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AN ELECTRONIC DIVICE TO ADJUST A CRYSTAL CLOCK

Louis Bourgeois, S.J.

Recently, a Sprenghether crystal chronometer was installed at Brebeuf College Seismological Observatory. It provides both the signals for the minute marks and a steady 60-cycle current for the recording equipment. The following improvements were added to the system:

1 - A resetting device for the crystal clock;

2 - A battery operated transistor power amplifier for supplying the 115-volt 60-cycle current needed for the recording equipment;

3 - A stroboscopic comparator for measuring the chronometer deviation from CHU or WWV signals with a 0.01 second accuracy.

There is nothing revolutionary in these features; yet their simplicity of design and their reliability are such that they appear to be of possible interest for other observatories.

The clock adjuster device

The Sprenghether crystal chronometer does not provide any mean for adjusting the minute signal against another time signal. The cam-switch can only be set mechanically by hand; this results in an error of few tenths of a second. The new electrical device can provide an adjustment of at least ± 0.01 second accuracy.

The functioning of this device is very simple. The crystal chronometer delivers a 115-volt 60-cycle current to the synchronous motor which actuates the minute signal cam-switch. Before this current reaches the cam-switch motor, an electronic device adds or subtracts some cycles to the original 60-cycle in order to move the timing system backward or forward, thus correcting the chronometer time difference. This is done in the following way: The single phase 60-cycle current produced by the chronometer is converted into a three-phase 60-cycle current by a conventional phase splitter (1), as shown in Fig. 1. After the current is amplified to avoid phase splitter loading, the three-phase AC is sent to the three stator windings of a small synchro-generator (selsyn),

one phase only being induced in the rotor, according to the position of this one.

When the selsyn rotor is manually rotated forward or backward, one cycle (i.e. 1/60th of a second) is added or subtracted to the controlled 60-cycle current for each complete revolution of the rotor. The rotor is rotated manually a number of turns and a fraction of a turn needed to correct the time difference, and then locked.

It should be noticed that such a phase-splitting device works only with a sine wave input. Since the chronometer 60-cycle output is a square wave, a sine wave restorer must be used. (Fig.1)

The power amplifier

The AC current picked up by the selsyn rotor has to be amplified, voltage and current wise, before being used. This is the purpose of the 50-watt power amplifier found in Fig. 1. This circuit is conventional. The amplifier transformers were built according to standard specifications (2). The only difference is the output transformer secondary which consists of 700 turns of No. 18 Formvar wire.

The variable transformer used at the input is not essential; a five-watt, 5000 ohm potentiometer could also do the work.

The control system

An easy way to compare the time given by the chronometer with a radio time signal is to use a stroboscope. The shaft of a 60-rpm synchronous motor fed by the regulated 60-cycle drives a two-inch hand sweeping a four-inch dial divided into 100 parts. Since the hand makes one revolution per second, each dial division equals 0.01 second.

This dial is illuminated once per second, for an extremely short time, by an electronic photo-flash actuated by the radio time signal. Thus, the dial hand appears to be "stopped" on the dial at a position measurable to $\pm$ 0.01 second accuracy. This dial hand has to be adjusted initially to a reference position which indicates the actual time of the chronometer. This is achieved by having the flash gun actuated by the chronometer minute signal and taking the hand position obtained this way on the dial as the reference point for comparison with the actual exact time.

sources: the radio time signal, the crystal chronometer and from a stand-by marine chronometer which can be substituted to the crystal chronometer by SW-3. (see Fig.2)

The flash gun is a common electronic strobe flash, similar to those used in photography, in which the large electrolytic capacitor has been replaced by a 1.0 microfarad, 600-volt capacitor in order to provide shorter recharge time, less brilliant light and longer life to the flash bulb.

Radio signal reception is improved with a high-Q band-pass filter adjusted to 1000 cycles, which is the audio pulse frequency of CHU and WWV.

The time system also provides the mean to record once a day on all the seismograms the CHU reference time signal when local CBC broadcast station relays the CHU signal. A standard receiver is then turned on automatically by the timing system. Since the audio frequency of the emitted pulses is 800 cycles instead of 1000 cycles, a switching device is necessary to change the resonant frequency of the band-pass filter.

Conclusion

The time system described in this article was completed in February 1967 and works very nicely since that time.

DC operation from constantly charged storage batteries has been found as a good asset, since power failures, even short, would affect the chronometer long-term accuracy.

Louis Bourgeois, S.J.

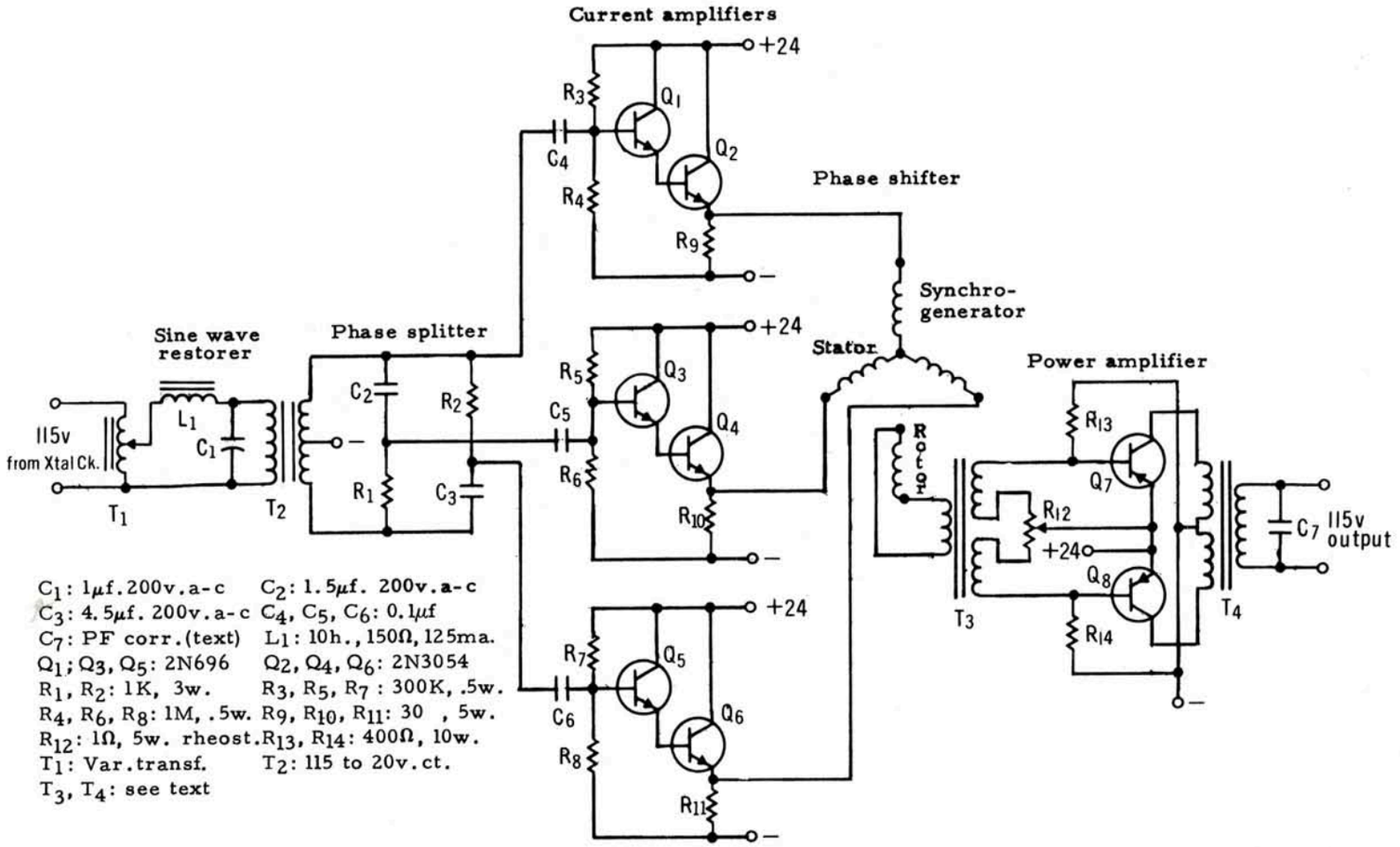
Acknowledgment

Thanks to Mr. Antonio Guimond, Montreal CBC engineer, for the idea of using a phase splitter and a synchro in our time control system.

References

(1) Millman and Taub: Pulse and Digital Circuits. Mc Graw-Hill, 1956, Chapter 16, p. 498.

(2) Military Standardization Handbook: Selected Semi-Conductor Circuits. U.S. Government Printing Office, 1960. Circuit 3-14 : 75 Watt Audio Amplifier.



C_1: 1μf. 200v. a-c C_2: 1.5μf. 200v. a-c
C_3: 4.5μf. 200v. a-c C_4, C_5, C_6: 0.1μf
C_7: PF corr. (text) L_1: 10h., 150Ω, 125ma.
Q_1; Q_3, Q_5: 2N696 Q_2, Q_4, Q_6: 2N3054
R_1, R_2: 1K, 3w. R_3, R_5, R_7: 300K, .5w.
R_4, R_6, R_8: 1M, .5w. R_9, R_{10}, R_{11}: 30 , 5w.
R_{12}: 1Ω, 5w. rheost. R_{13}, R_{14}: 400Ω, 10w.
T_1: Var. transf. T_2: 115 to 20v. ct.
T_3, T_4: see text

Fig. 1 - Circuit diagram of the crystal clock adjuster and the power amplifier.

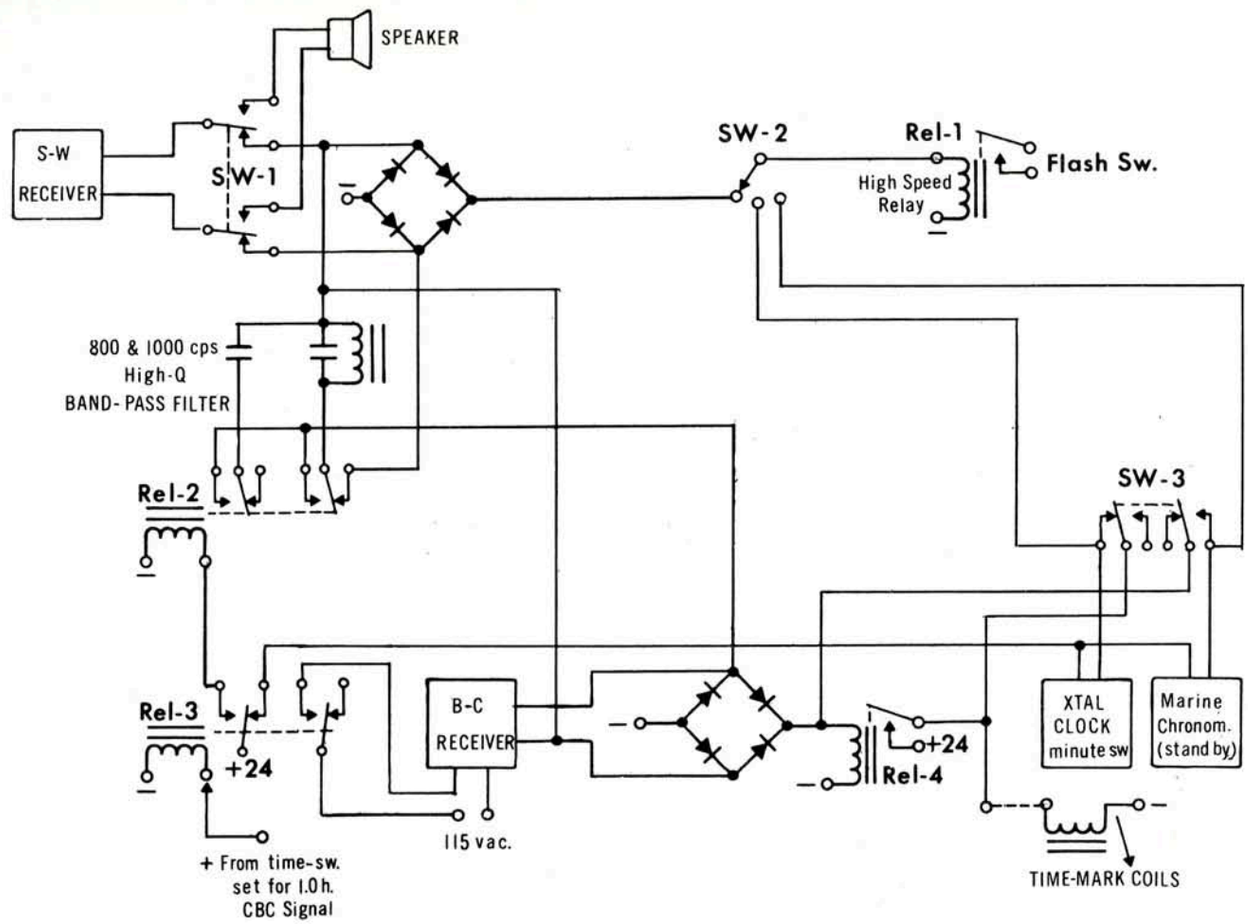


Fig. 2 - Switching circuit of the controlled time system.

ELECTRIC POTENTIAL GRADIENT AT BREBEUF COLLEGE OBSERVATORY 1957 to October 1963.
1 meter above ground

The following Tables give the mean daily and monthly hourly values of the potential gradient recorded during strict "fair weather conditions". No clouds of any type were present.

The absolute figures of the recordings have been reduced to 1 meter above ground by means of the reduction factor 0.113, calculated only in 1964. Earlier measurements had been impossible owing to lack of required equipment.

While we admit that such a procedure is objectionable, we believe that since the radio-active probe, its location and the keithley electrometer had not been changed we could obtain reduced values sufficient for comparative studies. We are well aware that such a reduction to 1 meter above ground is still a debated question.

In order to avoid recording small variations of the potential gradient the sensitivity of the electrometer was greatly reduced. The range of the voltage was of 5000 volts on each side of the central zero volt line. The minimum voltage of the absolute uncorrected values which could be read was 50 to 100 volts according to the shape of the recording. We were mostly interested in the larger trend of the potential gradient related to the main air masses making the transient local weather: anticyclones and cyclones.

As stated in Bulletin de Géophysique No. 16, the radio-probe is at 23 meters on the roof of the College, somewhat in the shade of a higher wall in the NW sector. The College is in the residential part of the town and atmospheric pollution has been stated by Summers, who made measurements at about 2 miles distance, as moderate. A full discussion of the data presented here will be found in the 1967 issues of "Pure and Applied Geophysics" published by the Birkhäuser Verlag, Basel, Switzerland.

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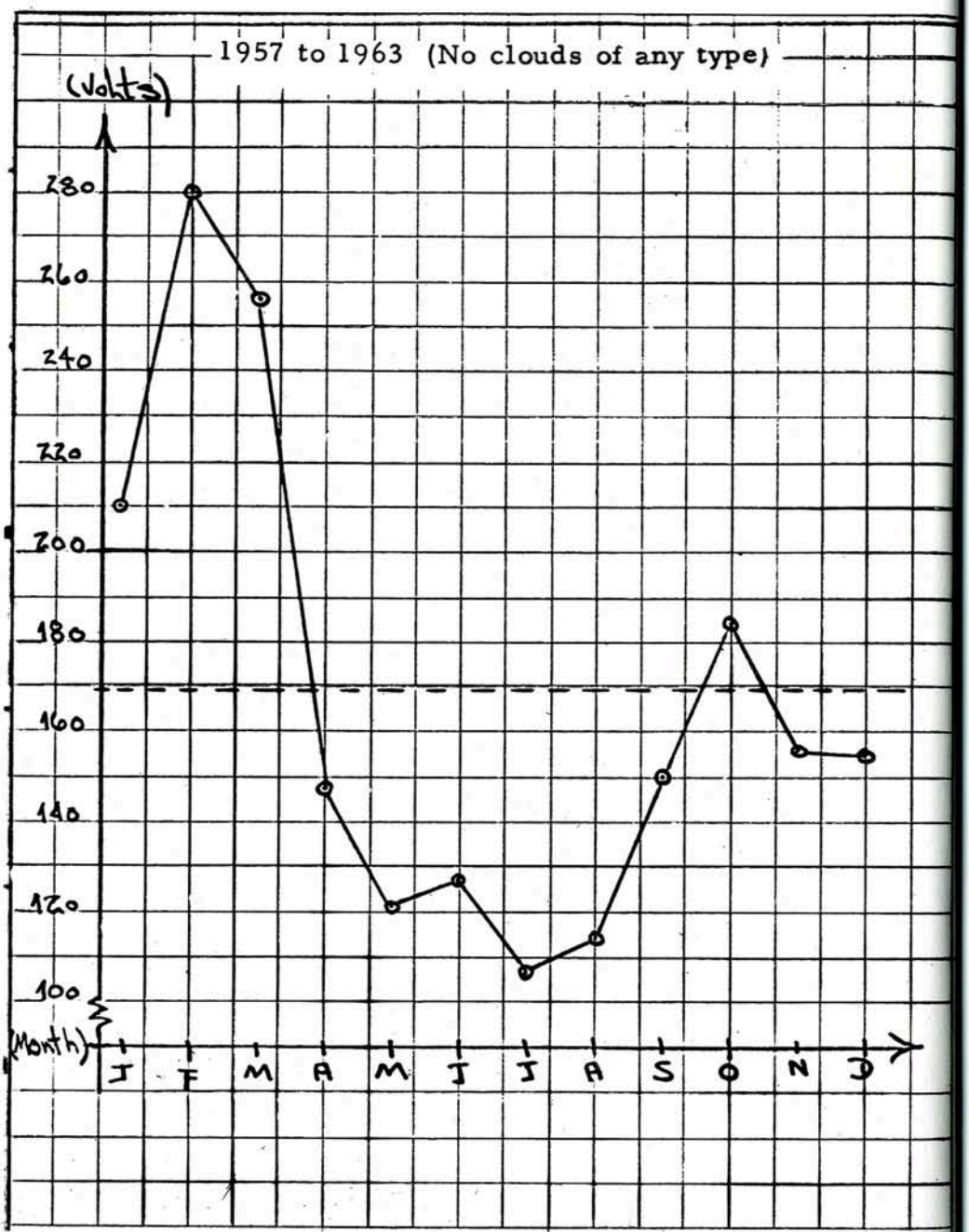
MEAN MONTHLY HOURLY AND DAILY MEAN VALUES OF THE POTENTIAL GRADIENT
1 METER ABOVE GROUND

