1	31.5	22	28	29	28.8	28.9	29.4	29	87.1	21.8	20	52.2	2.2	1.6		
9	58.71	26.6	30.8	23.6	28.5	29.2	29	29.3	29	85.4	22	21.6	53	2.1	1.6			
10	56	24.6	26.5	23.4	28.5	28.5	29	28.9	29.1	28.9	91.5	21	22.6	32.8	4	1.2		
11	56.89	26.3	30.4	23.5	27.6	28.2	28.8	28.8	29.1	28.9	85.1	21.6	22.8	51	2.1	1.6		
12	58.64	26.2	32.2	23.4	28	28.6	28.7	28.8	29.2	28.8	87	21.9	21.8	56.7	1.5	1.2		
13	59.62	26.9	32.8	23	28	29.1	28.8	28.8	29.4	29	84.4	22	21.4	55.1	2.8	2.1		
14	60.45	26.7	31.9	23.1	28.5	29.2	28.8	29	29.5	28.9	82.9	21.4	21.3	56.5	2.6	2.1		
15	60.46	25.6	30.4	21.5	28.3	29.1	28.9	29.2	29.4	28.9	84.3	20.4	19.7	50.4	2.5	2		
16	59.64	25.7	31.5	21.4	28.2	29	29	29.1	29.4	28.9	85	20.7	19.4	55.4	2.2	2		
17	59.24	25.6	30.5	22.1	28.3	29.2	29	29.1	29.4	28.9	84.7	20.5	20.2	54.5	2.2	1.8		
18	60.73	25.2	31.9	21.5	28.1	29.1	28.9	29	29.4	28.8	78.5	18.4	19.6	57.2	3.4	2.7		
19	61.04	25.2	31.3	21.8	28.1	28.9	28.9	29	29.3	28.7	79.8	18.8	19.2	49.2	3.2	2.4		
20	60.44	26.6	32.2	22	27.6	29	28.8	28.8	29.3	28.8	74.9	19.1	19.8	54	5.4	4.1		
21	59.89	25.7	31.4	23	28.1	28.7	28.8	28.9	29.3	28.8	83.6	20.3	21	54.1	2.3	2.2		
22	58.92	25.8	31.3	23.2	28.1	28.8	28.8	28.9	29.3	28.9	84.2	20.7	21.9	51.2	2.9	2.3		
23	58.65	26	31.3	22.6	28.1	28.9	28.8	28.8	29.3	28.9	79.7	19.6	20.9	53.8	4.1	2.8		
24	57.64	26	30.5	23.1	28.2	28.8	28.8	28.8	29.3	28.9	82	20.3	21.5	46.9	3	2.1		
25	56.67	26.3	31.5	23.3	28.1	29	28.8	28.9	29.2	28.8	87.4	22	21.7	53.5	2.3	1.6		
26	56.28	26.5	31.1	23.6	28.5	29.2	28.9	29.2	29.3	28.8	86.8	22.1	21.8	53.7	1.8	1.4		
27	57.08	26.2	30.8	23.8	28.6	29.1	28.9	29.1	29.3	28.7	89	22.4	22.3	44.8	1.3	1.1		
28	57.79	26	30.6	23.1	28.5	28.9	29.1	29.1	29.1	28.7	90.5	22.5	21.3	54.5	.7	.9		
29	58.45	25.8	30.7	22.5	28.3	28.9	28.9	29	29.3	28.8	89.2	21.9	20.5	47	1.6	1.4		
30	59.32	25.5	29.9	22.6	28.2	28.8	28.9	28.9	29.2	28.8	85.4	20.6	20.2	48.8	2	1.5		
Mean Total	758.48	26	31	22.9	28.2	28.9	28.9	29	29.3	28.9	85.3	21.2	21.2	50.6	2.2	1.8		
Departure from normal	-0.94	+0.1	+0.6	+0.7							+2.9	+0.9				54.4		

^a All the mean values given in this table are deduced from hourly observations.
^b These values are taken from instruments mounted in the Observatory Park, 1.5 meters above ground.
^c The amount of rainfall from 6 p. m. of the 3d to 6 a. m. of the 4th was taken from the recording instruments.

METEOROLOGICAL DATA FOR MIRADOR OBSERVATORY, BAGUIO.*

[$\phi = 16^{\circ} 25' N$; $\lambda = 120^{\circ} 36' E$; barometer above sea, 1,512.5 meters; gravity correction not applied, -1.65 mm.]

Day.	Pres- sure ^b (mean).	Air temperature at Mirador (on the top of the mountain).					Air temperature in the valley (near the city hall).				Relative humid- ity (mean).	Vapor pres- sure (mean).	Radiation.		Evaporation.	
		Mean.	Maximum.	Hour.	Mini- mum.	Hour.	Maximum.	Hour.	Mini- mum.	Hour.			Mini- mum on grass.	Maxi- mum in sun. Black bulb in va- cuo. ^c	Free ex- posure (total)	Shel- ter (total)
	mm.	°C.	°C.		°C.	°C.		°C.	°C.		Per ct.	mm.	°C.	°C.	mm.	mm.
1	636.77	18.7	22.4	11.20a.	16	0.05a.	23.4	2.00p.	15.7	3.35a.	88.7	14.2	14.4	14.2	3.3	1.9
2	37.06	18.7	23.3	9.15a.	16.7	6.45a.	23.5	9.35a.	15.7	12m.n.	91.5	14.7	15.2	13	2.4	1.3
3	28.44	17.2	18.7	1.10p.	15.5	4.00a.	20.8	10.00p.	14.2	5.00a.	84.8	12.4	13	3	1.5	1.5
4	32.82	16.8	18.5	2.05p.	14.7	3.00a.	19.2	3.55p.	15	6.00a.	94.8	13.5	13.8	1.4	1.4	1.4
5	37.28	19	24.3	1.00p.	16.7	4.30a.	24.8	2.50p.	15.8	6.00a.	86.5	13.9	14.7	4.1	2.5	2.5
6	36.98	18.8	25.4	0.50p.	16	6.10a.	26.2	1.10p.	15.1	6.25a.	83.8	13.5	14	4	2.9	2.9
7	36.70	18.4	24.3	Noon	15.7	6.05a.	25.7	0.30p.	13.6	6.25a.	83.7	13.1	11.7	3.4	2.4	2.4
8	37	19.2	24	10.05a.	15.2	4.50a.	24.8	11.10a.	14	6.40a.	83.7	13.7	12.2	2.6	2.1	2.1
9	37.01	19.1	24.6	0.20p.	16.1	6.00a.	25.6	Noon	14.8	6.40a.	88.8	14.6	13.2	1.9	1.8	1.8
10	35.39	17.9	21.5	8.50a.	16.1	3.50a.	22.5	11.30a.	14.5	6.30a.	83.2	12.7	12.8	2	2.2	2.2
11	34.69	16.2	16.8	8.40a.	14.8	0.40a.	19	0.05a.	15.7	4.50a.	92.5	12.6	14.8	1.5	1.3	1.3
12	36.52	17.7	22.6	0.50p.	15.7	6.45a.	22.6	1.40p.	15.8	6.00a.	86.7	12.9	14.5	3.1	2.4	2.4
13	37.44	18.7	25.1	0.35p.	15.7	2.50a.	25.6	1.15p.	15.4	5.00a.	86.2	13.8	14.2	2.7	2	2
14	38.22	18.1	24.4	10.35a.	15.2	4.00a.	24.4	10.55a.	14.5	7.00a.	90	13.8	13	3	1.9	1.9
15	38.11	19.1	24.4	0.20p.	15.4	4.25a.	25.6	1.00p.	13.3	6.25a.	75.5	12.5	10.6	4.9	3.2	3.2
16	37.60	18	24.3	10.15a.	14.5	6.00a.	24.8	11.00a.	13.5	6.30a.	77	11.6	10.7	2.6	2.2	2.2
17	36.97	17.6	22.2	11.30a.	14.7	11.55p.	24.7	10.35a.	13.8	5.45a.	87.2	13.2	12.3	2.7	1.9	1.9
18	37.98	17.7	23.8	1.55p.	14	12m.n.	24.5	1.00p.	12.2	12m.n.	68.7	10.2	10	4.8	3.5	3.5
19	38.43	17.6	23.1	11.20a.	13.2	3.00a.	24.2	1.25p.	11.5	6.00a.	69.7	10.3	8.2	5.7	4	4
20	38.28	18.6	23.8	11.20a.	14.6	4.40a.	25.6	1.55p.	14.5	5.35a.	65.5	10.3	11	8.4	5.4	5.4
21	37.70	18.5	24.3	0.05p.	15.6	11.20p.	25.5	1.05p.	13.8	5.50a.	74.5	11.8	13.6	5.8	3.6	3.6
22	37.08	18.2	24.2	0.15p.	15.3	1.10a.	25.1	0.15p.	14	6.25a.	72.7	11.2	12.3	5.4	3.5	3.5
23	36.70	18.3	24	11.00a.	15.5	4.15a.	25	1.50p.	13.6	6.40a.	75.7	11.8	12.1	4	2.1	2.1
24	36.04	18.4	25.4	0.20p.	16.1	4.00a.	25.8	0.50p.	14.7	6.20a.	83.5	13.1	12.7	2.2	1.7	1.7
25	35.23	18.9	24.6	10.15a.	16.5	6.00a.	26.7	Noon	14.8	6.10a.	86	13.8	13.5	1.2	1.2	1.2
26	34.90	18.7	25.1	10.40a.	16.3	1.35a.	24	10.25a.	15.5	6.20a.	88.8	14.1	13.2	1.3	1.2	1.2
27	35.53	18	21.8	11.10a.	16	3.30a.	23.2	2.20p.	16	5.00a.	93	14.2	14.9	.8	.8	.8
28	36	18.6	24.2	10.40a.	16.2	3.10a.	26.6	11.20a.	15.7	6.10a.	90.8	14.4	14.8	1.2	.9	.9
29	36.54	18.6	23.2	10.40a.	15.7	6.10a.	25.3	11.35a.	14	7.00a.	86.8	13.8	13.2	1.2	1.3	1.3
30	37.11	16.5	18.6	3.10p.	14.3	5.40a.	20.2	3.50p.	14.5	7.30a.	80.5	11.2	14	5	3.6	3.6
Mean	636.42	18.2	23.1		15.5		24.2		14.5		83.4	12.9	13		3.2	2.3
Total															95.6	67.7

Day.	Wind.				Amount (mean).	Clouds.		Sun- shine. ^e	Rain, 24 hours begin- ning 6 a. m.	Miscellaneous.
	Prevailing direction. ^d	Total move- ment.	Maximum hour- ly veloc- ity.	Direction at the time of the maximum velocity.		Form and direction.				
						Upper.	Lower.			
1	SE	351.6	23.5	E	6.9	Ca.-S. S,SSE	Cu.-N. S,SSE	2 55		○ a. ⊕ □ □ ⊖ p.
2	E, W	305	27.4	E	7.3	A.-Cu. E	Cu.	2 25	0.3	≡ a. ≡ d □ □ ⊖ p.
3	N, NE				9.3	Ca.-S. EbyS	N. NEbyE	0 00	54.2	d ² a. ● ⊙ ⊙ p.
4	SE				9.9	Ca.	Cu.-N. SbyE		17.2	● ⊙ a. ⊙ ⊙ d ² ⊖ p.
5	SE, E	452.8	39.4	E	2.7	Ca.-S.	Cu.			⊙ a. ⊖ p.
6	SE	256.2	21.2	SE	3.7	Ca.-S. NNE	Cu. E	5 40		⊙ a. ⊙ a. p. ⊕ ⊖ p.
7	W, E	187.8	15	E	5	A.-Cu. ESE	Cu. E	4 55		⊙ a. □ □ ⊖ p.
8	E	179.4	14.8	SW	5.6	Ca.-S.	Cu. E	5 15		⊙ a. ≡ d ² ⊖ p.
9	W, E	200.3	16.7	SW	5.6	Ca.	Fr.-Cu. NEbyN	5 10	4.3	⊙ a. ● ≡ ⊖ p.
10	E	329.6	44.8	E	8.7	A.-Cu. ENE	Cu.-N. NE, E	0 25	9.2	⊙ a. ⊖ p.
11	E	963.9	59.5	E	9.9	Variable	Cu.-N. sequad.	0 00	2.3	⊙ a. ≡ d ² ⊖ p.
12	E	537.9	35.7	E	8.6	A.-Cu. SEbyS	Cu.-N. SSE	1 00		⊙ a. □ □ d ² ⊖ p.
13	SE, E	398.6	31.4	E	4	Ca.	Cu. SE, WSW	5 45	2.3	□ □ ≡ a. p.
14	E quad.	311.7	25.5	SE	4.3	Ca.	Cu. E	4 45		≡ a. ≡ a. p.
15	SE quad.	258.5	21.9	SE	2.1	Ca.	Cu. ESE	5 10		≡ p.
16	E	283	19.5	SE	5.4	A.-Cu. ESE	Cu. ENE	4 25	16.8	⊙ a. ⊙ ⊙ ⊖ p.
17	E quad.	291.3	21.9	E	4.3	Ca.	Cu. NEbyE	3 45		⊙ a. ≡ p.
18	E	243.3	23	E	.4	Ca.	Cu.	6 30		⊙ a. ≡ p.
19	SE quad.	244.8	17.9	SE	1.6	Ca.	Cu. ENE	7 25		⊙ a. ≡ p.
20	E	448.5	29.3	E	.3	A.-Cu., Ca.	Cu. E	7 40		⊙ a. ≡ p.
21	SE	309.8	25.2	SE	3.8	Ca.	Cu.	4 55		⊙ a. ⊖ p.
22	E, SE	276.9	21.4	E	4	Ca.	Cu.-N. ESE	4 55		d ² a. ⊖ p.
23	S quad.	179.7	19.6	E	5.1	A.-Cu.	Cu.-N. ENE	4 15		⊙ a. ⊖ p.
24	W	178.4	12.7	W	5	A.-Cu. ESE	Cu. E	4 05	.3	⊙ a. ⊖ p.
25	W	170.6	19.1	W	5.3	Ca.	Cu. E	3 30		≡ d ² ⊖ p.
26	E, W	242.7	17.9	E	6	Ca.	Cu.-N.	3 25	21.1	⊙ a. ≡ d ² ⊖ p.
27	E, W	315	26.2	E	10	Variable	Cu.-N.	0 25	1.8	● a. ≡ d ² ⊖ p.
28	SE	233.8	17.5	W	6.1	Variable	Cu. E	2 45	1.6	≡ a. ≡ p.
29	E quad.	215.7	19.3	E	5.9	Ca.	Cu. NEbyE	2 30	14	⊙ a. p. ● □ □ p.
30	E	458.8	28	E	9.6	Ca.-S.	Cu.-N.	0 00		● a.
Mean		315.2	24.8		5.6			3 43		
Total									145.4	

* All the mean values given in this table are deduced from six daily observations taken at 2, 6, 10 a. m. and 2, 6, 10 p. m.
^b The barometric readings of this station are not reduced to sea level.
^c The black bulb actinometer was broken during a typhoon on October 29.
^d This element is based on hourly observations taken from a quadruple register, which gives only eight possible directions of the wind.
^e The sunshine recorder was interrupted by the typhoon of the 3d to 4th.

Daily rainfall at the stations of the Weather Bureau, November, 1915.

Station.	Day of month.															
	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.
	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.
Glan				6.6												
Jolo								12	1.5							
Isabela, Basilan		0.5	8.1					5.1	.8			24.9	11.5	0.3		2.3
Zamboanga		9.2	9.3	.1	4.1											
Davao			5.1													
Cagayan, Misamis				.5												
Dapitan	5.8			12.7	12.7	29.2	.5	15	15.2	1	.8					
Butuan	3.3	2.5	9.9	.3		9.7			43.4			1.5	18.3		3.6	2.3
Dumaguete	6.6				3.6				7.9	1					6.4	3.3
Tagbilaran	6.4				1.8			15.5	17.8						3.3	
Iwahig		22.4	2.8	24.9		.1					.6	19.5	.5	7.9	2	
Surigao		58.9	.3		1.3			.5	.5	10.1	.3		.5	1.5	6.1	5.3
Maasin		40.1								13						4.9
Cebu	1.3	10.2							8.9	.5		9.7	.8			6.4
Iloilo	1.8		6.9								1.5				1	
San Jose Buenavista	1.5	16.3	5.6			2.3				7.4	4.8		2.6	.5		2.1
Cuyo	1.3	10.9	1.8		.8	.8				9.4	1.8		1			
Ormoc	31.2	91.4	17		15	8.1	.8	4.1	34.3	17.5	.3	6.1	2.1	1.8	3.3	11.7
Guiuan	2.8	60.2	.5		1.8	2.6	.3	27.9	2.3	15	2.5			4.8	17	1.3
Tacloban	4.2	64	19.6					1.5	5.9	4.5	11.4	4.8		3	10.3	.5
Capiz		5.2	30.7		1.3			.3	14.8	56.4	12.7	22.3	.3	1.5	.8	
Borongan		50.8	2	.3	.3			.3	14	14.7	5.8	9.9		9.4	8.9	2.3
Calbayog	13.5	61.5	39.7					23.1	51.4	15		2.5	.5	24.6	10.4	5.4
Masbate		41.1	12.5						31.2	24.6	2.8				5.4	
Romblon	22.1	26.9	119.9		1.3	1.3		8.9	2	16	16	6.3	33.5	16.5	7.6	18.5
Batag		92.7	50.9			12.4		20.3	1.3	109.5	8.6	6.4		30.5	1.3	2.8
Gubat	3.8	24.6	98.6			6.4			4.1	45.7	33.8			2.5	2.5	19.6
Legaspi	2.5	18	88.5			3.3	6.6	5.8	1.3	17.5	69.9			.8	1.5	4
Sumay, Guam	5.1			1.3	19.1	25.4	5.1	3.8	11.5					6.4		
Calapan	3		24.1	2.3	1	.5					87.7	1.6	1	2.8	1	.8
Virac	1	44.7	150.2		.5	.5		4.3	64	17	3	2.3				8.7
Nueva Caceres	11.4	49.2	93.6		.4			.1	43.9	71.9	15.7	27.2				
Batangas	1.5	4.6	71.6	2				12.4	.5	116.2	.5	1				3
Atimonan		3	121.3		15.7			32	20.3	83.3	7.1	13.7	31.5		2.3	4.6
Ambulong, Tanauan	3.8	3.8	30.2			.5		.8	2	106	1.3	7.9	1			
Paracale	.5	24.3	177.2		11.2	1.3	16.8	32.7	50.6	22.1	1.5	3	1		2.8	18.6
Santa Cruz, Laguna	4.6	6.1	88.1		.8	2.8		8.7	5.6	76.9	1.6		.8	.8	1.8	1.3
Manila	1.5	.5	105.4	39.5			.5			31.4	.4					2.1
Antipolo	2	4.8	130.6	1.3				9.1	8.1	37.1	2.5	3.8				6.1
Iba			61	23.7						6.4	3.3		4.6			
San Isidro	1.3		91.1	1						28.8	5.1					
Tarlac		3.8	61.5					35.8	5.6	35.1	6.9			6.4		
Baler	4.1		100.9	33	.5		1.5			136.9	111.8	24.1	1.8			.3
Dagupan	.8		117.1	3.8			1			8.4	3.5		1.4			
Bolinao	1		149.8	41.2	.5					3.3	8.6		3			
Baguio		3	54.2	17.2					4.3	9.2	2.3		2.3			16.8
San Fernando, Union			5.6							8.6	1	11.2				
Echague	1.8		50.1	7.4					.3	42.6	24.9		7.4			7.1
Candon					1.8					2.5						
Vigan			.5				1.9					5.1				
Tuguegarao	6.9		6.6	11.9					2	27.3	13.5	5.9	13.5	6.4		1.5
Laoag										5.8		9.7				
Aparri			9.1						9.6	10.4	17.5	13.5	1.3			1.8
Santo Domingo, Batanes	2.1	2.2	9.3							3.8	6.1	85	73.9	12.2	1.4	

Daily rainfall at the stations of the Weather Bureau, November, 1915—Continued.

Station.	Day of month.														Total.
	17.	18.	19.	20.	21.	22.	23.	24.	25.	26.	27.	28.	29.	30.	
	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.
Glan	4.1				4.1	0.3						3.8	1.8	12.2	56
Jolo		1.3			45.4			0.6	0.8			8.9	17.5	15.5	106.6
Isabela, Basilan		2.8	0.8		3.6		21.6	10.4	1.8	.8	11.4	12.7	1.5		118.3
Zamboanga		4.5		2.5				10.9				2		2.8	49.6
Davao				12.4		13.7			19.8			7.1	4.6	53.3	198.1
Cagayan, Misamis	3.8	1.3				12.2		.3							37.4
Dapitan	1.5	.8	14.2	2.5	7.6	59.2	1.5			2.8	33	7.4	6.4	41.9	320.3
Butuan	4.3		.8	1.3	.5	39.6				10.2		.3		4.3	156.1
Dumaguete	2.3		6.5	13.2	.5					10.7	4.3	13.7	3	10.9	95.9
Tagbilaran				3.7	1.5	14	5.1					1.5	.5		74.2
Iwahig	8.3	12.2					1.8			3.1		21.6		1.5	129.4
Surigao	.3	1.6	36.5	23.8	10.6	9.7					1.8	5	1.8	1.3	182.6
Maasin	8.4	16.3		16.8		24.9									135.6
Cebu	.5	.5	2	2.5								1			37.9
Iloilo	1.5	7.4					7.1			16.5				16.8	60.5
San Jose Buenavista					5.1					.3				17.8	66.3
Cuyo								1		27				1.5	57.3
Ormoc	1.8	3		.8	1.3	3	22.1					3		7.4	284.4
Guiuan	14.3	.6	9.9	18.8	21.8	9.6	41.7	11.2	5	2.8	1.3	.8	5.8	15.7	298.3
Tacloban	2	6.8	.8	1.7	5	29.5	3.2	1.3					2.3	9.1	191.7
Capiz	5.9	9.2	3.6	1	6.6	3	6.9	3.3					10.2	4.6	222.9
Borongan	8.1	.3	2.8	34	55.4	56.7	10.2		6.9	6.8	3.8	2	24.9	33.3	363.9
Catbalogan ¹	18.3			1.3	3.5	.3	3.3	1	.6	13.6	1.5		14.5	6.3	
Calbayog	19.8			3.8	9.1	20.1	1.3	8.9	3.5	10	3.8	13.2	12.7	.5	354.3
Masbate	13.4	4.6	1.8	3.3	14.8	9.2	.5							4.3	169.5
Romblon	11.5		4.1	3.8	3	.5	4.6	3.5	.3	52.1	16	8.1	21.8	1.8	427.9
Batag	33.2			12.4	2.8	24.1	35.6	10.2			1.5		10.9	1	468.4
Gubat	24.1	2.5	9.1	30.8	31.5	34.8	2.8	3	21.1	4.1		6.9	14	12.2	438.5
Legaspi	38.9	1.8	4	16.6	12.2	19.5	14.5	.8	.8	3.3			4.8	9.4	346.3
Sumay, Guam	14	22.9	3.8	6.4	1.3	7.6	2.5		20.3				3.8	24.2	189.6
Calapan	11	28.7	7.7	23.6	7.8	.8	5.6	2.6	1.8	1.8			.8	.5	218.5
Virac	21.6	6.4	8.9	20.9	16.7	12.5	11.2	14	6.4	22.4		9.4	11.2	50.3	510.9
Nueva Caceres		2.3	8.1	12.9	8.3	7.5	2.5	2	.1	.8			3.4	21.8	388.9
Batangas	.8		1.8	5.9	13.7	8.6	.3	17.5	.3				8.6		271.1
Atimonan	4.8	8.1	33.3	25.1	44.4	16	27.7	19.5	26.7	1		2.3	12.2	21.1	577
Ambulong, Tanauan			1.3	5.1	18	7.1				4.5	1.3	1			195.6
Paracale		7.1	43.2	27.7	44.4	8.4	28.3	20.1	8.4	1.3	7.4	8.6	7.2	124.2	699.9
Santa Cruz, Laguna	3.3	.5	2.3	3	23.6	7.1	1.1	3	3.3	1.1		3	4.9	2.8	259.2
Manila				5.3	8.6	.5				.7	6.3	4.6	.8		208.1
Antipolo	.5		1.3	1.8	14	1.5	.8	1	1.3	2	1.5	5.6	7.9	4.1	248.7
Iba	.3					4.6	.8			4.6		8.2	8.4		126.4
San Isidro										9					136.3
Tarlac								5.6		7.4	3		18		189.1
Baler	3.8		.8	.3	2.3					68.8	19.9			1.5	512.3
Dagupan	14.2						.3			29.5	.3				192.9
Bolinao					.3					2.8					210.5
Baguio								.3		21.1	1.8	1.6	14		145.4
San Fernando, Union									1.8	2				1.5	81.7
Echague	6.4		7.4	12.4	15.5	13.7	22.9		4.1	12.7	.8		59.9	30	327.4
Candon											9.1		14.8	10.2	43.5
Vigan											5.8		11.4	6.9	45.9
Tuguegarao			5.6	14	13.9	10.7	17.8	6.6	3.6	13.7	1.8	14.2	222.4	138.5	545.8
Laog					2.8							17	9.7	14.5	63.3
Aparri	.8	4.3	66.3	12.2	4.7	22.3	15.2	46.2	.3		2.3	18.8	25.4	14.2	296.2
Santo Domingo, Batanes	3.8	1.5	.5	4.8	2.6	3.3	5.3	23.6	35.8	48.1	24.9	13.9	3.2	2.2	369.5

¹ This station was opened on the 17th.

MAXIMUM AND MINIMUM TEMPERATURES AT THE STATIONS OF THE WEATHER BUREAU, NOVEMBER, 1915.