1957	Daily mean	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Feb.	115.5	79.1	33.9	67.8	90.4	101.7	101.7	101.7	158.2	203.4	248.6	259.9	237.3	248.6	259.9	237.3	192.1	101.7	45.2	33.9	33.9	33.9	33.9	33.9	33.9
Mar.	104.6	67.8	56.5	56.5	45.2	45.2	45.2	67.8	113.0	169.5	169.5	169.5	158.2	135.6	124.3	113.0	113.0	113.0	146.9	135.6	90.4	101.7	96.4	90.4	90.4
Apr.	89.5	33.9	45.2	56.5	56.5	56.5	56.5	67.8	67.8	67.8	79.1	67.8	56.5	45.2											
May	49.9	33.9	33.9	33.9	33.9	45.2	45.2	45.2	56.5	56.5	67.8	67.8	56.5	45.2	56.5	45.2	45.2	45.2	45.2	45.2	56.5	45.2	56.5	67.8	67.8
Jun.	113.9	101.7	113.0	101.7	101.7	79.1	79.1	101.7	124.3	146.9	124.3	124.3	124.3	113.0	84.7	96.0	113.0	124.3	118.6	90.4	118.6	175.1	129.9	113.0	135.6
Jul.	49.9	33.9	22.6	45.2	45.2	45.2	56.5	67.8	79.1	90.4	79.1	67.8	45.2	45.2	33.9	33.9	45.2	45.2	45.2	33.9	56.5	45.2	45.2	45.2	45.2
Aug.	58.9	56.5	45.2	45.2	45.2	45.2	56.5	67.8	79.1	90.4	79.1	79.1	67.8	45.2	45.2	33.9	33.9	45.2	56.5	56.5	67.8	79.1	67.8	56.5	67.8
Sep.	198.7	146.9	158.2	158.2	169.5	146.9	158.2	237.3	305.1	305.1	259.9	248.6	226.0	226.0	192.1	192.1	169.5	180.8	192.1	203.4	169.5	180.8	192.1	169.5	180.8
Oct.	195.9	146.9	135.6	158.2	124.3	90.4	90.4	158.2	203.4	248.6	259.9	259.9	259.9	259.9	282.5	237.3	226.0	237.3	237.3	226.0	192.1	180.8	180.8	180.8	124.3
Nov.	136.5	135.6	135.6	113.0	135.6	135.6	135.6	135.6	135.6	158.2	180.8	180.8													
Dec.	77.7	45.2	45.2	45.2	33.9	33.9	33.9	45.2	45.2	79.1	113.0	124.3	135.6	192.1	169.5	169.5	124.3	113.0	79.1	67.8	56.5	45.2	22.6	22.6	22.6
Mean		79.1	79.1	79.1	79.1	67.8	79.1	101.7	135.6	158.2	158.2	146.9	146.9	124.3	146.9	146.9	135.6	135.6	135.6	124.3	113.0	113.0	113.0	113.0	113.0
1958																									
Jan.											11.3	11.3	79.1												
Feb.	258.0	248.6	259.9	226.0	226.0	237.3	226.0	282.5	237.3	237.3	237.3	237.3	271.2	316.4	316.4	282.5	282.5	282.5	259.9	259.9	248.6	214.7	271.2	282.5	248.6
Mar.	244.4	146.9	146.9	135.6	135.6	135.6	135.6	158.2	214.7	271.2	305.1	305.1	350.3	339.0	327.7	327.7	327.7	327.7	316.4	282.5	259.9	237.3	259.9	214.7	203.4
Apr.	146.0	113.0	101.7	113.0	101.7	101.7	124.3	145.9	169.5	203.4	203.4	180.8	180.8	158.2	158.2	146.9	135.6	158.2	146.9	158.2	146.9	135.6	146.9	146.9	124.3
May	122.4	124.3	135.6	135.6	135.6	146.9	124.3	158.2	180.8	158.2	146.9	135.6	113.0	113.0	113.0	113.0	113.0	113.0	90.4	90.4	90.4	101.7	101.7	101.7	101.7
Jun.	115.4	90.4	101.7	90.4	101.7	79.1	90.4	113.0	135.6	124.3	124.3	113.0	101.7	101.7	101.7	101.7	113.0	124.3	124.3	124.3	124.3	146.9	169.5	146.9	124.3
Jul.	101.7	90.4	90.4	101.7	90.4	90.4	90.4	113.0	146.9	135.6	124.3	124.3	113.0	113.0	101.7	101.7	101.7	90.1	90.1	79.1	79.1	101.7	101.7	90.4	79.1
Aug.	111.6	101.7	90.4	90.4	101.7	90.4	101.7	135.6	180.8	192.1	158.2	135.6	124.3	101.7	90.4	101.7	90.4	79.1	79.1	90.4	124.3	101.7	101.7	124.3	90.4
Sep.	166.7	146.9	146.9	113.0	135.6	146.9	146.9	169.5	226.0	226.0	226.0											226.0	192,1	180.8	158.2
Oct.	113.0	135.6	135.6	124.3	124.3	101.7	79.1	101.7	79.1	90.4	146.9	124.3	146.9	146.9	214.7	169.5	180.8	135.6	79.1	56.5	79.1	67.8	67.8	67.8	56.5
Nov.	136.0	124.3	113.0	79.1	67.8	67.8	67.8	67.8	79.1	145.6	158.2	158.2	158.2												
Dec.	109.9	45.2	56.5	22.6	11.3	0	0	11.3	11.3	33.9	113.0	180.8	384.2	350.3	180.8	339.0	273.3	192.1	113.0	79.1	90.4	67.8	67.8	56.5	56.5
Mean		124.3	124.3	113.0	113.0	101.7	113.0	135.6	158.2	169.5	180.8	158.2	180.8	214.7	203.4	203.4	192.1	180.8	158.2	146.9	135.6	135.6	146.9	135.6	124.3
1959																									
Jan.	256.1	327.7	293.8	259.9	282.5	259.9	248.6	259.9	293.8	327.7	497.2	361.6	440.7												
Feb.	285.3	259.9	271.2	271.2	282.5	248.6	259.9	282.5	316.4	361.6	361.6	395.5	384.2	293.8	293.8	282.5	305.1	226.0	259.9	237.3	237.3	226.0	248.6	271.2	271.2
Mar.	268.6	237.3	248.6	273.3	273.3	226.0	237.3	237.3	293.8	339.0	350.3	305.1	327.7	316.4	316.4	316.4	293.8	259.9	248.6	282.5	248.6	214.7	180.8	203.4	214.7
Apr.	125.7	101.7	113.0	124.3	113.0	113.0	124.3	135.6	169.5	169.5	146.9	146.9	113.0	169.5	146.9	124.3	79.1	214.7	124.3	101.7	101.7	113.0	113.0	90.4	67.8
May	123.8	124.3	135.6	135.6	146.9	158.2	146.9	146.9	146.9	135.6	146.9	158.2	146.9	101.7	135.6	101.7	90.4	79.1	79.1	79.1	101.7	113.0	146.9	113.0	101.7
Jul.	104.4	101.7	101.7	90.4	90.4	79.1	90.4	113.0	124.3	124.3	124.3	124.3	113.0	124.3	101.7	124.3	113.0	101.7	90.4	79.1	90.4	113.0	101.7	90.4	90.4
Aug.	118.2	146.9	124.3	124.3	113.0	124.3	124.3	135.6	146.9	146.9	158.2	124.3	79.1	90.4	90.4	101.7	79.1	79.1	79.1	90.4	101.7	135.6	135.6	146.9	158.2
Sep.	178.4	192.1	180.8	180.8	158.2	169.5	158.2	169.5	226.0	214.7	226.0	226.0	248.6	237.3	203.4	169.5	203.4	214.7	169.5	146.9	135.6	113.0	135.6	135.6	113.0
Oct.	285.3	259.9	237.3	271.2	259.9	259.9	293.8	372.9	429.4	384.2	327.7	293.8	271.2	203.4	237.3	237.3	259.9	282.5	282.5	372.9	339.0	248.6	214.7	269.5	237.3
Nov.	227.9	248.6	248.6	214.7	203.4	180.8	192.1	180.8	226.0	305.1	418.1	293.8	214.7	192.1	259.9	339.0	259.9	248,6			203.4	169.5	158.2	169.5	169.5
Dec.	192.7	146.9	146.9	113.0	90.4	90.4	79.1	58.2	58.2	101.7	282.5	384.2	384.2	418.1	429.4										
Mean		192.1	192.1	192.1	192.1	180.8	192.1	203.4	237.3	248.6	259.9	248.6	248.6	226.0	226.0	214.7	203.4	192.1	180.8	192.1	180.8	169.5	169.5	169.5	169.5

1960	Daily mean	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Jan.	208.1	135.6	135.6	113.0	90.4	90.4	56.5	56.5	124.3	158.2	293.8	293.8	327.7	565.0	497.2	406.8	406.8	339.0	282.5	192.1	124.3	90.4	90.4	67.8	56.5
Feb.	373.4	316.4	293.8	316.4	259.9	350.3	282.5	305.1	406.8	440.7	452.0	384.2	372.9	452.0	485.9	485.9	485.9	452.0	418.1	361.6	327.7	350.3	339.0	316.4	305.1
Mar.	353.1	271.2	293.8	271.2	327.7	316.4	350.3	372.9	395.5	440.7	406.8	406.8	372.9	327.7	305.1	316.4	327.7	372.9	452.0	429.4	395.5	339.0	316.4	350.3	316.4
Apr.	155.4	101.7	101.7	113.0	146.9	135.6	146.9	192.1	214.7	237.3	226.0	203.4	169.5	135.6	135.6	135.6	113.0	101.7	113.0	90.4	158.2	180.8	180.8	203.4	192.1
May	150.2	135.6	135.6	124.3	124.3	124.3	124.3	146.9	203.4	169.5	180.8	203.4	203.4	158.2	146.9	135.6	135.6	146.9	124.3	124.3	146.9	146.9	146.9	158.2	158.2
Jun.	138.4	135.6	124.3	124.3	135.6	124.3	180.8	203.4	203.4	192.1	169.5	146.9	135.6	135.6	123.4	135.6	123.4	123.4	113.0	101.7	113.0	124.3	124.3	113.0	113.0
Jul.	154.4	135.6	135.6	124.3	124.3	169.5	214.7	259.9	259.9	226.0	169.5	158.2	135.6	146.9	146.9	135.6	146.9	135.6	113.0	124.3	135.6	135.6	135.6	123.4	113.0
Aug.	167.6	135.6	146.9	146.9	169.5	169.5	180.8	226.0	282.5	271.2	248.6	203.4	169.5	146.9	146.9	124.3	135.6	124.3	124.3	124.3	146.9	158.2	146.9	146.9	146.9
Sep.	108.2	90.4	90.4	101.7	101.7	79.1	79.1	101.7	124.3	124.3	124.3	146.9	135.6												
Oct.	221.3	180.8	169.5	158.2	169.5	203.4	214.7	226.0	282.5	327.7	293.8	282.5	259.9												
Nov.	132.0	101.7	113.0	79.4	22.6	22.6	22.6	0	0	33.9	135.6	146.9	146.9												
Dec.	258.4	259.9	271.2	259.9	259.9	271.2	282.5	282.5	316.4	350.3	361.6	372.9	361.6												
Mean		169.5	169.5	158.2	158.2	169.5	180.8	203.4	237.3	259.9	259.9	248.6	237.3	248.6	248.6	226.0	237.3	226.0	214.7	192.1	192.1	192.1	180.8	180.8	203.4
1961																									
Jan.	324.4	259.9	237.3	248.6	226.0	248.6	271.2	271.2	305.4	293.8	384.2	395.5	384.2	440.7	452.0	406.8	395.5	418.1	395.5	361.6	350.3	316.4	271.2	226.0	226.0
Feb.	381.8	361.6	395.5	452.0	485.9	463.3	418.1	418.1	418.1	474.6	440.7	474.6	440.7	327.7	339.0	372.9	350.3	339.0	350.3	361.6	305.1	305.1	259.9	282.5	327.7
Mar.	342.3	203.4	214.7	271.2	282.5	293.8	293.8	339.0	384.2	384.2	384.2	350.3	327.7	305.1	305.1	293.8	339.0	418.1	395.5	440.7	372.9	361.6	406.8	406.8	440.7
Apr.	227.4	271.2	237.3	203.4	203.4	192.1	192.1	214.7	259.9	271.2	237.3	237.3	237.3												
May	174.7	192.1	158.2	180.8	158.2	158.2	158.2	158.2	192.1	192.1	180.8	169.5	124.3	158.2	146.9	124.3	113.0	101.7	101.7	135.6	203.4	271.2	293.8	259.9	259.9
Jun.	178.4	90.4	101.7	113.0	124.3	135.6	135.6	158.2	169.5	146.9	135.6	146.9	124.3												
Jul.	148.3	124.3	113.0	135.6	146.9	158.2	124.3	203.4	169.5	237.3	214.7	158.2	135.6	158.2	135.6	124.3	124.3	124.3	124.3	135.6	158.2	135.6	146.9	135.6	135.6
Aug.	135.6	124.3	113.0	113.0	113.0	113.0	124.3	146.9	158.2	169.5	158.2	135.6	124.3	124.3	124.3	124.3	135.6	124.3	124.3	135.6	146.9	169.5	158.2	146.9	146.9
Nov.	100.8	56.5	56.5		67.8	56.5	56.5	56.5	56.5	56.5	56.5	56.5	56.5	79.1	135.6	169.5	146.9	101.7	90.4	124.3	135.6	146.9	158.2	146.9	146.9
Dec.	136.5	113.0	113.0	124.3	135.6	135.6	124.3	124.3	146.9	158.2	135.6	113.0	124.3	113.0	124.3	135.6	146.9	146.9	135.6	169.5	169.5	169.5	146.9	146.9	124.3
Mean		180.8	169.5	203.4	192.1	192.1	192.1	203.4	226.0	237.3	237.3	226.0	203.4	214.7	214.7	214.7	214.7	226.0	214.7	271.2	226.0	237.3	226.0	214.7	226.0
1962																									
Jan.	207.6	192.1	203.4	192.1	180.8	214.7	203.4	203.4	214.7	327.7	339.0	372.9	384.2												
Feb.	379.1	418,1	327.7	361.6	429.4	418.1	384.2	271.2	350.3	429.4	272.9	452.0	429.4	452.0	497.2	497.2	485.9	395.5	384.2	339.0	282.5	350.3	282.5	316.1	271.2
Mar.	250.0	169.5	135.6	169.5	192.1	180.8	180.8	214.7	226.0	327.7	316.4	248.6	271.2	271.2	474.6	226.0	248.6	259.9	271.2	282.5	282.5	237.3	259.9	271.2	282.5
Apr.	143.0	124.3	90.4	101.7	101.7	90.4	79.1	101.7	180.8	203.4	214,7	214.7	269.5	146.9	180.8	124.3	113.0	135.6	146.9	135.6	135.6	146.9	146.9	135.6	113.0
May	127.6	146.9	101.7	101.7	146.9	169.5	192.1	180.8	192.1	146.9	135.6	124.3	79.1	56.5	67.8	101.7	101.7	101.7	113.0	146.9	146.9	135.6	135.6	113.0	124.3
Jun.	122.4	90.4	90.4	113.0	113.0	124.3	135.6	135.6	146.9	158.2	158.2	113.0	124.3	113.0	90.4	90.4	101.7	79.1	113.0	124.3	135.6	135.6	135.6	158.2	158.2
Jul.	95.1	124.3	146.9	124.3	90.4	79.1	67.8	56.5	124.3	113.0	101.7	113.0	79.1	56.5	67.8	67.8	56.5	56.5	56.5	56.5	67.8	101.7	192.1	146.9	135.6
Aug.	100.3	90.4	79.1	67.8	79.1	67.8	90.4	101.9	146.9	158.2	146.9	124.3	101.7	79.1	79.1	79.1	90.4	90.4	101.7	101.7	113.0	113.0	101.7	101.7	101.7
Sep.	131.7	90.4	90.4	101.7	67.8	45.2	67.8	90.4	146.9	135.6	146.9	146.9	113.0	90.4	67.8	79.1	90.4	79.1	79.1	113.0	124.3	90.4	79.1	79.1	45.2
Oct.	148.3	79.1	90.4	101.7	135.6	113.0	101.7	180.8	271.2	214.7	180.8	169.5	146.9	158.2	169.5	158.2	135.6	158.2	158.2	146.9	135.6	146.9	146.9	124.3	135.6
Nov.	200.1	158.2	158,2	158.2	158.2	146.9	124.3	158.2	237.3	293.8	293.8	259.9	214.7	192.1	214.7	214.7	226.0	226.0	203.4	226.0	226.0	192.1	192.1	169.5	158.2
Mean		158.2	135.6	146.9	158.2	146.9	146.9	158.2	203.4	226.0	214.7	203.4	192.1	158.2	192.1	158.2	169.5	158.2	158.2	169.5	169.5	169.5	158.2	158.2	135.6
1963																									
Jan.	56.1	0	0	0	0	0	11.3	11.3	11.3	11.3	45.6	0	11.3	45.6	192.1	305.1	339.0	192.1	33.9	22.6	22.6	22.6	33.9	22.6	11.3
Feb.	169.0	101.7	113.0	101.7	90.4	90.4	79.1	67.8	79.1	135.6	180.8	214.7	248.6	282.5	293.8	248.6	226.0	248.6	226.0	214.7	192.1	158.2	135.6	180.8	146.9
Mar.	235.9	180.8	192.1	192.1	203.4	180.8	192.1	192.1	214.7	282.5	350.3	372.9	339.0	180.8	113.0	282.5	316.4	361.6	282.5	226.0	192.1	203.4	203.4	203.4	203.4
Apr.	151.1	135.6	169.5	169.5	180.8	158.2	180.8	192.1	271.2	271.2	237.3	214.7	158.2	124.3	158.2	67.8	67.8	67.8	79.1	67.8	101.7	113.0	146.9	146.9	146.9
May	98.3	101.7	101.7	113.0	124.3	124.3	135.6	158.2	158.2	180.8	124.3	67.8	56.5	45.2	45.2	45.2	33.9	22.6	33.9	45.2	79.1	101.7	101.7	101.7	101.7
Jun.	91.3	79.1	79.1	79.1	90.4	90.4	90.4	101.7	101.7	101.7	113.0	124.3	113.0	113.0	101.7	101.7	79.1	67.8	67.8	79.1	124.3	79.1	79.1	67.8	67.8
Jul.	97.0	124.3	101.7	90.4	67.8	56.5	90.4	90.4	113.0	67.8	124.3	124.3	113.0	79.1	113.0	90.4	90.4	79.1	79.1	101.7	113.0	113.0	113.0	101.7	90.4
Aug.	104.1	101.7	101.7	90.4	79.1	101.7	113.0	146.9	135.6	101.7	124.3	113.0	79.1	56.5	79.1	101.7	67.8	79.1	56.5	101.7	124.3	135.6	124.3	146.9	135.6
Sep.	67.3	33.9	33.9	33.9	22.6	22.6	22.6	33.9	56.5	56.5	79.1	90.4	101.7	90.4	101.7	101.7	101.7	101.7	90.4	90.4	79.1	79.1	79.1	67.8	45.2
Oct.	138.9	101.7	135.6	135.6	146.9	124.3	135.6	203.4	226.0	237.3	214.7	146.9	124.3	101.7	101.7	101.7	101.7	101.7	124.3	124.3	146.9	146.9	101.7	124.3	124.3
Mean		90.4	101.7	101.7	101.7	90.4	101.7	113.0	135.6	146.9	158.2	146.9	135.6	113.0	124.3	146.9	146.9	135.6	101.7	101.7	113.0	113.0	113.0	124.3	101.7

MEAN MONTHLY POTENTIAL GRADIENT (E.S.T.)

1 meter above ground



DATE	Rayonnement total						Rayonnement diffus					
	Juillet	Août	Septembre	Octobre	Novembre	Décembre	Juillet	Août	Septembre	Octobre	Novembre	Décembre
1	614	551	521	276	38	37	M	250	99	188	30	37
2	635	76	447	332	151	147	210	74	188	128	132	85
3	635	313	353	224	28	M	228	252	219	170	27	M
4	663	348	42	66	137	151	164	258	40	62	104	66
5	691	555	383	162	208	88	167	184	151	145	91	80
6	365	514	277	335	64	139	M	283	192	95	63	63
7	503	466	340	330	97	9	M	247	187	91	94	9
8	545	427	508	325	26	11	208	333	76	84	26	11
9	601	500	499	310	15	37	178	282	86	91	15	36
10	391	423	462	47	32	18	M	222	114	46	31	18
11	567	145	495	119	180	40	M	141	91	104	62	40
12	481	309	418	139	41	156	151	234	110	95	41	40
13	456	533	299	335	219	116	202	161	226	75	43	65
14	654	474	301	113	80	94	143	258	199	111	73	82
15	654	312	95	255	178	132	168	251	73	138	62	M
16	716	208	391	129	59	43	89	183	122	101	56	43
17	612	281	391	86	30	25	159	232	139	70	24	24
18	288	536	417	88	15	14	228	183	119	84	11	14
19	122	572	352	40	204	83	121	127	110	39	39	61
20	535	537	454	92	211	124	206	165	69	81	38	62
21	524	261	331	283	186	73	233	199	168	85	54	71
22	616	157	113	282	186	56	234	148	112	96	46	56
23	316	190	207	281	179	138	285	151	147	62	43	72
24	580	211	308	284	13	115	268	196	187	69	10	62
25	521	456	346	282	12	58	323	195	135	69	9	57
26	564	251	377	270	42	119	132	191	124	64	33	93
27	660	287	264	268	136	147	114	186	227	66	78	73
28	348	559	336	222	108	152	272	69	159	98	59	49
29	336	511	232	49	149	45	265	151	195	45	54	41
30	668	389	79	255	54	155	99	224	76	63	54	59
31	673	538		77		135	95	88		64		82
Moyenne	533	383	335	205	103	89	191	197	138	90	50	53

Unité de mesure: 1 langley (= 1 calorie-gramme par cm^2) M: manquant E: une (plusieurs) heure (s) durant le jour fut (furent) estimée (s).

ELECTRIC POTENTIAL IN VOLTS AT 23 METERS ABOVE GROUND

V-7

JULY 1966

Time LST	0 1	1 2	2 3	3 4	4 5	5 6	6 7	7 8	8 9	9 10	10 11	11 12	12 13	13 14	14 15	15 16	16 17	17 18	18 19	19 20	20 21	21 22	22 23	23 24	No. of Hour	Mean
Day																										
1	350	150	500	600	600	750	1000	950	1100	800	750	400	D	450	450	350	400	500	550	600	500	500	500	450	23	570
2	300	300	250	350	350	450	700	650	500	450	650	300	350	450	500	450	450	600	650	550	500	500	450	350	24	460
3	200	300	350	250	300	300	200	350	450	400	600	650	800	650	500	450	400	300	200	100	D	100	100	100	23	350
4	300	100	100	100	350	500	500	550	650	300	550	500	350	400	400	300	350	550	650	1000	1000	650	800	800	24	490
5	900	850	850	1050	1150	1100	1350	1750	1750	1300	950	600	350	250	350	500	400	300	400	600	700*	M	M	M	21	830
6	1000	550	700	700	1050	1000	1200	1350	1050	950	850	750	800	800	1000	1050	D	D	550	700	450	200	200	100	22	770
7	100	200	250	100	0	50	550	950	M	M	900	850	850	800	850	1100	950	700	700	800	1000	1050	750	950	22	660
8	300	350	350	100	250	350	500	800	1100	1100	900	500	M	M	M	M	M	M	M	M	M	M	M	M	12	550
9	M	M	M	M	M	M	M	800	950	1250	1150	850	750	650	650	600	600	700	700	500	500	450	350	300	17	690
10	300	350	300	300	400	450	200	250	750	500	300	D	D	D	D	D	D	D	D	600	600	700	450	400	16	430
11	500	250	300	350	500	700	1000	1000	1050	950	800	650	600	550	500	600	600	600	700	750	750	700	550	500	24	640
e 12	500	550	550	450	250	300	D	D	D	D	D	1150	1200	1050	1000	950	800	800	800	900	550	600	500	550	19	710
13	800	700	900	750	400	150	400	600	0	300	550	D	200	M	650	650	700	800	950	850	700	550	550	500	22	570
14	500	550	600	700	700	800	1100	1200	1050	1050	M	M	M	M	M	M	M	M	M	M	M	M	M	M	10	820
15	M	M	M	M	M	1000	1200	1100	950	800	650	M	400	450	500	500	600	650	650	800	1000	1000	1000	800	18	780
16	750	650	700	800	800	1000	1300	1400	1450	1000	550	M	500	450	550	500	500	600	750	800	800	550	750	800	23	780
17	700	700	650	700	650	700	900	900	1000	950	900	750	700	550	500	600	650	400	550	750	600	650	600	750	24	700
18	800	900	850	700	750	800	1000	1000	950	550	M	M	M	M	M	M	M	M	M	M	M	M	M	M	10	830
19	M	M	M	M	M	M	M	M	M	250	-100	-50	0	100	M	M	M	M	600	500	50	50	450	50	9	230
20	300	150	200	250	450	500	1150	1900	1600	800	600	500	500	500	500	-250	300	700	850	700	150	1050	850	1200	23	680
21	1200	1000	700	750	200	500	1100	1450	1300	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	9	910
22	M	M	M	M	M	M	M	M	1500	1200	950	650	650	700	600	700	700	700	600	700	650	600	400	400	16	730
23	350	500	550	450	250	350	350	450	1000	1000	700	550	450	450	400	450	550	550	600	500	500	450	400	450	24	500
24	350	250	350	150	300	300	400	350	300	350	400	350	300	300	300	300	400	300	300	350	400	550	500	450	24	350
25	350	300	300	300	250	250	200	500	550	450	500	450	500	600	M	M	M	M	M	M	M	M	M	M	14	390
26	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	1000	1100	1050	1100	1150	1150	1150	7	1100
27	1150	900	1050	900	900	1450	1850	1600	1150	900	700	500	550	550	650	550	600	650	650	800	950	950	750	550	24	890
28	600	D	D	D	450	250	D	D	D	D	1700	1600	1450	1450	1200	1200	1450	1300	500*	D	D	D	D	D	12	1100
29	800	750	400	450	500	550	650	1300	1200	900	650	600	700	800	900	800	900	850	900	950	1100	1000	900	700	24	800
30	800	700	750	800	800	1100	1600	1450	1100	1100	1150	800	600	600	600	550	600	600	600	750	950	950	950	900	24	870
31	1200	1000	950	950	950	800	950	1200	1000	850	800	700	850	800	900	750	700	850	950	750	700	500	500	550	24	840
No. of Hours	26	25	25	25	26	27	25	26	26	26	25	22	24	24	23	22	22	23	25	25	24	24	24	24	588	
Mean	590	520	540	520	520	610	850	990	980	790	770	670	600	600	630	630	620	650	660	690	670	610	600	570		665

D: disturbed M: missing *: estimated

VERTICAL AIR-TO-EARTH CURRENT DENSITY (10^{-13} A/m^2)

I-7

JULY 1966

Time LST	0 1	1 2	2 3	3 4	4 5	5 6	6 7	7 8	8 9	9 10	10 11	11 12	12 13	13 14	14 15	15 16	16 17	17 18	18 19	19 20	20 21	21 22	22 23	23 24	No. of hours	Mean
Day																										
1	24	16	36	52	38	40	34	36	48	36	44	34	30	34	28	26	26	36	34	34	24	28	M	24	23	33
2	M	M	24	28	36	36	42	34	26	18	26	14	24	28	32	34	36	36	34	28	26	26	24	36	22	29
3	D	>134	68	88	116	116	66	44	34	28	52	48	56	54	54	54	46	36	26	D	D	>150	>150	>150	17	58
4	>150	>150	>150	>150	>144	84	76	58	34	16	40	30	24	26	26	18	20	32	38	46	32	28	54	46	19	38
5	56	50	58	30	46	48	46	54	50	34	24	14	8	8	14	18	14	8	18	26	24*	M	M	M	21	31
6	26	28	16	24*	24	46	38	36	22	38	44	42	46	46	56	48	D	D	40	44	>108	>150	>150	>150	18	37
7	>150	>150	>150	>150	>150	>150	>146	100	M	M	60	62	66	76	84	86	62	46	44	48	46	56	>72	>150	13	64
8	>150	>150	>150	>150	>150	>150	>142	120	66	64	50	36	M	M	M	M	M	M	M	M	M	M	M	M	5	67
9	M	M	M	M	M	M	M	92	74	76	66	56	50	50	46	36	38	40	36	21	18	21	18	18	17	44
10	22	28	26	26	48	40	20	24*	>120	>140	>150	D	D	50*	D	D	D	D	D	-8,	66	108	110	98	13	51
11	114	122	120	>150	>150	>150	124	86	68	66	56	50	40	46	44	40	40	38	30	46	40	52	72	90	21	66
12	>110	>150	>150	>150	>150	>150	D	D	D	D	D	>150	90	60	60	66	52	58	50	56	130	128	>150	>150	10	75
13	>150	>150	>150	>150	>150	>150	>150	>150	M	M	M	D	D	M	66	60	60	60	70	60	60	58	48	50	10	59
14	52	62	110	>150	>150	>136	90	60	48	52	M	M	M	M	M	M	M	M	M	M	M	M	M	M	7	68
15	M	M	M	M	M	62	52	42	42	48	42	M	24	26	30	30	38	40	44	54	46	46	52	50	18	48
16	46	52	48	50	62	62	60	58	64	52	30	M	36	30	42	36	38	40	40	30	26	26	42	42	23	44
17	30	40	44	50	48	50	64	62	62	50	48	42	66	54	96	70	86	56	48	42	38	36	32	40	24	52
18	42	48	46	38	40	40	48	50	52	54	M	M	M	M	M	M	M	M	M	M	M	M	M	M	10	46
19	M	M	M	M	M	M	M	M	M	>150	>124	40	38	D	M	M	M	M	>150	>150	>150	>150	>150	90	3	56
20	58	60	66	80	100	92	86	98	76	52	40	40	40	32	34	8	D	52	48	32	20	56	38	68	23	55
21	66	58	62	70	64	72	96	92	86	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	9	74
22	M	M	M	M	M	M	M	M	M	M	60	46	38	50	52	44	48	48	42	24	30	46	34	38	14	43
23	46	52	60	70	54	36	28	30	60	52	38	28	30	28	18	20	22	20	22	24	40	40	54	38	24	38
24	88	>140	>150	>150	>150	>134	60	38	30	28	28	22	20	22	24	24	26	20	18	20	20	22	20	22	19	29
25	32	46	76	>130	M	M	M	M	M	M	52*	M	50*	58	M	M	M	M	M	M	M	M	M	M	6	52
26	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	54	42	54	54	58	60	60	60	8	55
27	60	52	70	72	76	82	60	44	52	54	50	32	32	30	32	30	36	40	38	46	42	28	22	18	24	46
28	64	D	D	D	>150	>150	D	D	D	D	>150	>150	98	60	90	>140	>150	>150	D	D	D	D	D	D	4	78
29	>150	>150	>144	132*	130	>150	>150	102	102	78	52	48	50	60	64	56	58	50	58	62	62	66	80	80	19	73
30	96	108	130	126	120	124	88	72	40	32	30	30	30	34	32	34	40	38	36	40	40	40	42	52	24	61
31	72	100	138	>148	>150	>120	80	76	66	56	54	50	62	54	68	54	48	52	50	30	30	18	20	28	21	57
No. of hours	18	16	18	15	15	16	20	24	22	21	22	20	24	24	23	22	21	22	23	22	22	21	18	20	489	
Mean	55	58	65	62	67	64	63	63	55	89	45	38	44	42	47	41	42	40	40	39	42	47	46	49		49

D: disturbed M: missing *: estimated Underlined: associated with precipitation

ELECTRIC POTENTIAL IN VOLTS AT 23 METERS ABOVE GROUND

V-8 AUGUST 1966

Time LST	0 1	1 2	2 3	3 4	4 5	5 6	6 7	7 8	8 9	9 10	10 11	11 12	12 13	13 14	14 15	15 17	16 18	17 18	18 19	19 20	20 21	21 22	22 23	23 24	No. of hours	Mean
Day																										
1	550	500	600	650	650	850	950	700	600	600	550	500	550	550	450	300	350	450	550	500	600	600	500	400	24	569
2	650	600	450	700	350	250	300	400	400	250	550	350	-150	200	100	D	D	D	D	-450	D	-100	150	350	13	410
3	550	500	650	700	650	900	1100	1150	850	800	850	750	1050	1100	750	700	850	850	1050	1150	1050	1000	1100	1100	24	880
4	900	900	900	850	900	900	1350	1200	1200	1100	950	750	400	D	550	1000	800	800	750	400	350	450	600	700	23	810
5	700	700	600	500	500	550	850	1400	1950	1500	1200	900	650	450	500	550	600	650	800	800	900	750	100	700	24	780
6	1050	1350	1450	1850	650	500	400	1350	2250	2400	1350	800	600	600	650	550	500	400	350	150	200	250	300	300	24	840
7	300	350	350	300	200	300	200	250	300	350	400	550	500	500	450	550	300	200	150	50	0	0	0	0	20	330
8	0	0	0	0	0	0	100	250	300	650	850	650	550	650	600	400	500	650	600	500	350	-50	D	D	15	510
9	300	300	200	0	150	50	0	200	450	700	600	500	400	450	450	450	D	D	D	D	D	-250	D	D	14	370
10	0	0	0	0	0	0	0	0	0	50	300	600	600	600	600	650	950	900	750	600	500	450	550	500	14	610
11	500	550	500	300	250	D	D	0	0	0	0	0	0	0	150	350	50	0	0	0	0	0	0	0	5	420
12	0	0	0	0	0	0	0	0	0	350	550	D	D	D	850	300	1350	950	1100	750	700	750	700	50	10	750
13	500	400	450	600	450	400	700	950	950	950	700	600	550	600	600	650	650	700	600	750	750	650	600	550	24	640
14	500	500	600	550	550	650	1200	1000	1150	1150	900	650	400	350	350	350	300	250	150	350	400	400	400	450	24	560
15	450	550	500	650	200	250	250	300	450	400	500	450	400	550	550	450	600	500	200	150	50	150	150	100	24	370
16	50	0	0	0	0	0	50	250	300	200	0	-100	50	-100	D	D	D	0	0	0	0	0	0	0	6	150
17	0	50	50	0	0	0	100	300	350	800	1200	650	700	850	900	850	850	950	850	400	550	550	650	600	20	610
18	550	550	750	600	350	200	700	700	750	800	1050	750	800	900	1000	950	850	850	600	400	500	600	750	600	24	690
19	550	450	400	600	600	650	950	950	900	800	700	550	700	750	850	850	750	800	850	1100	1150	1200	1050	1100	24	800
20	900	750	700	750	700	900	1150	1400	1550	1600	950	600	550	600	650	600	600	750	700	300	800	800	950	1150	24	870
21	950	100	500	350	200	450	900	850	900	950	900	M	M	M	M	M	M	M	M	M	M	M	M	M	11	640
22	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	0	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0	0	0	0	0	0	0	150	750	950	400	550	750	600	450	450	500	450	11	540
24	350	500	450	300	350	600	500	750	550	450	850	800	850	700	-100	350	50	100	350	100	50	100	50	0	19	450
25	0	0	0	0	0	0	200	950	1150	1200	1000	750	650	800	700	400	650	500	D	600	400	650	750	250	17	680
26	0	0	0	0	0	0	0	50	50	100	400	750	950	800	750	800	800	850	800	800	850	1000	600	550	17	640
27	100	0	0	0	0	0	50	600	600	400	400	300	400	600	750	600	650	550	450	200	450	550	400	200	19	430
28	550	300	450	600	650	800	1000	1050	1100	700	500	400	400	450	450	500	550	450	500	850	1150	1200	1000	1000	24	690
29	800	700	800	450	400	300	950	1350	1600	1250	1000	650	550	600	550	550	600	500	450	300	250	200	150	50	24	620
30	350	D	D	0	0	0	0	0	0	50	250	400	450	550	550	500	400	400	150	50	100	50	150	0	15	290
31	50	200	300	200	250	150	600	750	450	650	800	400	100	200	0	-450	-50	200	250	500	600	750	550	500	21	400
No. of hours	23	21	21	19	20	19	23	25	25	26	26	24	25	24	24	24	23	24	24	25	24	23	24	22	558	
Mean	530	510	550	600	450	510	630	760	840	800	760	610	550	600	630	580	650	610	570	510	550	590	530	530		610

D: disturbed M: missing *: estimated Underlined: associated with precipitation

VERTICAL AIR-TO-EARTH CURRENT DENSITY (10^{-13} A/m^2)

I-8 AUGUST 1966

Time LST	0 1	1 2	2 3	3 4	4 5	5 6	6 7	7 8	8 9	9 10	10 11	11 12	12 13	13 14	14 15	15 16	16 17	17 18	18 19	19 20	20 21	21 22	22 23	23 24	No. of hours	Mean
Day																										
1	30	38	44	50	56	70	58	40	34	32	32	30	36	28	22	16	18	20	22	42	52	34	24	18	24	35
2	30	30	20	58	32	26	30	30	20	14	32	14	10	48	D	D	D	D	D	34	D	112	>150	>150	14	34
3	>150	>150	>150	>150	>150	>150	>150	>150	>144	82	72	106	76	62	44	48	50	52	60	50	48	58	110	90	15	67
4	106	112	110	114	>142	>150	>142	126	96	70	54	46	42	D	62	58	32	30	20	22	20	32	38	68	20	63
5	114	122	68	D	>150	>148	108	72	34	14	12	22	28	22	34	42	30	32	38	30	30	14	-8	26	20	45
6	36	38	22	54	32	42	30	58	26	34	18	18	26	30	34	30	28	22	18	10	10	16	8	12	24	27
7	14	28	30	24	18	30	18	12	12	18	18	28	22	30	32	34	28	>126	>150	>150	>150	>150	>150	>150	17	23
8	>150	>150	>150	>150	>150	>150	>150	>150	>150	126*	82	68	36	26	12	8	6	10	22	74	102	D	D	D	12	48
9	52	100	>150	>150	>150	>150	>150	>134	72	30	30	24	22	28	24	28	D	D	D	D	D	D	-20	D	10	41
10	>-62	54	96	92	114	86	146	>150	>132	90	78	58	60	70	56	52	62	44	28	18	22	28	26	32	21	62
11	40	34	40	30	12	D	D	D	>150	>150	>150	>150	>150	>150	>150	>150	>150	76*	90	140	90	56	100	94	12	67
12	106	104	106	68	56	120	150*	>150	>150	>150	>132	>150	D	D	D	40	82	62	60	64	60	74	98	>148	15	83
13	>150	>150	>150	>150	>150	>150	>148	100*	78	60	42	30	30	32	40	48	46	50	54	56	52	40	38	38	17	49
14	34	38	64	64	58	68	80	52	56	52	40	32	20	20	22	18	16	12	10	20	22	22	14	22	24	36
15	20	28	38	38	86	76	84	90	110	60	32	12	20	38	32	44	50	70	102	124	>140	>150	>150	>150	20	58
16	>150	>150	>150	>148	148*	132	148*	128	70	62	60*	D	D	D	D	D	D	>-100	>-100	>-100	D	>-100	>-100	>-100	7	107
17	>-100	>-100	>-100	>-100	>-100	>-100	>-88	-60	-42	4	32	32	44	52	54	50	48	54	50	40	44	46	48	50	15	43
18	82	92	92	90	80	74	118	98	92	88	78	46	44	58	80	94	70	54	28	M	M	34	40	40	22	72
19	50	60	80	80	70	74	48	34	30	34	38	42	40	48	52	42	32	34	40	M	M	M	M	M	19	49
20	M	M	M	M	M	M	M	M	M	M	38	30	30	38	42	42	42	42	38	30	32	30	40	52	14	38
21	52	60	54	50	54	48	50	32	40	52	48	M	M	M	M	M	M	M	M	M	M	M	M	M	11	49
22	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	>150	>150	>150	>150	>150	142*	1	142
23	40	>-70	>-100	>-100	>-100	>-100	>-100	>-100	>-92	16	88	106	116	128	128	88	62	52	80	70	72	110	122	>144	15	85
24	>150	146*	136	142	>148	>148	140*	126*	122	140*	90	62	66	66	D	>-100	D	>-100	>-100	>-100	>-100	>-100	D	D	11	112
25	D	>150	>142	>120	108	126	>150	136	112	90	68	44	34	48	42	48	36	26	24	70	98	98	108	>144	18	73
26	108	>144	>150	>144	52	90	120	136	>150	>150	>150	>150	96	80	52	50	44	42	32	30	30	42	80	120*	17	71
27	>42	>150	128	104	102	>138	>150	104	50	100	58	30	42	48	38	30	38	46	52	32	42	48	108	100	20	65
28	106	108	128	138	114	76	50	48	50	40	32	32	34	40	40	40	42	30	36	42	64	48	34	32	24	58
29	64	48	34	32	60	84	54	56	60	60	42	38	30	32	34	32	32	46	30	30	22	20	32	56	24	43
30	64	D	D	D	110	78	124	118	112	80	60	44	42	48	44	38	36	36	20	30	40	20	24	20	21	57
31	18	26	22	16	30	56	38	4	20	28	22	16	8	12	-8	-10	-8	10	10	20	16	40	30	34	21	23
No. of hours	20	19	19	18	20	18	19	21	21	26	27	24	26	24	23	24	23	24	24	23	21	22	20	19	525	
Mean	59	67	69	69	70	75	84	76	62	57	48	41	41	45	44	42	41	40	40	47	46	47	56	55		54

D: disturbed M: missing *: estimated Underlined: associated with precipitation

ELECTRIC POTENTIAL IN VOLTS AT 23 METERS ABOVE GROUND

V-9 SEPTEMBER 1966

Time LST	0 1	1 2	2 3	3 4	4 5	5 6	6 7	7 8	8 9	9 10	10 11	11 12	12 13	13 14	14 15	15 16	16 17	17 18	18 19	19 20	20 21	21 22	22 23	23 24	No. of hours	Mean
Day																										
1	300	300	-50	-150	-200	-150	400	700	750	500	550	450	300	250	400	900	1300	1300	1000	750	650	400	200	100	20	570
2	50	50	50	50	50	50	50	0	150	250	400	550	700	700	750	850	800	700	100	0	0	0	0	0	18	350
3	0	0	0	0	0	0	0	0	0	50	250	450	450	600	550	600	450	400	400	400	350	150	50	0	14	370
4	0	0	0	0	0	0	50	100	100	50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	50	350	900	850	600	550	550	750	750	800	850	800	750	650	450	350	350	17	610
6	400	400	400	D	50	300	350	200	0	0	250	750	850	850	700	500	-200	50	0	0	0	0	0	0	8	610
7	0	0	0	0	0	0	250	950	900	700	800	600	750	800	900	650	750	850	1100	1150	1050	850	500	800	18	800
8	850	650	500	700	650	850	1200	1750	2450	1950	1550	1050	850	800	750	650	750	1050	800	750	800	750	850	650	24	990
9	350	200	50	0	0	0	150	450	800	1050	1100	900	900	1050	1000	600	550	700	950	1050	900	750	650	350	21	690
10	0	0	0	0	0	0	0	150	350	450	500	550	650	700	550	400	D	900	400	450	300	300	250	50	16	430
11	200	250	350	300	300	250	300	350	600	850	900	450	350	350	500	450	450	350	700	1050	800	800	700	600	24	510
12	700	900	700	550	550	700	1600	2300	2450	1800	1450	1000	550	1050	1200	1050	750	450	550	750	850	900	900	550	24	1010
13	500	300	100	100	100	150	450	650	750	850	700	600	500	600	600	500	600	400	150	100	50	0	0	0	21	420
14	0	0	50	50	50	0	50	200	400	550	600	550	550	650	550	300	200	150	0	0	0	0	0	0	15	330
15	M	M	M	M	M	M	M	M	M	M	M	0	0	-50	-300	0	1050	1000	800	M	M	M	M	M	3	950
16	350	150	0	0	0	0	550	600	800	1100	1000	850	750	800	700	750	850	700	M	M	600	400	100	0	17	650
17	0	0	0	0	0	0	100	400	600	M	M	800	1000	1050	800	650	650	650	900	750	400	300	250	350	16	600
18	400	200	0	0	0	0	0	100	350	750	950	850	900	900	900	700	850	800	700	700	250	0	50	100	18	540
19	0	0	0	0	50	50	0	100	350	700	850	650	700	700	750	850	950	900	950	1000	900	1000	800	600	19	680
20	400	250	250	150	100	100	200	650	1250	1450	1350	1000	900	850	800	850	800	750	850	750	650	650	500	250	24	660
21	400	350	250	300	350	600	850	1150	1400	1000	900	900	850	1000	1000	1100	1150	700	0	0	0	0	0	0	17	800
22	0	0	0	0	0	0	0	0	0	0	0	0	150	50	0	0	0	0	0	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0	0	50	150	350	650	350	350	550	750	800	650	350	250	150	150	150	100	16	370
24	100	100	50	50	150	100	100	150	250	400	550	600	700	700	550	650	550	650	550	650	550	550	600	550	24	410
25	450	250	150	150	200	150	250	400	450	550	600	700	550	450	700	650	650	650	850	700	850	950	850	550	24	530
26	400	400	400	400	350	250	600	1550	1600	1550	1200	900	900	800	650	600	650	850	900	1200	1350	1500	1400	1350	24	910
27	1100	550	200	200	200	200	350	850	1100	1250	1450	1400	900	900	1000	1000	950	1000	750	800	750	550	500	350	24	770
28	250	300	300	400	400	450	600	1850	1900	1350	1200	950	1000	950	950	950	1000	750	550	600	600	600	700	700	24	800
29	900	1000	1000	1000	950	800	950	1500	1300	1450	1800	1500	1400	1550	1300	1150	500	150	0	0	0	0	0	0	16	1220
30	0	0	0	0	0	50	200	500	350	50	0	150	450	450	300	450	350	250	250	250	200	250	200	250	13	290
No. of hours	18	18	16	14	15	14	19	22	24	24	24	27	27	27	27	27	25	25	23	21	22	20	21	19	519	
Mean	450	370	300	310	300	340	470	770	890	900	910	760	710	760	750	710	740	710	670	710	620	610	500	450		645

D: disturbed M: missing *: estimated Underlined: associated with precipitation

VERTICAL AIR-TO-EARTH CURRENT DENSITY (10^{-13} A/m^2)

I-9 SEPTEMBER 1966

Time LST	0 1	1 2	2 3	3 4	4 5	5 6	6 7	7 8	8 9	9 10	10 11	11 12	12 13	13 14	14 15	15 16	16 17	17 18	18 19	19 20	20 21	21 22	22 23	23 24	No. of hours	Mean
Day																										
1	32	32	44	82	114	118	68	44	48	40	48	46	42	44	64	74	64	52	44	38	36	50	70	136	24	60
2	>150	>150	>150	>150	>150	>150	>150	140*	76	48	42	44	48	56	88	74	54	72	60	>150	>150	>150	>150	>150	12	67
3	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	94	44	42	46	40	38	32	32	36	36	36	66	144*	148*	12	45
4	>150	>150	>150	>150	>150	>150	130*	60	64	D	D	D	D	D	D	>-100	>-100	>-100	>150	>-100	>-100	>-100	>-100	>-100	0	0
5	>-100	>-100	>-100	>-100	>-100	-66	-12	38	66	76	56	36	40	42	44	40	48	42	28	>150	24	16	16	18	16	39
6	22	22	24	>150	26	82	82	D	D	140*	140*	80	62	54	40	40	D	D	>150	>150	>150	142	116	76	8	43
7	74	120	114	146*	114*	72	34	64	34	36	32	30	46	40	46	32	42	36	60	28	28	28	6	30	24	54
8	34	36	36	40	42	56	54	60	62	64	52	42	36	30	32	26	28	38	26	22	22	20	34	30	24	38
9	18	-22	-8	58	58	-16	12	44	34	42	46	42	38	48	36	28	28	30	40	46	30	32	32	34	21	37
10	34	-54*	>-100	-84	-54	40	106	D	54	46	>150	>150	>150	>150	>150	>150	D	D	34	>150	54	70	40	40	10	52
11	58	52	70	70	76	78	66	40	60	50	30	10	22	20	28	32	38	32	44	46	>150	22	14	16	23	42
12	40	28	36	48	36	80	56	60	80	M	8	6	8	54	70	50	24	8	M	M	M	18	20	8	20	37
13	18	M	M	M	M	M	D	D	32	28	16	14	28	32	32	22	28	16	12	24	52	78	94	98	17	37
14	96	82	106	76	62	80	98	60	38	28	28	26	28	54	44	32	44	44	M	>150	100	68	94	26	18	57
15	-82	-80	-24	50	88	D	>-100	>-100	>-100	>-100	>-100	D	130*	M	M	M	80	78	74	D	D	62	>150	54	8	77
16	62	70	66	62	76	60	66	D	D	56	54	40	34	38	32	32	34	40	M	M	36	>150	122	>150	18	54
17	132	120	116	92	70	50	86	>150	130*	62	36	36	58	54	42	42	34	34	42	30	32	D	D	30	31	63
18	46	58	96	130	128	130	132	98	68	56	56	50	54	48	42	32	38	38	42	40	70*	>150	>150	>150	21	69
19	>150	>150	>150	>150	>150	>150	>150	128	90	64	58	58	74	54	50	50	54	38	24	28	36	28	22	24	17	52
20	32	50	74	120*	>150	>150	140*	110	68	48	46	42	58	48	40	40	26	24	20	36	24	24	18	18	22	50
21	26	30	34	32	32	32	38	40	50	40	54	46	48	42	44	44	44	68	>100	>126	108	112	D	D	17	40
22	D	D	D	D	>-100	>-100	D	>-100	-70*	54	94	>126	146*	>150	>150	>150	>150	-70*	126	146*	-70	-76	-40	-50	3	139
23	-58	-86	-94*	50	-12	46	94	124	140	138	110	84	82	58	48	54	44	44	32	24	34	40	50	68	16	66
24	98	124	>150	>150	112	126*	>150	126	90	54	44	52	50	40	44	48	40	32	30	30	26	26	D	D	19	63
25	42	52	96	126	88	84	78	76	60	52	46	44	24	24	38	40	32	26	26	14	18	30	38	30	24	49
26	40	44	54	56	52	68	64	66	62	66	48	42	44	28	32	28	28	34	30	40	38	30	24	40	24	44
27	62	38	52	52	48	64	94	80	64	70	78	60	40	40	42	34	32	36	36	36	30	22	30	32	24	49
28	70	60	36	56	108	94	82	68	70	50	38	36	44	36	46	42	36	22	20	22	28	20	14	18	24	46
29	22	28	36	34	40	12	38	52	22	44	50	30	40	42	38	30	30	56	92	>150	>150	D	D	>-100	16	35
30	>-100	>-100	>-100	>-100	-10	-96	114	96	82	D	D	114	96	62	64	64	68	72	54	60	52	52	52	48	13	66
No. of hours	21	18	17	18	18	17	18	19	23	23	24	26	28	26	26	26	25	24	23	19	20	20	18	19	516	
Mean	50	58	64	74	75	73	73	73	65	55	49	45	52	44	45	41	41	38	41	39	35	37	39	41		51