Day.	Jolo.		Isabela, Basilan.		Zamboanga.		Davao.		Cagayan, Misamis.		Butuan.		Dumaguete.		Iwahig.	
	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.
	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.
1	29.9	22.2	33.6	24.1	30.3	23.6	33.8	23	31.1	24	34	24	30.9	23.8	32.5	22.2
2	32.9	22.1	33.2	24.1	31	23.9	32.7	22.6	31.2	23.2	32.1	24.2	31	24.1	33.1	22.3
3	31.4	23.4	33.6	23.1	29.7	23.5	33.2	23.5	34	23	33.7	23.4	32.7	23.9	31.8	22.3
4	32.8	22.3	32.2	22.6	31.3	23.2	34.2	22	31.8	23.2	34.5	23.3	30.5	25	32.6	23.4
5	30.7	22.8	33.1	22.1	31.4	23.8	33.9	22.8	32	22.6	33.5	22.4	31.8	24.5	32.3	22
6	30.5	25.2	32.1	22.6	31.8	22.8	33.6	22.8	31.9	22.7	34	23.2	31	24.6	33	21.4
7	30.4	21.9	32.6	22.1	31.4	23.2	33.2	22.1	31.8	22.3	32.6	22.4	31	24.4	32	22
8	29.9	21.3	33.8	22.6	30.6	22.8	32.7	21.5	31.7	22.6	33.5	23	30.6	23.8	31.9	22.3
9	32.4	21.8	32.1	22.5	30	22.9	33.2	22.3	32.5	23.2	33.6	24.4	31.7	24.9	32.7	22.5
10	31	22.5	32.4	23.1	29.4	24.2	31.2	22.6	30.4	22.5	29	21.9	31.9	23.4	31.5	22.9
11	31.5	22.1	31.6	22.7	28.8	23.6	31.7	22.8	31.6	22.5	32.1	24.4	31.5	23.1	31.6	22.4
12	31.4	21.9	31.8	22.1	30	22.6	32.7	21.6	30.7	21.5	33.8	22.7	30.2	23.5	30.9	22.3
13	31.1	21.9	31.9	22.6	30.5	22.9	31.2	21.7	31.7	22.1	33.1	22.5	30.5	23.2	31	22.7
14	30.3	20.9	32.1	22.6	30.2	22.5	32.7	21.9	31.4	22.5	32.3	22.9	30.4	24	30.5	21.8
15	29.9	22.3	31.8	22.1	30.3	22.4	32.7	22	31.7	22.1	32.5	22.4	31.8	24	30.5	22.6
16	30.5	21.8	31.6	22.6	29.9	23.4	33.2	21.5	31.6	22.1	32.1	21.6	30.8	23.7	32.3	21.9
17	32.1	21.2	32.6	21.8	30.6	22.4	32.7	22	31.5	22	32.6	22.6	31.1	24.5	31.7	21.2
18	30.6	21.7	33	22.1	30	22.7	32.7	22.5	30.8	21.9	31.4	23.3	29.7	24	28	22.8
19	30.3	21.9	33.8	22.5	31.4	22.8	29.7	23	31.1	22.8	28.5	23.8	31.2	24.6	30.4	21.8
20	31.1	21.9	33.6	22.7	31.4	23.4	30	22	31.3	22	32.5	22.1	31	25.1	32	21.4
21	30.9	21.9	32.8	22.6	29.5	22.8	32.7	21.6	31.1	22.5	32.3	23.4	30.8	23.7	31.7	21.6
22	30.4	22.2	33.1	22.5	31.4	22.5	32.2	21.9	30.7	23	32	23.2	31.8	24.5	31.4	22.1
23	32.2	21.9	32	22.1	30.2	22.9	31.7	21.8	30.9	22	32.5	21.9	30.8	24.5	31.4	22.3
24	30.4	22.3	32.1	22.4	30.5	22.9	31.2	22.6	31.5	23.1	33.3	23.4	30.5	23.7	30.6	22.6
25	31.6	22.3	32.4	22.6	29.9	23	30.7	22.9	31.9	23.5	33	24.4	30.3	23.5	31.8	22.3
26	31.1	22.4	33.2	22.1	31.2	23.2	32.7	23	32.1	22.5	35	23.9	31.2	24.2	30.5	21.9
27	30.2	22.4	33	23.1	31.3	24	32.3	23	31.9	23.2	32	23.9	30.3	24.5	31.9	22.3
28	29.6	21.7	34.6	22.2	30.6	23.2	32.6	22.8	32	22.5	31.2	23.9	30.6	24.6	32	23.2
29	28.9	21.6	34.1	22.6	30.4	23.4	31.7	23	31.5	22.7	32.5	23	30.2	24	30.4	22.9
30	30.5	22.2	33.1	22.3	30	23.3	31.7	23.1	31.6	22.6	32.6	22.6	31.2	24.6	32.1	22.7
Mean	30.9	22.1	32.8	22.6	30.5	23.1	32.4	22.4	31.6	22.6	32.6	23.1	31	24.1	31.5	22.3

Day.	Tagbilaran.		Surigao.		Maasin.		Cebu.		Iloilo.		San Jose Buenavista.		Cuyo.		Ormoc.	
	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.
	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.
1	32.4	23.5	32.2	23.6	35.2	24.6	31.6	24.2	31.2	24.9	32.1	23.5	30.6	24	33.3	23.2
2	34.3	23.6	32	23.2	31	23	32.4	24	31	24.5	32.3	23.5	31	24.5	31.4	21.1
3	31	25.5	31.5	22.9	35	23.8	30	24.5	28.1	25.2	28.2	24	28.6	24.4	30	22.8
4	32.5	24.5	33.5	22.8		25	33.5	26.1	31.5	25.4	32.3	26.4	31.8	24.7	33.5	24.7
5	32.1	23.7	33.6	23.8	33	24.3	33.3	24.9	32.6	24.3	32.7	23.6	32.6	24.4	32.9	23.1
6	32.4	23	32.3	22.4	33	22.2	33	25.3	31.1	24.4	32.8	23.5	31.5	25.9	31.9	22
7	32.2	22.6	32	22.8	33.2	23.4	33	24.5	32	23.9	32.7	22.4	31.4	25.9	32.1	21.4
8	31.8	23.6	31.8	23.3	34	23.9	32.9	24	31.6	23.7	32.7	22.5	31.8	25.6	31.5	22.1
9	33.4	23.6	32.6	23.6	31.17	24	33.8	24.9	33.4	24.6	32.2	23.5	32.2	26.9	30.9	22
10	29.5	23.9	31.7	23	31.3	24.6	30	23.7	28.4	24.5	27.8	23	30.2	25.3	28.5	23.2
11	31.2	23.8	32.9	23.1	33	25.4	32	24.7	32	24.4	30.7	23	30.7	24.4	31.5	22.7
12	31.4	22.7	34.4	22.9	32	23.2	31.4	23.2	32.5	23.2	33.7	22.5	30.9	24.5	32.4	22.4
13	31.3	23	33.6	23.5	33.2	23.6	31.7	24	32	24	32.2	23	31.7	24	32.2	22.4
14	31	23.5	32.1	23	32.6	23.5	31	24.5	32.5	24	33.2	23.5	30.5	24.3	31.8	21.9
15	33.1	22.6	32.3	22.9	33	23.6	31.6	24.5	31.6	24.4	32.8	22.5	30.8	26.6	31.6	21.4
16	31.4	23	30.8	23.2	32.2	23	31	24.4	31.4	24.8	31.8	22.5	31	26.7	31.3	22.6
17	31.8	23	31.5	23.3		23.7	31.5	24.2	31.9	24	32.3	22	31.5	26.4	31.7	20.8
18	29.6	23	27.5	22.7	33.3	22.8	29.2	24.5	28.6	23.5	32.2	23.5	29.8	25	30.8	22.8
19	31.6	22.3	29.9	22.2	32.3	22.6	31.1	23.9	30.6	23.5	33.2	21.1	30.5	26.1	33	21.4
20	31.2	22	31.3	21.9	31.8	23	31.8	23.8	31.1	23.8	33.7	20	30.5	26.2	32.1	22.4
21	31.4	22.4	30.4	21.9	32	23.6	31.1	24	30.9	24	32.4	21.6	31.1	25.9	32	23.4
22	32.2	23	31	22.8	31.4	22.8	31	24.3	31	24	32.7	22.1	29.8	26.3	31.6	23.4
23	30.8	23.4	30.7	22.5	33	23.2	30.9	23.7	30.9	23.9	33.3	22.4	30.6	26.4	31.5	22.4
24	31.4	23.4	31.6	22.9	32.5	23.4	31.9	24.3	31.6	23.5	32.8	22.4	31.8	26.1	31.8	21.9
25	31.4	23.6	34.5	23.2	32	23	32	24.5	31.5	24	34.2	22.6	31.5	24.6	32	22.4
26	32.3	23.4	32.9	23.4	31.8	23.2	32.1	25	33.1	24	32.8	23.5	29.4	24.1	32.8	22.5
27	31.7	23.8	32	23.6	34	23	31.7	25	31.9	24	32.4	23.5	31.3	24.4	32.7	22.6
28	31.3	23.6	33.6	23.6	34	23.6	31.8	25	31.5	25.2	33.2	23.3	31.5	26.7	32.5	22.3
29	31.9	23.7	31	23.8	33.3	24	31.8	24.7	31.4	24.7	31.8	23.5	30.7	24.8	31.4	22.9
30	32.1	23.7	32.1	23.4	34.4	23.2	32.5	24.5	30.7	23.7	33.3	23	30.7	26.7	32.1	22.6
Mean	31.7	23.3	32	23	32.8	23.5	31.8	24.4	31.3	24.2	32.4	22.9	30.9	25.4	31.8	22.4

Maximum and minimum temperatures at the stations of the Weather Bureau, November, 1915—Continued.

Day.	Guiuan.		Tacloban.		Capiz.		Borongan.		Calbayog.		Masbate.		Romblon.		Batag.	
	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.
	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.
1	32.4	23.6	33.7	24.4	32.5	23.7	22.9	30.9	23.4	32.2	25.6	33.7	23.8	31.9	24.5	
2	32.2	22.9	30.6	23.5	32.5	25.5	22.5	33.7	21.9	32.5	25.2	35.2	23.7	30	25	
3	30.5	24.7	29.9	23.4	28.3	24.4	23	28.4	23.5	27.6	25.2	29.9	22.2	28	22.5	
4	34.8	25.6	32.4	23.4	34.7	24.4	22.9	36.9?	24.5	31.2	25.4	34.6	22	30.5	23	
5	32.7	24.9	33.4	24.5	32.8	24.7	24.5	34.4	23.2	32.6	24.8	34.2	23.3	30.5	23?	
6	32.2	24	32	23.6	32	26.1	22.7	34.2	22.6	32.6	21.5?	33.1	24.2	31	24.6	
7	33	23.6	33	23.5	32	24.2	22.7	34.2	22.6	32.6	25.2	33.5	23.8	30.9	23.5	
8	32.8	24.2	32.9	24	32.3	24.2	23.9	32.9	23.3	31.6	24	33.2	23.8	31	24.5	
9	31.4	24.2	30.9	24.2	32.8	24.7	23.9	32.5	23.8	33.4	22.5	33.5	23.7	29	22.5	
10	32	24.9	31.7	23.1	28.7	23.6	23.6	27.6	24.1	32.6	22.2	32.2	24.4	30	22.5	
11	32.2	24.6	31.9	24.3	32.9	23.9	23.5	32.2	23.4	32.4	23.6	32.6	23.5	31	24	
12	32.7	23.4	32.3	23.7	31.6	23.7	23	31.8	23	32.6	25.4	33.2	23.4	30.6	23.5	
13	32	24.4	31.4	24.1	31.8	23.9	23.3	30.3	23.2	31.6	23.4	33.5	23.4	29.9	23	
14	32	24.5	30.3	23.5	31.9	24.2	22.1	30.3	22.5	32.2	26.6	33.5	22.9	29.5	23.5	
15	32.5	24	32.3	23.5	31.4	24.6	22.7	31	21.7	30.6	25.2	33.7	24	30	23	
16	32	23.7	31.5	24.5	31.8	26	23	32.3	23.1	32.2	24.4	34	23.5	30.2	24	
17	33.1	23.1	31.8	23.3	32	24.5	22.3	29.8	22.6	29.4	26	32.3	23.4	28.9	23.5	
18	31.8	24.3	29.2	24	31.4	24	23.7	31.9	22	31.2	24	33.5	22.9	29.5	23	
19	32	26	33	23.2	30.3	25.2	22	32.8	20.4	31.2	25.2	32.3	24.5	30	23.6	
20	31.9	25.3	32.5	24	31.3	24.7	23.2	33.5	20.7	31.2	25.6	32.2	23.9	30.4	22.5	
21	31.5	24	30.6	23.2	31.3	25.2	22.4	32	22.6	30.8	23.6	33.1	24.5	28	23.5	
22	32.2	24.2	31.9	24	31.2	24.6	22.6	32.3	23.1	29.8	24.4	32.5	24.8	28.6	23.7	
23	31.1	23.9	27.6	24	31	25	24.2	31.7	23.6	30.6	24.4	32.8	24.6	27	23	
24	33	23.1	32	23.5	31.2	23.9	22.6	31.9	22.6	32.2	24.8	32.9	23.9	29.9	22.8	
25	33.5	24.1	31.4	23.8	31.4	24.2	23.2	31.2	22.9	31.6	24.6	33.2	24	29.9	23.5	
26	32.1	24.3	31.8	24.2	31.3	23.9	23.1	30.9	22.9	32.2	26	31.3	24.1	29.9	23	
27	31.7	24.1	32.2	23.9	31.6	24	23.1	32.4	22.9	31.8	25.6	32.7	24.4	30.5	23.6	
28	32.7	23.5	32.8	24.1	31.8	25.9	23.4	33.5	22.9	32.2	26	33.8	24.5	30.5	23	
29	31.9	25.6	31.8	24.3	31	24.5	23	31.2	23.4	32.6	24.6	34	23.8	30.5	24.5	
30	32	24	32	24.2	31.3	24.6	23.4	30.6	23.2	32.4	26.5	31.7	23.5	27.5	24.6	
Mean	32.3	24.2	31.7	23.8	31.6	24.5	23	32	22.9	31.7	24.7	32.9	23.8	29.8	23.5	

Day.	Gubat.		Legaspi.		Sumay, ^a Guam.		Calapan.		Virac.		Nueva Caceres.		Batangas.		Atimonan.	
	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.
	°C.	°C.	°C.	°C.	°C.	°C.	°C. (b)	°C. (b)	°C. (b)	°C. (b)	°C. (b)	°C. (b)	°C.	°C.	°C.	°C.
1	32.8	25.4	33.6	24.5	30	24.8							32.8	23.2	31.2	23.6
2	31.2	24.3	32.2	26.3	30	25							31.5	24.6	32	26.5
3	27.5	23.6			29.8	25.4							26.8	22.4	23.4	22
4	31.2	24.1	32.2		29.6	24.8						21.2	32	22.8	31.6	24.4
5	32.4	26.5	33.4	25.6	28.6	24.4						22.1	33	23.8	30	23.8
6	32.1	24.9	32.4	25.3	28.4	24.6						23.1	30.8	23.6	31.6	24
7	32.3	24.7	32.1	24.2	29.2	24.4						20.8	34.2	22	28.8	25.3
8	32.8	24.5	33.4	24	30	24.8						20.7	31.3	22.4	29.6	25.4
9	30.3	24.8	32.2	24.6	29.2	24.6						21.8	31	22	29.2	24.5
10	26.2	23.6	25.4	23.2	30	24.8						21.6	26.1	23.2	27.3	23
11	29.8	23.5	32	22.9	30	23.8					32.6	21.4	30.3	23.2	28.8	23.1
12	31	24	33.2	24	30.6	24.4					34.2	21.5	32.1	24.2	30	23.5
13	31.3	23.8	32.6	24.6	31	22.8?					33.7	21.7	32.8	23	29.3	22.6
14	31.8	24	32.7	25.5	30.6	23.6?					34.3	20.2	33.1	22.8	31.5	24.4
15	31.3	22.7	33.3	23	30.2	24.6					32	20.2	32.7	22.4	31.2	25.6
16	32	24.4	33.6	25	30.2	22.2			32.9	21.5	31.2	21	33.7	23.4	30.1	24.8
17	28	23.6	27.5	24.2	29.4	22.6?			29.3	22.3	29	21.6	33.7	23.1	30.4	26
18	30.9	23.4	30.4	25	28	22.8?			34.3	22.4	30.8	22.6	31.8	20	30.2	25.7
19	30.8	23.5	31.1	23	29.2	23.4	32	22.5	33	22.6	(c)	21.6	32.1	22.1	29.1	23.8
20	29.8	24	30.2	24.3	29	23.8	30.6	21?	31	22		21.6	30.9	23.3	28.6	24
21	29	23.1	31.5	23.9	30	24	28.8	23.2	31.8	22		21.2	28.8	22.3	26.9	23.9
22	27.5	22.2	30	24.1	27.8	23.8	31	23.6	31.4	21.7		21.9	31	22.8	28.9	23.8
23	29.6	23.6	29.5	23.5	29.2	22.8?	30.6	23.6	31.9	21.5		21.6	32	21.9	29	23.9
24	31.3	23.1	32.3	22.2	30.8	23.8	30.9	23.6	32	21.8		21.4	31.2	23	28.4	24.3
25	30	24.2	30.6	24	29.2	23.8	30.5	24.2	30	22.2		22.5	31.4	23.8	28.5	24.5
26	31.4	23.4	32.4	23.5	29.8	22.2?	30.3	24.6	29	23		21.7	31.6	23.7	29.9	24.6
27	31.6	24.2	31.7	23.9	29.2	22.4	31.1	22.8	33.1	21.8		21.6	32.9	23.9	29.1	23.6
28	31.8	24.7	33.5	26.2	30.6	21.6?	31	25.4	32.7	21.9		21.5	32.2	23	30	25.5
29	32	24	33.2	23	29.2	24.6	32.5	24.5	32.5	21.6		21.6	31.4	23	28.6	26
30	30.5	24.9	31.7	25.2	28.6	24.4	30.1	24	28.5	21.7		21.4	32	22.5	26.7	24.6
Mean	30.7	24	31.7	24.2	29.6	23.8						21.5	31.6	22.9	29.5	24.4

^a The minimum temperatures of this station do not seem to be very reliable, the minimum thermometer being possibly somewhat defective.

^b The thermometer shelters of these stations were destroyed by the typhoon of October 23.

^c The maximum thermometer of this station was broken in the morning of the 19th.

Maximum and minimum temperatures at the stations of the Weather Bureau, November, 1915—Continued.

Day.	Ambulong, Tanauan.		Paracale.		Santa Cruz, Laguna.		Manila.		Antipolo.		Iba.		San Isidro.		Tarlac.	
	Maxi- mum.	Mini- mum.	Maxi- mum.	Mini- mum.	Maxi- mum.	Mini- mum.	Maxi- mum.	Mini- mum.	Maxi- mum.	Mini- mum.	Maxi- mum.	Mini- mum.	Maxi- mum.	Mini- mum.	Maxi- mum.	Mini- mum.
	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.
1	30	22.2	31.5	24	31.7	22.7	31.9	23.5	32.4	21.9	31.5	22.6	30.4	23	33.2	23.3
2	31	24.3	31.8	25.5	31.2	23.7	31.3	24.3	32.5	22.8	32.5	22.8	32.1	24	34	23.6
3	26.2	23.8	27.4	23	25.7	23.4	26.4	23.3	25	21.7	29.5	21.4	27.7	22.6	28.2	22.2
4	30.4	23.9	32.4	24.6	31.6	21.5	31.2	23.3	31.6	19.8	28.2	22.6	30	22.2	30.5	22.8
5	32.3	23.4	31.6	23.7	33.1	22.3	33.6	23.6	33.6	23.1	30.7	24	31.9	24.4	32.8	22.8
6	30.3	24	30.2	24.1	30.6	23.3	30.6	23.4	31.4	22.1	31.5	22.5	32.4	24.3	33.5	23
7	31.8	23.3	30	23.8	31	21.8	31.7	22.2	32.2	21.2	31.9	21.5	31.5	23.1	33.8	22.4
8	31.5	23	30.2	23.7	31.1	23	31.5	22	31.4	21	32.1	21.1	32	22.4	34	22.2
9	31	24.2	30.8	24	31.6	23.7	30.8	23.6	31.1	22.5	31.6	22.4	32.1	23	34	23
10	25	23.3	27.1	24.2	26	22.9	26.5	23.4	25.2	21.5	30.3	21.3	26.5	23.1	34.2	22.5
11	29.2	23.3	31.6	23.5	28.6	23.8	30.4	23.5	29	21.8	31.4	23.2	29.5	23.2	29.2	22.7
12	29	24.2	30	22.9	31	23.5	32.2	23.4	32.2	22.8	33.1	24.7	28.5	23.3	32.2	23
13	31	23	29.8	22.9	31.6	23.6	32.8	23	31.9	22.2	33.2	22	31.4	22.8	33.4	23.1
14	31	23.7	31.5	23	30.9	23.5	31.9	23.1	32.6	22.2	31.6	21.7	31.5	23.3	34	23
15	30.3	23.7	30	24.2	30.1	22.3	30.4	21.5	31.5	20.3	31.3	20.9	31.6	22.5	33.4	22
16	31.6	23.5	31.2	25	31	22.8	31.5	21.4	30	20.1	31.2	20.5	31.5	21.4	33.8	21.8
17	29.4	23.2	30.2	25.6	28.9	22.9	30.5	22.1	31.5	22.2	31.7	21.7	30.5	22.6	33	22.2
18	30.1	22.5	29.6	25	29.9	20.9	31.9	21.5	31.1	21.1	32.1	20.5	31	21.8	32.2	21.8
19	30	22.2	30.6	23.9	29.9	23.2	31.3	21.8	31.6	20.3	32	18.4	31.7	19.9	33.1	19
20	30.7	23.5	28.8	24	29.4	23.4	32.2	22	31.4	21.6	31.5	21	31.7	22.3	32.5	19.8
21	27	23	28.6	23.8	28.9	22.7	31.4	23	31.2	21	32.2	21.4	32.7	22.8	33.4	20.1
22	29.2	23	29.6	24.1	29.5	23.7	31.3	23.2	31.2	21.4	31.9	22.2	31.5	23.3	33.4	21
23	29.4	23	29.2	24	29.6	23	31.3	22.6	31.1	21	31.5	21.7	31.6	22.5	33.8	21
24	30.6	22.8	27.4	24.8	29.2	23.8	30.5	23.1	30.1	21.3	31.3	22.5	31.4	21.9	34	21
25	31	23.9	29.6	24.8	30.6	23.4	31.5	23.3	31.5	22.2	31.7	21.7	32.4	22.4	34.3	22.3
26	30.2	24	29.2	23.5	30.6	23.8	31.1	23.6	28.6	22.2	31.7	21.6	32	23.3	34.5	22.4
27	30	23	30.6	23.5	30.9	23.8	30.8	23.8	31.2	22.4	31.7	23.6	30	23.7	33.2	23
28	29	23.3	30.4	25	28.7	23.9	30.6	23.1	30	22	31.8	21.9	31.7	22.8	33.8	23
29	31.3	23.3	30.4	25.2	30.9	23.2	30.7	22.5	30.8	21.5	31.5	21.7	32.1	22.4	33.4	22.4
30	29.7	24	27.2	24.7	28.1	23.5	29.9	22.6	29.6	21.5	31.9	22.5	30.1	22.8	31	22
Mean	30	23.4	30	24.1	30.1	23.1	31	22.9	30.8	21.6	31.5	21.9	31	22.8	33	22.1

Day.	Baler.		Dagupan.		Bolinao.		Baguio.		San Fernando, Union.		Echague.		Candon.		Vigan.	
	Maxi- mum.	Mini- mum.	Maxi- mum.	Mini- mum.	Maxi- mum.	Mini- mum.	Maxi- mum.	Mini- mum.	Maxi- mum.	Mini- mum.	Maxi- mum.	Mini- mum.	Maxi- mum.	Mini- mum.	Maxi- mum.	Mini- mum.
	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.
1	34	23.6	34.9	23.5	31.5	23.8	22.4	16	31.5	22.7	31	23.4	30	24.1	30.8	23.2
2	34.6	24.9	32.3	24.5	31.9	24	23.3	16.7	32	23.9	30.5	24.3	30.5	24.5	31.8	23.8
3		23.2	28.8	23.8	30.3	23.6	18.7	15.5	30.8	23	26.7	23.1	30	23.5	30	24.9
4			28.7	22.1	26.6	22.6	18.5	14.7	32.5		30	23.8	33.6	23	32.9	26.1
5			34.7	25	32.5	24.5	24.3	16.7	33.6	26	31.8	23	31.9	24.2	32.3	23.6
6	34.7	24.5	34.4	24.8	31.1	24.4	25.4	16	34	24	30.4	23.3	30.5	24.9	32.7	23.4
7	30.5	23.2	34.6	23.9	31.9	22.9	24.3	15.7	33	22.8	31.1	22.8	31	24.6	32	24.2
8	31	23.2	32.8	22.7	31.5	23.4	24	15.2	33.1	22.2	30.8	22.5	31.5	23.5	30.5	22.6
9	32	22.5	34.3	24.5	31.7	24.9	24.6	16.1	32.7	23.5	30.8	23.2	31.4	25.4	31.5	23.7
10	30	23.5	32.5	24.4	31.5	23.9	21.5	16.1	32.3	24	26.1	23	31	24	35.4	23
11	29.2	22	29.8	23.8	27.5	24.4	16.8	14.8	29	24.1	27	22.3	29.4	24.8	30	23.7
12	28.4	23.4	33.6	23.7	31.6	25	22.6	15.7	32.4	23	28.5	23	30	24.2	31	23.5
13	29.8	22	34.3	23.5	30.9	23.7	25.1	15.7	32.1	22.1	30.5	23.7	30.5	23.2	30.4	22.5
14	31.4	22	31.7	23.9	30	23.7	24.4	15.2	31.6	23	30.5	23.5	30.5	24.1	30	23
15	31.6	22	33.8	23.1	32	23.1	24.4	15.4	32	23	29.9	23.5	30	24.4	32	23.6
16	34.5	21.6	32.8	22.6	32	23	24.3	14.5	32.2	22.5	28.1	22.5	30.5	24	32.1	23.6
17	33.5	22.5	34.3	23.4	31.7	23.5	22.2	14.7	32.3	21.9	28.6	23	30.5	22.1	33.5	23.2
18	34.8	23.4	34.5	21.6	31.3	23	23.8	14	31.8	22.3	28	22.1	31.7	20.9	32.9	24.3
19	35.6	19.3	32	20.4	31.5	21.4	23.1	13.2	31.7	21.5	26.3	21	30.6	20.9	33.5	22.5
20	35.4	22.6	32.4	21.8	31.6	22.5	23.8	14.6	32.2	21.4	27.7	22.2	32.5	22.5	33.1	23.6
21	31.5	24	33	22.5	31.9	22.7	24.3	15.6	32.7	22.9	27.6	22.3	32	23	33.4	23.5
22	34.7	22.1	32.6	22.5	31.5	22.7	24.2	15.3	32.6	22.1	25.8	22.3	32.2	23.9	33.3	23.2
23	34.9	23.2	32.8	22.5	31.5	21.6	24	15.5	31.5	22.5	25.8	22.2	31.5	23.2	33.5	23.2
24	31.8	21.8	32.2	22.4	31.7	23	25.4	16.1	32.5	23.3	27.7	22.5	31.5	23.1	31.5	23.2
25	31.5	22.3	34.7	23.2	32	23.3	24.6	16.5	31.7	23.4	28.6	23.5	31.5	24.2	32.8	23.6
26	28.5	23.2	33.2	23.5	32.5	23.5	25.1	16.3	32.4	23.8	28.8	23.6	31	25	32	22.8
27	29.6	23.8	32.4	24	31.1	24.9	21.8	16	32	23.8	29.5	23.6	30	26.6	30.5	24.1
28	31.6	22.7	33.1	24	32.1	23.8	24.2	16.2	32	23.1	29.5	24.1	30.5	23.7	31	23.5
29	31.1	22.7	33.8	23.5	31.1	25.6	23.2	15.7	31.3	22.6	29	23.5	27.5	24	26.1	23.1
30	29.9	23	32.3	22.5	29.8	21.4	18.6	14.3	28.9	23.6	22.9	21.4	24	22	28	22.1
Mean	32.1	22.8	32.9	23.3	31.2	23.5	23.1	15.5	32	23	28.6	22.9	30.6	23.7	31.7	23.5

Maximum and minimum temperatures at the stations of the Weather Bureau, November, 1915—Continued.

Day.	Tuguegarao.		Laoag.		Aparri.		Santo Domingo, Batanes.		Dapitan. *	
	Maxi- mum.	Mini- mum.	Maxi- mum.	Mini- mum.	Maxi- mum.	Mini- mum.	Maxi- mum.	Mini- mum.	Maxi- mum.	Mini- mum.
	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.
1	34	23.3	32.2	23.3	29.5	23.8	29	24.5	32	23.3
2	33.8	23.8	33.3	23.5	30.1	23.8	31.8	25.3	33.6	22.3
3	29.2	22.6	31.2	22.7	29.7	25	29.5	25.2	32.5	22.8
4	30.8	24.7	35.7	26.4	30.5	24.8	29.9	25.7	32.8	23.8
5	34.6	23	32.8	23.4	32.4	24	30.5	26.3	34.5	23.5
6	35.5?	23.5	34.1	23.2	31.5	24.3	30.8	24.9	32.5	22.6
7	33.4	22.3	32.7	23.3	31.2	23.4	31.4	24.6	32	22.2
8	33.6	22.6	33.2	23	31	23.3	31.1	25.5	33.4	22.2
9	33.2	23	32.3	23.2	30.9	23.1	31.6	24.3	33.5	23
10	28.2	23	34.4	22	28.8	23.8	31.1	25.6	32.5	23.2
11	30.2	22.8	33.3	23.7	29.7	23.2	29.9	25	32.3	22.6
12	29.8	23.3	33.5	23.5	29.7	22.8	25.8	23.5	33	23.2
13	33.2	23.3	33.6	22.6	29.6	23	25.8	22.5	31.9	22.2
14	32.5	23.2	31.8	23.5	29.7	24.3	27	23	31	20.8
15	32	22.2	32.5	21.4	30.7	22.8	30.5	23.4	31.6	23.8
16	28.6	22.7	32.2	22.6	26.7	23.8	30.5	24.4	31.3	24
17	31.4	22.4	34.5	20.5	29.5	23	29	23.8	31.5	23.6
18	31.2	20.6	34.4	20.3	29.4	21.8	25.9	23.1	31.8	22
19	25.8	20.4	30.8	22	26.3	22.6	28.5	23.1	31.1	22
20	30.2	21.5	33.9	23.7	29	23.2	26.9	23.5	30.5	24
21	30.6	22.8	34.1	29	24.4	27	23.3	33.1	23.5	
22	30.5	22.3	32.8	23.4	28.5	23	28.8	23.3	31.5	23.2
23	28.2	22.3	32.2	22.3	28.1	23.2	28.4	23.6	31.7	23
24	31	22.2	32.7	24.2	28.8	23.3	27.8	23.3	33.5	23.2
25	32.4	23.4	33.3	23.2	29.7	23.8	26.3	23.5	33.6	23.3
26	32.2	23	34.2	22.1	29.8	23.6	25.5	23.6	32.5	22.8
27	31.4	24.2	33.4	23	29.7	23.8	26.6	23.1	32.5	23
28	30.6	23.4	32.1	22.6	28	23.4	22.7	32.3	23.5	
29	24.7	21.1	27.2	23.5	25.2	23.1	24.1	21.5	31.6	23
30	22.5	20.5	29.7	23	24.7	22.4	23.6	20.8	32.1	23.5
Mean	30.8	22.6	32.8	22.9	29.2	23.5	28.4	23.9	32.3	23

* Received late.