D: disturbed M: missing *: estimated Underlined: associated with precipitation

ELECTRIC POTENTIAL IN VOLTS AT 23 METERS ABOVE GROUND

V-10 OCTOBER 1966

Time LST	0 1	1 2	2 3	3 4	4 5	5 6	6 7	7 8	8 9	9 10	10 11	11 12	12 13	13 14	14 15	15 16	16 17	17 18	18 19	19 20	20 21	21 22	22 23	23 24	No. of hours	Mean
Day																										
1	250	300	150	150	150	150	100	100	400	1100	1200	1350	1100	1000	950	750	700	900	800	950	800	750	350	400	24	620
2	350	200	100	50	0	0	0	200	450	600	600	900	750	600	600	450	400	450	500	550	650	500	250	200	21	440
3	200	100	0	0	0	0	50	200	550	1100	1100	950	700	950	850	1100	1600	1250	1100	850	550	350	300	200	20	700
4	250	250	300	200	100	100	50	0	0	0	0	0	0	0	0	0	0	0	0	0	50	150	450	500	11	220
5	250	450	450	700	750	850	900	950	900	850	D	D	150	1100	D	1000	D	700	200	600	750	750	650	500	18	680
6	450	550	550	550	600	750	950	1200	1450	1200	1150	1050	950	1350	1100	1000	1250	1350	1300	1250	1100	1300	1150	850	24	1020
7	750	700	900	950	950	950	800	700	800	1050	1250	1100	950	950	750	850	1150	1100	1000	950	950	950	950	900	24	930
8	900	850	850	850	850	900	950	1000	1150	1200	1200	1150	1200	1050	950	900	950	900	850	750	800	700	750	700	24	930
9	650	D	D	400	D	D	450	500	850	1050	1250	1250	1250	1300	1150	900	850	900	800	800	750	650	800	600	17	930
10	0	550	450	250	350	350	350	450	50	50	50	50	100	300	750	D	D	100	200	200	200	700	800	550	13	390
11	500	600	750	600	600	550	500	D	700	450	D	50	400	950	D	900	950	500	M	M	M	M	M	M	7	580
12	M	M	M	M	M	M	M	M	400	500	600	1000	1200	1000	1100	1050	1150	1000	1200	1100	1000	1150	1000	1150	16	970
13	400	800	1250	1200	950	850	1050	2200	1850	1400	1100	1000	850	900	900	950	1150	1350	1250	1300	1050	1000	950	850	24	1110
14	600	300	650	600	500	650	500	1000	1200	950	1150	D	0	750	800	700	750	900	850	750	650	400	350	250	22	690
15	100	0	0	0	0	0	0	0	50	100	100	200	250	350	300	150	150	150	200	250	250	300	300	0	16	200
16	50	0	0	0	0	0	0	50	100	200	200	400	300	550	400	250	300	300	400	350	100	200	600	650	17	320
17	700	650	700	500	400	350	850	1450	1050	950	850	950	900	1150	1250	1150	1200	950	800	1100	1100	800	700	600	24	880
18	750	700	600	650	1000	1300	1350	1600	1100	900	850	800	850	1000	1250	1400	1550	1250	1100	1300	1250	1100	1000	850	24	1060
19	750	550	150	100	50	150	500	550	500	300	300	200	100	100	100	100	0	0	0	0	0	0	0	0	10	360
20	0	0	0	0	0	0	0	0	0	0	0	0	650	1000	950	800	900	800	850	800	700	650	850	700	11	820
21	650	700	600	300	200	200	200	1050	1100	1100	1150	950	1000	1000	950	1050	1150	1050	850	850	900	900	1050	900	24	830
22	800	750	950	850	700	750	950	900	950	1000	1150	1100	1050	950	850	850	750	750	700	500	450	450	400	350	24	790
23	300	300	300	450	450	400	450	750	1050	1050	950	700	600	650	700	700	650	650	500	400	550	500	650	550	24	590
24	600	700	700	550	550	600	700	1150	1050	850	750	600	600	550	500	500	600	650	650	650	600	500	450	450	24	650
25	350	450	500	450	300	300	550	1000	1100	1200	1050	650	450	350	500	500	550	700	850	850	800	1300	1000	950	24	700
26	1050	850	1050	750	1350	950	550	1150	1250	1500	1250	1100	750	800	750	750	750	750	850	850	850	900	950	500	24	930
27	0	0	0	0	0	0	0	0	0	450	900	900	1050	1150	1050	1100	1100	1150	1150	1200	900	800	800	600	15	950
28	750	750	700	700	600	600	750	900	750	850	850	850	900	850	800	850	900	850	650	650	700	600	100	0	22	760
29	0	0	0	0	0	0	0	0	0	0	-100	100	150	200	500	600	600	500	600	500	300	100	150	500	10	430
30	550	550	500	600	650	400	550	800	900	750	750	650	750	750	750	800	700	550	550	500	400	600	900	950	24	660
31	900	850	650	600	500	200	250	500	450	450	400	200	200	200	200	150	300	450	550	600	450	450	450	500	22	460
No. of hours	25	24	23	23	22	22	23	22	25	26	24	23	23	26	25	25	26	28	28	28	29	29	28	27	604	
Mean	550	560	600	550	570	560	600	880	860	870	910	860	810	860	830	800	850	800	760	760	680	670	680	620		730

D: disturbed M: missing *: estimated Underlined: associated with precipitation

VERTICAL AIR-TO-EARTH CURRENT DENSITY (10^{-13} A/

I-10 OCTOBER 1966

Time LST	0 1	1 2	2 3	3 4	4 5	5 6	6 7	7 8	8 9	9 10	10 11	11 12	12 13	13 14	14 15	15 16	16 17	17 18	18 19	19 20	20 21	21 22	22 23	23 24	No. of hours	Mean
Day																										
1	56	54	60	74	72	74	74	80	72	60	58	60	52	42	38	28	34	42	32	28	24	24	22	18	24	49
2	26	30	32	30	28	40	54	56	40	36	40	50	42	30	24	20	26	20	22	22	28	26	30	34	24	33
3	38	48	54	54	52	56	62	68	58	58	56	52	52	58	50	68	62	28	18	20	14	22	30	32	24	46
4	38	44	44	50	42	D	D	142*	D	>150	>150	>150	>150	>150	D	D	>150	D	D	144*	>150	>150	142	132	7	70
5	>150	>150	>150	140*	120	134	136	128	114	96	D	D	>150	130	D	124	D	128	72	88	74	82	74	68	16	108
6	58	58	72	78	84	92	98	80	66	54	54	50	46	52	30	32	48	46	40	34	34	60	40	32	24	56
7	34	36	48	52	48	66	78	104	110	74	56	48	54	48	52	60	62	44	44	50	52	50	50	50	24	57
8	52	52	56	56	54	60	62	60	56	52	44	42	44	38	30	32	38	28	26	18	26	16	20	20	24	41
9	22	D	>150	54	D	>150	112*	80	72	56	56	58	52	54	46	32	30	28	28	28	24	24	20	16	20	45
10	22	24	44	130*	116*	120	92	D	D	>150	>150	D	>150	D	78	D	D	>150	>150	>150	>150	>150	142	>150	8	86
11	>150	>150	144*	140*	150*	150*	146*	D	D	>150	D	D	>150	>150	D	136*	>150	D	>150	M	M	M	M	M	5	146
12	M	M	M	M	M	M	M	M	M	M	122	134	108	72	56	46	46	30	30	30	46	40	30	62	14	61
13	68	100	86	94	92	82	90	78	42	40	36	28	30	38	34	38	46	46	38	42	30	28	24	24	24	52
14	34	62	56	32	28	40	60	80	50	52	52	D	40	62	50	44	42	40	38	36	52	40	150*	>150	22	52
15	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	116	96	70	54	52	66	74	80	80	90	78	58	64	88	14	76
16	>150	>150	D	72*	>150	>150	>150	>150	>150	>150	>150	150*	134	102	136	>150	>150	>150	>150	>150	>150	>150	140*	108	7	120
17	108	102	90	140*	>150	>150	>150	120	68	74	68	72	88	80	60	48	52	46	48	112	122	80	62	60	21	81
18	60	50	56	66	64	72	60	70	58	52	58	54	52	52	62	50	46	46	44	52	48	50	52	60	24	56
19	48	28	16	36	58	72	>150	>150	>150	>150	>150	>150	>150	110*	14	-38	-70	-68	-66	-74	>-100	>-100	>-100	>-100	6	43
20	>100	>-100	>-100	>-100	>-100	-90	-62	D	D	D	8	82	82	76	82	58	40	42	32	32	28	32	52	96	13	51
21	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	130*	72	62	54	48	50	56	60	58	62	56	48	50	56	14	62
22	42	40	54	52	38	42	56	58	58	48	50	48	48	46	24	46	48	62	40	44	40	38	38	32	24	45
23	30	28	38	52	80	140*	>150	120*	66	60	62	44	40	34	30	30	24	22	16	16	22	24	24	32	23	45
24	26	36	42	38	80	128	150*	>150	70	72	60	34	32	34	32	32	22	20	22	18	14	14	16	12	23	44
25	12	20	22	34	140*	>150	>150	102	36	36	34	36	22	20	22	26	24	22	26	20	20	34	24	28	22	35
26	32	26	50	22	58	110*	>150	110*	40	44	52	50	38	54	38	32	26	22	30	30	30	32	48	>150	22	44
27	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	128	112	90	80	64	62	58	64	78	56	70	54	38	13	73
28	56	50	48	80	96	84	102	128	100	80	58	52	52	38	32	40	32	28	22	22	20	20	130*	>150	22	56
29	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	140*	>150	130*	124	106	120	76	74	58	84	128	68	10	97
30	64	72	68	60	52	58	68	54	48	40	40	34	36	38	42	36	38	20	18	20	24	26	36	48	24	43
31	44*	52	84	114	96	108	132	140*	>150	>150	>150	142*	108	72	D	34	30	40	44	56	36	50	50	40	19	76
No. of hours	22	22	22	25	22	20	18	19	19	19	22	24	24	26	25	24	25	26	26	26	26	26	28	25	561	
Mean	44	53	57	70	75	86	91	90	64	57	60	67	59	57	51	45	45	45	39	43	41	41	58	50		57

D: disturbed M: missing *: estimated Underlined: associated with precipitation

ELECTRIC POTENTIAL IN VOLTS AT 23 METERS ABOVE GROUND

V-11 NOVEMBER 1966

Time LST	0 1	1 2	2 3	3 4	4 5	5 6	6 7	7 8	8 9	9 10	10 11	11 12	12 13	13 14	14 15	15 16	16 17	17 18	18 19	19 20	20 21	21 22	22 23	23 24	No. of hours	Mean
Day																										
1	500	550	500	450	300	300	300	300	200	100	0	50	0	50	-50	0	0	0	0	0	0	0	0	0	9	380
2	0	0	0	0	0	0	0	0	0	0	0	0	0	350	500	400	750	650	50	100	300	450	0	0	9	390
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	300	600	650	550	500	450	300	500	550	650	10	500
4	650	650	650	550	550	500	1000	1200	1250	1100	1000	900	800	850	850	1050	1300	850	900	750	750	900	1100	1100	24	880
5	1200	1250	1350	1300	1350	1300	1300	1500	1500	1450	1600	1650	1450	1250	1200	1300	1150	1350	1100	850	600	550	700	750	24	1210
6	300	50	0	0	0	0	0	0	0	0	0	0	50	50	250	450	550	750	800	550	500	750	700	650	12	500
7	950	750	650	500	350	650	250	300	450	650	1050	900	950	900	900	950	950	900	850	650	600	150	400	0	23	680
8	-50	-100	-150	-200	-100	-150	50	-150	-50	50	50	0	-100	-50	0	0	0	0	-50	0	0	0	50	50	1	50
9	50	100	200	300	400	500	800	250	0	0	0	0	0	0	0	0	0	50	50	100	200	300	0	50	5	440
10	100	100	100	100	150	150	50	50	50	100	150	350	350	400	700	850	400	400	350	-50	-300	-150	0	0	7	490
11	0	50	150	500	650	750	950	1100	1500	1200	1000	950	850	800	900	1150	600	700	1050	1050	500	600	300	100	23	760
12	900	1300	1100	1050	800	650	500	500	250	0	50	500	600	800	900	600	650	300	600	550	250	650	700	750	20	710
13	750	800	850	950	1000	1050	1050	1300	1300	1100	1000	1050	1050	800	900	800	900	1350	1600	1500	1050	850	1100	1800	24	1080
14	1550	1750	1850	1900	1850	1500	1700	1700	1900	1750	1400	850	1200	2050	1350	600	800	450	300	350	500	150	500	500	24	1180
15	600	500	300	650	650	550	800	1250	1700	1350	1300	1200	1000	1000	1050	1100	1400	1900	2250	1950	1400	1250	1700	1700	24	1190
16	1550	1350	1200	1000	1000	950	450	200	250	100	500	650	300	300	150	100	50	0	0	0	0	0	0	0	6	1170
17	0	0	0	0	0	0	0	0	0	100	50	-50	-100	-100	0	0	0	0	0	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0	0	0	0	0	0	50	100	400	500	150	-50	100	50	50	350	450	350	11	230
19	200	550	500	600	750	900	1050	1550	2050	1700	1200	1450	1250	1150	1200	1050	1200	1350	1450	1350	1400	1500	1600	1350	24	1180
20	1400	1400	1350	1300	1300	1450	1650	1700	2150	2200	1750	1900	1850	1700	1850	1700	1750	1850	1750	1700	1700	1800	1650	1200	24	1670
21	D	D	850	500	1800	1700	700	1700	2600	2300	2350	2350	1850	1950	2100	2400	2550	2600	1950	1750	1900	1550	1450	1550	22	1340
22	1350	1600	1650	1650	1700	1800	1500	1600	M	2750*	2750	>2600	2450	2200	1950	1800	1600	1500	1450	1400	1250	1300	1400	1150	14	1780
23	1500	1300	1200	1650	1450	1150	1650	1400	D	>3000	>2900	2600	1700	1750	1250	1300	1150	950	1050	1150	850	700	550	500	19	1350
24	D	D	D	400	100	200	800	300	450	-50	500	100	100	100	-150	250	250	0	0	100	100	100	150	250	0	0
25	100	100	350	-150	100	50	-100	50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0	0	0	0	0	0	500	650	950	800	800	750	800	750	750	800	650	850	12	750
27	1150	1150	550	650	700	1000	950	1100	1350	1300	1400	1400	1100	750	350	350	150	50	200	550	500	450	550	600	24	760
28	650	700	500	100	50	200	350	400	400	650	900	1450	1100	1250	1450	1750	1300	1550	550	450	350	350	150	250	24	700
29	200	50	-150	100	-100	100	450	750	900	1250	1150	1250	1300	1350	1450	1350	1350	1450	1100	1150	1100	1050	1000	950	18	1130
30	900	750	550	550	150	500	600	600	600	1250	M	M	M	M	M	M	M	M	M	M	M	M	M	M	10	640
No. of hours	15	16	18	18	18	18	19	17	15	15	14	15	20	21	22	22	22	21	21	21	21	21	19	18	447	
Mean	960	920	790	800	840	870	850	1080	1320	1470	1420	1350	1070	1050	1030	1040	1000	1060	970	910	790	790	880	900		995

D: disturbed M: missing *: estimated Underlined: associated with precipitation

VERTICAL AIR-TO-EARTH CURRENT DENSITY (10^{-13} A/m^2)

I-11 NOVEMBER 1966

Time LST	0 1	1 2	2 3	3 4	4 5	5 6	6 7	7 8	8 9	9 10	10 11	11 12	12 13	13 14	14 15	15 16	16 17	17 18	18 19	19 20	20 21	21 22	22 23	23 24	No. of hours	Mean
Day																										
1	30	36	32	60	140*	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	5	60
2	>150	>150	>150	>150	>150	>150	0	>-100	>-100	-20*	-80*	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	1	80
3	>150	>150	130*	130*	>150	>150	>150	>150	>150	>150	100	14	-54	D	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	1	80
4	132	142	130	114	130	>150	>150	>150	>150	>150	144*	>150	94	80	70	M	M	M	M	M	M	M	M	M	9	115
5	M	M	M	M	M	M	M	M	M	M	128	108	70	58	52	58	44	48	32	30	28	38	52	>150	13	57
6	>150	140*	>150	>150	D	D	>-100	>-100	>-100	>-100	-40	-18	-18	D	26	72	94	102	122	144*	146*	120	146*	>150	9	108
7	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	0	0
8	>150	>150	>150	>150	>150	100	48	50	D	D	D	16	20	22	48	92	98	56	26	34	20	26	62	72	15	49
9	82	100	116	120	120	150*	>150	>150	D	D	>-100	>-100	>-100	>-100	>-100	>-100	-66	-50	-44	-44	-10	28	10	-40	4	126
10	>-100	-96*	-80	-30	76	122	62	-18	30	102	142	>150	>150	>150	>150	>150	>150	>150	130*	68	52	D	>-100	>-100	3	74
11	>-100	-70	2	86	104	126	140	146*	128	110	100	78	54	54	74	108	124	>150	>150	>150	>150	>150	>150	>150	15	96
12	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	0	0
13	>150	>150	146*	132	104	132	120	120	90	64	52	52	42	34	40	30	40	58	62	60	32	48	84	124*	22	76
14	100	140	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	140*	84	126*	140*	>150	>150	>150	>150	>150	>150	>150	6	122
15	>150	>150	>150	>150	>150	>150	>150	>150	>150	132	98	54	36	40	34	34	42	50	48	40	30	54	54	42	15	53
16	64	64	62	46	46	>130	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	130	118	126	134	142*	10	93
17	142	142	>150	-14	28	54	74	84	98	112	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	134	94	7	81
18	58	30	8	0	10	D	D	0	-28	-60	-76	-84	-82	-84	22	60	88	86	92	112	142*	>150	>150	>150	11	64
19	>150	>150	>150	>150	>150	>150	>150	>150	112	64	58	66	46	42	48	40	56	82	110	108	140*	>150	>150	>150	13	75
20	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	104	84	72	62	66	62	70	94	140*	>150	>150	>150	>150	>150	9	84
21	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	92	62	46	54	62	74	98	140*	>150	>150	>150	>150	>150	>150	8	78
22	>150	>150	>150	>150	>150	>150	>150	>150	M	D	50	140*	76	92	66	46	58	50	44	58	92	102	102	110	14	78
23	140*	136	>150	>150	>150	>150	126	110	D	114	74	60	34	48	32	36	22	24	38	32	10	16	10	14	17	62
24	D	D	D	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	150*	128	>150	>150	>150	0	0
25	>150	>150	>150	>150	>150	>150	>150	142	114	100	36	72	100	102	82	68	102	126	70	54	20	40	98	150*	0	0
26	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	0	0
27	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	120	124	>150	>150	>150	>150	>150	2	122
28	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	0	0
29	130*	72	146	122	16	30	142*	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	1	142
30	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	M	M	M	M	M	M	M	M	M	M	M	M	M	M	0	0
No. of hours	6	6	8	7	8	5	6	4	4	6	12	11	11	12	14	13	13	12	11	11	12	9	9	7	217	
Mean	87	91	78	98	85	112	108	115	107	98	90	67	54	60	52	64	75	76	76	74	77	70	96	101		79

D: disturbed M: missing *: estimated Underlined: associated with precipitation

ELECTRIC POTENTIAL IN VOLTS AT 23 METERS ABOVE GROUD

V- 12

DECEMBER 1966

Time LST	0 1	1 2	2 3	3 4	4 5	5 6	6 7	7 8	8 9	9 10	10 11	11 12	12 13	13 14	14 15	15 16	16 17	17 18	18 19	19 20	20 21	21 22	22 23	23 24	No. of hours	Mean
Day																										
1	M	M	M	M	M	M	M	M	M	200	-900	-200	1150	900	150	350	100	-100	300	600	600	550	850	M	11	520
2	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	0	0
3	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	0	0
4	M	M	M	M	M	M	M	M	M	M	M	M	2550	2400	2600	2400	1950	1900	1700	600	350	250	600	950	12	1520
5	1000	1000	850	400	400	750	950	950	1500	1800	1800	2000	2150	2250	2000	900	-100	450	350	150	-250	-100	-200	-100	15	1320
6	-50	-100	-200	-500	-400	-250	0	500	450	750	1100	1200	1750	2250	1950	1750	1400	950	650	450	550	550	600	600	17	1030
7	550	300	-350	-50	-100	-450	-700	D	-600	50	350	850	1000	950	900	550	500	1000	700	500	500	-1400	-400	100	2	420
8	-550	550	400	1000	1250	400	400	200	650	450	600	800	450	1000	1550	1250	1500	1150	1200	1350	-100	200	200	900	6	830
9	300	300	500	550	950	150	0	550	1050	700	950	1000	900	900	700	750	800	1300	1300	850	500	150	250	750	0	0
10	1300	1250	1200	300	-250	700	200	100	D	100	350	850	D	500	900	1050	650	1000	400	700	500	-100	D	0	12	770
11	-500	D	D	750	600	400	400	600	900	450	500	650	750	950	1000	1150	950	800	850	800	850	1100	1100	900	21	780
12	1150	1400	1250	1150	1200	1200	1500	1900	2200	1500	1600	1500	1800	1850	1450	1450	1650	1850	1600	1550	1500	1400	1600	1700	24	1540
13	1800	1750	1250	2050	1700	1700	1550	2200	2250	2600	>3000	>3000	>3000	>3000	>3000	>3000	2650	2600	2250	2050	2050	1700	1850	2100	18	2010
14	2150	2400	2550	>2800	2400	2450	1700	1800	1900	1700	2100	1800	2000	2300	1450	1850	2050	1950	1650	1250	1250	900	500	1000	23	1790
15	650	700	600	1100	1100	800	350	1150	1450	1450	400	800	1750	2150	2300	2300	2150	2400	2300	2350	2250	2100	1950	2100	24	1530
16	1700	1700	1800	1400	1000	650	400	700	1350	1200	800	1000	750	550	1650	1100	-100	-250	-350	-500	-500	-250	-100	-150	16	1110
17	350	500	650	500	450	200	300	400	550	550	450	700	-150	250	650	650	550	750	100	-1550	-1150	-900	200	350	20	450
18	400	250	100	100	-100	-400	-1600	-800	250	-1200	-750	450	150	50	300	400	D	500	1000	1000	1150	1200	1350	1200	11	750
19	1200	1200	1200	850	1250	1800	1800	1600	1500	1750	1400	1950	1900	1600	1350	1600	1250	500	350	350	650	750	1300	950	24	1250
20	1450	1600	1300	1250	1150	1100	1200	1100	1200	1500	1750	2000	1900	1800	1800	1500	1000	600	400	500	600	D	1300	0	22	1270
21	50	-50	200	200	350	350	50	200	500	600	650	950	950	600	400	400	450	450	350	400	400	400	-500	-250	21	420
22	-300	50	-200	250	450	150	700	800	600	-50	800	650	900	450	-250	-300	-700	-700	-500	-500	-300	-200	M	M	11	530
23	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	1450	1350	1900	2100	2150	1650	1300	7	1700
24	950	600	600	400	-200	-300	D	D	D	D	D	D	D	0	0	D	D	M	M	M	M	M	M	M	4	640
25	M	M	M	M	M	M	M	M	M	M	300	700	-900*	-1400	-1450	-850	-350	-50	300	850	900	-650	-1350	-400	0	0
26	250	750	400	350	350	300	450	450	600	800	900	650	750	650	850	950	700	650	600	600	300	800	800	700	24	610
27	750	1050	1400	1200	1350	1800	1300	1200	1500	1500	2050	2350	2200	2050	2100	2200	1900	1500	1500	1700	1750	1950	1950	1800	24	1670
28	1500	1650	1800	1850	1700	1950	1950	2150	2150	2100	2700	2750	2700	2450	2350	2550	2550	2000	1500	1750	1450	1200	1050	900	24	1950
29	D	D	D	D	0	0	0	0	0	0	0	0	0	0	D	D	150	250	250	100	-200	-250	-50	-50	0	0
30	-550	-700	-850	-950	-450	-250	-400	150	700	850	1250	1150	1400	1650	1800	1800	1800	1450	1450	1400	1400	1350	1400	1650	17	1330
31	1800	1850	2150	2350	2450	2200	2350	2200	2300	2100	2200	2200	1850	1900	1600	1900	1550	1600	1150	1150	700	550	350	400	24	1700
No. of hours	18	18	17	18	16	17	17	18	18	18	17	17	18	19	18	18	18	20	21	20	19	18	19	17	434	
Mean	**1060**	**1110**	**1130**	**910**	**1120**	**1090**	**1010**	**1110**	**1310**	**1300**	**1320**	**1430**	**1620**	**1530**	**1520**	**1500**	**1410**	**1300**	**1080**	**1120**	**1070**	**1060**	**1080**	**1150**		**1225**

D: disturbed **M: missing** ***: estimated** **Underlined: associated with precipitation**

VERTICAL AIR-TO-EARTH CURRENT DENSITY (10^{-13} A/m^2)

I-12

DECEMBER 1966

Time LST	0 1	1 2	2 3	3 4	4 5	5 6	6 7	7 8	8 9	9 10	10 11	11 12	12 13	13 14	14 15	15 16	16 17	17 18	18 19	19 20	20 21	21 22	22 23	23 24	No. of hours	Mean
Day																										
1	M	M	M	M	M	M	M	M	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	M	M	M	0	0
2	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	0	0
3	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	0	0
4	M	M	M	M	M	M	M	M	M	M	M	M	92	78	86	64	130*	>150	>150	>150	>150	>150	>150	>150	5	90
5	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	136*	146*	>150	>150	>150	>150	>150	>150	>150	>150	1	136
6	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	0	0
7	>150	>150	>150	106	58	36	8	D	-56	-50	-66	-88	>-100	>-100	>-100	>-100	>-100	>-100	>-100	-96	-100*	>-100	-80	-58	0	0
8	-52	-52	-64	-84	-98	-92	-86	-72	-62	-40	-54	-68	-94	>-100	>-100	>-100	-96	-66	-14	-22	-28	-28	-32	-40	0	0
9	14	-16	-40	-6	-4	76	58	82	86	132*	150*	>150	>150	>150	>150	130*	92	24	10	-10	-54	-12	58	104	1	130
10	86	96	100	126	142	14	-56	>-100	>-100	>-100	>-100	>-100	-82	-66	-70	-94	>-100	>-100	>-100	>-100	>-100	>-100	>-100	>-100	6	94
11	>-100	>-100	>-100	>-100	>-100	>-100	-72	-8	30	62	82	98	110	120	124	132	136	142	146	144	148	>150	>150	>150	13	113
12	>150	>150	150*	>150	>150	148*	>150	>150	138	138	114	76	84	68	58	M	M	M	M	M	M	M	M	M	9	108
13	M	M	M	M	M	M	M	M	M	M	M	132	128	M	M	M	M	M	M	M	M	M	M	M	2	130
14	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	>150	>150	>150	>150	0	0
15	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	140*	136	140*	>150	>150	>150	>150	>150	>150	134	4	137
16	88	88	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	136	132	>150	>150	4	111
17	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	138	142	140	140	4	140
18	122	128	118	126	92	60	50	48	34	38	62	98	128	144	150*	140*	>150	>150	>150	>150	>150	142*	146*	>150	6	130
19	>150	>150	>150	140	146*	112	140	150*	>150	144	128	142	84	58	108	>150	>150	>150	>150	>150	>150	>150	>150	>150	11	123
20	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	0	0
21	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	0	0
22	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	M	M	M	M	M	M	M	M	0	0
23	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	>150	>150	>150	>150	>150	>150	>150	>150	>150	0	0
24	>150	>150	>150	>150	>150	>150	D	D	D	D	D	D	D	>150	>150	>150	>150	M	M	M	M	M	M	M	0	0
25	M	M	M	M	M	M	M	M	M	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	0	0
26	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	140*	54	-34	-62	-44	-8	-14	-8	4	32	16	18	24	7	41
27	22	28	44	60	72	92	94	82	62	50	34	80	124	134	140	142	>150	>150	>150	>150	>150	>150	>150	>150	16	79
28	>150	>150	>150	>150	>150	>150	>150	>150	130	124	112	40	50	66	110	60	>150	>150	>150	>150	>150	>150	>150	>150	8	86
29	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	D	D	D	D	70	92	112	>150	>150	>150	>150	>150	0	0
30	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	>150	D	>150	D	>150	>150	>150	>150	>150	142*	144*	>150	40	3	109
31	20	28	44	62	68	68	64	112	56	32	40	46	56	>150	>150	142*	>150	>150	>150	>150	>150	>150	150*	146	16	71
No. of hours	5	5	5	5	4	5	3	3	5	6	6	8	9	6	8	7	3	1	1	2	5	5	4	5	116	
Mean	68	74	91	103	107	87	99	115	83	92	85	94	87	87	113	115	135	142	146	74	119	115	113	97		98

M: missing *: estimated Underlined: associatated with precipitation

DAILY WEATHER SUMMARY AT DORVAL, QUEBEC

July 1966

1. Sunny. Cloudy periods in afternoon.
2. Sunny. High cloudiness in evening.
3. Clouding over in late afternoon. Few showers late evening.
4. Clearing during the night. Light showers early night.
5. Sunny.
6. Cloudy, clearing in the evening. Light thundershower in late afternoon.
7. Cloudy morning and afternoon.
8. Becoming sunny in the early morning. Very light shower in early morning.
9. Sunny. Cloudy periods in late afternoon to mid evening.
10. Cloudy. Thundershowers from early afternoon to early evening.
11. Few cloudy periods. Very light shower in late evening.
12. Becoming sunny at noon. Few thundershowers in the morning.
13. Becoming sunny in the early afternoon. Thundershower in early afternoon.
14. Sunny.
15. Sunny.
16. Sunny.
17. Clouding over in the late afternoon.
18. Cloudy. Partial clearing in the evening. Showers late morning and afternoon.
19. Cloudy. Thundershowers during the night. Rain rest of the day.
20. Cloudy late A.M. to mid-evening. Few showers in evening.
21. Cloudy, clearing in mid-evening. Thundershowers in late afternoon. Showers A.M. and evening.
22. Cloudy periods.
23. High cloudiness.
24. Sunny. Cloudy periods late afternoon and early evening.
25. Sunny.
26. Becoming sunny in mid-morning. Thundershowers during the night and showers in early morning.
27. Sunny. Very light shower in late evening.
28. Cloudy. Showers throughout the day. Thundershowers in mid-evening.
29. Cloudy clearing the evening.
30. Sunny.
31. Sunny.

August 1966

1. Clouding over mid-afternoon. Light shower in evening.
2. Overcast. Showers and rain P.M. and evening.
3. Clearing in early evening. Few showers A.M.
4. Cloudy from mid-A.M. to mid-evening. Few showers in afternoon.
5. Sunny.
6. Cloudy. Sunny breaks. Very light shower in evening.
7. Cloudy periods.
8. Cloudy. Sunny periods. Thundershower in evening.
9. Clouding over in late afternoon. Thundershowers in evening.
10. Cloudy. Light shower in morning.
11. Overcast. Showers. Rain and drizzle.
12. Cloudy. Thundershowers and drizzle.
13. Sunny.
14. Cloudy periods in the afternoon.
15. Cloudy becoming overcast in the afternoon. Very light shower P.M.
16. Cloudy to overcast. Thundershowers P.M. and evening.
17. Clearing late afternoon. Thundershowers early evening.
18. Sunny. Few cloudy periods in the evening.
19. Sunny.
20. Sunny.
21. Cloudy. Light shower P.M.
22. Overcast. Rain and drizzle.
23. Cloudy. Clearing in the late afternoon. Drizzle during the night. Shower P.M.
24. Cloudy. Clearing in the evening. Showers P.M.
25. Cloudy. Few showers P.M.
26. Cloudy. Partial clearing in late afternoon. Rain and showers A.M.
27. Clearing in mid-afternoon.
28. Sunny.
29. Sunny.
30. Cloudy A.M. and evening. Thundershowers A.M.
31. Sunny.

DAILY WEATHER SUMMARY AT DORVAL, QUEBEC

September 1966

1. Sunny.
2. Sunny. Clouding over in the evening.
3. Cloudy. Sunny periods.
4. Overcast. Rain all day.
5. Sunny.
6. Cloudy. Sunny periods. Showers A.M. and P.M.
7. Sunny. Cloudy periods P.M.
8. Sunny.
9. Sunny.
10. Sunny. Cloudy periods late P.M. Thundershowers P.M.
11. Sunny.
12. Sunny.
13. Sunny. Cloudy periods A.M.
14. Sunny. Clouding over P.M. Showers P.M. and evening.
15. Cloudy, clearing late afternoon. Showers to early PM.
16. Sunny. Cloudy periods late P.M.
17. Sunny.
18. Sunny. Clouding over late evening. Shower late evening.
19. Becoming sunny in late morning. Showers early night.
20. Sunny,
21. Clouding over in mid-afternoon. Light showers and rain in the evening.
22. Overcast. Rain, drizzle and showers all day.
23. Clearing in mid afternoon. Light rain to early A.M.
24. Variable cloudiness with considerable sunshine. Light shower in late evening.
25. Sunny. Cloudy periods in the afternoon.
26. Sunny.
27. Cloudy in the morning and afternoon.
28. Sunny with high cloudiness.
29. Clouding over in the late morning. Rain from mid-afternoon.
30. Cloudy. Rain ending in the late morning.

October 1966

1. High cloudiness.
2. Sunny. Few cloudy periods.
3. Variable cloudiness. Clear in the evening. Light rain P.M.
4. Cloudy, clearing in mid-evening. Light rain and showers to early evening. Thunder early evening.
5. Clouding over during the night. Showers A.M. and P.M.
6. Mainly sunny. Cloudy periods in the morning.
7. Clearing A.M. Sunny rest of day.
8. Sunny.
9. Cloudy to mid-morning then sunny. Thundershowers during the early morning.
10. Clouding over in the early morning and clearing in the early evening. Showers.
11. Clouding over during the night. Showers from early morning.
12. Mainly cloudy. Rain ending in early morning.
13. Sunny.
14. Cloudy. Clearing in late evening. Showers A.M.
15. Clouding over in early evening. Showers late evening.
16. Cloudy all day. Rain ending in late evening.
17. Overcast. Few breaks A.M. Very light shower A.M. Very light snowflurries in evening.
18. Overcast.
19. Overcast. Light rain and drizzle from mid-A.M.
20. Cloudy. Drizzle and rain ending in mid-afternoon.
21. Sunny.
22. Sunny.
23. Sunny.
24. Sunny.
25. Sunny.
26. Sunny.
27. Sunny.
28. Sunny. Cloudy periods in the evening. Very light rain late in the evening.
29. Cloudy A.M. and P.M. Clearing in the early evening. Few light showers P.M. Hail P.M.
30. Sunny.
31. Cloudy to overcast all day. Very light rain P.M. Short period of light snowin the morning.

DAILY WEATHER SUMMARY AT DORVAL, QUEBEC

November 1966

1. Overcast. Light showers and rain to late evening.
2. Cloudy with a few breaks. Light rain from late eve.
3. Overcast, clearing in mid-evening. Rain to mid-P.M.
4. Variable clouds. Light snow A.M. and P.M.
5. Becoming cloudy in late afternoon. Very light snow A.M. Light snow and rain from late evening.
6. Overcast. Light snow ending early A.M.
7. Cloudy to overcast.
8. Overcast. Light rain and drizzle to mid-evening.
9. Overcast. Light rain and drizzle from early morning.
10. Overcast. Light rain and drizzle A.M. Rain and showers in the evening.
11. Cloudy. Few breaks A.M. Very light rain in late eve.
12. Overcast. Few breaks in the evening. Very light rain and drizzle. Light snow flurry late evening.
13. Sunny.
14. Cloudy. Few breaks in the evening. Light snow late P.M.
15. Clearing late morning. Sunny rest of the day.
16. Overcast. Light snow from early morning to late eve.
17. Overcast. Light freezing rain, sleet and snow in the evening.
18. Overcast. Light freezing drizzle and freezing rain in the early morning.
19. Sunny.
20. Sunny.
21. Sunny.
22. Sunny. Fog early to mid-morning. Haze P.M.
23. Sunny. Clouding over early evening. Light shower in late evening.
24. Overcast.Light showers, rain and drizzle A.M.,P.M. and evening.
25. Overcast.Rain and showers all day. Fog A.M.
26. Overcast.Light drizzle in the early morning.
27. Cloudy. Very light showers in late evening.
28. Cloudy. Few breaks in the afternoon.
29. Variable cloudiness. Light rain during the night.
30. Overcast. Few breaks in the evening.

December 1966

1. Overcast. Light snow beginning in the morning.
2. Clearing in the early morning. Light snow during the night.
3. Cloudy during the night. Sunny rest of the day. Flurries during the night.
4. Sunny. Few light flurries in the late morning.
5. Clouding over in the morning. Light snow in the afternoon and evening.
6. Becoming sunny in the morning. Clouding over in the evening. Freezing drizzle during the night.
7. Overcast. Rain and drizzle all day.
8. Overcast. Rain and drizzle to mid-evening.
9. Overcast. Rain and drizzle. Fog in the evening(dense)
10. Overcast. Rain and drizzle. Dense fog in the night and evening.
11. Overcast. Rain during the night.
12. Sunny.
13. Sunny.
14. Variable clouds, becoming overcast in the early eve. Light flurries in the late evening.
15. Becoming sunny in the late morning. Very light flurry in mid-morning.
16. Overcast. Light snow changing to light drizzle and rain in the early evening.
17. Overcast. Light rain afternoon and evening.
18. Overcast. Clearing in the early evening. Light rain to mid-afternoon, then flurries to late afternoon.
19. Sunny. Few light flurries in the early evening.
20. Becoming cloudy in the early afternoon. Light snow from mid-evening.
21. Overcast. Few Periods of very light snow.
22. Overcast. Light snow AM and PM.
23. Sunny. Light flurry early in the night.
24. Cloudy. Light snow beginning the late evening.
25. Sky obscured by snow. Light snow all day. Blowing snow
26. Cloudy. Few breaks PM. Light snow ending during the night. Blowing snow.
27. Variable clouds. Very light snow during the night.
28. Becoming overcast early evening. Light snow late evening
29. Few breaks early evening. Light snow AM, PM and evening
30. Becoming sunny late morning. Light snow during the night
31. Becoming Cloudy mid-PM. Light snow in the evening.

INSTRUMENTS DE LA STATION

3 séismographes Benioff de 100 kg. avec 6 galvanomètres.
t_o=1 sec., t_g=0.2 sec. pour ZNE. Enregistreur, 60mm/min.
t_g=6 sec. pour Z'N'E'. Enregistreur, 30mm/min.
3 séismographes Sprengnether, type Columbia Z"N"E".
Avant le 13 février 1964, t_o=17 sec., t_g=100 sec.
Après le 13 février 1964, t_o=30 sec., t_g=100 sec.pour Z"N"E".
Enregistreur, 15mm/min.

Le 13 février 1964, l'amplification des Columbia a été augmentée. Cf. graphiques.

Dans notre bulletin, nous indiquons toujours sur quel séismogramme chaque phase a été lue en ajoutant après cette phase une des lettres suivantes:

ZNE pour celles données par les Benioff avec galvanomètres de 0,2 sec.

Z'N'E' pour celles données par les Benioff avec galvanomètres de 6 sec.

Z"N"E" pour celles données par les Columbia avec galvanomètres de 100 sec.

L'heure est inscrite à chaque minute sur les séismogrammes par la Société Radio-Canada au moyen d'une ligne téléphonique avec une précision de $\pm$ 0.1 sec. à l'année. Cette Société nous fournit en même temps un courant alternatif de 60 cycles de fréquence absolument constante, pour les moteurs des enregistreurs. De plus, le signal horaire de l'Observatoire du Dominion relayé par le poste local de radio CBF, à 01 00 00 p.m. s'enregistre automatiquement sur tous les séismogrammes.

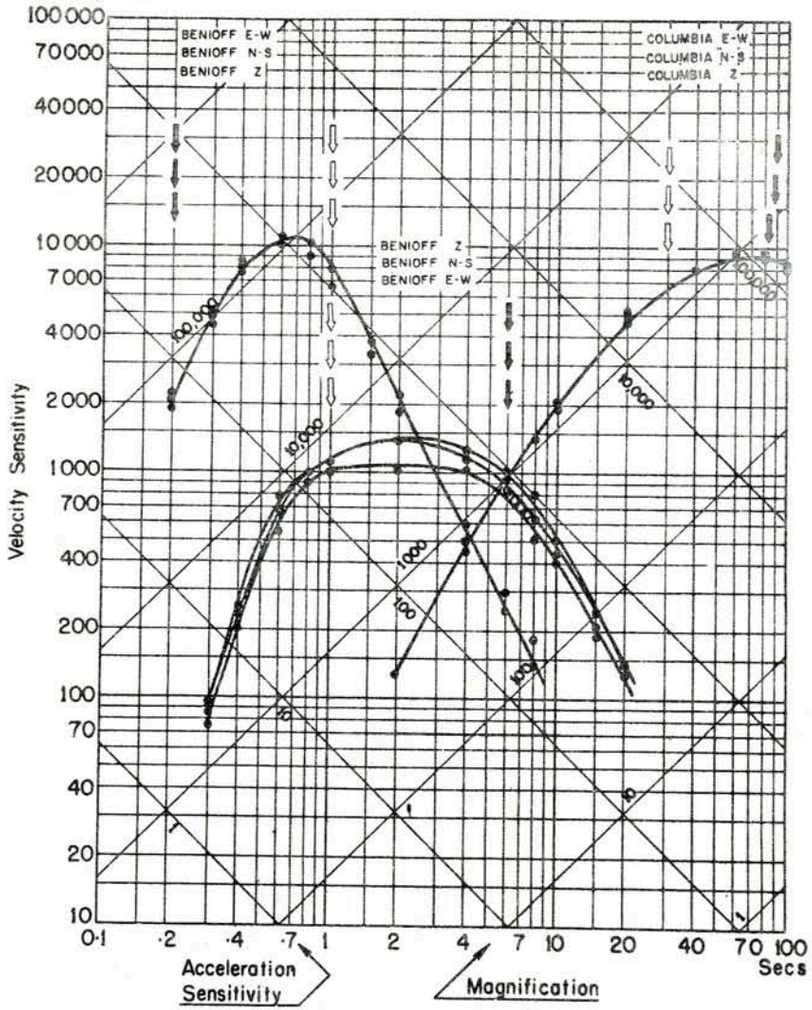
Les positions géographiques des épicentres ainsi que l'heure d'origine et la profondeur sont toujours empruntées à U.S.C.G.S. pour les séismes éloignés. Pour les locaux, ces données nous sont fournies par l'Observatoire du Dominion, et cela est indiqué chaque fois. Pour sauver de l'espace, nous ne mentionnons pas U.S.C.G.S. à chaque séisme.