SEISMOLOGICAL BULLETIN FOR NOVEMBER, 1915.

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EARTHQUAKES FELT IN THE PHILIPPINES.¹

4, 5^h 21^m [4, 13^h 21^m]. **Surigao** (NE Mindanao). Earthquake shocks of intensity II-III.

8, 11^h 49^m 17^s * [8, 19^h 49^m 17^s]. **Dagupan** (W Luzon). Earthquake of intensity III.

8, 20^h 52^m [9, 6^h 32^m]. **Guam** (Mariana Islands). Earthquake of intensity III.

10, 3^h 50^m 55^s * [10, 11^h 50^m 55^s]. **N Samar**. Earthquake of intensity IV, felt chiefly in the northwestern part of that island. Its origin lay probably in the sea between the islands of Samar and Masbate.

10, 5^h 30^m 44^s * [10, 13^h 30^m 44^s]. **Baguio** (W Luzon). Earthquake of intensity III.

11, 7^h 01^m [11, 16^h 41^m]. **Guam** (Mariana Islands). Earthquake of intensity III.

12, 7^h 22^m [12, 15^h 22^m]. **Butuan** (N Mindanao). Earthquake of intensity II-III.

13, 10^h 54^m 55^s * [13, 18^h 54^m 55^s]. **Central Luzon**. Earthquake of intensity V, felt throughout the central provinces of Luzon, from that of Ilocos Sur to the Manila or Rizal province, covering an area more than 400 kilometers long in the N-S direction and about 230 kilometers wide, extending from the Baler Bay in the Pacific to the Zambales coasts in the China Sea. Its meizoseismic area comprised the oriental part of the Pangasinan province and the northern of Nueva Ecija, consequently the origin was in the seismotectonic line which crosses the Island of Luzon from the said Baler Bay to the Lingayen Gulf. This earthquake was registered by the seismographs of Butuan (Mindanao), Taihoku and Zikawei.

16, 0^h 08^m [16, 8^h 08^m]. **Ormoc** (W Leyte). Oscillatory earthquake, direction WSW-ENE, intensity IV-V, duration 8 seconds. It repeated with intensity III at 1^h 14^m [9^h 14^m]. The origin was in the known center existing near to the Camotes Islands.

18, 1^h 12^m 56^s * [18, 9^h 12^m 56^s]. **S Luzon and N Mindoro**. Earthquake of intensity III-IV felt in the provinces of Cavite and Batangas, and in the northern part of Mindoro Island. Its origin lay in the Verde island strait, which separates Mindoro Island from Luzon. There was a slight after-shock at 1^h 29^m 45^s * [9^h 26^m 45^s] and a second one of intensity III at 1^h 31^m 00^s * [9^h 31^m 00]. The origin of this last quake seems to have been farther to the ESE in the same seismotectonic line.

18, 20^h 20^m 22^s * [19, 4^h 20^m 22^s]. **N Luzon**. Extensive earthquake felt in the northern provinces of Luzon, Nueva Ecija, Tarlac, Zambales, Pangasinan, La Union, Montañosa, Nueva Vizcaya, Isabela, Cagayan, Ilocos Sur and Ilocos Norte. The meizoseismic area comprised the central part of the last province, its capital, Laoag, being the town most

¹ The intensity of earthquakes is given in the notation known as the Rosi-Forel scale. The time is that indicated by the seismographs at the Central Observatory whenever the disturbance has been registered by them. This fact is denoted by an asterisk (*). Otherwise the time is that noted by the observer who sent the report. All time indications are in Greenwich mean time (midnight = 0^h), insular time being in brackets for the convenience of Philippine readers.

affected. The intensity of the quake, judging from the cracks produced in some large masonry buildings and cracks and breaking of wooden frames in others of mixed materials, surely reached degree VII. The structures of Laoag more damaged were the provincial building, Constabulary Quarters and offices, the provincial governor's residence, and some few private houses; the cost of repairs has been calculated at ₱64,000. In the wooden houses and nipa shacks the loss was due to the breakage of household objects. A report says that some fissures opened in the sandy banks near the mouth of the Laoag river in the China Sea coast. It is also added that during the earthquake big waves were observed.

As no damage of any kind was reported from other towns it seems that the earthquake had its greatest intensity in the capital of the province, Laoag, and accordingly our observer states that it was stronger in that town than in any other situated NE or S of it. The fissures opened and the waves mentioned above show that the shocks were also very strong on the coast, which is some 6 kilometers distant from Laoag. The data at hand are too meagre to determine the extension of the meizoseismic area and to draw the isoseismals. But examining the reports from the different provinces where the shock was distinctly felt, it is evident that the earth movements lost more rapidly their intensity southwards than toward the east and northeast. So at Vigan, Ilocos Sur, some 70 kilometers south of Laoag, the shocks were not considered as extraordinarily strong and the observer gave the degree IV, all reporters from the more southern provinces giving III and II. The writer was that day in Baguio, SSE of Laoag and some 190 kilometers distant, as he at the time was walking did not perceive the shock, but it was felt by other persons at rest. Toward the east it was felt with intensity III in the southern part of the Cagayan Province at distances of about 130 kilometers, while in the northern part, at Aparri, it was considered as rather strong, degree V, and of long duration. The distance between Aparri and Laoag is about 120 kilometers in a ENE direction. Such an extraordinary intensity at such a distance leads us to believe that the meizoseismic area extended considerably toward the ENE and that the epicenter was really in the central cordillera or very close to it. This supposition explains the great intensity of the earthquake in the northern part of the Province of Cagayan and places its origin under a region already known for its instability or seismicity. The only objection is the report of the observer of Laoag, stating that the shock was more strong in that town than in any other situated N, E, or S of it; but the value of such statement is more than questionable, if it is remembered that there is not any important town east of Laoag and even less toward the ENE, being very near in these directions the Cordillera, a wide mountain region, inhabited only by some few scattered tribes settlements, wherefrom it is useless to expect any reports. Finally we can not consider this earthquake as a very local and superficial one because it was registered by most of the seismographs of the Far East, at distances of 4,000 kilometers and probably more.

25, 20^h 37^m [26, 6^h 17^m]. Guam (Mariana Islands). Earthquake shock of intensity II-III.

RECORDS OF THE MICROSEISMOGRAPH.

[Time: Greenwich mean. Midnight=0^h. Instrument: Wiechert seismograph; 1,000 kilograms. A_N: T₀=7.1; ε=2.08; $\frac{r}{T_0^2}$ =0.042; A_E: T₀=6.40; ε=2.31; $\frac{r}{T_0^2}$ =0.039. Alluvium. 2.40 meters above sea level.]

No.	Date.	Character.	Phase.	Hour.	Period.	Amplitude.		Remarks.
						A _N μ	A _E μ	
281	1	Iv	eP L F	5 14 08 14 21 17				
282	1	Iv	eP L F	5 47 13 47 38 52				
283	1	IIr	eP S L M _{E1} M _{N1} M _{N2} M _{E2} M _{E3} M _{N3} M _{E4} M _{N4}	7 30 12 36 08 42 10 46 06 46 26 48 19 48 49 50 53 52 07 54 10 56 58				NE Japan. End overtaken by the following earthquake.
					14		107	
					14	72		
					13	72		
					15		90	
					16		64	
					13	87		
					12		60	
					13	76		
284	1	Ir	e S L M _N M _E F	9 06 25 11 28 14 58 20 20 23 02 10 02				
					15	23		
					14		17	
285	3	Iv	eP L F	3 20 58 21 12 24				
286	5	Iv	eP L M _N M _E F	12 24 45 25 02 25 06 25 09 28				
					2	30		
					2		34	
287	6	Ir	eP L M _N F	9 39 35 43 34 45 35 10 02				
					5	7		
288	6	Iv	eP L M _E F	10 15 41 15 50 16 07 20				
					3		18	
289	8	Iv	eP F	11 49 17 52				Dagupan (W Luzon).
290	10	Iv	eP L M _N F	3 50 55 51 57 52 39 4 03				N Samar.
					3	24		
291	10	Iv	eP L M _N M _E F	5 30 44 31 09 31 23 31 28 39				Baguio (W Luzon).
					2	66		
					3		66	
292	10	Iv	eP F	11 04 56 07				
293	13	III _d	eP iL	10 54 55 55 14				Central Luzon. Maxima and end in both components lost by the force of the shock.
294	14	Iv	eP L M _E M _N F	23 26 19 26 33 26 40 26 54 37				
					3		200	
					3	151		
295	16	Iv	eP F	12 46 00 48				
296	18	III _d	eP iL	1 12 56 13 08				S Luzon and N Mindoro. Maxima in both components lost by the force of the shock. End overtaken by the following earthquake.

Records of the microseismograph—Continued.

No.	Date.	Character.	Phase.	Hour.	Period.	Amplitude.		Remarks.
						A _N μ	A _E μ	
297	18	I _v	eP	<i>h. m. s.</i>				Aftershock. End overtaken by the following earthquake.
			L	1 26 45				
			M _N	27 05	3	36		
298	18	II _d	eP	1 31 00				Aftershock.
			iL	31 22				
			M _E	31 25	5	199		
			M _N	31 31	3	217		
			F	43				
299	18	I _v	eP	2 21 39				
			L	21 54				
			M _N	22 11	3	24		
			F	25				
300	18	I _r	eP	4 08 47				
			S	13 46				
			L	16 09				
			M _E	19 17	12	18		
			M _N	19 26	10	14		
			F	56				
301	18	II _d	eP	5 20 18				
			iL	20 37				
			M _E	20 43	3	204		
			M _N	20 50	3	253		
			F	27				
302	18	II _d	eP	20 20 22				N Luzon. Maxima and end in E-W component lost by the force of the shock.
			iL	21 00				
			M _{N1}	21 12	4	1,038		
			M _{N2}	22 54	4	1,109		
			M _{N3}	25 36	5	1,164		
			F	21 01				
303	18	I _v	eP	21 02 46				
			L	02 58				
			F	06				
304	24	I _v	eP	7 54 53				
			L	55 03				
			M _E	55 06	2	36		
			F	57				
305	27	I _v	eP	8 38 28				
			L	38 48				
			M _E	39 11	3	19		
			F	45				
306	27	I _v	eP	17 12 00				
			F	15				
307	30	I _v	eP	23 15 12				
			F	18				

TEMBLORES DE TIERRA SENTIDOS EN FILIPINAS.¹

4, 5^h 21^m [4, 13^h 21^m]. Surigao (NE de Mindanao). Temblor de tierra de intensidad II-III.

8, 11^h 49^m 17^{s*} [8, 19^h 49^m 17^s]. Dagupan (W de Luzón). Temblor de tierra de intensidad II-III.

8, 20^h 52^m [9, 6^h 32^m]. Guam (Islas Marianas). Temblor de tierra de intensidad III.

10, 3^h 50^m 55^{s*} [10, 11^h 50^m 55^s]. N de Sámar. Temblor de tierra de intensidad III-IV sentido principalmente en la parte NW de la isla; su origen se hallaba probablemente en el mar, entre las Islas de Sámar y Masbate.

10, 5^h 30^m 44^{s*} [10, 13^h 30^m 44^s]. Baguio (W de Luzón). Temblor de tierra de intensidad III.

11, 7^h 01^m [11, 16^h 41^m]. Guam (Islas Marianas). Temblor de tierra de intensidad III.

12, 7^h 22^m [12, 15^h 22^m]. Butúan (N de Mindanao). Temblor de tierra de intensidad II-III.

13, 10^h 54^m 55^{s*} [13, 18^h 54^m 55^s]. Centro de Luzón. Temblor de tierra de intensidad V, sentido en las provincias centrales de la Isla de Luzón desde la de Ilocos Sur hasta la de Manila o Rizal, comprendiendo por consiguiente una extensión de más de 400 kilómetros en la dirección N-S y 230 de E a W, que es la que media entre las costas orientales y las occidentales de Luzón. Su epicentro encerraba la parte oriental de la provincia de Pangasinán y septentrional de Nueva Écija; originóse por consiguiente en la línea seismotectónica que cruza la isla desde el seno de Baler, en el Pacífico, al Golfo de Lingayén en el mar de la China. Fué registrado por los sismógrafos de Butúan, (Mindanao), Taihoku y Zikawei.

16, 0^h 08^m [16, 8^h 08^m]. Ormoc (W de Leyte). Temblor oscilatorio, dirección WSW-ENE, intensidad IV-V, duración 8 segundos. Repitió a 1^h 14^m [9^h 14^m] con intensidad III. El origen se hallaba en el conocido centro situado hacia las Islas Camotes. Fueron registrados tan sólo por el sismógrafo de Butúan (Mindanao).

18, 1^h 12^m 56^{s*} [18, 9^h 12^m 56^s]. S de Luzón y N de Mindoro. Temblor de tierra de intensidad III-IV, sentido en las provincias del S. de Manila, de Cavite y Batangas, y en la parte N de la Isla de Mindoro. El epicentro se hallaba en el estrecho llamado de Isla Verde, que separa la Isla de Luzón de la de Mindoro. Hubo una repetición a 1^h 26^m 45^{s*} [9^h 25^m 45^s] de intensidad II-III y otra a 1^h 31^m 00^{s*} [9^h 31^m 00^s] de intensidad III. El origen de esta última parece se hallaba más lejos hacia el ESE en la misma línea seismotectónica.

18, 20^h 20^m 22^{s*} [19, 4^h 20^m 22^s]. N de Luzon. Extenso temblor de tierra sentido en las provincias septentrionales de Luzón, Nueva Écija, Tárlac, Zambales, Pangasinán, La Unión, Montañosa, Nueva Vizcaya, Isabela, Cagayán, Ilocos Sur e Ilocos Norte. El área meizosísmica comprendía la parte central de esta última siendo su capital Laoag la que sufrió más sus efectos. La intensidad del terremoto a juzgar por las grietas causadas en algunos edificios de mampostería, grietas y roturas del maderamen en los mixtos, seguramente llegó al grado VII. Las construcciones más quebrantadas por el terremoto fueron el edificio del gobierno provincial, la comandancia de los constables,

¹ La intensidad de los terremotos se indica conforme a la conocida escala de Rossi-Forel. Cuanto a la hora de su ocurrencia, adoptamos la indicada por los sismógrafos de este Observatorio siempre que los hayan registrado, distinguiéndola por medio de un asterisco (*). En caso contrario copiamos la apuntada por los observadores que nos envían las notas. Todas las indicaciones del tiempo se refieren al tiempo medio de Greenwich (medianoche = 0^h). Para conveniencia de los lectores de Filipinas se añade también el tiempo insular.

la residencia del gobernador provincial y algunos otros de particulares, calculándose que los gastos de reparación ascenderán a ₱64,000. En las casas de madera y en las de caña y nipa las pérdidas se redujeron a la rotura de objetos. Abriéronse algunas grietas en los bancos arenosos del delta que forma el río de Laoag al desembocar en el Mar de la China. También se notaron allí olas extraordinarias durante el terremoto.

Como no se mencionan daños ocurridos en ningun otra población parece que el terremoto desarrolló su mayor fuerza en la capital, y conforme a esto el observador asegura que fué allí más fuerte que en ninguna otra población del N, E o S de la misma. Las grietas y las olas mencionadas más arriba demuestran también que fué muy fuerte en la costa del mar, distante unos 6 kilómetros de Laoag. No poseemos datos suficientes para determinar la extensión del área meizosísmica ni para trazar las otras líneas co-sísmicas. Examinando, empero, los *reports* recibidos de las diferentes provincias donde el temblor se sintió distintamente, resulta con evidencia que los movimientos de la tierra perdieron más rápidamente su energía hacia el S. que hacia el E y N. Así en Vigan, Ilocos Sur, unos 70 kilómetros al S de Laoag el temblor no fué considerado como extraordinariamente fuerte, y el observador le dió el grado IV; los demás *reports* de las provincias más meridionales le dan III y II. El autor de estas líneas se encontraba aquel día en Baguio que dista unos 190 kilómetros hacia el SSE de Laoag; pero como en aquella hora estaba en movimiento no sintió el temblor aunque lo sintieron generalmente las personas que se hallaban en estado de reposo. Hacia el E se sintió con intensidad III en la parte S de la Provincia de Cagayán a distancias de 130 kilómetros, mientras que en la parte N, en Aparri, se consideró como de intensidad V y tuvo larga duración. La distancia entre Aparri y Laoag es de cerca de 120 kilómetros, en dirección al ENE. Tan extraordinaria intensidad a tal distancia induce a creer que el área meizosísmica se extendía considerablemente hacia el ENE y que el epicentro se hallaba en la Cordillera Central o muy cerca. Tal suposición explica la mayor intensidad del temblor en la parte N de la Provincia de Cagayán y coloca su origen en una región ya conocida por su grande inestabilidad y sismicidad. La única objeción que se ofrece es el *report* del observador de Laoag en el que asegura que el temblor tuvo en dicha población más intensidad que en ninguna otra del N, E o S: mas semejante aseveración pierde mucho de su fuerza si se tiene en cuenta que no existe población ninguna importante al E de Laoag y menos al ENE, encontrándose luego la cordillera o extensa región montañosa habitada tan sólo por algunos pocos grupos de monteses, de donde es inútil esperar información alguna. Por último se debe notar que este temblor no puede de ningún modo considerarse como muy local y superficial puesto que fué registrado por la mayor parte de los sismógrafos del Extremo Oriente a distancias de 4,000 kilómetros y probablemente mayores.

25, 20^h 37^m [26, 6^h 17^m]. Guam (Islas Marianas). Temblor de tierra de intensidad II-III.

1. 2914
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THE GOVERNMENT OF THE PHILIPPINE ISLANDS

WEATHER BUREAU

MANILA CENTRAL OBSERVATORY

BULLETIN FOR DECEMBER, 1915

PREPARED UNDER THE DIRECTION OF
REV. JOSÉ ALGUÉ, S. J.
DIRECTOR OF THE WEATHER BUREAU

MANILA
BUREAU OF PRINTING
1916

BULLETIN FOR DECEMBER, 1915.

METEOROLOGICAL BULLETIN FOR DECEMBER, 1915.

By Rev. JOSÉ CORONAS, S. J.,
Chief, Meteorological Division of the Weather Bureau.

GENERAL WEATHER NOTES.

Pressure and temperature.—The mean atmospheric pressure for this month in the Philippines is considerably lower than the normal for December and than that of the preceding year. The highest pressures were observed on the 20th and 21st, and the lowest on the 6th and 7th.

The mean monthly temperature is either slightly lower than, or almost identical with, both that of the preceding year and the December's normal. The extreme temperatures for Manila were 32.2°C. on the 9th and 19.8°C. on the 4th. The absolute maximum and minimum temperatures for Baguio were 24.4°C., 12.7°C. on the top of Mirador, and 25.2°C., 12.2°C. in the valley.

PRESSURE AND TEMPERATURE AT THE FIRST AND SECOND CLASS STATIONS FOR DECEMBER, 1915.

Station.	Pressure.						Temperature.					
	Mean.	Departure from Dec., 1914.	Highest mean.	Day.	Lowest mean.	Day.	Mean.	Departure from Dec., 1914.	Highest.	Day.	Lowest.	Day.
Tagbilaran	757.52	-2.18	759.46	20	754.12	6	26.1	+0.2	32.3	1, 17	22.1	24
Surigao	57.35	-2.49	59.27	20	52.72	6	26.1	+ .1	34.1	7	20	5
Cebu	57.60	-2.33	59.44	20	53.75	6	27.4	+ .2	32.2	15	23	24
Iloilo	57.58	-2.10	59.49	20	53.48	7	26.4	- .3	32	10, 15, 16	22	6
Ormoc	57.76	-2.39	59.80	20	52.72	6	26	- .2	32.7	23	21.4	17, 29
Taloban	57.45	-2.35	59.79	20	49.57	6	25.9	- .5	32.7	17	21.5 ^a	6
Capiz	58.16	-2.11	60.37	20	52.63	7	26.4	- .3	33.3	8	22.3	7
Calbayog	57.65	-2.70	60.16	20	48.32	6	25.5	- .2			22.4	17, 23, 24
Legaspi	57.64	-2.81	60.36	20	47.26	6	26.4	- .7				
Atimonan	58.37	-2.38	61.78	20	45.06	7	25.7	- .8	32	9	22.4	6
Ambulong, Tanauan	57.62	-2.86	60.46	20	45.02	7	25.5	- .9	32.5	13, 23	19.1	6
Paracale	58.54	-2.62	61.72	20	46.88	7	26	- .2	31.8	8	22	7
Manila	58.39	-2.60	61.28	21	47.52	7	25.4	+ .1	32.2	9	19.8	4
San Isidro	58.76	-2.46	61.62	21	50.29	7	25.3	- .8	32.5	23	19	4
Dagupan	57.83	-2.32	60.76	21	50.30	7	26.5	- .5	34.8	10	20.6	6
Bolinao	58.12	-2.47	61.08	21	50.93	7	26.3	-1.2	31.6	3	20.4	24
Baguio ^b	638.20	-2.05	638.55	21	630.21	7	17.5	- .7	24.4	27, 28	12.7	23
Vigan	758.25	-2.26	761.20	21	751.39	8	26.5	- .2	33	4	20.5	24
Tuguegarao	60.33	-1.73	64.16	20	54.66	7	24.1	-1	33.3	29	19.2	21, 26
Aparri	60.77	-1.41	64.64	23	55.38	8	23.8	- .9	29.6	9	19.4	19

^a 28 days of observation only.

^b The barometric readings of this station are not reduced to sea level.

Rainfall.—The amount of rainfall for this month is considerably greater than that of December, 1914, and in a great number of stations is much greater also than the December's normal. At the Central Observatory the total monthly rainfall is 129.9 and 120.2 mm. above that of the preceding year and the normal of this month, respectively. The most abundant rains of the month were observed in Leyte, Samar, and central and southern Luzon during the typhoon of the 5th to 7th, of which we shall speak presently.

RAINFALL AT VARIOUS STATIONS OF THE WEATHER BUREAU DURING THE MONTH OF DECEMBER, 1915.

Station.	Total.	Departure from Dec., 1914.	Departure from normal.	Rainy days.	Departure from Dec., 1914.	Greatest rainfall in a single day.	Day.	Station.	Total.	Departure from Dec., 1914.	Departure from normal.	Rainy days.	Departure from Dec., 1914.	Greatest rainfall in a single day.	Day.
	mm.	mm.	mm.		mm.	mm.			mm.	mm.	mm.		mm.	mm.	
Glan	90.6			11	44.4	23		Legaspi	786.9	+617.1	+304	21	+1	177.8	6
Jolo	187.3	+118.5	+33.2	23	45.2	17		Sumay, Guam	165.1	+29.3		20	+3	33	24
Isabela, Basilan	320.8	+271.3	+175	18	129.8	29		Calapan	258	+137		25	+5	106.1	7
Zamboanga	143.4	+45.1		13	54	7		Virac	829	+584.4		22	+3	194	6
Davao	303.6	+227.7	+97.5	14	89.2	16		Nueva Caceres	990.7	+916.5	+688.7	24	+14	168.2	6
Cagayan, Misamis	186.6	+181.8		20	28.7	26		Batangas	345	+323.7		15	+7	233.6	7
Dapitan	378.8		+81.2	25	55.9	29		Atimonan	926.2	+802.1	+535.7	27	+11	355	6
Butuan	251.2	+177.7	-47.9	19	56.8	4		Ambulong, Tanauan.	264.8	+238.4		9	0	143.5	7
Dumaguete	370.2	+298.8		19	86.4	17		Paracale	998.3	+724.5		27	+5	204.1	6
Tagbilaran	98.4	+24.1	-55.4	14	16.8	2		Santa Cruz, Laguna	377.3	+254.7		19	+7	96.7	7
Iwahig	648.1	+417.9		22	232.1	19		Manila	182.3	+129.9	+120.2	13	-1	68.7	2
Surigao	334.2	-115.6	-198.6	21	98	31		Antipolo	318.6	+268.4		19	+7	81.6	7
Maasin	346.8	+145.3	+42.7	12	99.1	5		Iba	92.1	+83.4		7	+4	50.8	10
Cebu	92.1	+10.8	-56.3	21	22.9	13,31		San Isidro	123.7	+110.9	+75.1	12	+5	45.6	7
Iloilo	105.7	+52.4	-11.7	16	18.1	26		Tarlac	79.9	+78.1	+37.6	8	+6	46.3	7
San Jose Buenavista	122.5	+117.9	+62.2	18	39.1	13		Baler	231.2	-99.1	-124.9	19	+3	53.6	7
Cuyo	50.3	+35.5	1	10	13.5	10		Dagupan	20.1	+19.3	+5.8	8	+7	11.6	7
Rmoco	327.2	+212.2	+140.7	23	82.6	5		Ambulong	29.1	+23.7	+16	10	+7	10	12
Guinay	733.4	+497.2		25	126.7	5		Baguio	93	+85.5	+39.2	12	+5	27.5	14
Tacloban	552.5	+374.7	+197.1	25	117.9	5		San Fernando, Union	2.4	+2.4	-5.8	2	+2	1.3	8
Capiz	167.9	+142.3	-70.9	24	39.8	6		Echague	247.9	+157.1		24	+12	49.1	7
Borongan	812.3	+374.5	+198.1	25	79.2	5,23		Candon	3.8	-1.3	-7.9	1	0	3.8	11
Catbalogan	750.1			27	239.9	6		Vigan	44.9	+42.9	+37.5	5	+4	40.9	31
Calbayog	716.7	+671	+436.5	25	266.7	6		Tuguegarao	149.6	+90.1	+4.8	8	+1	41.4	11
Maabate	522.3	+459	+318.7	21	95	6		Laosag	37.3	+37.3		2	+2	27.9	11
Romblon	307.1	+205.3	+87.3	22	92.9	6		Aparri	302.9	+229.7	+53.8	24	+7	82.5	11
Batag ^a	605.5	+485.7?						Santo Domingo, Batanes	247.5	-109.5	-106.1	21	-2	62.8	7
Gubat	889.2	+669.1	+383.2	26	202.5	6									

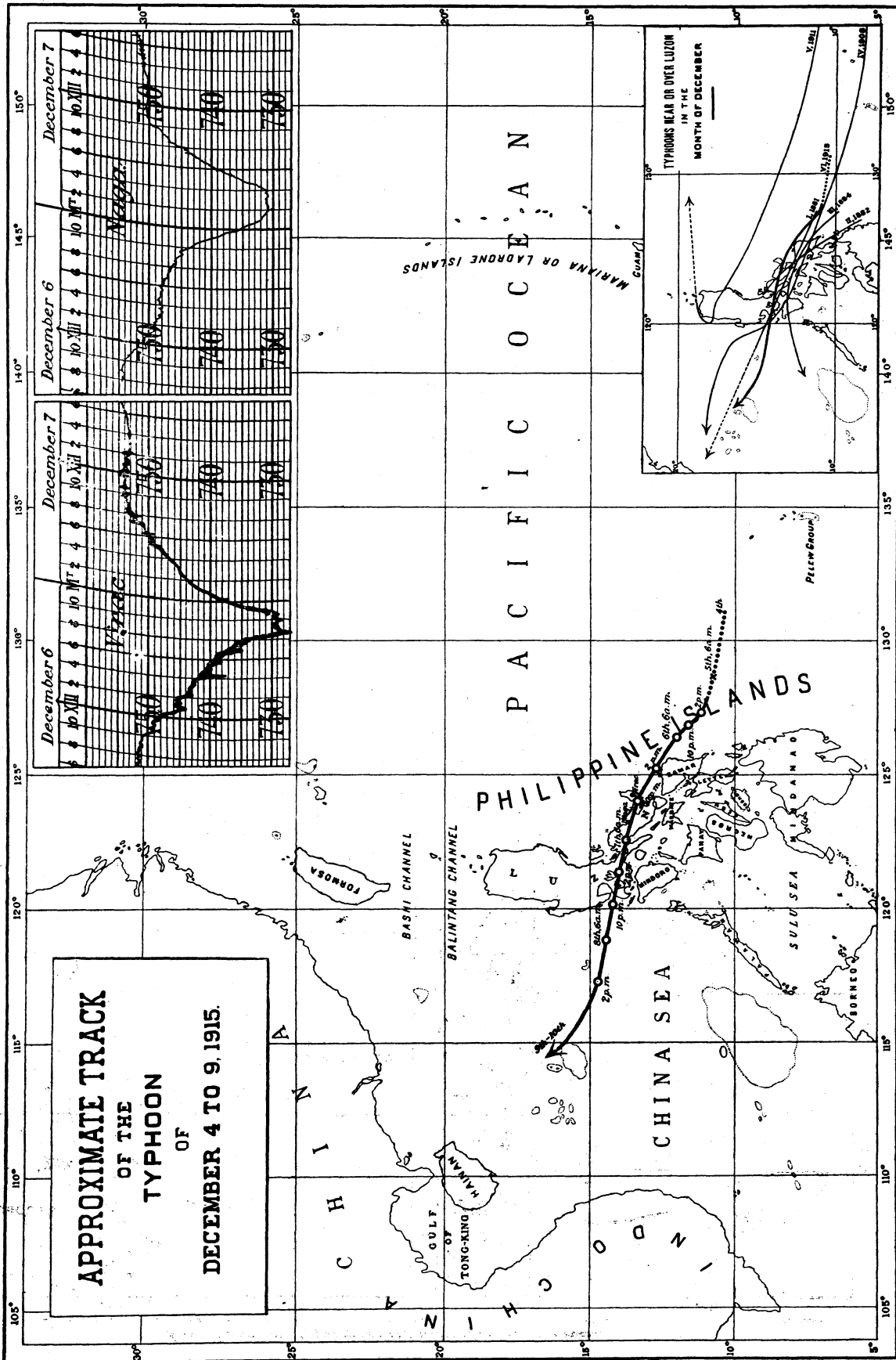
^a 29 days of observation.

THE TYPHOON OF SOUTHERN LUZON, DECEMBER 4 TO 9, 1915.

This typhoon, the last of 1915, crossed Luzon to the south of Manila on December 7. Although it is not frequent that a typhoon traverses the Philippines across the Island of Luzon or very near it in the month of December, yet we may mention five other cases which have occurred during the last 35 years: (1) December 12, 1881, about 30 miles south of Manila through the Province of Batangas, direction WNW; (2) December 31, 1882, through the western coast of Samar and the southeastern part of Luzon, direction NNW; (3) December 26 and 27, 1884, through northern Samar, moving NW, and then inclining westward across or very near the southernmost coast of Luzon; (4) December 6, 1908, about 60 to 70 miles south of Manila across the northern coast of Mindoro, direction WNW; (5) December 8, 1911, through the Province of Cagayan, in northern Luzon, very close to Tuguegarao, direction WNW. Our readers will see the tracks of these typhoons in Plate XIX. There was another typhoon passing across the southern part of Luzon on December 4, 1889, but it has been impossible for us to get sufficient information for tracing its track. It is stated in the daily records of the Manila Observatory that this typhoon bifurcated on the 3d or 4th, one branch going to the China Sea, the other to the Pacific Ocean. We have prescinded also from a few other depressions which had not a real development of a typhoon while over the Island of Luzon.

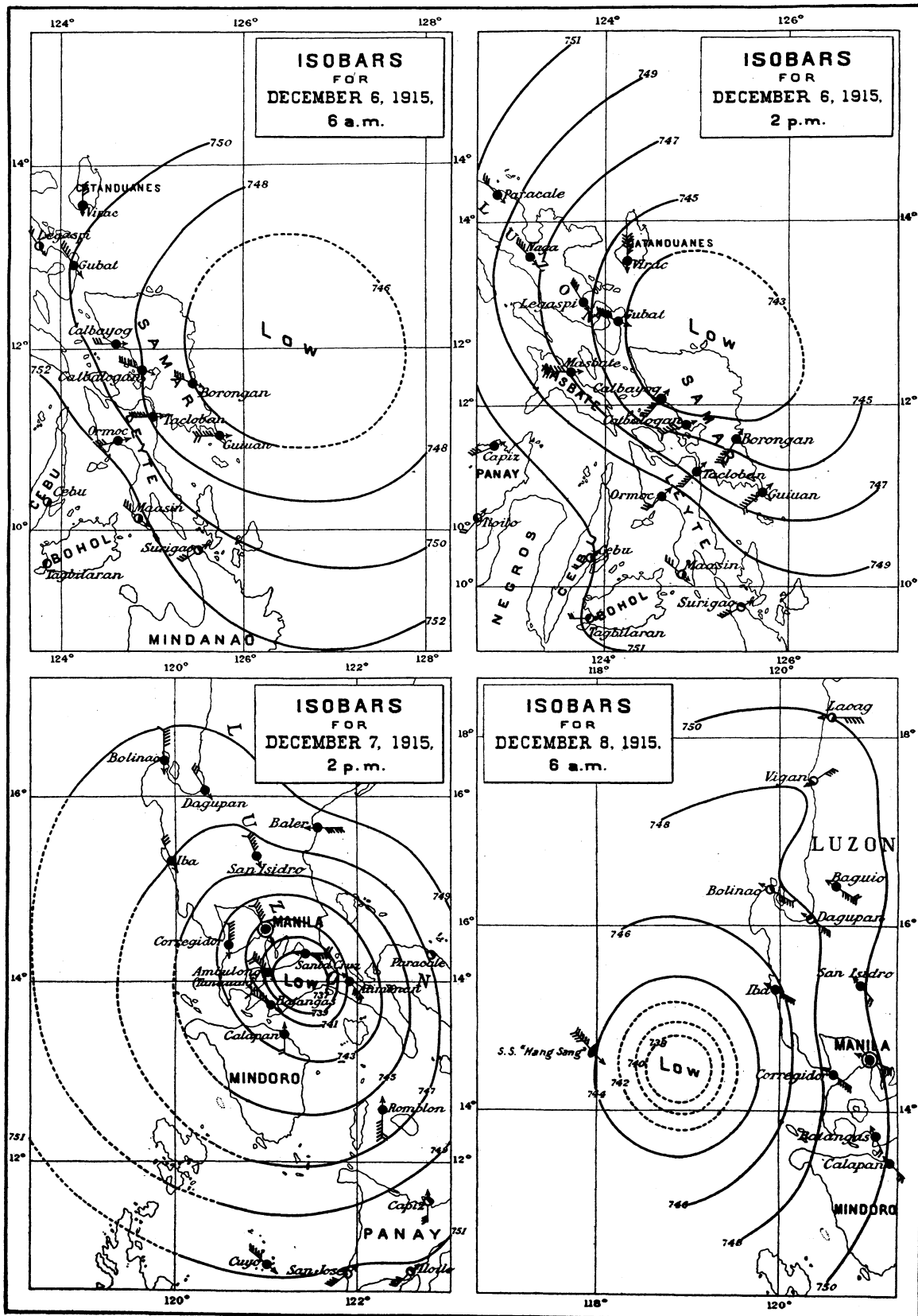
Origin of this typhoon; first signs in the Philippines.—No observations having been received from Yap, it has been impossible to ascertain the place of origin of this typhoon or to decide whether it formed near the Philippines or farther east in or near the Western Carolines. The first slight signs of a depression or typhoon to the east of the Visayas were noticed in the afternoon of the 4th in the observations of Samar, Leyte, and north-eastern Mindanao. Yet it was only in the morning of the 5th that the first definite warning could be sent out by Manila Observatory situating the center of the typhoon to the east of Samar moving W or WNW. The falling of the barometers was so decided at 2 p. m. of the 5th and the wind direction so clearly cyclonic in southern Luzon, the

Plate XIX



ISOBARS FOR THE TYPHOON OF DECEMBER, 1915.

Plate XX.



N.B. - The barometric readings have been reduced to standard gravity.

Visayas and Mindanao, that there was hardly any possible doubt of the existence of a well-developed typhoon between 11° and 12° latitude N and in about 127° longitude E moving at the time W or WNW. Proper warnings had been sent in the morning to all our stations, and typhoon signals ordered to be hoisted in southern Luzon and the Visayas.

The typhoon in the Philippines.—As the direction of this typhoon was changing considerably almost every day (see track in Plate XIX), it was a very difficult task to decide what part of Luzon was most threatened by the storm. Only after midnight of the 6th it appeared almost certain that the typhoon was to traverse the southern provinces of the island, following a path very similar to that of the typhoon of October 23. Accordingly timely warnings were sent during the night to all our observers southeast and south of Manila.

In Plate XX we offer to our readers the isobars for 6 a. m. and 2 p. m. of the 6th, 2 p. m. of the 7th, and 6 a. m. of the 8th. It is clear from them that the center of the typhoon passed very close to the northeastern coast of Samar in the afternoon of the 6th moving WNW or NW by W; it was near Lucena to the south of Santa Cruz, Laguna, at 2 p. m. of the 7th; and it had moved into the China Sea, to the west of Manila, at 6 a. m. of the 8th. During the 7th and part of the 8th the typhoon was moving W by N.

It is much to be regretted not to have any observation from Batag as the observer was caught by the typhoon in a neighboring town. The barometric minimum must have been very low there, and the force of the winds terrific. The observer reported that 90 per cent of the houses were practically destroyed by hurricane winds, and that the crops were greatly damaged. He further adds that in Calomotan, a suburb of Laoang, out of 200 houses there remained only three after the typhoon.

Our observer at Virac failed also to make extra observations during this typhoon as he was too busy in saving the instruments and every thing else from the heavy rain and the fury of the winds. The station was much damaged and unroofed. From the barographic record we see that the barometric minimum recorded there was about 727 mm. from 8 to 10 p. m. (See Plate XIX.) Relative calm was observed from 9.46 to 10.27 p. m. according to the observer's report.

In the following table we publish some of the observations taken at Legaspi and on board the steamship *Batangueño* anchored at Sorsogon Bay.

METEOROLOGICAL OBSERVATIONS FOR DECEMBER 5 TO 7, 1915.

Date and hour:	S. S. "Batangueño," anchored at Sorsogon Bay (Capt. A. Diokno).			Legaspi.				
	Pressure.	Wind.		Pressure.	Wind.		Weather.	Rainfall every 4 hours.
		Direction.	Force.		Direction.	Force.		
Dec. 5:	<i>mm.</i>		<i>0-12.</i>	<i>mm.</i>		<i>0-12.</i>		<i>mm.</i>
4 a. m. -----	758.5	NE	3					
6 a. m. -----				756.27	NNE	3	o	
2 p. m. -----				55.25	N	3	o	1.3
4 p. m. -----	56.8	NW	2					
Dec. 6:								
2 a. m. -----	54.6	NW	5	53.73	NW	3	o	
6 a. m. -----	52.4		2	52.44	NW	2	o	3.8
8 a. m. -----	52.4			51.74	WNW	1	o	
10 a. m. -----	51			51.36	N	4	o, r	40.1
Noon -----	49.5			49.55	N	4	o, r	
1 p. m. -----				47.96	NW	4	o, r	
2 p. m. -----	47		3	47.25	NNW	4	o, r	34
3 p. m. -----				46.61	NW	3	o, r	
4 p. m. -----	43.5		5	45.07	WNW	5	o, r	
5 p. m. -----				44.61	NW	5	o, r	
6 p. m. -----	43.3			43.94	NW	5	o, r	55.4
7 p. m. -----				42.69	NW	5	o, q, r	
8 p. m. -----	40	W	3	40.50	NW	5	o, q, r	
9 p. m. -----	38		6	38.21	WNW	6	o, q, r	
10 p. m. -----	39		10	34.83	SW	8	o, q, r	17.3
11 p. m. -----				34.20	SW	8	o, q, r, l	
Midnight -----	39.5		12	35.40	SW	8	o, q, r	
Dec. 7:								
1 a. m. -----				38.10	SW	8	o, q, r	
2 a. m. -----	45		8	40.82	SW	7	o, q, r	19.3
3 a. m. -----				42.33	S	6	o, q, r	
4 a. m. -----	47.	S	8	44.38	S	6	o, q, r	
5 a. m. -----				46.56	SE	5	o, q, r	
6 a. m. -----	50		5	48.05	SW	5	o, q, r	11.7
8 a. m. -----	52			50.68	SE	4	o, d	
10 a. m. -----	54		3	52.21	S	4	o, d	10.2
Noon -----	52.5		3	51.88	S	3	o	
2 p. m. -----	52		2	51.37	S	3	o	
6 p. m. -----	54			52.99	S	6	o	
10 p. m. -----	55			54.77	Calm		o	

NOTE.—Capt. A. Diokno, of the steamship *Batangueño*, said: "At 5 p. m. were about 12 miles S of Bondoc Point and continued with great speed toward Aguja Point. Rough seas and fresh north-westerly winds. At 6 p. m. we anchored at Magallanes Harbor; 8 a. m., considering this harbor too small to endure there a typhoon and obliged by the considerable falling of the barometer, we sailed for Sorsogon Bay where we anchored with two anchors and a good number of chains. We stayed in this place and prepared for the typhoon that was approaching; 8 p. m. of the 6th the winds began to back to W increasing in fury later. Between 11 and midnight of the 6th, gigantic waves were reaching the bridge, covering the deck with water. Then we began to throw everything we had on deck and only after this the ship was more stable although struggling hard with the winds and waves."

The following observations made at Naga and Atimonan may be of interest to our readers:

METEOROLOGICAL OBSERVATIONS FOR DECEMBER 5 TO 9, 1915.

Date and hour.	Naga.					Atimonan.				
	Pressure.	Wind.		Weather.	Rain in 24 hours, beginning 6 a. m.	Pressure.	Wind.		Weather.	Rainfall.
		Direction.	Force.				Direction.	Force.		
Dec. 5:	<i>mm.</i>		<i>0-12.</i>		<i>mm.</i>	<i>mm.</i>		<i>0-12.</i>		<i>mm.</i>
6 a. m. -----	757.44	N	2	o		758.10	NE	5	o	1.3
2 p. m. -----	56.36	N	3	o	1.3	57	NNE	6	o	
Dec. 6:										
6 a. m. -----	54.35	NNW	4	o, d		55.91	NbyW	7	o, q	
10 a. m. -----	53.76	NW	6	o, q, r		56.75	NbyW	7	o, q	
Noon -----	51.45	NW	4	o, r		55.38	NWbyN	6	o, q	
1 p. m. -----	50.55	NNW	5	o		54.47	NNW	6	o, q	
2 p. m. -----	48.97	NW	4	o, r		53.63	NWbyN	5	o, q	.5
3 p. m. -----	48.37	NNW	3	o		53.14	NW	3	o, r	1.8
4 p. m. -----	48.36	NNW	5	o, q, r		52.85	NWbyN	4	o, r	1.8
5 p. m. -----	48.42	NNW	5	o		53	NWbyN	3	o, d	.3
6 p. m. -----	48.12	NNW	7	o, q		53.11	NW	4	o, r	1.3
7 p. m. -----	46.92	NW	7	o, q		52.79	NW	6	o, q, r	5.3
8 p. m. -----	46.22	NW	6	o, q		52.96	NW	4	o, q, r	3.6
9 p. m. -----	45.02	NW	7	o, q		52.26	NW	4	o, q, r	2.5
10 p. m. -----	42.64	NW	8	o, q		51.65	NW	5	o, q, r	4.1
11 p. m. -----	38.32	NW	8	o, q		49.88	WNW	6	o, q, r	10.4
Midnight -----	35.42	NW	8	o, q	168.2	49.14	NW	6	o, q, r	16
Dec. 7:										
1 a. m. -----	32.40	NW	8	o, q		48.24	NW	6	o, q, r	30
2 a. m. ^a -----	31.28	Calm		o		47.43	NW	9	o, q, r	38.1
3 a. m. -----	31.49	Calm		o		46.42	NNW	10	o, q, r	48.3
4 a. m. -----	31.50	SE	3	o		45.61	NW	9	o, q, r	50.8
5 a. m. -----	36.45	SE	9	o, q		44.25	NW	11	o, q, r	73.7
6 a. m. -----	40.74	SE	10	o, q, r		43.73	NNW	10	o, q, r	66.5
7 a. m. -----	43.42	SE	10	o, q		42.93	NNW	10	o, q, r	
8 a. m. -----	46.05	SE	10	o, q, r		41.72	NbyW	11	o, q, r	
9 a. m. -----						39.62	NNE	10	o, q, r	
10 a. m. -----						38.05	NNE	9	o, q, r	^b 88.9
11 a. m. -----						38	NE	5	o	
11.30 a. m. -----						^c 37.91	NE	2	o	
Noon -----	51.89	SE	2	o, d		38.12	SE	2	o	
2 p. m. -----	51.01	SE	2	o, r		43.13	SE	5	o, q, r	49.5
6 p. m. -----						47.31	E	4	o, q, r	26.7
10 p. m. -----					62.8	50.69	SE	5	o, q, r	25.4
Dec. 8:										
6 a. m. -----	55.21	E	2	o, r		53.08	SEbyS	3	o, r	23.4
2 p. m. -----	54.82	SE	1	o		53.82	SbyE	3	o	2
Dec. 9:										
6 a. m. -----	57.33	Calm		c		56.67	SbyE	2	c	

^a The vortical calm lasted for over one hour until some minutes after 3 a. m.; 3.30 a. m. winds veering from E to S. During the calm some light winds from the NE quadrant were observed; the sky cleared up; some stars were visible.

^b Every four hours.

^c 11.30 a. m. very light winds; weather clearing up.

It will be noticed in these observations that relative calm was observed at Naga with a barometric minimum a little above 731 mm., while at Atimonan the same relative calm occurred with a barometric minimum not lower than 737.90 mm. From this it would appear that the typhoon was much less developed when it passed near Atimonan than when it was over Naga; and again that it was even more intense and better developed when passing close to Batag and Virac than when it struck Naga. It was generally reported from the provinces of Ambos Camarines and Tayabas that this typhoon was much less severe than that of October 23; and more damage was done this time in the Provinces of Tayabas, Laguna, Batangas, and Cavite by the floods and heavy rains than by the force of the winds.

In the following table we offer to our readers the observations taken at Batangas and Ambulong while the center of the storm was passing to the south of Manila and north of Batangas.

METEOROLOGICAL OBSERVATIONS FOR DECEMBER 6 TO 9, 1915.

Date and hour.	Batangas.					Ambulong, Tanauan.				
	Pressure.	Wind.		Weather.	Rainfall.	Pressure.	Wind.		Weather.	Rainfall every four hours.
		Direction.	Force.				Direction.	Force.		
Dec. 6:	<i>mm.</i>		<i>0-12.</i>		<i>mm.</i>	<i>mm.</i>		<i>0-12.</i>		
6 a. m. -----	757.23	NE	1	c	-----	756.28	NE	2	c	-----
2 p. m. -----	54.20	W	2	o	-----	54.06	NE	1	o	-----
10 p. m. -----	53.82	NW	2	o	-----	53.21	NW	2	o, d	-----
Midnight -----	53.33	NW	2	o, r	1.0	52.88	N	1	o	-----
Dec. 7:										
2 a. m. -----	51.33	NW	3	o, r	9.7	50.23	WNW	3	o	-----
4 a. m. -----	49.61	W	4	o, r	11.7	48.57	NW	4	o	-----
6 a. m. -----	49.07	WNW	7	o, q, r	16.3	48.04	NW	5	o	-----
7 a. m. -----	48.96	WNW	6	o, q, r	6.6	48.22	NW	5	o, d	-----
8 a. m. -----	48.46	WNW	6	o, q, r	5.8	47.47	NW	7	o, q	-----
9 a. m. -----	48.12	WNW	7	o, q, r	9.9	46.86	NW	7	o, q	-----
10 a. m. -----	47.57	WNW	6	o, q, r	6.9	45.22	NW	7	o, q, r	21.6
11 a. m. -----	46.71	WNW	7	o, q, r	10.9	45.09	NW	7	o, q, r	-----
Noon -----	44.18	WNW	7	o, q, r	13.2	43.47	NW	8	o, q, r	-----
1 p. m. -----	43.55	WNW	7	o, q, r	15.7	40.62	NW	8	o, q, r	-----
2 p. m. -----	42.83	WNW	7	o, q, r	17.3	39.03	NW	8	o, q, r	63.5
3 p. m. -----	41.63	W	8	o, q, r	18	38.44	Variable	4	o, q, r	-----
4 p. m. -----	42.08	WSW	7	o, q, r	12.4	38.71	E	3	o, d	-----
5 p. m. -----	42.80	SW	6	o, q, r	48.8	39.31	E	4	o, d	-----
6 p. m. -----	43.43	SSW	7	o, q, r	13.7	41.87	SE	7	o, q, d	33
10 p. m. -----						45.70	SE	7	o, q, d	1.8
Dec. 8:										
2 a. m. -----						47.48	SE	5	o, r	-----
6 a. m. -----	51.61	SSE	2	o, r	54.4	51.03	SE	3	o, d	23.6
2 p. m. -----	53.34	SE	1	o, r	15.5	52.73	SSE	3	o, d	2.8
Dec. 9:										
6 a. m. -----	56.63	NE	1	b	2.5	56.16	Calm	-----	o	1
2 p. m. -----	55.39	SSE	2	c	-----	54.66	NE	1	c	-----

The rate of progress of this typhoon across the southern part of Luzon was somewhat less than 10 miles per hour. Its direction was W by N.

The typhoon in the China Sea.—Through the courtesy of the Director of Hongkong Observatory we are in possession of very valuable observations taken on board the steamer *Hang-Sang* in the China Sea. They are given in the table below. The attention of our readers is invited to the interesting description of the vortical region passing over the steamer, as given in the column "Remarks."

METEOROLOGICAL OBSERVATIONS MADE ON BOARD THE STEAMER "HANG-SANG," DECEMBER 7 TO 9, 1915
(CAPT. SPENCER WILDE).

Date and hour.	Position.		Pressure.	Wind.		Remarks.
	Latitude north.	Longitude east.		Direction.	Force.	
Dec. 7:	° /	° /	mm.		0-12.	
6 a. m. -----	16 35	116 56	757.67	NEbyN	5	
2 p. m. -----	15 34	117 22	57.16	N	5	
6 p. m. -----	15 02	117 35	54.37	N	5	Very curious pinkish glow in the sky at sunset. Sun not visible.
10 p. m. -----	14 34	117 50	53.60	N	9	
12 midnight ---	14 31	117 56	52.33	N	9	
Dec. 8:						
2 a. m. -----			49.54	NbyW	7-8	
3 a. m. -----			48.52	NbyW	7-8	
4 a. m. -----			48.27	NbyW	7-8	
5 a. m. -----			48.27	NNW	9	
6 a. m. -----			45.98	NW	11	
7 a. m. -----			44.71	NW	12	
8 a. m. -----			38.87	NW	12	Very heavy rain.
9 a. m. -----	14 47	118 00?	34.81	NNW-NE-SE	3-0	At 9 a. m. ship in storm center. High confused NNW sea. Sky overcast, sun trying to break through; hazy horizon with heavy cloud bank all round, about 10° high. Several small birds, including a bat, flying about; also flies of the hornet species; wind gusty between NE and SE.
10 a. m. -----			36.33	SE	2	
11 a. m. -----			35.32	ESE	2	
Noon -----			35.82	SE	3	
1 p. m. -----			35.06	SE	7-8	
2 p. m. -----			35.06	SE	9-11	
3 p. m. -----			36.33	SE	9-11	
4 p. m. -----			36.33	SE	9-11	
5 p. m. -----			38.87	SEbyS	8	At 1.30 p. m. wind came away from the SE in a violent squall, force 11, with very heavy rain.
6 p. m. -----			39.63	SSE	8-6	
7 p. m. -----			41.41	SSE	8-6	
8 p. m. -----			44.21	SSE	8-6	
9 p. m. -----			45.48	SSE	8-6	
10 p. m. -----			47	S	8-6	
11 p. m. -----			48.78	S	7-6	
12 midnight ---			49.03	S	6	
Dec. 9:						
2 a. m. -----			52.59	S	6	
4 a. m. -----	15 13	118 56	52.84	S	5-6	
6 a. m. -----			53.35	SSW	5-6	
10 a. m. -----	15 52	118 32	55.13	SSW	4	
2 p. m. -----	16 20	118 14	53.86	SSW	4	
10 p. m. -----	17 14	117 41	56.40	SSW	4	

It would seem from these observations, as compared with those of the Philippines of the preceding days, that the typhoon had probably increased again in intensity after leaving the Philippines in the evening of the 7th. Yet it was on the 9th that it began to fill up rapidly, any sign of the storm having disappeared entirely in the afternoon of the 10th.

NOTAS GENERALES DEL TIEMPO.

Presión y temperatura.—La presión atmosférica media de este mes en Filipinas es considerablemente menor que la normal de Diciembre y que la del año anterior. Las presiones más altas se observaron los días 20 y 21, y las más bajas el 6 y el 7.

La temperatura media mensual es casi idéntica o ligeramente menor que la del año pasado y que la normal de Diciembre. Las temperaturas extremas de Manila fueron 32.2° C. y 19.8° C., observadas los días 9 y 4 respectivamente. Las temperaturas máximas y mínimas absolutas de Baguio fueron 24.4° C., 12.7° C. en la cumbre del Mirador, y 25.2° C., 12.2° C. en el valle.

Precipitación acuosa.—La cantidad de agua caída en este mes en Filipinas es considerablemente mayor que la de Diciembre, 1914, y en gran número de estaciones es también mucho mayor que la normal de Diciembre. En el Observatorio Central la cantidad total de agua recogida durante el mes es mayor que la del año pasado y que la normal de este mes en 129.9 y 120.2 mm., respectivamente. Las lluvias más abundantes del mes se observaron en Leyte, Sámar y en el centro y sur de Luzón durante el baguio del 5 al 7, del cual hablaremos luego.

EL BAGUIO DEL SUR DE LUZÓN, DICIEMBRE 4 AL 9, 1915.

Este baguio, el último de 1915, atravesó Luzón por el sur de Manila el 7 de Diciembre. Aunque no es frecuente que un tifón cruce las Filipinas a través de la Isla de Luzón o muy cerca de ella en el mes de Diciembre, sin embargo podemos citar otros cinco casos ocurridos durante los últimos treinta y cinco años: (1) Diciembre 12, 1881, a unas 30 millas al sur de Manila a través de la Provincia de Batangas, dirección WNW; (2) Diciembre 31, 1882, a través de la costa occidental de Sámar y la parte SE de Luzón dirección NNW; (3) Diciembre 26 y 27, 1884, a través del N de Sámar, moviéndose al NW, y luego inclinándose al W a través o muy cerca de la costa más meridional de Luzón; (4) Diciembre 6, 1908, a unas 60 ó 70 millas al sur de Manila a través de la costa septentrional de Mindoro, dirección WNW; (5) Diciembre 8, 1911, a través de la Provincia de Cagayán, en el N de Luzón, muy cerca de Tuguegarao, dirección WNW. Nuestros lectores podrán ver en la Lámina XIX las trayectorias seguidas por estos tifones mientras cruzaban las Filipinas. Hubo otro tifón que pasó también por la parte meridional de Luzón el 4 de Diciembre, 1889; pero no nos ha sido posible obtener datos suficientes para trazar su trayectoria. Consta en los registros diarios del Observatorio de Manila que este tifón se bifurcó el día 3 ó 4, yendo una rama al Mar de China, y la otra al Océano Pacífico. También hemos prescindido de algunas otras depresiones que no tenían el desarrollo de verdadero tifón mientras cruzaban la Isla de Luzón.