Nous indiquons aussi quelques fois, après une phase, sur la ligne suivante, la période de l'onde du sol et son amplitude en microns.

Nous tenons à exprimer publiquement notre reconnaissance à l'Observatoire du Dominion qui envoie chaque année ses techniciens refaire l'étalonnage complet de tous les séismographes et pour toute la gamme des fréquences, par la méthode de Willmore.

M. Buist, S.J.

STATION: MONTREAL



ϕ = 45°30'09"N λ = 73°37'23"W Altitude 112M

Foundation : Ordovician Limestone (Trenton)

T_s T_g

Date of Calibration: April - 1962
Feb. - 1964

BENIOFF'S		BENIOFF'S		COLUMBIA'S	
S.P. - Z	Apr. 4	I.P. - Z	Apr. 4	L.P. - Z.	Feb
S.P.H. - N.S.	Apr. 4	I.P.H. - N.S.	Apr. 4	L.P.H. - N.S.	Feb
S.P.H. - E.W.	Apr. 5	I.P.H. - E.W.	Apr. 5	L.P.H. - E.W.	Feb

2 jan. 54.3 N., 164.5 W.
Unimak Isl. region
h about 57 km.
H 04 52 17.1
ePZ 05 01 45.5

3 jan. eN" 06 37.5

3jan. 4.7 N., 76.0 W.
Colombia
h about 103 km.
H 18 16 05.9
iPZ 18 23 39.8 c

4 jan. 15.4 S., 70.9 W.
S. Peru
h about 189 km.
H 12 48 13.2
iPZ 12 58 04.1 c

5 jan. 23.2 S. 70.4 W.
Near coast of N. Chile
h about 33 km.
H 00 25 43.1
ePZ 00 36 43

5 jan. 13.2 N., 95.5 E.
Adaman Isl. region
h about 37 km.
H 17 21 28.4
eN" 18 24

6jan. 6.8 N., 73.1 W.
N. Colombia
h about 168 km.
H 04 19 59.3
iPZ 04 27 09.3

9 jan. 5.4 S., 113.6 E.
Central Mid-Atlantic Ridge
h about 39 km.
H 03 04 00.9
eN" 03 57

9 jan. 21.4 S., 69.6 W.
N. Chile
h about 68 km.
H 04 06 30.9
ePZ 04 17 22

10 jan. 6.6 S., 154.5 E.
Solomon Isl.
h about 64 km.
H 16 12 14.8
eN" 17 19

11 jan. ePZ 02 59 03

11 jan. 33.7 N., 137.2 E.
Near S. Coast of Honshu, Japan
h about 33 km.
H 14 16 32.2
eSKSN" 14 41.4

12 jan. 2.3 S., 77.0W.
Peru-Ecuador border region
h about 182 km.
H 08 02 09.6
ePZ 08 10 31

12 jan. 15.3 N., 94.4 W.
Near Coast of Oaxaca, Mexico
h about 51 km.
H 12 29 29.1
eN" 12 47

13 jan. 19.1N., 64.7 W.
Virgin Isl.
h about 41 km.
H 10 30 51.1
ePZ 10 36 35
iN 45.5

13 jan. 52.9N., 172.0 E.
Near Isl. Aleutian Isl.
h about 14 km.
H 10 41 11.0
iPZ 10 52 03.8 c

13 jan. 8.4 S., 74.0W.
Peru-Brazil border region

h	about 190 km.		
H	14	17	10.8
iPZ	14	26	14.6 d

14 jan. $ePnZ$ 15 30 44.5
$eSnE$ 31 40.7

15 jan. 59.5 N., 144.6 W.
Gulf of Alaska

h	about 33 km.		
H	11	59	58.6
ePZ	12	08	02

15 jan. 33.5 S., 69.9 W.
Chile-Argentina border region

h	about 36 km.		
H	19	29	34.7
ePZ	19	41	35.5

16 jan. eN" 01 02

16 jan. 52.9 N., 171.9 E.
Near Isl. Aleutian Isl.

h	about 25 km.		
H	09	11	50.0
iPZ	09	22	41.3

16 jan. 54.9 N., 165.8 E.
Komandorski Isl. region

h	about 15 km.		
H	19	44	39.5
iPZ	19	55	38.6 d

17 jan. 14.0 N., 91.7 W.
Near Coast of Guatemala

h	about 126 km.		
H	14	42	22.9
ePZ	14	49	07

19 jan. 17.8 S., 71.3 W.
Near Coast of Peru

h	about 50 km.		
H	04	44	28.9
iPZ	04	54	52.4 d

20 jan. 37.9 N., 138.0 E.
Near W. coast of Honshu, Japan

h	about 33 km.		
H	01	44	49.5
ePZ	01	57	57.5 d

20 jan. 15.1 S., 168.0 E.
New Hebrides Isl.

h	about 28 km.		
H	04	27	44.9
eZ"	05	26	

20 jan. 14.9 S., 75.6 W.
Near coast of Peru

h	about 44 km.		
H	07	14	04.6
ePZ	07	24	08

20 jan. 53.0 N., 171.8 E.
Near Isl. Aleutian Isl.

h	about 29 km.		
H	14	46	06.2
ePZ	14	56	56.5

20 jan. 52.4 N., 169.6 W.
Fox Isl., Aleutian Isl.

h	about 19 km.		
H	16	32	19.9
ePZ	16	42	18

21 jan. 5.6 N., 77.6 W.
Near W. coast of Colombia

h	about 14 km.		
H	18	20	24.4
ePZ	18	28	02

22 jan. 17.4 N., 94.1 W.
Chiapas, Mexico

h	about 139 km.		
H	07	36	49.3
iPZ	07	43	10.3
ipPZ			45.3

22 jan. 56.0 N., 153.7 W.
S. of Alaska

h	about 33 km.		
H	14	27	07.9
iPZ	14	35	52.4

22 jan. 62.1 N., 141.3 W.
Central of Alaska

h	about 46 km.		
H	22	07	35.4
ePZ	22	15	16

23 jan. 16.3 N., 94.9 W.
Oaxaca, Mexico

h	about 32 km.		
H	00	57	21.8
ePZ	01	04	04

23 jan. 37.0 N., 106.9 W.
New Mexico

h	about 10 km.		
H	01	56	38.0
ePZ	02	02	16

26 jan. 59.6 S., 26.3 W.
S. Sandwich Isl. region

h	about 80 km.		
H	01	00	15.2
eN"	01	59	

28 jan. 17.1 S., 168.4 E.
New Hebrides Isl.

h	about 24 km.		
H	05	42	16.4
eN"	06	33	

28 jan. 2.7 N., 95.3 W.
Galapagos Isl. region

h	about 33 km.		
H	07	59	58.0
iPZ	08	08	26.5 d

28 jan. 51.6 N., 157.0 E.
Near E. coast of Kamchatka

h	about 107 km.		
H	22	38	12.2
iPZ	22	49	37.1 d
ipPZ		50	04.0

29 jan. 16.6 N., 91.2 W.
Mexico - Guatemala border region

h	about	7 km.	
H	14	40	26.5
ePZ	14	47	02

31 jan. 24.8 S., 64.4 W.
Salta Prov. Argentina

h	about 43 km.		
H	14	01	25.4
iPZ	14	13	37.0 d

3 fév. 21.7 S., 68.4 W.
Chile-Bolivia border region

h	about 116 km.		
iPZ	00	58	01.3
ipPZ			31.7

4 fév. 16.8 N., 96.2 W.
Oaxaca, Mexico

h	about 41 km.		
H	03	42	33.1
ePZ	03	49	18

4 fév. 15.9 S., 167.9 E.
New Hebrides Isl.

h	about 190 km.		
H	10	39	12.2
eP'Z	10	57	42

4 fév. 6.6 N., 82.2 W.
S. of Panama

h	about 33 km.		
H	16	15	56.2
eZ"	16	36	

5 fév. 39.2 N., 22.0 E.
Greece

h	about 38 km.		
H	02	01	48.3
iPZ	02	12	37.8 c

5 fév. 39.2 N., 22.2 E.
Greece

h	about 45 km.		
H	02	58	00.6
ePZ	03	08	50

5 fév. 26.1 N., 103.1 E.
Yunnam Prov. China

h	about 15 km.		
H	15	12	29.1
iPZ	15	26	36.5 d

5 fév. 50.2 N., 155.1 E.
Kurile Isl.

h	about 98 km.		
H	16	16	00.8
ePZ	16	27	37 c
iPZ			37.4 d

5 fév. 19.6 S., 69.6 W.
N. Chile

h	about 87 km.		

H	23	34	24.7
iPZ	23	44	55.9 c
ipPZ		45	18.6

6 fév. 15.9 N., 93.6 W.
Near coast of Chiapas, Mexico

h	about 92 km.		
H	04	12	26.9
ePZ	04	19	07

6 fév. 60.4 N., 152.3 W.
S. Alaska

h	about 91 km.		
H	23	28	07.8
ePZ	23	36	27.8
ipPZ			50.0

7 fév. 29.8 N., 69.7 E.
W. Pakistan

h	about 33 km.		
H	04	26	13.9
eSKSN"	04	50	32

7 fév. 19.0 N., 108.3 W.
Revilla Gigedo Isl. region

h	about 33 km.		
H	07	40	22.4
ePZ	07	47	46

7 fév. 14.4 S., 73.8 W.
Peru

h	about 10 km.		
H	08	41	18.8
iPZ	08	51	24.9 c

7 fév. 30.2 N., 69.8 E.
W. Pakistan

h	about 10 km.		
H	23	06	34.5
eSKSN"	23	31	

8 fév. 36.3 N., 28.2 E.
Turkey

h	about 80 km.		
H	13	16	21.8
ePZ	13	27	41.5

8 fév. 18.8 N., 106.8 W.
off coast of Mexico

h	about 33 km.		
H	17	06	45.6
ePZ	17	14	05

9 fév. 14.3 N., 93.0 W.
Near coast of Chiapas, Mexic

h	about 53 km.		
H	00	55	19.8
ePZ	01	02	09

9 fév. 56.7 S., 25.7 W.
S. Sandwich Isl. region

h	about 27 km.		
H	04	40	28.4
eP'Z	04	59	29

9 fév. 12.8 N., 87.5 W.
Near coast of Nicaragua

h	about 33 km.		
H	06	22	38.1
ePZ	06	29	27

9 fév. 35.3 S. 106.0 W.
Easter Isl. Cordillera

h	about 33 km.		
H	13	57	48.7
eN"	14	40	

9 fév. 15.2 S., 75.2 W.
Near coast of Peru

h	about 54 km.		
H	15	13	30.1
ePZ	15	23	36

9 fév. 1.7 S., 77.9 W.
Ecuador

h	about 168 km.		
H	20	30	23.3
iPZ	20	38	40

10 fév. 16.7 S., 73. 9 W.
Near coast of Peru

h	about 13 km.		
H	10	43	30.3
ePZ	10	53	50

10 fév. 20.8 N., 146.3 E.
Mariana Isl. region

h	about 43 km.		
H	14	21	10.9
eSKSE"	14	46	12

10 fév. 47.2 N., 150.8 E.
Kurile Isl.

h	about 162 km.		
H	20	13	33.0
ePZ	20	25	30

10 fév. 14.6 N., 92.6 W.
Near coast of Chiapas, Mexico

h	about 56 km.		
H	23	31	28.7
eZ"	23	52	

12 fév. 35.9 N., 90.0 W.
Tennessee

h	about 33 km.		
H	04	32	14.7
ePZ	04	40	15

13 fév. 49.8 N., 78.1 E.
E. Kasakh S.S.R.

h	about 0 km.		
H	04	57	57.7
iPZ	05	10	20.1 c

13 fév. 14.1 N., 61.4 W.
Windward Isl.

h	about 192 km.		
H	06	07	24.1
ePZ	06	13	44.5

13 fév. 36.9 N., 106.9 W.
New Mexico

h	about 5 km.		
H	06	32	21.4
e(P)Z	06	37	53.5

13 fév. 6.6 S., 132.6 E.
Tanimbar Isl. region

h	about 12 km.		
H	06	35	55.7
iP'Z	06	55	17.3 c

13 fév. 10.5 N., 104.2 W.
Off coast of Mexico

h	about 33 km.		
H	10	00	45.3
ePZ	10	08	48

13 fév. 26.1 N., 103.2 E.
Yunnam Prov. China

H	10	44	41.0
eSKSN"	11	13	08

13 fév. 29.8 N., 69.7 E.
W. Pakistan

h	about 33 km.		
H	19	09	47.4
eN"	19	58	

13 fév. 37.1 N., 91.0 W.
E. Missouri

h	about 7 km.		
H	23	19	36.9
e	23	27	26

15 fév. 14.7 N., 91.3 W.
Guatemala

h	about 66 km.		
H	00	16	53.8
ePZ	00	23	38

15 fév. 22.7 S., 176.2 W.
S. of Fiji Isl.

h	about 33 km.		
H	09	56	29.8
eN"	10	43	

16 fév. 17.7 S., 167.9 E.
New Hebrides Isl.

h	about 31 km.		
H	03	18	27.2
eP'Z	03	37	19

16 fév. 52.4 N., 169.6 W.
Fox Isl. Aleutian Isl.

h	about		47 km.
H	11	58	14.2
ePZ	12	08	10

17 fév. 32.2 S., 78.9 E.
Mid-Indian Rise

h	about 33 km.		
H	11	48	00.8
iP'Z	12	07	53.5 d

17 fév. 32.2 S., 79.0 E.
Amsterdam-Naturaliste Ridge

h	about 33 km.		
H	12	43	01.1
eP'Z	13	02	53

18 fév. 6.9 N., 124.0 E.
Mindanao Philippine Isl.

h	about 57 km.		
H	06	59	05.0
eN"	08	04	

18 fév. 44.3 N., 143.1 E.
Hokkaido region, Japan

h	about 225 km.		
H	19	02	51.5
iPZ	19	15	01.2 c

19 fév. 43.9 N., 147.0 E.
Kurile Isl.

h	about 98 km.		
H	22	48	55.0
iPZ	23	01	16.5

20 fév. 60.8 N., 152.2 W.
S. Alaska

h	about 105 km.		
H	02	08	40.4
ePZ	02	17	20

20 fév. 6.9 N., 73.0 W.
N. Colombia

h	about 152 km.		
H	04	10	27.5
ePZ	04	17	38

20 fév. 53.1 N., 159.8 E.
Near E. coast of Kanchatka

h	about 44 km.		
H	05	58	09.6
iPZ	06	09	28.0 d

20 fév. 9.8 S., 75.6 W.
Peru

h	about 22 km.		
H	15	25	40.1
ePZ	15	35	13

20 fév. 48.0 N., 155.0 E.
Kurile Isl.

h	about 33 km.		
H	18	15	50.0
ePZ	18	27	44

20 fév. eZ 18 36 17

20 fév. 16.9 N., 99.9 W.
Near coast of Guerrero, Mexico

h	about 33 km.		
H	18	59	57.1
ePZ	19	06	57

21 fév. 55.6 S., 26.9 W.
S. Sandwich Isl. region

h	about 33 km.		
H	00	22	29.7
eSKSN"	00	47	26

22 fév. 5.4 S., 151.5 E.
New Britain region

h	about 28 km.		
H	05	02	37.2
eP'Z	05	21	33.5
iP'Z			33.9

23 fév. 15.4 S., 72.7 W.
S. Peru

h	about 115 km.		
H	18	10	21.9
ePZ	18	21	21

24 fév. 52.6 N., 172.5 E.
Near Isl. Aleutian Isl.

h	about 65 km.		
H	05	40	06.8
e(P)Z	05	50	49.5

25 fév. 15.1 S., 173.2 W.
Tonga Isl.

h	about 33 km.		
H	22	50	47.1
eN"	23	35.5	

26 fév. 52.4 N., 173.6 E.
Near Isl. Aleutian Isl.

h	about 51 km.		
H	00	33	50.1
iPZ	00	44	36.0

27 fév. 52.1 N., 175.1 E.
Rat Isl. Aleutian Isl.

h	about 52 km.		
H	16	30	17.9
iPZ	16	41	01.2

27 fév. 18.8 N., 102.6 W.
Michoacan, Mexico

h	about 94 km.		
H	20	44	59.0
iPZ	20	51	50.9

28 fév. 43.7 N., 139.6 E.
E. Sea of Japan

h	about 225 km.		
H	02	02	13.6
iPZ	02	14	31.7 d

28 fév. 29.2 N., 130.1 E.
Ryukyu Isl.

h	about 33 km.		
H	13	35	39.0
eN"	14	33	

28 fév. 26.0 S., 70.4 W.
Near coast of N. Chile

h	about 67 km.		
H	21	38	52.4
iPZ	21	50	06.1 d
ipPZ			24.0

1 mars 23.3 S., 68.1 W.
N. Chile

h	about 120 km.		
H	12	21	51.4
iPZ	12	32	44.4 d

2 mars 18.2 S., 67.0 W.
Bolivia

h	about 274 km.		
H	05	56	27.6
iPZ	06	06	30.9 c

2 mars 52.4 N., 172.3 E.
Near Isl. Aleutian Isl.

h	about 40 km.		
H	11	51	20.7
iPZ	12	02	11.3 d

3 mars 48.3 N., 154.3 E.
Kurile Isl.

h	about 45 km.		
H	03	25	28.0
ePZ	03	37	20.5 c
iPZ			21.1 d
ipPZ			33.0

3 mars 20.2 N., 45.6 W.
N. Atlantic Ridge

h	about 34 km.		
H	10	12	23.2
ePZ	10	19	08.5

3 ma
N. Atlantic Ridge

h	about 33 km.		
H	10	17	50.6
ePZ	10	24	37.5

4 mars 38.8 S., 177.9 E.
North Isl. New Zealand

h	about 27 km.		
H	23	58	55.9
iP'Z	00	18	00.3 c

5 mars 42.8 N., 143.1 E.
Hokkaido region, Japan,

h	about 120 km.		
H	04	48	44.5
iPZ	05	01	14.0 d

5 mars 8.2 N., 74.7 W.
N. Colombia

h	about 53 km.		
H	14	33	23.2
ePZ	14	40	33

5 mars 0.0 18.0 W.
N. of Ascension Isl.

h	about 33 km.		
H	20	54	45.7
eSSSN"	21	21	56

5 mars 21.5 S., 175.3 W.
Tonga Isl.

h	about 40 km.		
H	22	49	34.9
eN"	23	36	

6 mars 9.5 N., 126.2 E.
Mindanao, Philippine Isl.

h	about 93 km.		
H	00	09	33.2
eN"	01	02	

6 mars 31.6 N., 60.5 E.
Tibet

h	about 35 km.		
H	02	15	56.7
eSKSN"	02	40	18

6 mars 24.1 S., 176.9 W.
S. of Fiji Isl.

h about 33 km.
H 18 01 50.0
eSSSN" 18 37.7

6 mars 7.1 N., 71.6 W.
Venezuela
h about 46 km.
H 21 04 18.8
ePZ 21 11 39

7 mars 39.1 N., 41.7 E.
Turkey
h about 13 km.
H 01 16 05.8
ePZ 01 28 04

7 mars 14.5 N., 93.2 W.
Near coast of Chiapas, Mexico
h about 22 km.
H 09 10 54.5
ePZ 09 17 46.5

7 mars 46.1 N., 111.4 W.
Montana
h about 33 km.
H 18 09 43.6
eSN' 18 23 09

7 mars 37.2 N., 114.8 E.
N.E. China
h about 33 km.
H 21 29 17.0
eN" 21 46.8

8 mars 18.9 S., 173.3 W.
Tonga Isl.
h about 33 km.
H 00 18 09.8
eN" 01 03.6

8 mars 31.3 S., 66.8 W.
San Juan Prov. Argentina
h about 102 km.
H 02 32 52.7
ePZ 02 44 33

8 mars 1.9 N., 126.4 E.
Motucca passage
h about 33 km.
H 05 41 04.5
eP'Z 06 00 13

8 mars 0.2 N., 92.7 W.
Galapagos Isl. region
h about 33 km.
H 10 39 20.3
eN" 11 12.8

8 mars 1.9 N., 126.4 E.
Molucca passage
h about 78 km.
H 12 19 20.8
eN" 13 07

8 mars 20.0 S., 68.9 W.
Chile-Bolivia border region
h about 122 km.
H 20 46 12.0
iPZ 20 56 43.1

9 mars 16.5 N., 95.4 W.
Oaxaca, Mexico
h about 33 km.
H 05 08 29.5
ePZ 05 15 16

9 mars 27.6 N., 115.0 W.
Baja, California
h about 33 km.
H 14 02 12.8
ePZ 14 09 26

9 mars 7.4 S., 108.4 E.
Java
h about148 km.
H 23 13 51.8
eP'Z 23 33 03

10 mars 32.2 N., 137.5 E.
S. of Honshu, Japan
h about 382 km.
H 04 26 19.6
ePZ 04 39 12.5

12 mars 24.1 N., 122.6 E.
Taiwan region
h about 63 km.
H 16 31 21.8
ePZ 16 45 42

13 mars 55.0 S., 126.4 W.
Easter Isl. Cordillera
h about 33 km.