Origen de este tifón; primeros indicios en Filipinas.—No habiéndose recibido observaciones de Yap, es imposible señalar con certeza el origen de este tifón o determinar si se formó cerca de Filipinas o más al este, en, o cerca de, las Carolinas Occidentales. Los primeros ligeros indicios de una depresión o tifón al E de Visayas se notaron la tarde del 4 en las observaciones de Sámar, Leyte y NE de Mindanao. Sin embargo, fué necesario esperar la mañana del 5 para que pudiese el Observatorio de Manila enviar el primer aviso definido de este tifón, situando su centro al E de Sámar e indicando su movimiento de traslación al W o WNW. El descenso de los barómetros era tan franco a las 2 p. m. del 5, y la dirección del viento tan claramente ciclónica en el S de Luzón, en Visayas y Mindanao, que apenas se podía dudar de la existencia de un tifón bien desarrollado entre 11° y 12° latitud N y en los alrededores de 127° longitud E, moviéndose entonces al W o WNW. Ya por la mañana de dicho día 5 se habían enviado oportunos avisos a todas nuestras estaciones y se había ordenado se izasen señales de temporal en el S de Luzón y en Visayas.

El tifón en Filipinas.—Como la dirección de este tifón cambiaba considerablemente casi cada día (véase su trayectoria en la Lámina XIX), era muy difícil determinar que

parte de Luzón estaba más amenazada. Sólo después de media noche del 6 pareció casi seguro que el tifón iba a cruzar las provincias meridionales de la Isla, siguiendo una trayectoria muy semejante a la del tifón de 23 del pasado Octubre. Consiguientemente se enviaron durante aquella noche avisos apremiantes a todos nuestros observadores del SE y S de Manila.

En la Lámina XX ofrecemos a nuestros lectores las isobaras de 6 a. m. y 2 p. m. del día 6, 2 p. m. del 7 y 6 a. m. del 8. En ellas se ve claramente que el centro del tifón pasó muy cerca de la costa NE de Sámar la tarde del 6, moviéndose al WNW o NW $\frac{1}{4}$ W; estaba cerca de Lucena al S de Santa Cruz, Laguna, a las 2 p. m. del 7; y se había trasladado al Mar de China, al W de Manila, a las 6 a. m. del 8. Durante el 7 y parte del 8 el tifón se movió al W $\frac{1}{4}$ NW.

En el texto inglés publicamos en una tabla algunas de las observaciones hechas en Legaspi y a bordo del vapor *Batangueño* que se hallaba entonces fondeado en la bahía de Sorsogón.

Es muy de sentir no tener observación alguna de Batag, por haber sido sorprendido el observador por el tifón en un pueblo vecino. La mínima barométrica debió haber sido allí muy baja, y la fuerza de los vientos terrible. El observador informó que 90 por ciento de las casas fueron prácticamente destruidas por los vientos huracanados, y que las plantaciones sufrieron considerablemente. Añade, además, que de las doscientas casas que había en Calomotan, barrio de Laoang, sólo quedaron tres después del tifón.

Nuestro observador de Virac también descuidó hacer observaciones extraordinarias durante este tifón, por haber estado muy ocupado en salvar los aparatos y otros objetos de las copiosas lluvias y la furia de los vientos. La estación quedó muy mal parada y sin techo. Según la curva barográfica, la mínima barométrica registrada en dicha estación fué 727 mm. de 8 a 10 p. m. (Véase Lámina XIX.) Se experimentó calma relativa desde 9.46 hasta 10.27 p. m., según informe del observador.

En el texto inglés publicamos las observaciones hechas en Naga y Atimonan, las cuales creemos serán de interés para nuestros lectores. Se nota en estas observaciones que se experimentó calma relativa en Naga con una mínima barométrica algo mayor de 731 mm., al paso que en Atimonan la misma calma relativa ocurrió con una mínima barométrica no menor de 737.90 mm. De esto parecería deducirse que el tifón estaba mucho menos desarrollado cuando pasó cerca de Atimonan que cuando pasó por Naga; y, además, que era aún más intenso y estaba mejor desarrollado cuando pasó cerca de Batag y Virac que cuando atravesó Naga. Informes recibidos de las Provincias de Ambos Camarines y Tayabas hacen constar generalmente que este tifón fué mucho menos intenso que el de 23 de Octubre; y en las Provincias de Tayabas, Laguna, Batangas y Cavite más daño causaron esta vez las inundaciones y abundantes lluvias que la fuerza de los vientos.

En una tabla que puede verse en el texto inglés ofrecemos a nuestros lectores las observaciones hechas en Batangas y Ambulong mientras el centro del baguio pasaba por el S de Manila y N de Batangas.

La velocidad de traslación de este tifón a través de la parte meridional de Luzón fué algo menor de 10 millas por hora. Su dirección era W $\frac{1}{4}$ NW.

El tifón en el Mar de China.—Debido a la amabilidad del Director del Observatorio de Hongkong poseemos muy valiosas observaciones hechas a bordo del vapor *Hang-Sang* en el Mar de China. Las publicamos en una tabla en el texto inglés. Llamamos la atención de nuestros lectores sobre la interesante descripción de lo observado cuando la región vortical pasaba sobre el vapor, según se da en la columna "*Remarks.*"

Según estas observaciones, comparadas con las de Filipinas de los días anteriores, parece que el tifón había probablemente aumentado de nuevo en intensidad después de dejar las Filipinas la tarde del 7. Sin embargo, el día 9 empezó a deshacerse rápidamente, habiendo desaparecido por completo todo indicio de baguio la tarde del 10.

METEOROLOGICAL DATA FOR MANILA CENTRAL OBSERVATORY.*

[$\phi=14^{\circ} 34' 41''$ N; $\lambda=120^{\circ} 58' 33''$ E; barometer above sea, 14.2 meters; gravity correction not applied, -1.72 mm.]

Day.	Pressure (mean).	Air temperature. ^b			Underground temperature.				Relative humidity (mean)	Vapor pressure (mean)	Radiation.			Evaporation. ^b		
		Mean.	Maximum.	Minimum.	0.25 meter.		0.50 meter.				1.50 meters.	2.50 meters.	Minimum on grass	Maximum in sun. Black bulb in vacuo.	Free exposure (total)	Shelter (total).
					8 a.m.	2 p.m.	8 a.m.	2 p.m.			8 a.m.	8 a.m.				
1	759.82	24.9	30	22.5	28.2	28.7	28.8	28.9	29.2	28.6	87.6	20.4	20.1	49	1.2	1.2
2	60.34	23.2	24.3	22.4	27.8	27	28.6	28	28.9	28.4	95.9	20.2	20.3	29.4	0	.2
3	59.42	24.1	27.1	21.4	26.5	26.9	27.8	27.7	28.9	28.4	82.7	18.4	18.8	38.7	2	1.8
4	59.15	24.7	31.5	19.8	26.3	27.2	27.7	27.8	28.8	28.4	75.4	17	17.2	52.8	4.2	3
5	58.43	24.5	29	20.7	26.8	27.5	27.7	27.8	29	28.4	81.5	18.5	18.2	43.6	2.4	2.1
6	55.82	24.1	27.8	20.3	26.7	26.9	27.7	27.7	28.7	28.3	80.1	17.8	17.8	37.9	1.5	2.3
7	47.52	24.1	26.5	22.7	26.6	26.1	27.5	27	28.6	28.2	90.9	20.3	21.5	26.9	.7	4
8	53.10	24.6	26.4	23.7	25.7	26	26.7	26.8	28.8	28.3	92.5	21.3	22.5	34	.3	1.1
9	56.69	26.7	32.2	23.5	25.8	26.9	26.8	27	28.5	28.5	84.5	21.7	21.9	53.3	2.7	2
10	58.11	25.8	29.9	23.2	26.7	27.3	27.1	27.4	28.5	28.5	87.2	21.4	21.6	54.7	2	1.4
11	57.63	25.8	29.3	23	27.2	27.5	27.4	27.5	28.4	28.3	86.3	21.2	22	50.3	1.8	1.5
12	57.14	26.4	29.9	24	27.3	28.2	27.6	27.8	28.3	28.4	88	22.3	23.1	51.4	2.1	1.5
13	56.92	26.5	30.6	24.2	27.8	28.3	27.9	28.2	28.3	28.4	86.6	22.2	23.2	51.5	2.2	1.6
14	57.33	26.3	31.8	24.1	27.9	28.6	28.1	28.2	28.4	28.4	87.6	22.2	23	53.5	2	1.5
15	58.20	26.6	30.7	24	27.8	28.6	28.2	28.4	28.3	28.4	85.5	22.1	23.1	50.2	2	1.5
16	58.92	26.6	31.7	23.7	27.8	29.2	28.2	28.6	28.3	28.3	85.2	21.9	21.9	53.8	2.6	2
17	59.25	26	31.6	22.1	27.8	29	28.3	28.6	28.4	28.3	84.1	20.9	20.3	54.2	2.9	2.2
18	59.90	25	28.7	22.8	27.9	28	28.5	28.4	28.2	28.3	81.4	19.2	21	39.4	2.9	2.3
19	60.63	25.1	29.9	22	27.1	27.9	28.2	28.2	27.9	28.1	73.9	17.4	20.2	56.3	4.3	3.3
20	61.21	25.3	30.6	22.6	26.9	28	28	28.1	28	28	75.6	18	20.9	55.5	2.8	2.3
21	61.28	25	30.7	21.1	26.7	28	27.9	28	28.4	28.3	77.9	18.2	18.7	52.3	3	2.3
22	60.50	24.5	30.4	20.8	26.7	27.5	27.9	27.9	28.4	28.1	82.3	18.6	19.1	46.8	2.2	2
23	60.79	24.8	29.5	21.1	26.5	27.4	27.8	27.8	28.4	28.1	76.7	17.7	18.6	48.8	3.4	2.5
24	60.73	25.1	29.9	22.3	26.8	27.5	27.7	27.7	28.3	28.1	77.5	18.2	20.6	50.2	2.7	2.1
25	60.17	25	30	22	26.6	27.5	27.6	27.6	28.3	28	78.1	18.3	19.8	52.2	4.9	2.8
26	59.60	25.6	31.3	21.4	26.5	27.9	27.6	27.8	28.3	28	75.3	18.1	19.7	52	4.3	3.4
27	58.12	26.1	31.1	21.8	26.7	27.8	27.7	27.7	28.3	28.1	78.6	19.5	19.1	50.5	4.4	3.7
28	57.34	26.4	31.7	23.3	26.9	28.2	27.6	27.9	28.3	28.1	87	22.2	21.8	53.9	2.1	1.5
29	57.62	26.4	31.6	22.4	27.2	28.2	27.8	28	28.4	28.2	84.4	21.4	20.6	50.5	2.7	2.2
30	58.98	26.3	30.6	23.6	27.5	28.5	27.9	28.2	28.3	28.1	88.5	22.4	21.8	54.7	1.4	1.7
31	59.29	25.2	30.9	22.3	27.3	28.5	28.1	28.2	28.1	28	88.5	22.1	21	52.7	1.5	1.3
Mean Total	758.39	25.4	29.9	22.4	27	27.8	27.8	27.9	28.5	28.3	83.5	20	20.6	48.4	2.4	2.1
Departure from normal	-2.05	+0.2	0	+1.2							+2.3	+0.8			75.2	64.3

Day.	Wind.				Clouds.			Sunshine.	Rain, 24 hrs. beginning 6 a. m.		Miscellaneous.	
	Prevailing direction.	Total movement.	Maximum hourly velocity.	Direction at the time of the maximum velocity.	Amount (mean).	Form and direction.			On the tower.	In the park.		
						Upper.	Lower.					
												0-10.
1	E quad.	81	11	E	9.5	Ci.-S., Ci.	Cu.-N.	E	2 05	28.3	28	● p.
2	N	82.5	8	N, NNW	10		N.	E	0 00	68.7	69	● a. p.
3	NNE	120	16.5	NNE	9.6	Ci.-S.	Cu., Cu.-N.	E	0 00			
4	NE quad.	97	23	NE by N	3.2	Ci.	Cu.	ENE	8 15			
5	N quad.	92	12	NNE	9.9	Ci.-S.	Cu.-N.	NE by E	0 50			d° a.
6	NNW	220	17.5	NNW	9.1	Ci.-S.	S.-Cu.	NE	0 35	7.6	9.7	Ω a. d. p.
7	NW	943	68	NW	10		N.	NNW	0 00	41.8	68.7	1/2 a. p. d. p.
8	SE	514.5	33	SE by S	10		N.	SSE	0 00	12.4	13.2	● a. d. p.
9	SE	235	17	SSW	4	Ci.	Cu.	SE	7 45			
10	Variable	96	15	W	6.6	Ci.	Cu.	E	4 25			d° p.
11	W quad.	84	11.5	WSW	9.7	Ci.-S.	Cu.	E	1 55	10.9	10.9	
12	W quad.	147.5	14.5	SW	8.5	Ci., A.-Cu.	NE	E	3 55	.3	.3	● a.
13	SW quad.	150.5	16	WSW	7.1	Ci.	Cu.	E quad.	3 45			d. a.
14	N quad.	131	17.5	NW	8.5	ci., A.-Cu.	sse	Cu.	3 50			Γ d° < p.
15	N quad.	106	12.5	NNE	7.8	Ci.	Cu.	ENE	3 00	.5	.8	d p.
16	E quad.	94	12	NE	6.9	Ci.	Cu.	E	4 20			Γ d p.
17	NE, NNE	138	14	W, WNW	3.9	Ci.	Cu. NE, ENE	E	8 05			Γ d° d° p.
18	NNE, N	129	16.5	NNE	9.2	Ci., Ci.-S.	Cu.-N., Cu.	E	0 00	2.6	2.5	● a.
19	N	185	23	N by W	8.4	A.-Cu.	ENE	Cu.	3 40			
20	N	109.5	9.5	NW	8.1	A.-Cu.	Cu.	E	2 05			
21	N quad.	104.5	11	SW	5.8	Ci.	Cu.	E	5 45			
22	N quad.	88	19	NNE	6.4	Ci.	NW	Cu.	2 45	.4	.4	d° a. d. p.
23	N	130	16.5	NNE	8.9	Ci.	Cu.	E	2 35			
24	N	74	10	NNE	9.7	Ci.-S.	Cu.	E	1 50			
25	N	166	18	NNE	7.8		Cu.	ENE	3 00			
26	N	181	19.5	NNW	6.1	Ci.-S.	SW	Cu.	5 20			≡ a.
27	N	224.5	27	N	6.9	Ci.-S.	E by S	Cu.	4 05	.5	.8	d p.
28	W, SE	84.5	13	NNW	6.5	Ci.	Cu.	ENE	6 35			d a. d° p.
29	NW quad.	155.5	16	NW	4	Ci.	Cu.	E	7 00			
30	E	118	15.5	W, WNW	5.3	Ci.	Cu.	E	6 10	5.8	6.1	Ω a. Γ d p. d° p.
31	E, WNW	132.5	13	W	7.1	Ci.	E	Cu.	4 10	2.5	2.9	≡ a. ● p.
Mean Total		167.5	17.6		7.6				3 29			
Departure from normal		5,194			+1.4				107 45	182.3	213.3	
		+478.4							-49 13	+120.2		

* All the mean values given in this table are deduced from hourly observations.
 b These values are taken from instruments mounted in the Observatory Park, 1.5 meters above ground.

METEOROLOGICAL DATA FOR MIRADOR OBSERVATORY, BAGUIO.*

[$\phi = 16^{\circ} 25' N$; $\lambda = 120^{\circ} 36' E$; barometer above sea, 1,512.5 meters; gravity correction not applied, -1.65 mm.]

Day.	Air temperature at Mirador (on the top of the mountain).				Air temperature in the valley (near the city hall).				Radiation.			Evaporation.				
	Pres- sure ^b (mean).	Mean.	Maxi- mum.	Hour.	Mini- mum.	Hour.	Maxi- mum.	Hour.	Mini- mum.	Hour.	Rela- tive hu- midity (mean).	Vapor pres- sure (mean).	Mini- mum on grass.	Maxi- mum in sun. Black bulb in va- cuo. ^c	Free expos- ure (total)	Shel- ter (total)
	mm.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	Per ct.	mm.	°C.	°C.	mm.	mm.	
1	637.35	18.3	22.7	0.40p.	15.1	4.35a.	24.2	11.20a.	14.3	5.00a.	74.7	11.6	13.5	5.2	3.4	
2	37.46	17.3	21.6	9.55a.	14.8	11.55p.	24.7	10.15a.	14.7	6.20a.	84	12.3	13	2.4	1.7	
3	36.80	17.6	22.5	1.05p.	14.3	12 m.n.	23	1.15p.	13.5	6.30a.	79.2	11.7	13.5	5	2.8	
4	36.48	16.7	22.7	0.30p.	13.2	6.10a.	23.3	0.50p.	12.5	6.00a.	81	11.4	12.3	4.3	3	
5	35.78	16.8	21.4	9.10a.	13.6	1.15a.	23.6	11.25a.	12.3	6.40a.	86.8	12.3	12	1.6	1.3	
6	34.41	17.4	23	9.50a.	13.5	5.50a.	23.3	11.05a.	12.8	6.00a.	86.2	12.6	11.9	3.7	2.9	
7	30.21	18.4	19.8	6.15a.	16.5	9.00p.	20.3	11.35a.	16.6	4.00a.	78	12.2	15.5	2.8	2	
8	30.28	16.6	17.4	0.05a.	15.7	7.10a.	17.9	0.05a.	16.2	8.00a.	94.2	13.2	15.9	1.7	1.9	
9	34.20	17.7	21.7	3.25p.	16.5	1.15a.	22.7	2.00p.	16.3	1.50a.	87.8	13.2	15.7	3.2	2.1	
10	36.04	18.3	23.5	0.15p.	15.6	5.50a.	24.5	1.50p.	15.7	5.25a.	87.3	13.5	15	4.3	3	
11	35.58	16.8	18.9	3.05p.	14.9	10.15a.	20.6	3.25p.	15	10.00a.	87.8	12.5	16.7	1.5	1.1	
12	35.27	18	21.8	1.50p.	16.2	1.00a.	21.7	2.30p.	15.3	2.45a.	92.5	14.2	14.5	7	5	
13	35.04	18.4	22.2	1.55p.	16.2	6.30a.	22	1.55p.	16.1	7.00a.	95.3	15	15	3	3	
14	35.38	17.4	19.3	9.25a.	16	10.05p.	20.5	10.30a.	15.7	12 m.n.	98	14.4	16	7	6	
15	36.18	18.3	23.3	11.35a.	16.1	12 m.n.	24.4	Noon	15.2	2.35a.	90.8	14.2	14.7	1.2	8	
16	36.82	18.1	23.1	10.40a.	15.6	1.25a.	24.6	11.10a.	15	5.00a.	93.5	14.4	14.4	1.1	7	
17	37.17	18.4	23.5	1.00p.	15.5	6.15a.	24.4	11.20a.	14.9	6.40a.	89.7	14	13.8	1.9	1	
18	37.24	16.9	23.4	1.15p.	13.1	12 m.n.	23.5	1.20p.	13.2	12 m.n.	82.7	11.7	12.2	5.7	2.6	
19	37.56	16.3	22.5	1.00p.	12.9	4.55a.	23.1	1.15p.	12.4	4.00a.	76.3	10.4	12	6.5	3	
20	38.19	16.3	20.7	1.15p.	14	4.00a.	23.3	1.05p.	13.8	1.30a.	81.3	11.2	13.4	5.5	2.6	
21	38.55	17.4	23.2	1.00p.	13.3	1.05a.	23.6	10.30a.	13.4	3.40a.	85	12.5	13	2	1.7	
22	37.60	16.8	22.8	1.00p.	13.2	12 m.n.	24.7	2.00p.	13.2	12 m.n.	82	11.7	12.7	4.7	2.8	
23	37.36	15.7	21.2	0.30p.	12.7	5.15a.	23.3	2.30p.	12.2	6.20a.	76.8	10.1	12	7.4	4	
24	37.64	16.4	22.4	0.30p.	12.9	2.00a.	23	Noon	12.7	4.50a.	78.3	10.9	11.7	5.5	3.1	
25	37.56	17	22.9	11.25a.	13.1	5.50a.	24.2	0.05p.	13.7	12 m.n.	82.2	11.8	12	3.7	2.4	
26	37.39	18.2	23.8	11.15a.	13.5	4.00a.	23.7	11.50a.	13.2	6.00a.	82.5	12.7	12.9	3.5	2.6	
27	36.41	19	24.4	2.10p.	15	0.50a.	24.7	2.00p.	13.9	2.00a.	83.3	13.5	13.3	2.5	1.9	
28	35.78	18.7	24.4	1.55p.	15.5	1.20a.	25.2	3.00p.	14.8	7.10a.	88.8	14.2	14.1	3.8	1.8	
29	35.94	18.6	23.6	9.55a.	15.6	6.30a.	24.5	10.10a.	15.3	6.35a.	90.7	14.4	14.1	9	9	
30	37.08	18.4	23.5	11.55a.	15.5	5.50a.	23.4	4.05p.	15	7.00a.	94.3	14.8	14.8	1.5	1.1	
31	37.30	17.1	20.2	10.15a.	15.5	9.55p.	20.2	10.50a.	14	12 m.n.	92.3	13.4	14.1	1	1.7	
Mean	636.20	17.5	22.2		14.7		23.1		14.3		85.9	12.8	13.7	3.1	1.9	
Total														95.8	60.3	

Day.	Wind.				Clouds.		Sun- shine.	Rain, 24 hours begin- ning 6 a. m.	Miscellaneous.
	Prevailing direction. ^d	Total move- ment.	Maxi- mum hour- ly veloc- ity.	Direction at the time of the maximum velocity.	Amount (mean).	Form and direction. Upper. Lower.			
		Km.	Km.		0-10.		h. m.	mm.	
1	E, SE	410.5	25.5	E	4	A.-Cu. S	4 46		d° p.
2	E	243.4	26.4	E	9	A.-Cu. S	0 35		d° p.
3	E	306.8	21.9	E	4.4	Cl.-S. SW	4 20		○ a. p.
4	E	357.9	25.1	E	2.6	Cl.	4 55		p.
5	SE quad.	276.4	19.6	E	6.6	Cl.-S.	3 00		p.
6	W, NE	268.4	22.5	N	5.3	Cl.-S. EbyS	3 50		p.
7	E	881.3	79.2	E	9.9	Cl.-S.	0 00	4.2	○ a. p. ● a. p. 2 p.
8	E	1,305.7	70	E	10		0 00	19.7	p.
9	SE, E	851.1	61.8	SE	9.1	Cl.	2 45	.6	p.
10	E, SE	416	37	E	4.6	Cl.	4 55	1	p.
11	E	489.9	32.2	SE	9.1	Cl.-S.	0 00	10.5	● a. d° p.
12	E quad.	190.9	13.5	E	9.7	Cl.-S.	0 00	4.6	d° a. p.
13	E, W				8.4	Cl., Cl.-S.	0 45	5.6	d a. p. p.
14	E				9.1	A.-Cu.	0 00	27.5	d a. p. p.
15	SE	218.6	18.3	E	7.7	Variable	3 00	.5	p.
16	E	236.4	19.5	E	6.1	Cl. SSW	3 00		p.
17	N, SE	296.5	18.5	SE	4.7	Cl.	5 10		p.
18	E	486.1	30.3	E	3.9	Cl.	6 00		p.
19	SE, E	568.7	33	SE	3.6	Cl.-S.	4 05		○ a.
20	E	514.3	29.3	E	6.6	Cl.-S.	1 00		
21	E	268	20.7	SE	5.9	Cl.	5 20	4.8	● a. p.
22	SE, E	375.8	27.2	SE	3.3	Cl. S	4 10		○ a. p.
23	SE	644.8	31.6	SE	2	Cl.	5 30		
24	SE	508.9	38.8	E	8	A.-Cu. S	2 25		
25	E	368.9	32.4	E	4	A.-Cu. SSE	4 40		p.
26	E	364.6	25.4	E	7.9	Cl. WSW	4 20		d° p.
27	W	164.6	11.6	NE	3.1	Cl.	3 40		p.
28	W	210.2	18.8	SW	4.7	Cl.	5 25		p.
29	W, SE	236.7	14.3	SE	6	Cl.	1 30	.3	p.
30	E quad.	240.7	16.4	SE	6.4	Cl.	0 15		p.
31	E	247	17.2	E	7.6	A.-Cu. S.-Cu.	1 00	13.7	p.
Mean		412	28.9		6.2		2 54		
Total							90 00	93	

* All the mean values given in this table are deduced from six daily observations taken at 2, 6, 10 a. m. and 2, 6, 10 p. m.
 b The barometric readings of this station are not reduced to sea level.
 c The black bulb actinometer was broken during a typhoon on October 29.
 d This element is based on hourly observations taken from a quadruple register, which gives only eight possible directions of the wind.

DAILY RAINFALL AT THE STATIONS OF THE WEATHER BUREAU, DECEMBER, 1915.

Station.	Day of month.															
	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.
	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.
Glan	0.3					16.3	4.6			2.5	1		9.1		1.5	0.5
Jolo	6.6	0.5	0.3	0.3	2.6	17.8	11.2	3.5	3.8			2	10.9		9.4	
Isabela, Basilan	1	2.5	.5		.8	66.3	57.4	10.6	1.5	2		3	.8			
Zamboanga	4.4					38.4	54	6.9								1.8
Dayao	5.3								19			22.4		38.6	4.1	7.4
Dagupan, Misamis	21.3	2		22.1	13.2	.3	14.8	4.8				3.6			13.5	3
Dapitan	5.8	1.3	3.8	25.2		2.3	5.8	1.3		4.8		2				6.9
Butuan	27.4	1	9.4	56.8	16.6			2.3		.3						2.3
Dumaguete	60.7	1		14				2.3		24.9		1.3			9.5	3.1
Tagbilaran	6.3	16.8		15			1.5									
Iwahig	29.3	11.9	30	6.4	9.7	2.5	.5	1.8								
Surigao	.8	3.6	8.6	46.1	44.4	1.8								22.1	35.8	3.7
Maasin				12.7	99.1	14.7							1.3			3.9
Cebu	5.1	.8					3.8		1.3	1	3.8		22.9	.5	3.6	.5
Iloilo	14.2	.8	4.1	15	.8		17			1.8					.5	
San Jose Buenavista	8.1	.3		2.3		.3			2.8	36.4			39.1		.3	2
Cuyo				5.9						13.5		3.6	1.8		4.1	
Ormoc	6.1	2.1	1	1.5	82.6	53.8	2.5		4.4	1.3	8.9			1.8	14.5	22.9
Gutuan	2.6	19.3	7.4	60.4	126.7	20.6		60.2	12	6	.3				3.6	2.8
Tacloban	11.5	19.9	1.2	11.9	117.9	92.8		22.4	4.7	3.6	.1		.5	9.6		1
Capiz	6	.3	1.4	2.3		39.8	.3		.5	19.1		.3	2.3		.3	2.3
Borongan	18.8	57.7	17.8	21.8	79.2	45.2		1.3	19.8	.3						7.9
Catbalogan	6.1	7.8	5.4	6.4	198.1	239.9			3.8			7.6		2.8	2.5	1.5
Calbayog	15.5	12.7	13.5	3.5	72.3	266.7		3.3	5.3	2.3	5.1			7.1		25.7
Masbate	51.8	43.2	14.5		7.6	95	2		2.5	.8		.8	20.4			.3
Romblon	24.4	19.5	1.6	4.1		92.9	56.2						2.3	1.1		7.1
Batag	24.8	40.9	70.6	12.7				8.6	6.4	9.4						
Gubat	62.2	76.5	20.1		74.2	202.5	3.6		1	1.3	3.8	1	3.6	8.1	4.3	
Legaspi	26.2	66.5	32.8	1.3	6.1	177.8	10.2			10.2				6.4	2.3	3.3
Sumay, Guam	3.8	2.5	14	31.7	1.3		2.5	22.9	7.6	7.7	3.8					6.3
Calapan	2.3	4.6	2.3	3.8	1	28.4	106.1	19.3	12.7	.8	1.5	15.7		12.2	3.1	
Virac	68.1	76.7	39.4		31.5	194		16.8	.5	21.9	30.8	1				9.4
Nueva Caceres	4.6	153.9	84.6	2	1.3	168.2	62.8		4.1	14.5	2.5					
Batangas	10.2	2.1	1.3			38.7	233.6	18		16.3	4.1				.3	3.3
Atimonan	27.8	32.3	19.6	1.3		355	213.9	2		10.2	8.9	2.3		2.8		
Ambulong, Tanauan	43.9	48.6					143.5	3.8		7.7					6.6	
Paracale	44	121.4	69.6	6.2	.3	204.1	22.2		.8	15.5		33.3			1.6	20.6
Santa Cruz, Laguna	36.3	75.9	2.1	1.8		88.9	96.7	5.1		7.9	6.1	7.2	1	6.6	1.3	
Manila	23.3	68.7				7.6	41.8	12.4			10.9	.3			.5	
Antipolo	54.9	59.7			.5	43.9	81.6	13.7	8.1	.8	1.5	.5	11.4	3.5	3.6	
Iba	.3	1				.3	21.1	16.8		50.8				1.3		
San Isidro	2.5	3.6				2.8	45.6	3.3	16.3		4.8	2.1	24.4	13.9	4.1	
Tarlac						2.8	46.3	7.6			.5	16.3	2.8	.3	2.8	
Baler	2.8	15	.3			14	53.6	21.8	26.7	26.9	38.8	.6	5.1	5.6	.5	
Dagupan		.3				.8	11.6	1.9		.3	2.6	.3		2.3		
Bolinao							1	7.7	2.5	4.1	.3	10		2		
Baguio							4.2	19.7	.6	1	10.5	4.6	3.6	27.5	.5	
San Fernando, Union		1.1						1.3								
Echague	10.9	4.9	1.3		2.5	12.2	49.1		1	22.9	33.8	1.3	7.4	8.1		20.6
Candon											3.8					
Vigan	.1						1			1.4	2.4					
Tuguegarao						4.1	37.8			36.1	41.4					12.2
Laoag							9.4				27.9					
Aparri	2.4	1.3	1.6	3.8		2.3	11.6	4.5	5.1	22.2	82.5		1.3	27.2	16.1	13
Santo Domingo, Batanes					.4	8.5	62.8	1.3	36.1	49.4	37.2	7.7	7.9	3.1	2	8.3

* No observation.

Daily rainfall at the stations of the Weather Bureau, December, 1915—Continued.

Station.	Day of month.															Total.
	17.	18.	19.	20.	21.	22.	23.	24.	25.	26.	27.	28.	29.	30.	31.	
Glan	6.6						44.4					3.8				90.6
Jolo	45.2	0.8		6.4	1.5	6.6		19.3				8.9	3.3	7.8	0.3	187.3
Isabela, Basilan	23.9		13.5						0.8			1	1.3	129.8	4.1	320.8
Zamboanga	21.5	.6			1.3						1.8			8.4	1.8	143.4
Davao			4.8		2.5		16.5	16.3	21.8		20.1				35.6	303.6
Cagayan, Misamis	13	1.3			.3	1.5	2.1		20.1	28.7			.3		18.8	186.6
Dapitan	32	10.2	30.5	41.1	13.2	23.4	.8	32.8	18.5	7.4	.8	36.1	55.9	5.3	11.6	378.8
Butuan	8.1	9.7	2.1			1.3	34.6	8.9	6.1	4.4	5.8			2.3	51.8	251.2
Dumaguete	86.4	1	4.1		3	25.1	14.5	1.3			21.7	30.7		64.8	.8	370.2
Tagbilaran	11.7	13.2		6.9		7.9	2.3	1	.8	6.1	2.3					98.4
Iwahig	27.2	19.3	232.1	105.4	1.8	22.1	25.4	6.6	2.5	3.1	1.3		17	8.5	1.7	648.1
Surigao	4.4	22.3	25.1	10.6											5	334.2
Maasin			11.2		44	19.8	14	7.1		22.4				14.7	74.9	346.8
Cebu	1.8	7.7	1.5			2	3.5	1	.8			3.8	1.3		2.5	92.1
Iloilo		8.4	2.8		1.3	1	.3	9.9		18.1	9.7					105.7
San Jose Buenavista		.8					.5	.3	1.5	13.2	.5		4.1			122.5
Cuyo									8.9	1.5			3.6	4.6		50.3
Ormoc		33.3			19.1	.3	11.5	19.1	1.3	17.6	.5			2.8		13.3
Guiuan		15.8	29.7	25.9	30	62.7	23.9	45.2	44.9	11.2	5.6	.5		15	106.5	733.4
Tacloban		19.6	2	3	36.1	15.5	59.4	54.2	10.2	10.1	3			6.3	33.7	552.5
Capiz		8.5	1.8	16	2.1	29.1	6.9	8.3	12.3	5.2	1.5		1		3	167.9
Borongan	.8	47.3	59.7	67.5	61.4	36.6	79.2	46.8	57.9	6.6	3.8	2	.5	5.6	66.8	812.3
Catbalogan	2.3	14	22.1		38.9	3.9	58.7	23.1	10.6	16.5	23.6	3.6		5	25.7	750.1
Calbayog		6.1	23.3	14.5	46.2	36.6	40.6	23.9	12.1	14.5	39.2			1.3	8.1	716.7
Masbate		15.7	35.8	14.2	53.4	24.1	23.9	93.2	3.3	19.5						522.3
Romblon		3	12.9	3.3	8.6	6	25.7	11.9	.8	7.9	5.6	1.5	8.9	1.3		307.1
Batag		38.6	63.5	40.6	41.9	64	43.2	19.1	79	7.1	2.3		1.3	1.3	30.2	605.5
Gubat		23.3	64.5	29	71.9	106.6	37.6	30	18.1	33.3	4.8	2.5	4.1	1.3		889.2
Legaspi		25.9	98	16.7	90.2	92.5	43.8	39.4	23.4	3.1	11.8					786.9
Sumay, Guam	1.3			1.3			6.4	33	10.2	1.3	2.5		2.5		2.5	165.1
Calapan	9.4		3	1		5.3	2.3	9.9	1.5	8.4			1.3	1.3	.8	258
Virac		8.6	121.9	2.3	97.8	37.8	23.6	5.4	29			1.3	10.7		.5	829
Nueva Caceres	1.1	93.2	126.9	27.4	133.8	32.8	10.4	3.8	49.5	3.6	5		2	1.3	.9	990.7
Batangas		6.9	.8			1.5			2.8	1	1.6				6.1	345
Atimonan	11.3	45.5	42.7	12.5	16	16.8	1.3	21.6	3.3	31.6	9.6	7.1	15.8		11.4	926.2
Ambulong, Tanauan	3	6.4		1.3												264.8
Paracale	5.1	31.8	57.6	33.9	31.7	7.4	11.4	11.5	42.5	87	7.9	2.8	99.6	3.3	25.2	998.3
Santa Cruz, Laguna	8.1	26	3.6	.5			.3		.5	.3	.8				.3	377.3
Manila		2.6				.4					5			5.8	2.5	182.3
Antipolo	7.4	4.8									1.3	2.8			17.8	318.6
Iba																92.1
San Isidro														.3		123.7
Tarlac																79.9
Baler							.6	.8				3	1.3	4.6	9.2	231.2
Dagupan																20.1
Bolinao	.5													.5		29.1
Baguio					4.8									.3		13.7
San Fernando, Union																93
Echague	3.3	2			5.1	1.3	.8	.8		.3	4.9		.8	3.8	48.8	247.9
Candon																3.8
Vigan															40.9	44.9
Tuguegarao	2.8													10.9	4.3	149.6
Laog																37.3
Aparri	24.1	12.5	15.6	.5	10.4	30.4	9	.3	.3	4.9						302.9
Santo Domingo, Batanes	3.8	3.7	2.9	.8	1.7	4.3		.8						3.3		247.5

* No observation.

MAXIMUM AND MINIMUM TEMPERATURES AT THE STATIONS OF THE WEATHER BUREAU, DECEMBER, 1915.

Day.	Jolo.		Isabela, Basilan.		Zamboanga.		Davao.		Cagayan, Misamis.		Butuan.		Dumaguete.		Tagbilaran.	
	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.
	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.
1	26.4	21.7	31.1	22.1	27.9	23.6	30.8	23.4	30.9	23.2	32.5	22.9	31	24.2	32.3	23.5
2	30.5	21.9	31.6	23.1	30.3	22.6	29.6	22.2	29.8	22	31.5	23.2	30.6	22.8	30.3	23.5
3	29.6	21.9	33.1	21.9	31	22	32.7	22.5	29.9	22.5	27.8	23.6	29.8	24.6	30.4	23
4	30.5	22.8	30.1	23.1	30.3	23.8	29.5	21.8	25.5	23.2	24.8	22.7	28.2	23.7	27.1	23.5
5	29.4	23.8	29.8	23.1	30.5	24	25.2	22	25.8	22	26.8	20.7	29.6	23	27.4	23
6	31.4	23.1	31.1	21.3	29.4	22.9	31.2	20.9	29.7	22.5	30.5	21.8	29.5	25.1	27.6	23.6
7	32	21.9	31.1	22.1	28.8	21	30.2	23	30.2	22.9	33.5	22.2	30.5	24.7	29.9	25.5
8	29.5	22.9	27.8	23.1	27.3	22	31.7	22.1	30.7	22.6	33.1	22.9	31.3	24.5	30.4	24.6
9	30.9	22.2	30.6	23.3	30.2	22.8	32.2	22.5	30.3	22.7	31.1	23.2	31	23	30.3	24
10	29.9	23.3	31.8	21.6	30	22.2	29.7	22.2	30	22.9	28.4	23.4	30	23.2	30.2	23.3
11	31.9	22.3	31	22.8	29.9	22.4	31.7	22	30.7	22.4	33	22.4	30.1	22.2	30.4	23.1
12	30.2	22.6	30.8	23.1	29.2	22.4	30.5	23.2	30.7	22.9	33.5	24.2	30.5	22.4	31.3	23.6
13	29	23.3	31.6	21.6	30.9	23.4	31.5	23	30.7	22.5	32.3	23.8	31.1	22.9	31.4	23.5
14	31	21.8	33.1	21.6	30.7	22.8	30.9	22.8	30.8	21.9	32.7	23.4	31.2	22.4	32.1	22.6
15	31.3	21.9	32.1	23.3	30.7	22.9	30.2	21.9	30.9	21.9	32.5	22.9	29.9	23.7	31.4	22.7
16	29.9	21.4	31.6	23.6	30.5	23.5	31.2	23.5	29.3	23	31.8	24.4	30.1	23.2	30.7	23.2
17	29	22.2	31.4	23.3	29.8	23	31.6	22.7	31	22.9	33.5	23.6	31.3	24.4	32.3	23.4
18	31	21.1	32.1	23.6	30.4	22.5	26.7	22.5	27.2	23.2	25	22.8	30.2	22.5	30.3	22.3
19	31.6	20.9	31	23.8	30.4	23.3	26.5	21.5	29.7	21	27.7	21.4	30.8	24.7	30.5	22.6
20	29.5	21.3	31.8	22.4	30.3	22.4	32.2	22	30.7	21.7	30.8	22.3	30.5	25.9	31.4	22.8
21	31.1	21.3	31.9	22.7	30.2	23.3	32.6	22.5	30.7	22.2	32	22.8	31	24.9	31.4	23.5
22	29.9	23	34.1	23.1	31.9	22.2	32.2	22.5	30.5	24	31	23.2	30.6	23.9	32.1	23.3
23	30	22.9	33.1	23.1	29.7	23.1	31.9	22	30	23.1	27.6	22.4	29.1	24	30.3	23.4
24	31	21.9	33.1	23.5	30.4	22.6	31.7	20.6	29.8		29	20.8	29.9	23	30.4	22.1
25	31.9	20.5	32.6	22.3	30.5	21.8	32.2	22.2	30.5		22.5	30.8	21.5	30.8	31.8	23.6
26	31.3	21.5	31.9	23.3	31	23	32.2	23	30.5	23.5	30.8	23.9	30.8	24.8	30.4	23.7
27	31.4	22.8	32.2	23.1	30.4	23	31.5	23	30.2	23	32.3	23.2	30.7	24.8	30.1	23.5
28	30.4	22.5	31.8	23.6	30.3	24.2	31.7	23.5	31.1	23.7	33.5	23.8	29.9	24	30.9	23.5
29	29.3	21.9	30.1	22.6	30.2	22.9	31.7	22.9	31.3	23.7	34.2	23	30.2	24.2	31.3	23.3
30	28.5	23.3	29	22.5	28.7	23.2	31.8	23	28.5	23.5	31	23.4	30.4	21.7	31.3	23.4
31	29.8	24.2	31	24.1	30	22.9	30.2	21.8	29.2	22.3	25.6	23	29.5	22.6	29.2	23.4
Mean	30.3	22.3	31.5	22.8	30.1	22.8	30.8	22.4	29.9	22.7	30.7	22.9	30.3	23.7	30.5	23.4

Day.	Iwahig.		Surigao.		Maasin.		Cebu.		Iloilo.		San Jose Buenavista.		Cuyo.		Ormoc.	
	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.
	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.
1	24.8	23	31.5	22.8	34.4	23.4	31	24.5	30.9	24	31.7	23.1	30.4	25.9	31.1	22.9
2	29.7	22.2	30.3	22.2	34	23	31	23.8	30.5	24.2	32.2	23.1	29.1	25.5	30	22.6
3	30.1	23.7	28.3	23.2	32.6	23	30	23.8	29.1	24.4	31.8	22.4	29.5	26.2	30.8	22.4
4	26.2	23.1	27.7	21.9	32	22.5	29	24.4	29.1	23.5	29.2	24	27.3	25.7	28.7	22.9
5	29.5	22.4	27	20	28	22.4	28.9	24.9	28	23.3	30.2	22.5	29.5	25	27.9	22.6
6	29.3	22.8	28.7	23.4	29.8	23	28.5	26	27.8	22	28.2	22.6	29	23.4	28.2	22.9
7	31	26.2	34.1	23.8	30.6	25	29.2	25	30.2	24.3	30.4	26.1	28.7	22.5	29.6	26
8	31.2	26.5	32.2	23.3	31.8	24	30.6	24.4	31	24.1	31.2	26.6	30.7	26.5	30.8	24
9	31.9	22.7	32	22.9	33.5	24.1	31.1	23.8	31.4	23.5	32.6	23	32.3	24.1	31.3	22.8
10	31.4	21.4	28.3	23.1	34.2	23.2	30	23.5	32	23.9	32.2	22.9	31	24	29.8	22.4
11	31.3	22	30.8	22.3	33	23.1	30.9	24	30.4	23	31.7	22.6	30.3	24.6	30.1	22.4
12	28.8	22.3	32.5	22.3	33.5	23.2	30.2	24	30.1	22.6	31.2	22.5	30.6	23	30.4	21.9
13	32	21.1	32.4	22.7	35	23	31	24.1	29.5	22.6	26.7	23.1	29	24.9	31.6	22.7
14	32.1	21.8	31.9	22.5	33.8	24.2	32	23.8	30.4	23.3	31.7	23	31.6	23.8	31.9	23.5
15	30.9	22.4	31.6	22.5	34	23.2	32.2	24.6	32	23.8	31.2	22.6	29.2	23.4	31.6	22.2
16	31.1	22.4	30.3	23.4	33.4	23.3	31.1	24.5	32	23.9	31.7	22.8	30.2	23.9	31.8	22.2
17	30.2	22.4	30.9	22.5	34	23.6	31.5	24.6	31.4	24.3	32	22.9	30.5	26.5	32	21.4
18	31.1	22.8	29.3	23.1	32	23.5	31	23.9	30.9	23.9	31.8	21	30.1	25.4	30.9	23.2
19		22.5	26.4	23	32.6	22.8	30	24	30	24.5	32.1	23.8	29.7	25.8	30.4	23.1
20	31.1	23.6	30.4	22.4	33.5	23.5	31.6	24.7	30.4	24.5	32.2	23.5	29.7	26.2	30.7	23.7
21	31.1	22.9	30.9	23	31.7	23.4	32	23.9	30.9	24.3	30.8	22.5	29.1	26	30.2	23.5
22	31.2	22	29.6	23.7	30	23	30.9	24.3	30.5	23.5	31.7	23	29.2	25.7	30.1	23.4
23	30.9	22.6	26.7	23	31.9	23	28.5	24.1	27.9	23.4	31.7	23.5	28.3	25	27.2	23.6
24	30.5	22.7	31.4	21.2	30.8	22.5	30	23	27.5	23	30.8	22.1	29	25.1	29.2	22.9
25	31.8	23.1	28.9	22.9	31.5	23.2	30.4	24.2	30	24	32.2	23.1	30	25.7	27.4	23.5
26	31	22.6	30	23.5	32	24.2	31	23.5	29.9	23.8	31.1	23.1	29.5	24.8	29.3	23.7
27	31.5	21.6	30.6	22.7	33	23.6	31	23.9	30.5	24.6	30.8	23	29.8	25.2	30.8	22.9
28	29.8	23.1	32.5	22.9	32.8	23.6	30	24.7	30.4	24.3	31.2	23.6	30	26	32.7	22.4
29	27.3	23.9	31.9	22.5	33.5	23.4	31	24.6	31.5	25	32.1	24.1	30.1	25.4	31.8	21.4
30	30.9	22.6	31	23.6	34	23.3	31.6	23.8	30.3	24.5	31.8	23.9	29.9	24.8	32.2	21.9
31	31.9	22	27.6	20.8	34	24.5	31	24	30.1	24.5	30.2	23.4	28.7	25.1	27.7	23.2
Mean	30.4	22.8	30.2	22.7	32.6	23.4	30.6	24.2	30.2	23.8	31.2	23.2	29.7	25	30.3	22.9

Maximum and minimum temperatures at the stations of the Weather Bureau, December, 1915—Continued.

Day.	Guiuan.		Tacloban.		Capiz.		Borongan.		Cathalogan.		Calbayog.		Masbate.		Romblon.	
	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.
	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.
1	31.4	24.5	30.3	23.9	31	25.2	23.4	23.4	29.5	22.5	32.2	23.1	28.4	25.8	31.5	23.8
2	31.1	25	28	23.4	29.9	25.2	30.6	23.3	27.7	23.2	29.5	23.5	27.8	23	32.1	23
3	28.3	24.8	28.1	23.5	29.8	25.5	29.2	22.9	27.2	22.7	27.2	23.3	27.6	24.5	29.5	23.6
4	28.9	25.2	27.1	24	29.6	25.1	30.3	23.9	27.5	22.5	28.2	23.1	29.2	25.2	32	23.3
5	27.2	22.4	27	22.9	28.8	25.4	28.8	22.8	27.5	22.8	28.6	23.7	29.2	23.2	29.4	22.7
6	28.8	22.6	26.5	21.5?	27.6	23	28.6	21.4	25.2	22.5	26.8	22.7			30.1	22.9
7	32.4	25.5	31	23.5	30.6	22.3		24.4	29.2	22.6	29.7	24.2?	29.8	23.6	28.9	21.7
8	34.4	26	31.6	23.5	33.3	24.9		22.3	30.9	24.3	31.1	24.4	32.5	25.6	33.8	24.2
9	30.5	21.5	31.2	23.2	31.8	23.4		32.1	30.2	23	30	23.2	33	24.4	34.1	24
10	28	22.9	28	22.6	30.4	24.2	31.8	23	27.1	22.8	28.5	23.2	32.8	23.2	32.4	23.3
11	32.4	22.1	30.2	22.5	30.8	23.4		22.6	29.4	23.2	30.5	23	30.4	24.6	31.1	23.4
12	32.6	23.2	31.2	22.4	31.8	22.9	32.8	22.8	30.5	22.3		22.9	31.8		32.6	22.2
13	32.7	23.7	32.3	22.9	32	22.8	32.6	22.8	30	22.5	32.7?	22.5	32	24.2	33.7	22.8
14	32.3	23.1	31.5	23.9	31.7	23.5	33.1	22.7	30.5	23.6		22.8	29	24	31.7	22.8
15	32.7	23	30.8	22.8	31.4	23.2	33.6	22.5	30.8	22.3	32.1	22.7	32.4	24.5	33.9	22.8
16	32.4	23.9	32.4	23.2	31.6	23.9	33.3	23	31	22.5	32	23.5	31.6	24.5	34.1	23.5
17	31.4	23.6	32.7	23	31.2	24		22.8	31.2	22.7	32.8	22.4	32.5	25.2	31.6	24.5
18	32	23.9	31.8	23.6	30.5	23.8		23.5	29	22.3	30.7	22.8	31.5	25.8	33.1	24.3
19	28	23.9	29	23.6	30.9	25.2		23.4	30	22.9	29.1	23.7	31.2	23.8	33.1	23.9
20	30.5	23.1	28.4	24	31.2	24.7		23.1	28.7	23	27.7	23.2	28	23.8	30.2	23.7
21	31.5	24.8	28.9	23.6	29.8	25.2		23.1	29	22.7	31.7	23.4	28.2	24.5	30.8	23.7
22	30.8	24.5	28.5	23.5	28.8	24.5		23	28.5	23.1	27.8	22.8	27.6	22.8	30.5	23.7
23	29.2	24	25.5	22.5	27.4	23.7		22.4	26	23.3	25.3	22.4	27	24	29.2	23.4
24	29.7	24.9	26.6	22.8	27.8	23.3	29.2	22	28	22.3	27.7	22.4	26.2	23.5	29	21.9
25	27.6	23.5	26.5	23.2	29.4	24.7	26.6	22.3	26.2	22.8	26.5	23.4	28		32.2	23.8
26	30.6	24.5	27.1	23.8	29.3	25.4	27.9	23.9	26.5	23.1	28.6	23.6	26.8	24	30.4	24.2
27	31.4	22.5	31.1	23.2	30.8	24.8	30.4	22.9	28.1	23.1	27.8	23.7	29	23.8	33.2	24.5
28	33	22.8	31.2	23.5	30.6	24.9	31.4	23.7	31	23.3		23.7	31.8	24.5	31.5	24.1
29	32.2	23.1	31.8	22.6	32	24.9	30.6	23.4	30.8	22.7		23.1	31.8	25.5	30.9	23.8
30	30.9	22.8	32	23.4	31.5	24.8	30.7	22.9	29.6	22.9	31.2	24.3	31.5	25.4	33.7	23.4
31	29.2	24.3	27.1	23.2	30.4	25.4	28.8	24.4	27.4	22.8	27.6	23.3	29.4	26.4	33.1	23.2
Mean	30.8	23.7	29.5	23.2	30.4	24.3	30.6	23	28.8	22.8	29.4	23.2	29.9	24.4	31.7	23.4

Day.	Batag.		Gubat.		Legaspi.		Sumay, Guam.		Calapan.		Virac.		Nueva Caceres.		Batangas.	
	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.
	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.
1	28	23.8	27.7	24	28	23.6	29.4	24	30.5	23.9	26.6	22.1		22.3	30.1	22.3
2	27.5	22.3	25.5	23.1	25.5	23.2	30.2	23.8	29	20.4?	27.5	23.6		21.6	26.9	22.5
3	28	22	26.2	22.4	27.4	23	30	24.2	28.6	23	28.9	23		21.2	28.2	22.6
4	28	23	27.5	23.2	28.8	23.8	29.8	23.8	30.8	24.5	29	22.1		21	31.3	22.5
5		23	28.6	23.4	29.3	24.8	30.8	23.4	30	22	29.7	22		21.7	29.2	22.5
6			25.2	23	27.4?	23.9?	30.2	23.6	32	20.5?		22.2		21	27.6	19.3
7			27.7	22.6			30	25	28.2	20.1	28.5			21	25.2	22.2
8	31.5	24	31.4	24.5			30	24.8	26.4		32.7	23.5		21.1?	25.8	22.5
9	29.9	24	31.6	23			29	25	30.5	22	32.9	22		22.5	31.1	22.6
10	27	22	29	23.9	31.2	24.1	30.6	24.8	30.8	22	29.6	21.9		21.2	33	23
11	30	23.5	29.5	23.4	29.2	23	29.8	24	30.7	23.5	29.5	22		21.5	30.3	23.1
12	30	23	28.8	23.5	30.1	23.4	29.4	24.8	30.5	22.1	31.3	23.1		22.4	31	23.4
13	31	22.8	31	22.9	31.1	22.6	30.2	24.6	30.9	21.6	32.2	21.6			30.7	23.2
14	30.6	23.7	31	23.5	32.9	23.6	30.6	24.4	31.2	22.4	33	22.1	32	21.9	30.7	23.9
15	31	23.5	30.8	23.9	31.7	23.6	29.6	24.6	30.9	23.4	32.1	22	32	21.7	32.7	23.4
16	30.7	24	30.6	23.9	32.2	24.1	29.8	24.6	30.7	22.5	32.5	21.8	31.4	21.4	31.3	23
17	30.6	23.7	31	24	32.4	23.4	30	24.8	32	22.5	33	22	30.7	21	31.3	22
18	31.2	23.6	27	23.5	29.6	25	30.2	24.6	32.2	23	31.5	21.4	29.7	20.1	28.8	23.6
19	28	23.2	27	23.9	26.7	24	30	24.8	29.4		28.4	22.4	27.1	20	29	22.3
20	27.8	22	26	23	26.7	24.1	30.2	24.8	29.8		28.8	22.8	27	20	28.5	22.9
21	28	23.5	27.8	24	27.9	24.1	29.6	25.2	29.1		26.8	23	25	22	29.8	21.1
22	27	22.8	25.3	21.5	25.7	22.1	30.2	24.6	30.5		26.5	22.7	26	21.6	29.4	22.6
23	27.5	21.8	26.3	23.1	26.7	23.5	29.4	24.8	31		27.3	22.4	27.9	21.3	30.3	22.2
24	27.8	20.9	26.6	21.8	26.9	23.2	29.8	24.6	27.5		27.5	22.1	28.1	21.1	28.8	22.7
25	27.8	21	27.4	24	28	24.7	29.8	22.8	30	22.9	29.6	23	28.6	22.2	29.3	22.3
26	28.7	23	28.5	24.5	28.8	24.9	29.4	23.2	30	22.3	30.5	22.6	29.4	21.9	28.8	23
27	29.4	24	28.5	24.2	31.2	25.1	28.8	24.8	30.1	23	32.8	22.8	29	23	29.3	23
28	30.4	24	30	25.5	31.7	24.4	29.4	24.6	30.8	23	31.5	23.8	29.7	22.2	31.8	23.2
29	30	24.4	30.6	25.2	31.6	25.3	29.6	25.2	30.5	23.1	33	22.2	30.5	21.1	32.5	23.4
30	30.9	24	29.9	23.8	32.6	25.6	29.4	24.6	32.5	22.3	32	21.9	31	22.4	33.2	22.8
31	29.5	23.8	29.5	24.6	30.7	25.5	29.2	24.2	31	22.8	33.4	22.8	30.1	22.3	30.2	23.1
Mean	29.2	23.1	28.5	23.6	29.4	24	29.8	24.4	30.3	22.4	30.4	22.4	29.2	21.5	29.9	22.7

Maximum and minimum temperatures at the stations of the Weather Bureau, December, 1915—Ctd.