H 17 58 35.6
eN" 18 33

13 mars 14.4 N., 88.4 W.
Honduras
h about 27 km.
H 21 46 22.2
ePZ 21 53 22

14 mars 0.9 N., 27.7 W.
Central Mid-Atlantic ridge
h about 33 km.
H 03 21 31.7
ePZ 03 31 39

15 mars 24.4 N., 122.7 E.
Taiwan region
h about 33 km.
H 23 31 46.1
eN" 00 07

16 mars 21.2 S. 174.3 W.
Tonga Isl.
h about 66 km.
H 12 13 02.4
eN" 12 59

16 mars 9.5 N., 121.9 E.
Sulu Sea
h about 24 km.
H 20 38 23.5
ePSN" 21 09.0

17 mars 2.0 N., 126.4 E.
Molucca passage
h about 79 km.
H 03 57 27.0
eN" 04 37

17 mars 19.4 S., 70.6 W.
Near coast of N. Chile
h about 48 km.
H 10 59 02.5
ePZ 11 09 36

17 mars 8.7 N., 103.7 W.
Off coast of Mexico
h about 33 km.
H 14 04 11.9
eSN" 14 19 15

17 :
Fiji Isl. region
h about 626 km.
H 15 50 32.2
eP'Z 16 08 03.5
iP'Z 04.3 c

18 mars 43.7 N., 127.3 W.
Off coast of Oregon
h about 33 km.
H 18 05 23.5
eSSSN" 18 22.5

19 mars 43.3 N., 145.8 E.
Hokkaido, Japan region
h about 11 km.
H 08 11 40.3
ePZ 08 24 16.5

19 mars 9.4 S., 159.2 E.
Solomon Isl.
h about 33 km.
H 13 42 27.2
eN" 14 33

19 mars 37.4 N., 114.8 E.
N. E. China
h about 33 km.
H 16 59 41.7
eN" 17 45

19 mars 52.7 S., 19.9 E.
S. E. of Africa
h about 33 km.
H 17 16 40.9
eN" 18 34

19 mars i^{P_n} 22 52 06.6
i^{S_n} 24.0

20 mars 0.6 N., 30.2 E.
Uganda
h about 36 km.
H 01 42 49.9
ePZ 01 56 29

20 mars ePZ 06 02 20.5 c

20 mars 17.0 S., 174.3 W.
Tonga Isl.

h	about 117 km.		
H	07	47	50.2
eN"	08	54	

20 mars 12.3 S., 167.4 E.
Santa Cruz Isl.

h	about 57 km.		
H	18	09	09.4
eN"	19	08	

20 mars 71.8 N., 2.5 W.
Jan Mayen Isl. region

h	about 33 km.		
H	21	50	00.0
eN"	22	09	

21 mars 21.1 S., 68.7 W.
Chile-Bolivia border region

h	about 133 km.		
H	13	26	10.5
iPZ	13	36	47.0 d

21 mars 3.3 N., 84.1 W.
Off coast of Central America

h	about 33 km.		
H	14	28	11.3
eSN"	14	42	44

21 mars 2.6 S., 140.3 E.
Near N. coast of W. New Guinea

h	about 16 km.		
H	16	00	21.7
eN"	17	02	

22 mars 13.4 N., 90.0 W.
El Salvador

h	about 33 km.		
H	03	41	50.8
ePZ	03	48	42

22 mars 37.5 N., 115.0 E.
N. E. China

h	about 11 km.		
H	08	19	33.8
ePZ	08	33	04

22 mars 23.8 N., 122.8 E.
Taiwan region

h	about 51 km.		
H	00	04	34.7
eP'Z	00	22	31

23 mars 38.1 S., 73.6 W.
Near coast of Central Chile

h	about 33 km.		
H	04	11	36.1
eN"	04	57	

23 mars 16.8 N., 85.9 W.
Caribbean Sea

h	about 33 km.		
H	05	11	32.5
ePZ	05	17	44
iPZ			44.9

23 mars ePZ 16 05 23

23 mars 7.3 S., 74.8 W.
Peru-Brazil border region

h	about 137 km.		
H	21	57	09.6
iPZ	22	06	11.4

25 mars 2.0 S., 139.0 E.
Near N. coast of W. New G

h	about 51 km.		
H	08	56	46.1
eN"	10	00	

25 mars 51.5 N., 179.6 W.
Andreanof Isl. Aleutian Isl.

h	about 33 km.		
H	12	54	55.7
eN"	13	24.5	

25 mars 56.6 N., 135.4 W.
S. E. Alaska

h	about 22 km.		
H	21	59	26.4
eN"	22	19.7	

26 mars 6.9 N., 73.0 W.
N. Colombia

h	about 151 km.		
H	02	14	09.1
iPZ	02	21	20.6

26 mars 18.5 S., 26.2 E.
S. Rhodesia

h	about 16 km.		
H	09	42	17.8
eN"	11	06	

26 mars 37.6 N., 115.2 E.
N. E. China

h	about 33 km.		
H	15	19	03.2
eSKSN"	15	43	12

26 mars 37.7 N., 114.9 E.
N. E. China

h	about 33 km.		
H	18	14	22.6
eN"	19	00.0	

27 mars 23.7 S., 66.8 W.
Jujuy Prov. Argentina

h	about 201 km.		
H	14	53	33.9
iPZ	15	04	19.2

27 mars 60.4 N., 146.1 W.
S. Alaska

h	about 13 km.		
H	15	44	43.5
eN"	16	07.6	

27 mars 8.9 N., 83.4 W.
Costa Rica

h	about 40 km.		
H	18	53	41.3
iPZ	19	00	54.0 c

27 mars 14.9 N., 93.4 W.
Near coast of Chiapas, Mexico

h	about 33 km.		
H	21	07	32.9
eN"	21	52	

27 mars 9.5 N., 83.5 W.
Costa Rica

h	about 65 km.		
H	23	12	48.9
eN"	23	33	

28 mars 37.2 N., 114.7 E.
N. E. China

h	about 33 km.		
H	03	26	30.4
eN"	04	22	

28 mars [illegible]
Peru-Ecuador border region

h	about 19 km.		
H	15	29	18.4
iPZ	15	38	10.1 d

28 mars 4.0 S., 80.8 W.
Peru-Ecuador border region

h	about 52 km.		
H	17	42	47.6
iPZ	17	51	35.9 d

28 mars 4.0 S., 80.9 W.
Peru- Ecuador bor der region

h	about 22 km.		
H	20	29	32.3
iPZ	20	38	24.0 d

29 mars 23.7 N., 142.1 E.
Volcano Isl. region

h	about 79 km.		
H	02	17	38.5
eSKS	02	42	03

29 mars 37.4 N., 114.9 E.
N. E. China

h	about 34 km.		
H	06	12	00.4
eN"	06	44	

30 mars 21.8 N., 62.2 E.
Arabian Sea

h	about 33 km.		
H	04	18	38.1
eN"	04	51.5	

30 mars 49.8 N., 129.7 W.
Vancouver Isl. region

h	about 33 km.		
H	12	40	01.0
ePZ	12	47	12

31 mars 17.3 S., 167.8 E.
New Hebrides Isl.

h	about 34 km.		
H	05	05	54.7
eN"	05	56.5	

1 avril 51.7 N., 176.4 E.
Rat Isl. Aleutian Isl.

h about 73 km.
H 02 51 08.2
iPZ 03 01 47.1 d

1 avril 64.6 N., 153.0 W.
Central Alaska
h about 33 km.
H 03 38 37.8
ePZ 03 46 59

2 avril 16.5 N., 97.4 W.
Oaxaca, Mexico
h about 42 km.
H 01 52 38.3
iPZ 01 59 29.7 d

2 avril 6.9 N., 73.1 W.
N. Colombia
h about 148 km.
H 18 16 55.0
ePZ 18 24 05.5

3 avril 36.7 N., 140.8 E.
Near E. coast of Honshu, Japan
h about 68 km.
H 04 43 41.1
iPZ 04 56 46.5

3 avril 39.0 N., 21.5 E.
Greece
h about 25 km.
H 11 36 24.8
eZ" 12 14

3 avril 30.7 N., 113.7 W.
Gulf of California
h about 33 km.
H 19 44 38.0
eN" 20 03.1

4 avril 54.7 S., 146.2 E.
W. of Macquarie Isl.
h about 33 km.
H 05 37 49.7
eN" 06 42

4 avril 13.6 N., 89.7 W.
El Salvador
h about 108 km.
H 19 50 07.6
iPZ 19 56 47.4
ipPZ 57 07.0

4 avril 10.8 S., 164.3 E.
Santa Cruz Isl.
h about 37 km.
H 23 32 22.3
eZ" 00 32

5 avril 37.0 N., 138.2 E.
Honshu, Japan
h about 4 km.
H 08 51 16.4
ePZ 09 04 33

5 avril 55.1 S., 158.4 E.
Macquarie Isl. region
h about 5 km.
H 11 57 36.9
eP'Z 12 17 18

5 avril 61.7 N., 126.9 W.
N. W. Territories, Canada
h about 37 km.
H 14 32 27.6
ePZ 14 39 11

6 avril 45.8 S., 96.1 E.
S. E. Indian Rise
h about 33 km.
H 02 59 01.7
eSSN" 03 46.3

6 avril 22.4 S., 68.0 W.
N. Chile
h about 179 km.
H 14 04 24.3
ePZ 14 14 13

6 avril 56.6 N., 154.5 W.
Kodiak Isl. region
h about 33 km.
H 22 28 38.7
iPZ 22 37 23.3 d

7 avril 26.1 N., 127.4 E.
Ryukyu Isl.
h about 46 km.
H 09 42 32.1
eN" 10 34

8 avril 51.2 N., 157.7 E.
Near E. coast of Kamchatka
h about 47 km.

H 05 24 44.6
iPZ 05 36 15.6 c

8 avril 51.2 N., 157.8 E.
Near E. coast of Kamchatka
h about 48 km.
H 05 24 44.6
iPZ 05 36 15.6 c

8 avril 52.7 N., 33.2 W.
N. Atlantic Ocean
h about 33 km.
H 05 52 40.4
ePZ 05 58 24

8 avril 56.9 N., 152.0 W.
Kodiak Isl. region
h about 33 km.
H 09 19 09.6
eN" 09 43

8 avril 15.0 S., 175.3 W.
Samoa Isl. region
h about 33 km.
H 11 10 21.5
eN" 11 55.5

8 avril 26.2 S., 114.4 W.
Easter Isl. region
h about 33 km.
H 14 07 53.9
ePZ 14 20 08

8 avril 56.8 N., 151.9 W.
Kodiak Isl. region
h about 33km.
H 22 10 53.9
ePZ 22 19 35.5

8 avril 50.6 N., 156. 7 E.
Kurile Isl.
h about 200 km.
H 23 05 36.2
ePZ 23 16 57

8 avril 52.3 N., 173.5 E.
Near Isl. Aleutian Isl.
h about 45 km.
H 23 46 50.8
ePZ 23 57 37

9 avril 9.4 N., 84.2 W.
Costa Rica
h about 40 km.
H 02 34 23.0
iPZ 02 41 31.1 c

9 avril 9.6 N., 84.1 W.
Costa Rica
h about 30 km.
H 02 42 08.7
ePZ 02 49 18.4 d

9 avril 14.1 S., 166.7 E.
New Hebrides Isl.
h about 47 km.
H 14 49 22.8
eN" 15 40

9 avril 60.2 N., 147.1 W.
S. Alaska
h about 34 km.
H 18 51 45.0
iPZ 18 59 57.8 c

9 avril 56.7 N., 152.0 W.
Kodiak Isl. region
h about 33 km.
H 20 08 38.6
ePZ 20 17 14.5 d

10 avril 22.0 S., 68.3 W.
N. Chile
h about 115 km.
H 05 55 49.7
iPZ 06 06 34.0

10 avril 6.9 N., 73.0 W.
N. Colombia
h about 155 km.
H 10 33 35.0
iPZ 10 40 45.5
ipPZ 41 20.0
isPZ 36.0
iPPZ 44.5

10 avril 53.1 N., 171.0 E.
Near Isl. Aleutian Isl.
h about 20 km.
H 10 39 51.0
iPZ 10 50 45.0 d

10 avril 31.5 S., 71.2 W.
Near coast of Central Chile

h	about 64 km.		
H	16	36	14.6
ePZ	16	48	00
ipPZ			17.1

10 avril 41.4 N., 125.5 W.
Off coast of N. California

h	about 33 km.		
H	22	27	01.8
ePZ	22	34	12

11 avril 52.5 N., 173.0 E.
Near Isl. Aleutian Isl.

h	about 29 km.		
H	16	05	41.6
ePZ	16	16	31

11 avril 18.4 N., 102. 3 W.
Michoachan, Mexico

h	about 72 km.		
H	17	17	33.8
iPZ	17	24	29.4 d

11 avril 56.6 N., 152.0 W.
Kodiak Isl. region

h	about 33 km.		
H	23	00	24.0
ePZ	23	09	02

12 avril 38.1 S., 73.0 W.
Central Chile

h	about 44 km.		
H	23	37	42.1
ePZ	23	50	06
iPZ			08.6 c

13 avril 38.2 S., 73.2 W.
Near coast of Central Chile

h	about 40 km.		
H	03	35	16.3
ePZ	03	47	40

14 avril 25.0 S., 64.5 W.
Salta Prov. Argentina

h	about 25 km.		
H	06	19	13.6
iPZ	06	30	27.6 c
ipPZ			36.0

14 avril 34.5 N., 24.0 E.
Crete

h	about 33 km.		
H	18	51	45.8
ePZ	19	03	02

15 avril 5.0 N., 82.4 W.
S. of Panama

h	about 33 km.		
H	06	42	59.7
ePZ	06	50	41

16 avril 57.0 N., 153.6 W.
Kodiak Isl. region

h	about 33 km.		
H	01	27	15.3
iPZ	01	35	55.7 d

16 avril 18.3 N., 62.0 W.
Leeward Isl.

h	about 30 km.		
H	07	12	37.1
ePZ	07	18	36

16 avril 35.0 N., 141.5 E.
Off E. coast of Honshu, Japan

h	about 63 km.		
H	10	13	27.7
eN"	11	07	

16 avril 19.0 N., 70.4 W.
Dominican Republic region

h	about 46 km.		
H	11	32	01.1
iPZ	11	37	40.7 d

16 avril 21.1 S., 178.6 W.
Fiji Isl region

h	about 511 km.		
H	15	23	29.3
eP'Z	15	41	11.5

16 avril 56.7 N., 136.2 W.
Off coast of S. E. Alaska

h	about 5km.		
H	22	49	38.9
ePZ	22	57	16

17 avril 54.2 N., 133.5 W.
Queen Charlotte Isl. region

h	about 33 km.		
H	16	46	50.9
ePZ	16	53	11

20 avril 18.8 N., 147.0 E.
Mariana Isl.

h	about 12 km.		
H	02	32	49.7
eN"	03	16.7	

20 avril 18.9 N., 146.8 E.
Mariana Isl.

h	about 33 km.		
H	06	00	39.4
eSSN"	06	34.6	

20 avril 18.8 N., 146.9 E.
Mariana Isl.

h	about 28 km.		
H	14	01	26.7
eSSSN"	14	38.7	

20 avril 41.7 N., 48.2 E.
E. Caucasus

h	about 19 km.		
H	16	42	03.7
ePZ	16	54	04

21 avril 49.8 N., 78.0 E.
E. Kazakh S.S.R.

h	about 0 km.		
H	03	57	58.0
ePZ	04	10	21

21 avril 34.8 N., 26.0 E.
Crete

h	about 52 km.		
H	06	45	28.6
iPZ	06	56	49.0 c

21 avril 6.9 N., 73.1 W.
N. Colombia

h	about 152 km.		
H	08	18	23.9
iPZ	08	25	35.5 c

22 avril 37.8 S., 73.4 W.
Near coast of Central Chile

h	about 18 km.		
H	03	06	32.3
ePZ	03	18	57

22 a
Kodiak Isl. region

h	about 9 km.		
H	07	23	47.6
eN"	07	50.5	

22 avril 56.9 N., 151.8 W.
Kodiak Isl. region

h	about 33 km.		
H	10	15	50.6
eN"	10	40	

22 avril 57.5 N., 152.1 W.
Kodiak Isl. region

h	about 22 km.		
H	23	27	20.5
ePZ	23	35	55 d
iPZ			55.9 c

23 avril 0.9 S., 122.4 E.
N. Celebes

h	about 45 km.		
H	00	09	34.4
eP'Z	00	28	38

23 avril 41.6 S., 174.4 E.
Cook Strait, New Zealand

h	about 15 km.		
H	06	49	38.6
eP'Z	07	09	02

23 avril 0.5 S., 122.2 E.
N. Celebes

h	about 79 km.		
H	08	56	45.8
eP'Z	09	15	42

24 avril 13.0 N., 88.9 W.
Off coast of Central America

h	about 62 km.		
H	06	03	52.2
iPZ	06	10	38

25 avril 21.9 S., 68.5 W.
Chile-Bolivia border region

h	about 115 km.		
H	02	10	15.2
ePZ	02	20	59

27 avril 38.2 N., 42.7 E.
Chile-Bolivia border region

h about 25 km.
H 19 48 49.8
eN" 20 24

28 avril 15.2 N., 94.9 W.
Near coast of Oaxaca, Mexico
h about 33 km.
H 10 39 07.3
ePZ 10 46 03

28 avril 19.1 S., 173.6 W.
Tonga Isl.
h about 27 km.
H 16 56 20.0
eN" 17 41

28 avril 44.0 N., 127.8 W.
Off coast of Oregon
h about 18 km.
H 22 30 05.1
ePZ 22 37 23

29 avril 53.8 N., 157.8 W.
S. of Alaska
h about 33 km.
H 01 46 42.6
iPZ 01 55 48.4 c

30 avril 18.8 N., 106.7 W.
Off coast of Jalisco, Mexico
h about 54 km.
H 13 01 18.5
ePZ 13 08 39

1 mai 3.6 S., 143.0 E.
Near N. coast of New Guinea
h about 21 km.
H 12 57 12.2
eN" 14 53.5

1 mai 8.5 S., 74.3 W.
Peru-Brazil border region
h about 165 km.
H 16 22 56.3
iPZ 16 32 03.1 d
ipPZ 38.1

1 mai 23.8 N., 45.2 W.
N. Atlantic ridge
h about 33 km.
H 22 23 21.5
ePZ 22 29 43

2 mai 6.0 S., 149.7 E.
New Britain region
h about 52 km.
H 09 52 48.5
iP'Z 10 11 45.2 c

2 mai 8.2 S., 74.1 W.
Peru-Brazil border region
h about 148 km.
H 10 55 47.8
iPZ 11 04 55.6 d

2 mai 38.1 N., 42.7 E.
Turkey
h about 54 km.
H 13 55 03.6
eN" 15 28

2 mai 38.0 N., 42.6 E.
Turkey
h about 41 km.
H 23 12 22.9
eN" 23 51.8

4 mai 39.1 N., 21.8 E.
Greece
h about 41 km.
H 06 36 59.8
eN" 07 08

4 mai 12.5 N., 87.6 W.
Near coast of Nicaragua
h about 60 km.
H 18 13 54.3
iPZ 18 20 42.8 d
ipPZ 59.5

4 mai 37.7 N., 27.9 E.
Turkey
h about 14 km.
H 21 48 58.2
eN" 22 21

5 mai 53.4 N., 168.7 W.
Fox Isl. Aleutian Isl.
h about 25 km.
H 00 22 27.3
iPZ 00 32 18.6 d

5 mai 51.6 N., 176.8 E.
Rat Isl. Aleutian Isl.

h about 75 km.
H 06 39 12.0
eN" 07 10

5 mai 24.4 N., 122.6 E.
Taiwan region
h about 60 km.
H 14 21 22.7
eSKSN" 14 46 23

6 mai 37.0 N., 115.4 E.
E. China
h about 33 km.
H 00 25 58.7
eN" 01 22

6 mai 15.4 S., 34.4 E.
Malawi
h about 33 km.
H 02 36 56.8
eN" 03 31

6 mai eN" 15 17

7 mai 53.6 N., 167.5 W.
Fox Isl., Aleutian Isl.
h about 45 km.
H 03 26 46.3
ePZ 03 36 28

7 mai 37.8 N., 27.9 E.
Turkey
h about 12 km.
H 13 08 16.0
ePZ 13 19 36.5

9 mai 34.5 N., 26.5 E.
Crete
h about 33 km.
H 00 42 55.6
iPZ 00 54 23.2 d

9 mai 13.6 N., 91.0 W.
Near coast of Guatemala
h about 68 km.
H 03 41 00.0
ePZ 03 47 50

9 mai 37.2 N., 31.2 E.
Turkey
h about 125 km.
ePZ 04 02 30

9 mai 34.5 N., 26.6 E.
Crete
h about 33 km.
H 06 08 28.5
ePZ 06 19 56.5

9 mai 28.3 N., 112.0 W.
Gulf of California
h about 33 km.
H 20 23 11.3
eN" 20 41.5

10 mai 28.5 N., 111.8 W.
Gulf of California
h about 33 km.
H 01 15 55.7
eN" 01 34

10 mai 41.8 N., 141.9 E.
Hokkaido, Japan region
h about 43 km.
H 10 08 56.6
iPZ 10 21 41.8 d

10 mai 51.8 N., 99.0 E.
USSR-Mongolia border region
h about 2 km.
H 21 04 04.0
eN" 21 40

11 mai 62.8 N., 150.1 W.
Central Alaska
h about 91 km.
H 01 26 23.7
iPZ 01 34 30.4 c

11 mai 16.7 N., 96.6 W.
Oaxaca, Mexico
h about 57 km.
H 01 55 51.0
iPZ 02 02 37.3 d

11 mai 48.9 N., 156.2 E.
Kurile Isl. region
h about 13 km.
H 14 17 34.1
iPZ 14 29 24.9 c

11 mai 49.0 N., 156.2 E.
Kurile Isl. region
h about 33 km.
H 14 26 41.6
iPZ 14 38 29.8 d

11 mai 34.4 N., 26.5 E.
Crete
h about 34 km.
H 15 06 02.1
ePZ 15 17 29.5

11 mai ePZ 16 07 06.5

11 mai 48.8 N., 156.3 E.
Kurile Isl. region
h about 28 km.
H 21 39 35.3
iPZ 21 51 24.8 c

13 mai iPZ 13 36 33.5 d

14 mai 34.2 N., 138.9 E.
Near S. coast of Honshu, Japan
h about 33 km.
H 17 03 56.5
eN" 17 41

14 mai 10.5 N., 63.0 W.
Near coast of Venezuela
h about 16 km.
H 20 27 27.4
ePZ 20 34 37

15 mai 53.4 N., 167.8 W.
Fox Isl. Aleutian Isl.
h about 33 km.
H 04 34 10.9
iPZ 04 43 56.4 c

15 mai 51.5 N., 178.4 W.
Andreanof Isl. Aleutian Isl.
h about 31 km.
H 14 46 06.5
ePZ 14 56 36

15 mai 1.5 S., 78.0 W.
Ecuador
h about 195 km.
H 20 16 04.1
iPZ 20 24 18.0 c

16 mai 6.9 S., 129.4 E.
Banda Sea
h about 212 km.
H 02 46 42.4
eP'Z 03 05 33

16 mai 36.6 N., 34.3 W.
Azores Isl. region
h about 34 km.
H 12 57 43.4
eE" 13 12.5

16 mai 53.4 N., 167.9 W.
Fox Isl. Aleutian Isl.
h about 15 km.
H 23 16 34.8
ePZ 23 26 24