Day.	Atimonan.		Ambulong, Tanauan.		Paracale.		Santa Cruz, Laguna.		Manila.		Antipolo.		Iba.		San Isidro.	
	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.
1	29.4	24.4	28.7	23.3	28	24.5	27.5	24.1	30	22.5	30	21.5	30.7	21	31	21
2	25.7	23.3	24	22.9	26.4	23	25.6	22.6	24.3	22.4	23.6	21.4	28.5	22.5	25.5	22
3	26.2	23.7	26	23	26.4	23.5	25.5	22.9	27.1	21.4	26.6	20.6	30.8	22.2	29.4	20.7
4	27.8	24	29	23.5	28.8	23.7	29.1	23.3	31.5	19.8	30.4	19.7	32	21.4	30.8	19
5	27	24.1	27	20.4	27.8	25	28	22.8	29	20.7	28	20.5	30.7	20	30	20.5
6	26.5	22.4	27.2	19.1	26.2	23.5	25.7	20.1	27.8	20.3	26.8	18.8	30.6	19.2	28.9	19.1
7	26.2	22.8	25.4	22.7	27.2	22	26.7	19.6	26.5	22.7	26.1	20.7	28.2	21.8	26.9	22.5
8	29.7	23.5	26	22.9?	31.8	25	27.8		26.4	23.7	25.8	22.1	27.6	23.3	26.9	23.5
9	32	23.6	30.4	22.8	31.6	24.4	31.6	22.5	32.2	23.5	31.3	22.2	31.4	23.1	31.5	22
10	30.2	23	30.3	22.3	29.2	23.5	30	23.1	29.9	23.2	30.6	21.8	31	22.6	30.4	22.9
11	26.8	23.7	29.9	22.5	27.8	23.5	29.5	22.4	29.3	23	29.8	22	29.7	22	28.1	23.4
12	30.5	23.6	30.9	23.3	29.2	23.5	30.6	23.6	29.9	24	30.1	22.8	30.3	22.7	29.8	23.4
13	30.5	23	32.5	22.1	29.6	22.6	30.6	22.8	30.6	24.2	30.2	22.9	30.6	22.2	30.5	23.7
14	30	23.6	31.2	22.9	28.8	23.8	30.6	23.9	31.8	24.1	29.8	22.8	28.6	22.1	26.1	24
15	28.4	24.9	30	24.4	29.6	23.1	29.7	23.9	30.7	24	29.8	22.7	30.6	22.6	30.2	23.6
16	28	25.1	31.7	22.7	29.8	23.8	30.1	23.5	31.7	23.7	31.3	22.6	31	22.2	31.2	23
17	28.7	25	32.1	22.4	29	25	30.9	21.7	31.6	22.1	31.5	20.7	31.8	22	30.9	21.9
18	27.7	23.3	26.3	23.6	28.7	24	26.6	23.6	28.7	22.8	28	21.8	29.8	21.1	29.4	22.5
19	25.4	23	27.2	23	25.8	23.4	26.7	22.6	29.9	22	29.6	21	29.8	21.7	29.1	19.8
20	26	23.3	27.8	22.7	25.6	23.8	27.1	22.6	30.6	22.6	30.1	21.7	30.1	21.4	29.6	21.7
21	26	23.7	29	24	26.9	23.5	27.7	23.7	30.7	21.1	30.4	19.8	30.9	21	30.9	20.5
22	26.2	23.9	28.4	23.5	27	24.5	27.2	23.3	30.4	20.8	29	20.3	30.4	20.3	30.4	20.6
23	26.8	23.8	28.3	23.2	27.8	23.5	28.2	23.3	29.5	21.1	29.4	19.9	30.4	20	30	19.1
24	26.8	23.5	28.2	22.9	27.7	23.5	28.1	22.5	29.9	22.3	29.7	19.9	30.6	20.4	28.7	19.8
25	26.9	23.6	29.7	23.5	28.7	23.5	27.5	23.8	30	22	30.2	20.5	31.3	20.9	29.6	22.4
26	26	23.9	30	24.2	26.7	23.8	27.5	24.1	31.3	21.4	30.8	21	31.4	20.6	30.6	21.2
27	27	24.4	31	23	28.4	25	28.7	23	31.1	21.8	30.8	21.5	31.2	20.6	32	20.7
28	28.6	24	32.5	23.5	29.6	24	31.1	23.3	31.7	23.3	31	21.8	31.4	21.5	32.5	23
29	28.6	25	32.4	23	29.4	23.8	31.7	23.2	31.6	22.4	31.5	21.2	32.2	22	31.6	22.4
30	28.5	25	32.3	23.9	29.6	23.2	31.3	23.9	30.6	23.6	32.6	22.2	31.4	21.7	32	22.8
31	27.5	25.1	30.7	23.6	29.8	24.2	29.4	23.6	30.9	22.3	31.1	21.8	31	21.8	31.3	22
Mean	27.8	23.8	29.2	22.9	28.4	23.8	28.7	23	29.9	22.4	29.6	21.3	30.5	21.5	29.9	21.8

Day.	Tarlac.		Baler.		Dagupan.		Bolinao.		Baguio.		San Fernando, Union.		Echagüe.		Candon.	
	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.
1	32.5	21.1	33	23.2	33.3	21.6	31.4	21	22.7	15.1	31	21.1	21.2	29	22.4	
2	27	21.2	29	23.1	30.3	23.1	29.9	23.6	21.6	14.8	31.5	23.2	20.5	29	23.1	
3	31.5	20.4	30	22.5	33.3	21.9	31.6	22.4	22.5	13.3	31.3	22.4	21.3	28.5	22.5	
4	32.5	19.8	30.6	20.4	34	21.9	31	21.9	22.7	13.2	31.4	21.8	21.6	28.7	21.7	
5	32	19.9	32	21.4	32.4	21	31.5	20.9	21.4	13.6	31.7	21.8	21.6	29.9	22	
6	32.2	19.4	30.6	20.1	30.7	20.6	30.6	20.7	23	13.5	30.6	21	19.9	29	21.5	
7	25.5	22.4	33	21.3	27.7	24	28.5	26.5	19.8	16.5	30.5	22.6	21	28.5	25	
8	25.4	22.5	29.7	23.7	27.3	24	28.1	23.9	17.4	15.7	29.4	24.1	22.6	28.5	25.5	
9	32	23	31	25	33.8	24.4	30.8	24.5	21.7	16.5	34.7	24.5	21.8	31	22.5	
10	32.7	23	30.5	24.2	34.8	23.7	31.5	24.1	23.5	15.6	31.5	23.7	22.9	29.5	22.7	
11	30.3	22.8	28	22.8	29.3	24	28.5	23.3	18.9	14.9	29.1	23.5	22.4	27.2	24.5	
12	32.6	23.1	29.8	23.8	30.5	24	29.5	22.6	21.8	16.2	30.2	22.4	22.7	28.5	23.5	
13	32.4	23	31	23.4	30.9	23.9	30.9	23.4	22.2	16.2	31	23.5	24.6	28.8	24.5	
14	28.2	23	29.1	24.3	29.9	24.3	28.5	26.1	19.3	16	29.7	24.9	23.7	29.9	25	
15	33	23.4	31.5	22.9	32.2	23.5	30.5	24.1	23.3	16.1	31.5	23.3	20	30	23.6	
16	32.5	22.1	31	22.8	34.4	23.5	31.2	23.3	23.1	15.6		23.3	22	29.5	23	
17	33	21.6	31.4	21	30.5	23.3	28.7	23.4	23.5	15.5	29.7	22.5	21.9	29	24.1	
18	31.2	21.2	32	22.5	32.4	22.8	29.9	24.2	23.4	13.1	31.4	22.6	20.3	29.5	23	
19	30.8	20	28.7	22.9	32.2	20.9	30.3	21.6	22.5	12.9	29.9	22	18.6	30	22.5	
20	31.8	20.3	29	22.2	31.4	22.7	29.6	21.2	20.7	14	28.4	21.5	19.3	30	22	
21	32.9	20.2	29.5	20.5	33.4	22	30.5	22	23.2	13.3	30.4	21.9	19.4	29.5	22.4	
22	32.5	20.2	30.4	20.4	31.2	21.4	29.6	23.2	22.8	13.2	30.9	20.5	19.3	30.5	22	
23	32.5	21.8	27	21.4	33.2	21	30.6	21.2	21.2	12.7	30.3	21	19.2	30	21.5	
24	31.6	22.3	26.9	21.5	32.7	21	30.6	20.4	22.4	12.9	30	20.4	19.3	29.6	20.5	
25	32.6	22.9	30.8	21.5	30.9	21.4	30.9	21.7	22.9	13.1	30.5	22	19.8	29.5	21	
26	31.8	20.8	31.5	21.4	34.3	21.6	30.7	21.4	23.8	13.5	30.3	20.8	21.8	30.5	22.5	
27	35	20.5	32	22.6	32.2	21.5	31.5	20.8	24.4	15	31.4	20.8	22.4	30.5	22.1	
28	34.5	23	31.3	23.2	33.4	22.9	31.5	21.5	24.4	15.5	31.5	21.6	23.4	30.5	23	
29	34.6	23	33.4	23.9	32.8	24	29.5	26	23.6	15.6	31.9	23.5	24.3	30.3	24.2	
30	34.5	23.4	34.2	22.3	33.9	23.4	31.1	25.7	23.5	15.5	31.6	23.5	23.4	30.4	24.1	
31	33	22.5	30.5	23.4	32.1	23.4	31	23	20.2	15.5	31.1	24	21.9	30.5	24.5	
Mean	31.8	21.7	30.6	22.4	32	22.7	30.3	22.9	22.2	14.7	30.8	22.4	21.4	29.5	23	

Maximum and minimum temperatures at the stations of the Weather Bureau, December, 1915—Ctd.

Day.	Vigan.		Tuguegarao.		Laoag.		Aparri.		Santo Domingo, Batanes.		Dapitan.*	
	Maxi-mum.	Mini-mum.	Maxi-mum.	Mini-mum.	Maxi-mum.	Mini-mum.	Maxi-mum.	Mini-mum.	Maxi-mum.	Mini-mum.	Maxi-mum.	Mini-mum.
	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.
1	31.2	22.2	26.4	21.1	33.8	23	25.1	22	25.2	20.7	30.4	22.3
2	32.7	22.8	28.2	22.1	32	22.7	26.7	22.2	26	21.3	30.2	21.6
3	32.6	21.2	27.7	21.4	34	20.6	27.6	22.3	27	21.9	30.3	24.2
4	33	24.3	27.6	20	33.5	19.3	27	21.3	26.5	23.3	27.5	22.5
5	32.3	21.5	27.8	21.4	33.2	20	27.5	21.7	27.6	21.3	27.5	22.5
6	31.3	21.7	26	19.5	33.6	18.1	27.4	20	26.4	21.8	28.1	25
7	28.1	23.2	26.8	23.1	30.2	24	27.5	23.6	25.9	22.7	31	23.2
8	31.2	25	31.1	22.8	31.5	25.1	29.2	24	28	22.7	31.4	23
9	32.5	23.2	32.1	22.3	34	26.2	29.6	23.1	28.2	22.8	31.9	21.6
10	30	23.2	30.6	23.1	33.8	22.9	28.6	23.7	25.6	21.8	31.8	23.1
11	27	23	27.2	22.3	27.2	23.5	25.67	23.2	26.5	22.5	32.2	22
12	31.2	23.1	30.7	22.8	31	23.4	28.6	23.2	24.8	23	32.1	22.6
13	30.1	22.6	31	23.5	30.4	22.5	27.5	23.2	26.1	23.4	31.5	22.6
14	29.2	23	28.2	22.5	30.6	24.2	26.5	23	26.7	22.6	32.4	21.8
15	31	22.3	27.6	22.3	32.1	22.8	24.2	22.2	26	23.3	32	21.8
16	31.3	22.2	25.3	21.7	33.7	21.3	25	22.4	26	21.8	31.6	22.3
17	29.8	22.1	27	21.2	34	21.6	25	21.2	22.6	20.8	31.2	24
18	30.4	21.3	25.5	20	30.3	22.5	22.5	19.6	20.6	18.2	29.6	22.6
19	30.8	22.4	26.2	19.3	30.6	21.5	24.2	19.4	21	17.6	31.1	23.9
20	30.7	22	25.4	20.4	33.8	21.7	25.4	20.8	21.17	17.6	32	24
21	30.5	20.7	27.8	19.2	32.7	19.4	25	20.6	21.5	17.6	31.2	23.5
22	31.3	21.2	26.2	20.6	30.2	22.5	23.2	19.6	21.5	17.9	30.6	23.3
23	31.9	22.5	25.8	19.5	31.1	21.1	22.9	19.8	22.4	18.5	29	24
24	31.1	20.5	25.2	19.4	32.4	17	25.4	19.8	26	19.4	31.1	25
25	30.5	21.7	28.5	20.3	32.2	20.3	26	20.3	26.8	21.3	30.5	23.8
26	30.6	23	29.5	19.2	33.8	19.1	26	20.6	26.5	21.3	32	23.4
27	31.3	22.2	29.8	21.4	34.4	19	27.3	22.6	27.1	23.3	31	23.8
28	31	23.5	32.6	23	32.2	21.5	28.3	23.3	27.4	22.6	32.2	23.3
29	30.4	22.7	33.3	23.1	32.5	20.4	28.8	21.8	27.6	22.8	32.1	23.5
30	30.4	22.7	32.3	24.1	32.3	20.6	28.9	24.3	27.6	23.1	30.6	21.1
31	30.3	23.5	27.2	23	33	21.7	27.5	24.3	27.8	23.4	29	22
Mean	30.8	22.5	28.3	21.5	32.3	21.6	26.5	21.9	25.5	21.4	30.8	23

* Received late.

SEISMOLOGICAL BULLETIN FOR DECEMBER, 1915.

By Rev. MIGUEL SADERRA MASÓ, S. J.,
Assistant Director of the Weather Bureau.

EARTHQUAKES FELT IN THE PHILIPPINES.¹

1, 16^h 54^m [2, 0^h 54^m]. Butuan (N Mindanao). Oscillatory earthquake, direction NE-SW, intensity III-IV.

9, 14^h 03^m [9, 22^h 03^m] Paracale (SE Luzon). Oscillatory earthquake, direction ENE-WSW, intensity III, duration 5 seconds. It was also felt far away toward the E of Paracale in the region of the old Isarog Volcano.

12, 0^h 25^m 39^s * [12, 8^h 25^m 39^s]. N Luzon. Earthquake of intensity IV. Its epicenter lay in the northern part of the Mountain Province.

12, 4^h 11^m 53^s * [12, 12^h 11^m 53^s]. Legaspi (SE Luzon). Earthquake of intensity III, duration 6 seconds. It was also perceptible toward the NW of Legaspi in the neighborhood of the Isarog Volcano. This earthquake probably had its origin in the sea, E of San Bernardino Strait.

17, 8^h 38^m 20^s * [17, 16^h 38^m 20^s]. Butuan (N Mindanao). Earthquake of intensity II-III. Its origin was in the Pacific toward the southern part of the "Philippines Deep," and consequently it must have been felt also in the southeastern Provinces of Mindanao.

19, 14^h 19^m 12^s * [19, 22^h 19^m 12^s]. Vigan (NW Luzon). Earthquake shock of intensity II-III.

19, 20^h 19^m 10^s * [20, 4^h 19^m 10^s]. Butuan (N Mindanao). Earthquake of intensity II-III. Its origin must be placed in the Pacific, far off the eastern coasts of Mindanao, where it was but slightly felt.

21, 6^h 05^m 04^s * [21, 14^h 05^m 04^s]. Mindoro Island and S Luzon. Earthquake of intensity III-IV. The origin of the shocks lay in the northern part of Mindoro: they were felt throughout this Island and the Province of Batangas.

25, 10^h 34^m [25, 20^h 14^m]. Guam (Mariana Islands). Earthquake of intensity III.

27, 20^h 01^m [28, 4^h 01^m]. Butuan (N Mindanao). Oscillatory earthquake, direction N-S, intensity III-IV, duration 4 seconds.

29, 8^h 00^m [29, 16^h 00^m]. Goa (SE Luzon). Earthquake shock of intensity III. This was the first of one of the series of shocks felt in the neighborhood of the old Isarog Volcano, in the Province of Ambos Camarines. The three strongest occurred on the 29th at 22^h (30, 6^h), on the 30th at 7^h (15^h) and on the 31st at 5^h (13^h). These and many other minor shocks felt in November gave rise among the people to the rumor that the volcano was awakening and a great eruption had to be feared as imminent.

29, 10^h 58^m [29, 18^h 58^m]. Catbalogan (W Samar). Oscillatory earthquake, direction NW-SE, intensity III, duration 5 seconds.

29, 22^h 08^m 08^s * [30, 6^h 08^m 08^s]. Baguio (W Luzon). Earthquake shock of intensity II-III.

31, 21^h 09^m 11^s * [Jan. 1, 5^h 09^m 11^s]. Candon (NW Luzon). Earthquake of intensity III.

¹ The intensity of earthquakes is given in the notation known as the Rossi-Forel scale. The time is that indicated by the seismographs at the Central Observatory whenever the disturbance has been registered by them. This fact is denoted by an asterisk (*). Otherwise the time is that noted by the observer who sent the report. All time indications are in Greenwich mean time (Midnight=0^h), Insular time being added in brackets for the convenience of Philippine readers.

RECORDS OF THE MICROSEISMOGRAPH.

[Time: Greenwich mean. Midnight=^{0h}. Instrument: Wiechert seismograph; 1,000 kilograms. $A_N: T_0=7.1; \epsilon=2.08; \frac{r}{T_0^2}=0.042;$
 $A_E: T_0=6.4; \epsilon=2.31; \frac{r}{T_0^2}=0.039.$ Alluvium. 2.40 meters above sea level.]

No.	Date.	Character.	Phase.	Hour.			Period.	Amplitude.		Remarks.
								A_N μ	A_E μ	
308	1	Iv	eP	h.	m.	s.	2	10		
			L	12	07	17				
			M _E	07	07	31				
			F	07	44	10				
309	1	Iv	eP	14	49	11	1	12		
			L	14	49	26				
			M _E	49	49	37				
			F	52						
310	3	I _r	e	2	46	12	14	11	35	
			S	50	57					
			L	57	08					
			M _N	58	26					
			M _E	58	45					
			F	3	22					
311	5	Iv	eP	17	34	48				
			F	37						
312	5	Iv	eP	17	38	00				
			F	48						
313	8	Iv	eP	9	53	26	2	30		
			L	53	51					
			M _N	53	57					
			F	56						
314	12	Iv	eP	0	25	39	2	10	N Luzon.	
			L	26	11					
			M _E	26	30					
			F	29						
315	12	Iv	eP	4	11	53	3	19	Legaspi (SE Luzon).	
			L	12	42					
			M _E	12	57					
			F	17						
316	12	Iv	eP	7	56	00				
			F	58						
317	12	Iv	eP	17	33	15				
			F	36						
318	15	Iv	eP	12	50	40				
			L	50	59					
			F	54						
319	17	I _u	e	7	13	21	14	10		
			S	22	05					
			L	31	13					
			M _N	35	10					
			M _E	37	46					
			F	8	29					
320	17	Iv	eP	8	38	20	9	13	Butuan (N Mindanao).	
			S	40	07					
			L	41	47					
			M _E	42	38					
			M _N	42	38					
			F	9	19					
321	17	Iv	eP	12	46	14				
			F	49						
322	18	Iv	eP	17	09	36				
			F	12						
323	19	Iv	eP	14	19	12	1	22	Vigan (NW Luzon).	
			L	19	25					
			M _N	19	27					
			F	24						
324	19	I _r	eP	20	19	10	13	8	Butuan (N Mindanao).	
			S	22	33					
			L	25	30					
			M _N	33	23					
			M _E	33	23					
			F	57						

Records of the microseismograph—Continued.

No.	Date.	Character.	Phase.	Hour.	Period.	Amplitude.		Remarks.
						A _N μ	A _E μ	
325	21	IIv	eP L M _N F	h. m. s. 6 05 04 05 18 05 44 24	3	759	Mindoro Island and S Luzon.	
326	21	Iv	eP F	9 10 07 12				
327	21	Iv	eP F	13 23 18 26				
328	22	Iv	eP L F	7 20 32 21 00 24				
329	26	Iv	eP L F	14 54 36 54 52 58				
330	26	Iv	eP L F	15 51 27 51 46 54				
331	26	Iv	eP L F	21 40 00 40 19 43				
332	28 29	Ir	e F	23 59 0 40				
333	29	Iv	eP L M _N F	22 08 08 08 30 08 39 14	2	24	Baguio (W Luzon).	
334	30	Iv	eP L M _N F	10 14 33 15 08 15 05 20	2	15		
335	31	Iv	eP F	13 13 22 16				
336	31	Iv	eP F	21 09 11 12			Candon (NW Luzon).	
337	31	Iv	eP F	22 54 22 57				
338	31	Ir	e S L M _N M _E F	23 05 17 09 23 13 33 14 10 14 29 48	5 5	42 24		

TEMBLORES DE TIERRA SENTIDOS EN FILIPINAS.¹

1, 16^h 54^m [2, 0^h 54^m]. Butúan (N de Mindanao). Temblor oscilatorio, dirección NE-SW, intensidad III-IV.

9, 14^h 03^m [9, 22^h 03^m]. Paracale (SE de Luzón). Temblor oscilatorio; dirección ENE-WSW, intensidad III, duración 5 segundos. Este temblor fué también sentido débilmente, hacia el E. de Paracale en la región del antiguo volcán Isarog.

12, 0^h 25^m 39^s * [12, 8^h 25^m 39^s]. N de Luzón. Temblor de tierra de intensidad IV. Su epicentro se hallaba en la parte norte de la Provincia Montañosa.

12, 4^h 11^m 53^s * [12, 12^h 11^m 53^s]. Legaspi (SE de Luzón). Temblor de intensidad III, duración 6 segundos. Fué también perceptible en las cercanías del antiguo volcán Isarog. Su origen, al parecer, se hallaba en el mar, hacia el E del estrecho de San Bernardino.

17, 8^h 38^m 20^s * [17, 16^h 38^m 20^s]. Butúan (N de Mindanao). Temblor de tierra de intensidad II-III. Su origen se hallaba en el Mar Pacífico, hacia la parte sur del grande Abismo de Filipinas, fué sin duda más perceptible en la región sudeste de la Isla de Mindanao.

19, 14^h 19^m 12^s * [19, 22^h 19^m 12^s]. Vigan (NW de Luzón). Temblor de intensidad II-III.

19, 20^h 19^m 10^s * [20, 4^h 19^m 10^s]. Butúan (N de Mindanao). Temblor de tierra de intensidad II-III. Su origen se hallaba lejos en el Mar Pacífico pero fué perceptible en la parte oriental de la Isla de Mindanao.

21, 6^h 05^m 04^s * [21, 14^h 05^m 04^s]. Isla de Mindoro y S de Luzon. Temblor de intensidad III-IV. Su origen estaba en la parte N de Mindoro y fué perceptible en toda la isla y en la vecina Provincia de Batangas.

25, 10^h 34^m [25, 20^h 14^m]. Guam (Islas Marianas). Temblor de tierra de intensidad III.

27, 20^h 01^m [28, 4^h 01^m]. Butúan (N de Mindanao). Temblor oscilatorio, dirección N-S, intensidad III-IV, duración 4 segundos.

29, 8^h 00^m [29, 16^h 00^m]. Goa (SE de Luzón). Temblor de tierra de intensidad III. Este fué el primer temblor de una de las series de movimientos sísmicos ocurridos en las cercanías del antiguo volcán Isarog situado en la Provincia de Camarines. Los principales tuvieron lugar a 22^h del 29 (30, 6^h), 7^h (15^h) del 30 y 5^h (13^h) del 31. La repetición de estos pequeños temblores y los sentidos en Noviembre dieron lugar al falso rumor de que el viejo volcán se despertaba y era inminente una erupción.

29, 10^h 58^m [29, 18^h 58^m]. Catbalogan (W de Sámar). Temblor oscilatorio dirección NW-SE, intensidad III, duración 5 segundos.

29, 22^h 08^m 08^s * [30, 6^h 08^m 08^s]. Baguio (W de Luzón). Temblor oscilatorio, intensidad II-III.

31, 21^h 09^m 11^s * [1 Enero, 5^h 09^m 11^s]. Candón (NW de Luzón). Temblor de intensidad III.

¹ La intensidad de los terremotos se indica conforme a la conocida escala de Rossi-Forel. Cuanto a la hora de su ocurrencia, adoptamos la indicada por los sismógrafos de este Observatorio siempre que los hayan registrado, distinguiéndola por medio de un asterisco (*). En caso contrario copiamos la apuntada por los observadores que nos envían las notas. Todas las indicaciones del tiempo se refieren al tiempo medio de Greenwich (medianoche=0^h). Para conveniencia de los lectores de Filipinas se añade también el tiempo insular.

**APPENDIX TO THE MONTHLY BULLETINS
FOR 1915.**

**ANNUAL SUMMARY OF METEOROLOGICAL DATA FOR MANILA
DEDUCED FROM TWENTY-FOUR DAILY OBSERVATIONS
DURING THE YEAR 1915.**

Month.	Pressure.		Air temperature.									
	Mean.	Departure from normal.	Mean.	Departure from normal.	Mean maximum.	Departure from normal.	Mean minimum.	Departure from normal.	Absolute maximum.	Day.	Absolute minimum.	Day.
January	762.16	+0.96	24.8	-0.1	30.9	+0.8	20.2	-0.2	32.6	10	17.5	16
February	61.48	+ .15	25.7	+ .4	32.8	+2	19.7	- .5	34.2	26	17.3	4
March	61.92	+1.36	26.8	+ .2	33.8	+1.3	21.6	+ .3	36.4	31	18.9	7
April	60.31	+ .87	28.7	+ .6	36.5	+2.5	22.8	0	38	30	20.6	24
May	58.16	- .20	29.2	+ .7	35.6	+2	24.8	+ .9	38.6	17	22.6	1
June	57.91	- .04	28.8	+ .9	35	+2.5	24.6	+ .7	36.9	6	23.3	22
July	57.01	- .22	27.6	+ .5	32.3	+1.4	24.4	+ .7	36.3	7	22.1	16
August	57.44	+ .12	26.9	- .1	30.8	+ .1	24	+ .3	32.9	1	22.5	31
September	57.45	0	26.8	- .1	31.6	+ .9	24	+ .3	33.4	24	22.4	29
October	56.40	-2.26	26.6	- .1	31.4	+ .3	23.7	+ .6	33.9	8	22.4	22
November	58.48	- .94	26	+ .1	31	+ .6	22.9	+ .7	33.6	5	21.4	16
December	58.39	-2.05	25.4	+ .2	29.9	0	22.4	+1.2	32.2	9	19.8	4
Annual	758.92	-0.19	26.9	+0.3	32.6	+1.2	22.9	+0.4	38.6	V, 17	17.3	II, 4

Month.	Wind.					Relative humidity.		Vapor pressure.		Cloudiness.	
	Prevailing direction.	Velocity.			Direction at the time of the maximum velocity.	Mean.	Departure from normal.	Mean.	Departure from normal.	Mean.	Departure from normal.
		Total.	Departure from normal.	Hourly maximum.							
January	E quadrant.	Km. 3,595.5	Km. -1,483.5	Km. 27.5	N	P. ct. 78.6	P. ct. +0.5	mm. 18.1	mm. 0	0-10. 5.5	0-10. +0.2
February	E, SE	4,829	-542.7	27.5	SE	69.5	-4.3	16.6	- .9	3.8	-1
March	SE	5,912	-899.7	28	SE	70.9	- .5	18.2	+ .1	4.4	0
April	SE, E	6,834.5	-113.5	31	SE	66	-3.6	18.7	- .7	3	-1
May	SW	7,298	+426.6	35	SW	75.1	- .8	22.1	+ .5	6.2	+ .5
June	E, SE	5,236.5	-1,523.1	43	SWbyW	75.5	-5.2	21.8	- .5	6.6	- .4
July	SW quadrant.	6,484	-2,035.9	36.5	SW	83.5	-1.3	22.7	+ .3	7.6	- .2
August	SW quadrant.	8,018.5	-1,025.5	42	SWbyS	87.3	+2.3	22.8	+ .4	8.2	+ .3
September	SW quadrant.	5,531	-2,599.7	36	SW	86.4	+ .7	22.6	+ .1	7.8	+ .1
October	NE, ESE	6,405.5	+1,079.6	58	SWbyW	85.9	+2.3	22.1	+ .5	8.1	+1.4
November	N quadrant.	4,698.5	+ 90.3	68	SW	85.3	+2.9	21.2	+ .9	6.6	+ .3
December	N	5,194	+478.4	68	NW	83.5	+2.3	20	+ .8	7.6	+1.4
Annual		70,037.0	-8,329.3	68		79.0	-0.4	20.6	+ .1	6.3	+0.1

Month.	Evaporation.		Sunshine.		Rainfall.					
	Free exposure, total.	Under shelter, total.	Total.	Departure from normal.	Total.	Departure from normal.	Greatest in a single day.	Day.	Rainy days.	Departure from normal.
January	mm. 110.4	mm. 85.5	h. m. 168 55	h. m. -21 53	mm. 5.6	mm. -21.3	mm. 3.5	30	5	0
February	178.5	133	242 25	+42 48	3.8	-6.5	3.8	21	1	-2
March	194.3	142.3	227 50	-11 07	3.3	-14.6	2.4	20	1	+1
April	248.6	185.1	239 25	+26 04	5	-33.4	1.5	22	1	-3
May	188.6	138.3	225 30	-6 58	50.4	-57.2	13.5	25	9	0
June	159.9	122.4	187 50	+14 16	126.7	-107.1	53.6	26	10	-6
July	93.4	77	141 25	-3 58	276.3	-123.2	80	28	20	-1
August	64.8	56.9	115 10	-24 48	413.3	+51.1	63.2	13	23	+1
September	69.1	57.6	153 10	+16 05	478.7	+106.2	103.3	11	21	+1
October	69.6	59.8	120 40	-49 20	165.4	-18.5	27.5	2	19	+3
November	66.8	54.4	143 10	-20 21	208.1	+79.4	105.4	3	15	+3
December	75.2	64.3	107 45	-49 13	182.3	+120.2	68.7	2	13	+4
Annual	1,513.0	1,176.6	2,123 15	-88 25	1,914.9	-24.9	105.4	XI, 3	141	+1

CATALOGUE OF PHILIPPINE EARTHQUAKES, 1915.^a

Date.	Time of occurrence (Greenwich mean time).		Place.	Probable origin or epicenter.		Approximate extensions of the shaken area.		Intensity (Rossi-Forel).	Remarks.
				ϕ	λ	Longer axis.	Shorter axis.		
Jan. 4	<i>h.</i>	<i>m.</i>	SE Luzon and Visayas	12.5 N	123.2 E	Km. 400	Km. 250	V-VI	Registered in the Far East. Many aftershocks.
7	16	48	NW Luzon					III-IV	
11	13	40	Butuan (N Mindanao)					III	
13	17	34	Nueva Caceres (SE Luzon)					III	Registered at Manila.
14	17	40	Cagayan (N Mindanao)					IV	
15	3	06	Agusan Valley (E Mindanao)	8.0 N	125.6 E	250	200	IV	
20	4	04	N Mindanao	9.2 N	124.6 E			III-IV	Registered at Manila and Batavia.
21	15	06	Central Mindanao	7.5 N	125.0 E	200	200	V-VI	Registered in the Far East.
27	19	06	SE Luzon and Visayas	12.5 N	123.2 E	400	250	IV-V	Registered at Manila.
30	7	48	Surigao (NE Mindanao)					II-III	
31	12	07	NE Mindanao	9.8 N	126.3 E	500	400	IV	Do.
Feb. 3	2	20	Butuan (N Mindanao)					II-III	
11	20	10	Davao (SE Mindanao)					III	
12	1	30	Cotabato (SW Mindanao)					III	Repeated at 15 ^h 37 ^m .
12	16	39	Central Mindanao	7.5 N	125.0 E	200	200	IV-V	
12	22	45	Butuan (N Mindanao)					III	
13	15	06	Davao (SE Mindanao)					II-III	Registered at Manila.
13	17	08	NW Luzon					III	Do.
14	1	45	S Luzon					III	Do.
18	11	26	Surigao (NE Mindanao)					IV	Repeated at 11 ^h 42 ^m .
19	5	38	Eastern Luzon	15.4 N	121.7 E	300	180	IV	Registered at Manila.
19	10	47	E Samar					IV	Do.
20	4	34	Ormoc (W Leyte)					II-III	
20	15	42	Eastern Mindanao	7.0 N	126.7 E			IV	Registered at Manila and Batavia.
22	6	37	NE Mindanao	9.5 N	126.0 E			III-IV	
Mar. 4	10	43	Calbayog (NW Samar)					II-III	
4	21	35	Agusan Valley (E Mindanao)	8.3 N	125.7 E			IV	
7	13	18	Calbayog (NW Samar)					III	Repeated at 16 ^h 15 ^m .
12	14	50	SE Luzon and Visayas	12.5 N	123.2 E	500	300	VI-VII	Registered all over the world. Many aftershocks on the 13th, 14th and 15th.
13	18	51	Nueva Caceres (SE Luzon)					III	
15	23	36	Borongan (E Samar)					III	
17	11	02	Nueva Caceres (SE Luzon)					III	
21	5	42	Guam (Mariana Islands)					IV	
24	3	52	do					III	Repeated at 11 ^h 37 ^m .
24	15	17	Tuguegarao (NE Luzon)					II-III	
30	19	22	Masbate Islands	12.5 N	123.2 E			III-IV	
30	20	45	Dansalan (N Mindanao)					IV	
Apr. 2	17	23	Capiz (N Panay)					III	Registered at Manila.
4	14	43	Nueva Caceres (SE Luzon)					II-III	Do.
6	2	51	Guam (Mariana Islands)					IV	
6	20	59	Samar and Leyte Islands	11.6 N	124.5 E			IV	Do.
9	8	09	Legaspi (SE Luzon)					III	
12	13	07	Northern Luzon	18.6 N	121.4 E	300	180	VI-VII	Registered in the Far East.
16	18	24	Baguio (W Luzon)					III	Registered at Manila.
18	11	27	Western Luzon	16.3 N	121.2 E	250	250	V	Do.
25	0	50	Iba (W Luzon)					III	
26	14	16	Camarines and Albay (SE Luzon)					III-IV	Do.
29	9	07	Aparri (NE Luzon)	19.0 N	122.7 E			IV	Do.
May 1	4	27	Guam (Mariana Islands)					III	
1	14	00	Butuan (N Mindanao)					IV	
2	20	06	Legaspi (SE Luzon)					III-IV	Do.
8	5	13	Mindoro Island and S Luzon	13.5 N	121.0 E	300	250	V	Registered at Manila. Fore-shock at 5 ^h 10 ^m .
9	14	14	N Mindoro					III	
13	6	40	Guam (Mariana Islands)	14 N	137 E			III	
16	13	55	Batanes Islands	20.3 N	121.8 E			VII-VIII	Registered at Manila. Aftershocks at 20 ^h 05 ^m and 22 ^h 15 ^m .
16	22	16	Northern Luzon	18.7 N	122.2 E			IV-V	Registered at Manila.
18	18	47	NE Mindanao	9.2 N	125.4 E			III-IV	
21	20	22	Batangas (S Luzon)					III	Registered at Manila.
27	1	42	Batanes Islands					IV	Do.
27	15	42	Aparri (NE Luzon)					III	
28	21	34	Baguio (W Luzon)					II-III	Do.
31	13	50	Legaspi (SE Luzon)					II-III	
June 8	2	39	Northern Luzon	18.8 N	122.3 E			V	Registered at Manila and Taihoku.
8	5	05	Butuan (N Mindanao)					III	Registered at Manila.
13	8	00	Zamboanga (W Mindanao)					III-IV	
16	7	39	Calbayog (NW Samar)					III-IV	Do.
16	19	15	Masbate and N Leyte	11.5 N	124.3 E			III-IV	

^a See explanation in Monthly Bulletin of the Weather Bureau for December, 1910, page 445.

Catalogue of Philippine earthquakes, 1915—Continued.

Date.	Time of occurrence (Greenwich mean time).	Place.	Probable origin or epicenter.		Approximate extensions of the shaken area.		Intensity (Rossi-Forel).	Remarks.
			ϕ	λ	Longer axis.	Shorter axis.		
			$^{\circ}$	$^{\circ}$	Km.	Km.		
June 17	14 20	Guiuan (SE Samar)					III	
17	23 34	Mindoro Island and S Luzon	13.5 N	121.0 E	300	250	IV-V	Registered in the Far East.
18	0 06	Guiuan (SE Samar)					III-IV	Registered at Manila.
19	4 18	Butuan (N Mindanao)					III	
19	13 30	Iba (W Luzon)					II-III	
20	1 06	NE Mindanao	9.4 N	126.7 E			III	Do.
20	13 26	Benguet and Nueva Vizcaya (Central Luzon)					II-III	
22	21 28	Samar and NE Mindanao	10.5 N	126.4 E			IV	Registered in the Far East.
24	16 21	NE Mindanao	9.8 N	126.5 E			V	Registered at Manila.
25	0 09	E Samar	12.0 N	126.0 E			IV	
July 2	0 05	N Samar	12.8 N	124.9 E			IV	Do.
2	13 25	Batanes Islands	20.3 N	121.8 E			IX	Registered at Manila, Taihoku and Batavia. Aftershocks at 14 ^h 07 ^m and 15 ^h 12 ^m .
4	13 56	Legaspi (SE Luzon)					III	
4	21 40	Maasin (S Leyte)					III	
7	3 45	Masbate Island					III	
8	4 44	Samar and Leyte Islands	11.2 N	125.3 E	150	150	V	Repeated with the same intensity at 7 ^h 17 ^m . Registered at Manila. Minor aftershocks during the day.
9	4 12	Batanes Islands	20.3 N	121.8 E			III-IV	
9	23 16	Borongan (E Samar)					III	
10	10 30	Western Luzon	16.6 N	121.2 E			IV	Registered at Manila.
11	16 39	NE Mindanao					III-IV	Registered at Manila. Origin in the Pacific Ocean.
12	20 08	Bolinao (W Luzon)	16.3 N	119.5 E			III-IV	Aftershocks at 20 ^h 25 ^m and 22 ^h 40 ^m . Registered at Manila.
15	2 40	Batanes Islands	20.3 N	121.8 E			IV	
16	13 36	Butuan (N Mindanao)					II-III	
19	10 02	Ormoc (W Leyte)					III	
21	6 36	Butuan (N Mindanao)					III-IV	
22	19 14	Nueva Caceres (SE Luzon)					III	Registered at Manila.
24	6 33	Batanes Islands	20.3 N	121.8 E			III	
28	8 21	Butuan (N Mindanao)					III	
Aug. 5	8 48	Central Mindanao	7.5 N	125.4 E	200	150	IV-V	Do.
8	14 37	Butuan (N Mindanao)					III	
16	6 09	do					III-IV	
21	19 30	do					IV	
24	10 51	Baguio (W Luzon)					II-III	
24	11 30	Butuan (N Mindanao)					III	
25	10 20	Glan (S Mindanao)	5.6 N	125.1 E			III-IV	
25	23 16	Ormoc (W Leyte)					III	
26	18 29	Bolinao (W Luzon)	16.3 N	119.5 E			III	Do.
27	8 47	Batangas (S Luzon)					III	Do.
30	7 17	N Luzon	18.6 N	121.4 E			IV	Do.
31	20 42	Jolo Island	4 N	120 E			IV	Repeated at 21 ^h 10 ^m .
Sept. 5	12 19	Agusan Valley (E Mindanao)	8.2 N	125.8 E	400	180	VII	Registered in the Far East.
12	0 01	S Mindanao	4 N	124 E			III	
13	20 10	Butuan (N Mindanao)					III	
14	6 27	Aparri (NE Luzon)					III-IV	
14	20 21	Jolo Island					III	
15	19 56	Guam (Mariana Islands)					III	
18	20 07	NE Mindanao	9.2 N	125.4 E			IV	Repeated at 4 ^h 10 ^m on the 19th.
21	14 52	Batangas (S Luzon)					III	Registered at Manila.
24	9 30	NW Luzon					IV	
24	13 09	Surigao (NE Mindanao)					II-III	
26	1 16	Legaspi (SE Luzon)					III-IV	Registered at Manila.
28	14 04	Samar and NE Mindanao					III	Origin in the Pacific Ocean.
Oct. 2	19 30	Catanduanes Island					IV	Registered at Manila.
5	11 40	Surigao (NE Mindanao)					III	
7	9 37	Guam (Mariana Islands)					III	
10	13 05	Zamboanga (W Mindanao)	7 N	122.6 E			III-IV	
11	5 06	Butuan (N Mindanao)					III	
12	0 13	Baguio (W Luzon)					III	
12	22 30	do					II-III	Repeated at 3 ^h 37 ^m on the 13th. Registered at Manila.
19	15 18	Butuan (N Mindanao)					III	
22	2 57	Guam (Mariana Islands)					II-III	
25	8 33	S Luzon					III	Registered at Manila.
26	1 49	Ambos Camarines (SE Luzon)	14 N	123.5 E			IV	Do.
26	17 38	Ormoc (W Leyte)					II-III	
28	9 07	Iloilo (E Panay)					III	
31	14 54	Ormoc (W Leyte)					III-IV	
Nov. 4	5 21	Surigao (NE Mindanao)					II-III	
8	11 49	Dagupan (W Luzon)					II-III	Do.
8	20 52	Guam (Mariana Islands)					III	
10	3 51	N Samar	12.3 N	124.4 E			III-IV	Do.
10	5 31	Baguio (W Luzon)					III	Do.
11	7 01	Guam (Mariana Islands)					III	
12	7 22	Butuan (N Mindanao)					II-III	
13	10 55	Central Luzon	16.0 N	120.8 E			V	Registered in the Far East.
16	0 08	Ormoc (W Leyte)	10.7 N	124.5 E			IV-V	Repeated at 1 ^h 14 ^m .

Catalogue of Philippine earthquakes, 1915—Continued.

Date.	Time of occurrence (Greenwich mean time).	Place.	Probable origin or epicenter.		Approximate extensions of the shaken area.		Intensity (Rossi-Forel).	Remarks.
			ϕ	λ	Longer axis.	Shorter axis.		
Nov. 18	1 13	S Luzon and N Mindoro.....	13.5 N	121 E	Km.	Km.	III-IV	Repeated at 1 ^h 27 ^m and 1 ^h 31 ^m . Registered at Manila. Registered in the Far East.
18	20 20	N Luzon.....	18.3 N	120.8 E			VII	
25	20 37	Guam (Mariana Islands).....					II-III	
Dec. 1	16 54	Butuán (N Mindanao).....					III-IV	Registered at Manila. Do. Origin in the Pacific Ocean. Registered at Manila. Registered at Manila. Origin in the Pacific Ocean. Registered at Manila. Registered at Manila. Do. Do.
9	14 03	Ambos Camarines (SE Luzon).....					III	
12	0 26	N Luzon.....					IV	
12	4 12	Legaspi (SE Luzon).....					III	
17	8 38	SE Mindanao.....					II-III	
19	14 19	Vigan (NW Luzon).....					II-III	
19	20 19	E Mindanao.....					II-III	
21	6 05	Mindoro Island and S Luzon.....	13.4 N	121 E			III-IV	
25	10 34	Guam (Mariana Islands).....					III	
27	20 01	Butuan (N Mindanao).....					III-IV	
29	8 00	Ambos Camarines (SE Luzon).....					III	
29	10 58	Catbalogan (W Samar).....					III	
29	22 08	Baguio (W Luzon).....					II-III	
31	21 09	Candon (NW Luzon).....					III	

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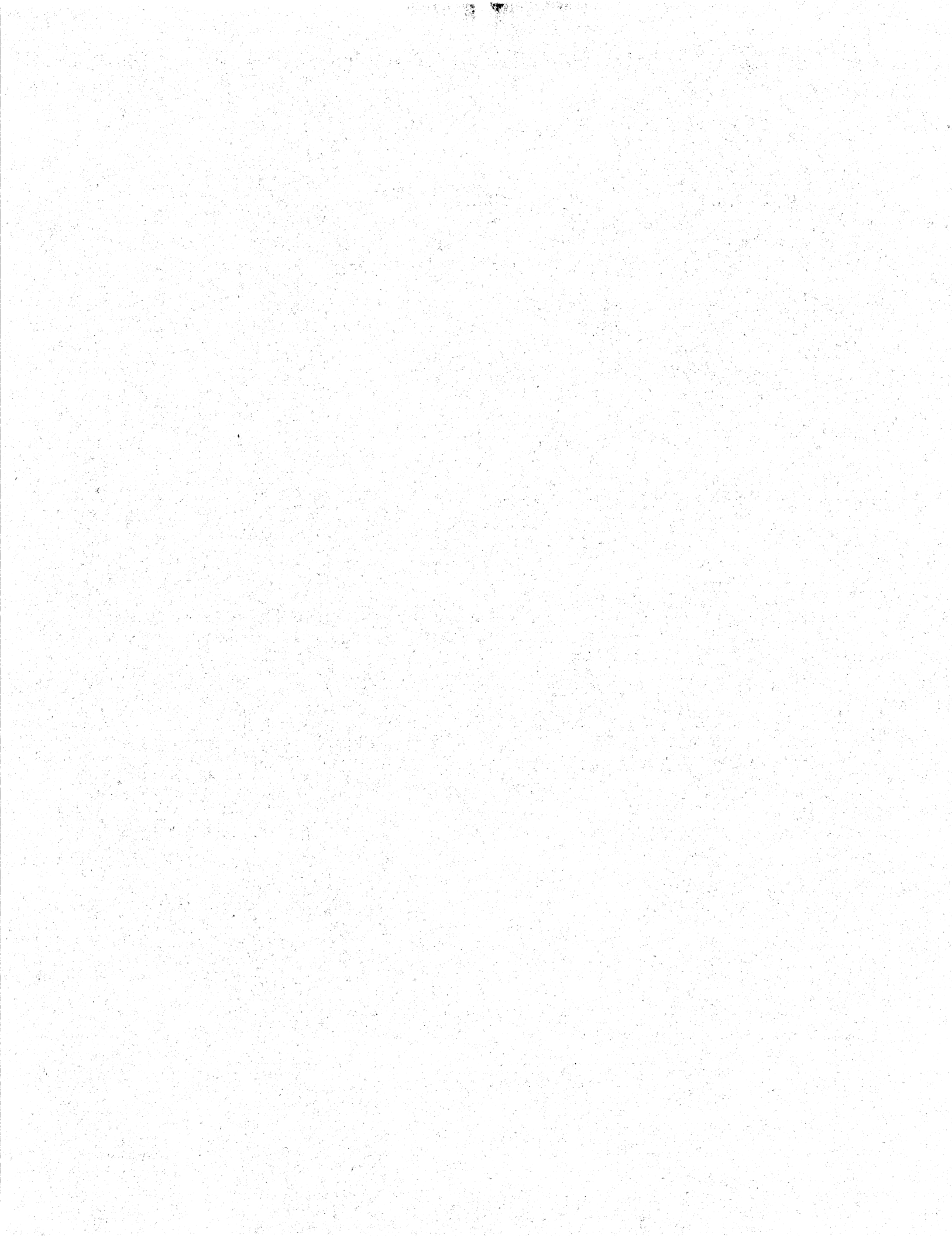
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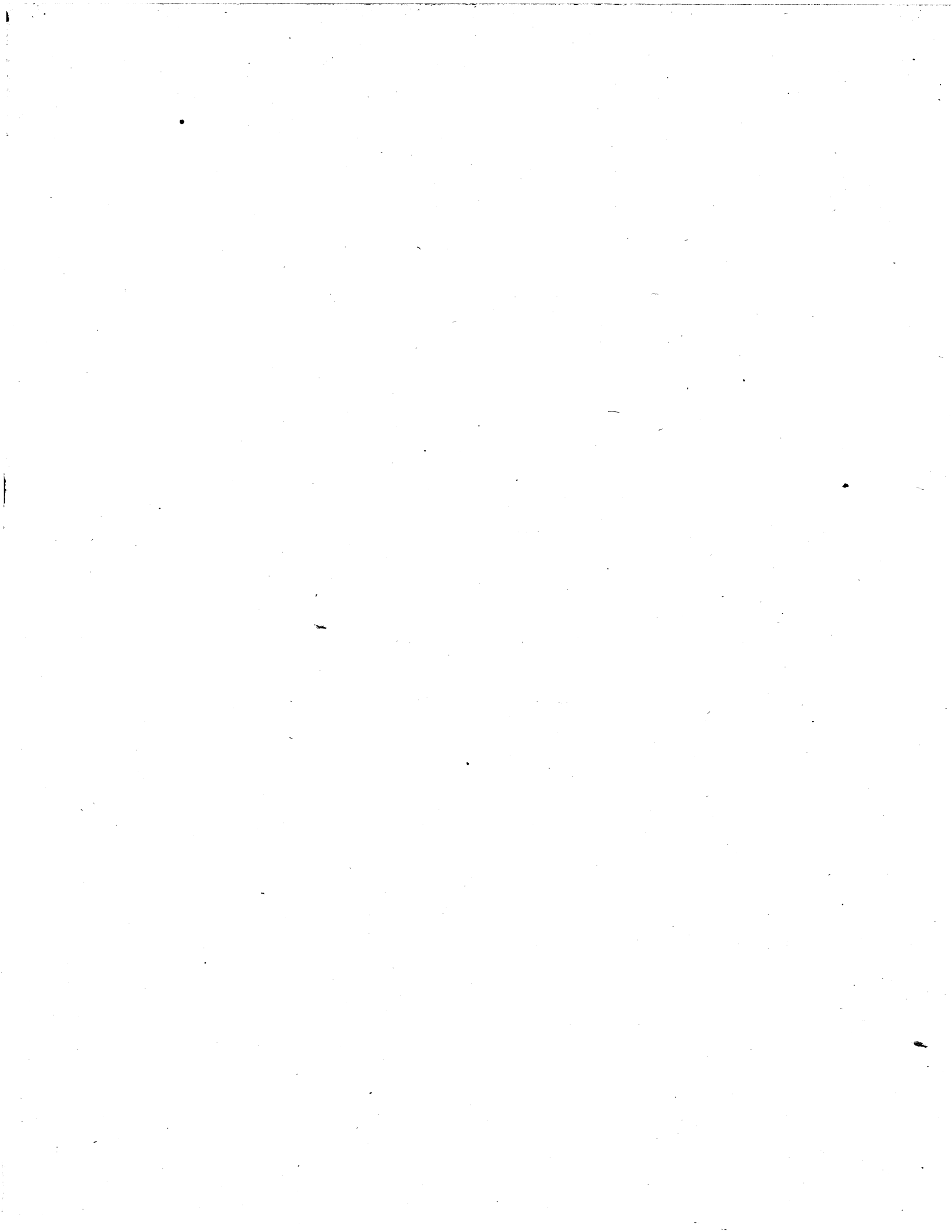
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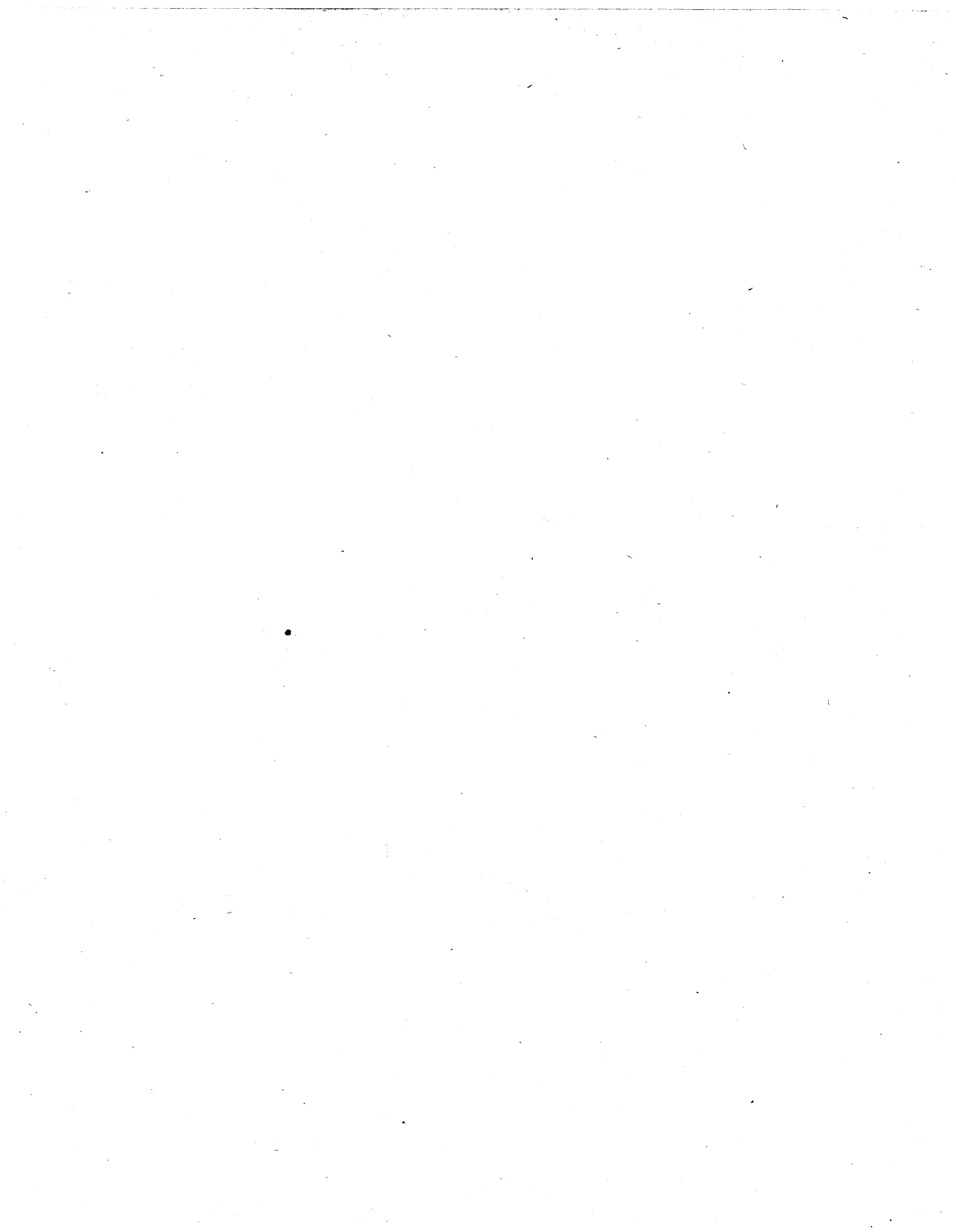
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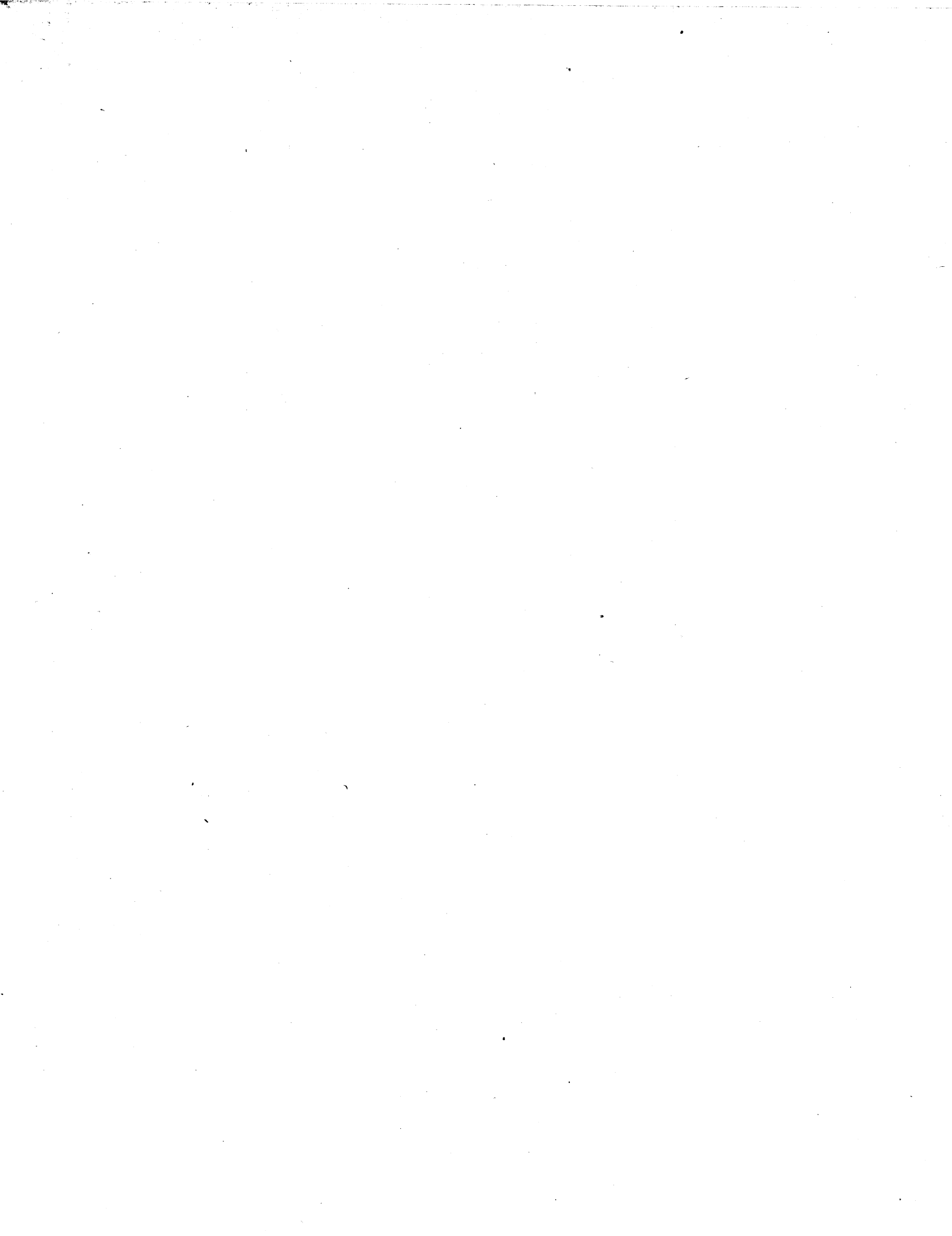
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