17 mai 35.8 N., 140.5 E.
Near E. coast of Honshu, J
h about 68 km.
H 00 59 06.3
ePZ 01 12 15.5

17 mai 17.2 N., 99.0 W.
Guerrero, Mexico
h about 35 km.
H 01 47 37.3
iPZ 01 54 30.1

17 mai 0.7 N., 30.1 E.
Uganda
h about 12 km.
H 07 03 29.4
ePSE" 07 30.2

17 mai 44.0 S., 75.2 W.
Off coast of S. Chile
h about 33 km.
H 16 58 17.0
ePZ 17 11 11.5

18 mai 25.0 N., 109.0 W.
Gulf of California
h about 33 km.
H 07 32 07.3
ePZ 07 39 01.5

19 mai 54.1 N., 164.1 W.
Unimak Isl. region
h about 28 km.
H 07 06 26.8
iPZ 07 15 57.4 d

19 mai iPZ 14 03 01.5 d

20 mai e (P) Z 06 31 51

20 mai 13.9 N., 146.1 E.
S. of Mariana Isl.
h about 66 km.
H 09 14 49.2
eSKSN" 09 40

20 mai 55.0 N., 165.7 E.
Komandorski Isl. region
h about 46 km.
H 11 44 28.8
ePZ 11 55 24

20 mai 19.6 N., 122.0 E.
Philippine Isl. region
h about 96 km.
H 18 02 41.4
eN" 18 56

20 mai 50.2 N., 129.7 W.
Vancouver Isl. region
h about 37 km.
H 23 58 51.7
eSE" 00 12.0

21 mai 50.0 N., 129.5 W.
Vancouver Isl. region
h about 33 km.
H 02 44 36.7
eN" 03 00

21 mai 8.1 S., 74.4 W.
Peru-Brazil border region
h about 160 km.
H 07 44 20.1
ePZ 07 53 25

22 mai 7.4 S., 155.5 E.
Solomon Isl.
h about 83 km.
H 02 52 12.7
eN" 03 44

22 mai 21.0 N., 108.9 W.
Revilla Gigedo Isl. region
h about 28 km.
H 06 06 30.3
eN" 06 22

22 mai 21.2 N., 108.7 W.
Revilla Gigedo Isl. region
h about 53 km.
H 07 42 49.9
ePZ 07 50 01

23 mai 7.4 S., 155.8 E.
Solomon Isl.
h about 111 km.
H 00 02 49.5
eN" 01 07

23 mai 52.8 N., 33.6 W.
N. Atlantic Ocean
h about 33 km.
H 01 25 58.4
ePZ 01 31 38

23 mai 7.6 N., 73.5 W.
N. Colombia
h about 59 km.
H 06 06 00.1
eN" 06 44

23 mai 30.0 N., 139.8 E.
S. of Honshu, Japan
h about 28 km.
H 08 39 44.4
eN" 09 04

23 mai 21.4 N., 108.7 W.
Revilla Gigedo Isl. region
h about 58 km.
H 11 51 29.6
ePZ 11 58 39

23 mai 13.8 N., 146.4 E.
S. of Mariana Isl.
h about 39 km.
H 14 22 32.5
eSKSN" 14 47.8

23 mai 20.5 S., 68.8 W.
Chile-Bolivia border region
h about 113 km.
H 18 00 16.4
iPZ 18 10 50.9 d

24 mai 39.7 N., 121.9 W.
N. California

h	about 2 km.		
H	03	49	52.8
eN"	03	08	

24 mai 54.3 S., 2.8 E.
Bouvet Isl. region

h	about 33 km.		
H	07	19	31.8
eN"	08	07	

24 mai 37.4 N., 22.1 E.
S. Greece

h	about 34 km.		
H	09	39	26.0
ePZ	09	50	24

24 mai 21.3 N., 108.7 W.
Revilla Gigedo Isl. region

h	about 57 km.		
H	20	19	40.7
eSN"	20	32	44

25 mai 6.4 S., 131.1 E.
Tanimbar Isl. region

h	about 39 km.		
H	08	28	56.6
eP'Z	08	48	16

25 mai 21.6 S., 169.9 E.
Loyalty Isl. region

h	about 35 km.		
H	12	07	04.8
eE"	12	44	

25 mai 52.9 S., 160.0 E.
Macquarie Isl. region

h	about 33 km.		
H	13	20	56.2
eP'Z	13	40	29

26 mai iP_nZ 03 49 34.1
iS_nZ 56.9

26 mai 15.8 S., 167.1 E.
New Hebrides Isl.

h	about 34 km.		
H	04	33	51.0
eN"	05	34	

26 mai 21.2 S. 176.9 W.
Fiji Isl. region

h	about 230 km.		
H	18	30	07.4
eSKSN"	18	57	48

26 mai 31.4 N., 115.7 W.
Baja, California

h	about 33 km.		
H	20	33	22.1
eN"	20	52	

26 mai 28.6 N., 130.3 E.
Ryukyu Isl.

h	about 33 km.		
H	22	59	03.2
eN"	23	55	

27 mai 51.4 N., 178.5 W.
Andreanof Isl. Aleutian Isl.

h	about 33 km.		
H	22	07	43.4
eN"	22	38.5	

28 mai 24.4 N., 122.5 E.
Taiwan region

h	about 33 km.		
H	00	03	56.8
ePSN"	00	32.3	

28 mai 36.8 N., 138.0 E.
Honshu, Japan

h	about 18 km.		
H	05	21	23.8
eN"	06	07	

28 mai 23.8 N., 125.1 E.
S. W. Ryukyu Isl.

h	about 12 km.		
H	05	53	15.1
eN"	06	44	

28 mai 11.1 S., 165.3 E.
Santa Cruz Isl.

h	about 33 km.		
H	12	24	46.8
eN"	14	54	

28 mai 7.6 N., 36.1 W.
Central Mid-Atlantic Ridge

h	about 33 km.		
H	17	57	32.6
eSN"	18	13	43

28 mai 7.0 N., 35.0 W.
Central Mid-Atlantic Ridge

h	about 33 km.		
H	20	35	29.1
eSN"	20	51	50

30 mai 7.6 N., 77.0 W.
N. Colombia

h	about 32 km.		
H	03	09	34.4
iPZ	03	16	52.4 c

30 mai 25.9 N., 109.6 W.
Gulf of California

h	about 33 km.		
H	16	53	21.1
eN"	17	11.9	

31 mai 37.6 N., 78.0 W.
Virginia

h	about 33 km.		
H	06	19	02.0
$e(P_n)Z$	06	22	30.4

31 mai 52.3 N., 169.7 W.
Fox Isl. Aleutian Isl.

h	about 33 km.		
H	07	42	59.5
ePZ	07	52	56

31 mai 8.4 S., 74.3 W.
Peru-Brazil border region

h	about 154 km.		
H	08	50	18.9
iPZ	08	59	27.5 c

31 mai 25.7 N., 109.2 W.
Gulf of California

h	about 33 km.		
H	10	21	49.7
eN"	10	38	

31 mai eE" 13 14

1 juin 51.5 N., 176.2 E.
Rat Isl. Aleutian Isl.

h	about 15 km.		
iPZ	02	44	43.1 d

1 juin 23.4 S., 174.9 W.
Tonga Isl. region

h	about 24 km.		
H	11	47	33.1
eN"	12	34	

2 juin 51.1 N., 176.0 E.
Rat Isl. Aleutian Isl.

h	about 41 km.		
H	03	27	53.3
iPZ	03	38	39.8 d
ipPZ			52.2

2 juin 0.0 N., 123.2 E.
N. Celebes

h	about 185 km.		
H	07	08	08.4
iPZ	07	27	02.5

2 juin ePZ 15 36 33.0

2 juin 15.5 S., 71.5 W.
S. Peru

h	about 121 km.		
H	17	05	38.1
ePZ	17	15	39.4

3 juin 30.8 S., 68.7 W.
San Juan Prov. Argentina

h	about 101 km.		
H	10	42	58.1
ePZ	10	54	37

3 juin 17.9 S., 178.8 W.
Fiji Isl. region

h	about 643 km.		
H	13	49	13.8
eP'Z	14	06	33.5

4 juin 36.6 N., 21.0 E.
Mediterranean Sea

h	about 80 Km.		
H	06	16	57.4
iPZ	06	27	49.4

4 juin 20.1 S., 69.4 W.
N. Chile

h	about 99 km.		

H 18 07 00.8
iPZ 18 17 33.5
ipPZ 18 00.0

4 juin 46.5 N., 152.5 E.
Kurile Isl.
h about 27 km.
H 23 48 17.8
ePZ 00 00 24

6 juin 14.9 S., 167.8 E.
New Hebrides Isl.
h about 37 km.
H 01 45 45.5
eP'Z 02 04 33.5

6 juin 36.3 N., 71.2 E.
Afghanistan-USSR border region
h about 225 km.
H 07 46 16.2
iPZ 07 59 03.2 c

6 juin 30.6 S., 69.3 W.
Chile-Argentina border region
h about 109 km.
H 09 56 33.4
ePZ 10 08 09

6 juin 9.6 N., 126.4 E.
Mindanao, Philippine Isl.
h about 45 km.
H 20 47 11.5
eN" 21 07 38

7 juin 15.0 S., 75.8 W.
Near coast of Peru
h about 48 km.
H 00 59 46.6
iPZ 01 09 51.3 c

7 juin 14.9 S., 76.0 W.
Near coast of Peru
h about 68 km.
H 01 20 09.9
ePZ 01 30 11.5

7 juin 15.1 S., 75.9 W.
Near coast of Peru
h about 42 km.
H 03 24 17.2
iPZ 03 34 23.8 c

7 juin 24.2 N., 122.5 E.
Taiwan region
h about 41 km.
H 11 44 51.5
eN" 12 34

7 juin 113.9 N., 139.6 E.
W. Caroline Isl.
h about 50 km.
H 13 59 36.0
ePZ" 14 14.5
iP'Z 18 15.5 d

7 juin 15.1 S., 75.8 W.
Near coast of Peru
h about 51 km.
H 15 14 42.1
iPZ 15 24 47.2 c

8 juin 23.1 N., 120.9 E.
Taiwan
h about 33 km.
H 10 46 05.2
eE" 11 41

8 juin 15.2 S., 75.8 W.,
Near coast of Peru
h about 39 km.
H 14 56 54.0
ePZ 15 07 01.5

8 juin 23.0 S., 66.3 W.
Jujuy Prov. Argentina
h about 233 km.
H 15 02 02.6
ePZ 15 12 41

8 juin 53.1 N., 171.1 E.
h about 20 km.
H 19 56 21.3
iPZ 20 07 15.0

9 juin 7.6 N., 94.1 E.
Nicobar Isl. region
h about 55 km.
H 00 12 12.1
eN" 01 00

9 juin 45.0 N., 146.4 E.
Kurile Isl.

h about 160 km.
H 01 57 38.0
iPZ 02 09 47.7 d

9 juin 44.3 N., 147.6 E.
Kurile Isl.
h about 110 km.
H 15 39 27.8
ePZ 15 51 44

9 juin iPZ 16 05 06.8 d

9 juin 30.1 N., 142.2 E.
S. of Honshu, Japan
h about 12 km.
H 22 16 22.1
eN" 22 48.3

10 juin 52.0 N., 175.0 E.
Near Isl., Aleutian Isl.
h about 33 km.
H 04 25 14.3
ePZ 04 36 02

10 juin 14.8 S., 76.0 W.
Near Isl., Aleutian Isl.
h about 22 km.
H 08 13 25.8
iPZ 08 23 33.5 d

10 juin 45.3 N., 27.9 W.
N. Atlantic Ridge
h about 33 km.
H 10 32 45.7
eE" 10 48.3

10 juin 6.1 S., 149.8 E.
New Britain region
h about 53 km.
H 12 15 05.7
eN" 12 53.7

10 juin 32.9 N., 39.8 W.
N. Atlantic Ridge
h about 8 km.
H 22 14 37.3
eSE" 22 25 38

11 juin 19.2 N., 108.1 W.
Revilla Gigedo Isl. region
h about 15 km.
H 02 37 38.7
eSN" 02 51 00

11 juin 14.6 S., 75.9 W.
Near coast of Peru
h about 39 km.
H 11 04 11.2
eN" 11 47

11 juin 51.6 N., 178.4 W.
Andreanof Isl. Aleutian Isl.
h about 60 km.
H 18 13 40.6
iPZ 18 24 06.5 c

12 juin 6.5 N., 73.0 W.
N. Colombia
h about 142 km.
H 03 56 19.9
ePZ 04 03 35

13 juin 21.2 S., 174.1 E.
New Hebrides Isl. region
h about 49 km.
H 07 33 13.4
eSKKSE"08 00 28

13 juin 79.9 N., 5.0 E.
Greenland Sea
h about 33 km.
H 14 13 00.4
eN" 14 33.5

13 juin 12.2 S., 167.1 E.
Santa Cruz Isl.
h about 259 km.
H 18 08 38.4
iP'Z 18 26 57.1 d

14 juin 8.1 N., 37.3 W.
Central Mid-Atlantic Ridge
h about 33 km.
H 11 54 57.8
eSN" 12 10 48

15 juin 10.4 S., 160.8 E.
Solomon Isl.
h about 31 km.
H 00 59 45.8

ePZ'' 01 15 08
iP'Z 18 39.8

15 juin 10.2 S., 161.1 E.
Solomon Isl.
h about 33 km.
H 01 31 55.5
eZ 01 51 44

15 juin 10.2 S., 160.3 E.
Solomon Isl.
h about 33 km.
H 02 05 38.2
eP'Z 02 26 21

15 juin 10.7 S., 161.3 E.
Solomon Isl.
h about 33 km.
H 04 26 53.3
iP'Z 04 45 51.7 d

15 juin 10.1 S., 161.0 E.
Solomon Isl.
h about 39 km.
H 06 13 52.3
eP'Z 06 32 45

15 juin 10.3 S., 160.7 E.
Solomon Isl.
h about 18 km.
H 16 36 24.1
ePSN'' 17 06 48

15 juin 11.2 S., 167.0 E.
Santa Cruz Isl.
h about 107 km.
H 22 43 38.2
eN'' 23 37

16 juin 10.3 S., 161.0 E.
Solomon Isl.
h about 27 km.
H 09 46 58.1
eSSSN'' 10 27 48

16 juin 10.2 S., 160.9 E.
Solomon Isl.
h about 38 km.
H 14 31 28.0
eN'' 15 22

16 juin 7.0 S., 107.8 E.
Java
h about 148 km.
H 16 55 28.5
eN'' 17 19 32

16 juin 12.9 N., 44.5 W.
N. Atlantic Ridge
h about 30 km.
H 18 01 01.8
ePZ 18 08 44.5

16 juin 22.1 S., 67.2 W.
Chile-Bolivia border region
h about 190 km.
H 20 32 24.1
ePZ 20 43 05

16 juin 26.2 S., 70.8 E.
S. Indian Ocean
h about 33 km.
H 22 30 04.2
eP'Z 22 49 41

17 juin 10.3 S., 160.8 E.
Solomon Isl.
h about 33 km.
H 00 45 02.9
eN'' 01 43

17 juin 42.4 N., 142.9 E.
Hokkaido, Japan region
h about 69 km.
H 08 48 38.2
ePZ 09 01 10.5

17 juin 10.5 S., 161.0 E.
Solomon Isl.
h about 33 km.
H 11 47 38.7
eE'' 12 54

17 juin 10.2 S., 161.0 E.
Solomon Isl.
h about 33 km.
H 22 26 04.1
eN'' 23 17

18 juin 10.2 S., 160.9 E.
Solomon Isl.

h about 22 km.
H 08 24 35.9
eN'' 09 16

18 juin 3.3 S., 143.2 E.
New N. coast of New Guinea
h about 17 km.
H 19 15 24.4
eP'Z 19 34 36.5

19 juin 59.5 N., 137.7 W.
S. E. Alaska
h about 27 km.
H 00 07 59.0
ePZ 00 15 24

19 juin 8.8 S., 149.5 E.
E. New Guinea region
h about 54 km.
H 07 52 20.2
eP'Z 08 11 33.5

19 juin 14.9 S., 75.9 W.
Near coast of Peru
h about 29 km.
H 15 40 47.6
iPZ 15 50 53.8 c

19 juin 51.7 N., 176.2 W.
Andreanof Isl. Aleutian Isl.
h about 57 km.
H 19 28 43.1
ePZ 19 39 01.5 d

20 juin 51.5 N., 178.6 W.
Andreanof Isl. Aleutian Isl.
h about 34 km.
H 01 24 12.9
eN'' 01 54

20 juin 41.4 N., 141.7 E.
Hokkaido, Japan region
h about 140 km.
H 04 31 39.1
ePZ 04 44 12

20 juin 16.2 S., 173.1 W.
Tonga Isl.
h about 33 km.
H 08 52 02.9
eN'' 09 37

20 ju
N. Easter Isl. Cordillera
h about 33km.
H 09 38 16.3
ePZ 09 47 52

21 juin 10.9 S., 165.3 E.
Santa Cruz Isl.
h about 25 km.
H 00 43 13.5
eSSSN'' 01 20.0

21 juin 34.5 N., 120.7 W.
S. California
h about 5 km.
H 09 46 20.1
eN'' 10 05.5

21 juin 57.9 S., 25.7 W.
S. Sandwich Isl. region
h about 16 km.
H 12 59 00.1
eN'' 13 55

21 juin 16.3 N., 94.8 W.
Oaxaca, Mexico
h about 62 km.
H 18 11 43.0
eSE'' 18 23 44

21 juin 50.1 N., 157.8 E.
Kurile Isl.
h about 14 km.
H 23 06 25.9
iPZ 23 18 06.9 d

22 juin 14.7 N., 92.1 W.
Near coast of Chiapas, Mexico
h about 87 km.
H 07 11 00.8
ePZ 07 17 42

22 juin 61.4 N., 147.6 W.
S. Alaska
h about 53 km.
H 11 38 53.7
iPZ 11 58.3 c

22 juin 7.2 S., 124.6 E.
Banda Sea

h about 507 km.
H 20 29 03.6
ePʻZ 20 47 28.5

23 juin 43.8 N., 139.9 E.
E. Sea of Japan
h about 218 km.
H 05 01 42.4
iPZ 05 14 00.0 d

24 juin 6.9 N., 73.1 W.
N. Colombia
h about 142 km.
H 20 00 07.0
iPZ 20 07 18.3 c

25 juin 13.7 N., 91.2 W.
Near coast of Guatemala
h about 119 km.
H 17 24 38.9
iPZ 17 31 21.7

25 juin 16.0 N., 96.5 W.
Oaxaca, Mexico
h about 40 km.
H 23 17 06.1
ePZ 23 23 58.5

27 juin 22.7 S., 175.8 W.
Tonga Isl. region
h about 60 km.
H 08 38 45.8
eN" 09 35

27 juin 29.7 N., 80.0 E.
Nepal-India border region
h 40 km
H 10 59 18.1
ePZ 11 13 13

27 juin 38.0 S., 177.2 E.
North Isl., New Zealand
h about 54 km.
H 21 47 05.5
ePZ 22 06 03.5 c
iPZ 03.9 d

27 juin ePZ 23 46 06.5

28 juin 35.8 N., 120.6 W.
Central California
h about 5 km.
H 04 08 54.7
ePZ 04 16 03

28 juin 35.9 N., 120. 5 W.
Central California
h about 4 km.
H 04 26 12.4
ePZ 04 33 19.5

28 juin 10.2 S., 161.2 E.
Solomon Isl.
h about 33 km.
H 11 39 02.1
eN" 12 35

29 juin 49.9 N., 78.0 E.
E. Kazakh SSR
h about 0 km.
H 06 57 58.1
ePZ 07 10 20.5

29 juin 35.8 N., 120.5 W.
Central California
h about 5 km.
H 19 53 24.1
eN" 20 08.5

29 juin 13.8 S., 166.7 E.
New Hebrides Isl.
h about 35 km.
H 21 46 54.5
eN" 22 17.0

30 juin eN" 01 36

30 juin 9.6 N., 126.7 E.
Mindanao, Philippine Isl.
h about 44 km.
H 12 27 41.9
eN" 12 48 10

30 juin 24.4 N., 122.2 E.
Taiwan region
h about 47 km.
H 15 45 26.0
eN" 16 36

30 juin 51.7 N., 179.9 W.
Andreanof Isl. Aleutian Isl.
h about 28 km.
H 17 07 06.9
eN" 17 38

30 juin iPZ 22 21 34.0 c

1 juillet 24.8 N., 122.5 E.
Taiwan region
h about 117 km.
H 05 50 39.2
ePZ 06 04 51
ePPN" 06 09 27

M. Buist, S.J.

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SOMMAIRE

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VERY HIGH FREQUENCY (950 MHz) ATMOSPHERICS RECORDED DURING OVERHEAD THUNDERSTORMS

by E. Gherzi, S.J. (*)

When a thunderstorm is nearing a recording station, the atmos-rics registered show a gradual increase and decrease of intensity. h a behaviour is very clear when the frequency used is of the order 0-30 kHz. The phenomenon is shown in all our recordings on 20 kHz. n the frequency to which the receiver is tuned reaches very high es, as in our case (950 MHz) the trend of the registration of the at-spherics is quite different. As long as the undercloud, checked with tating radar on the 3 cm band, is more than 2 km distant, almost no y high frequency atmospherics are recorded, but as soon as the storm verhead, the 950 MHz atmospherics show up quite rapidly and are y intense. (Plate I) The interesting point is that when the thunder-d has passed away, these atmospherics die out as fast as they had ted. We do not know if other observers have already reported such end of very high frequency atmospherics. The phenomenon seems to ly in the electric turmoil of the thundercloud some special types of charges to be considered. Of course these high frequency atmosphe-s will die out sooner than low frequency atmospherics (f.i. 20 kHz) but r sudden appearance and sudden disappearance require an explanation.

Our receiver is a Marconi type C.M.C. serial 111, for U.H.F. munication, modified for A.M. reception. It has a sensitivity of 0.7 rovolt on 50 ohms. While for recording atmospherics on 20 kHz we d a large Delta serial vertically polarized, for the reception of those 950 MHz, we used what has been called a "short-back fire antenna", eloped and tested by Dr. Hermann Ehrenspeck of the microwave phy-laboratory of the AFCRL, Bedford, Mass. U.S.A. Here is the des-tion given by the author: "As a single element, it consists of a cir-r flat plate disc, spaced another quarter wave, in front of the dipole. s system acts like a partially open cavity and produces a remarkable of 14.5 db above isotropic. Sidelobes and backlobes are below 20 db both M and E planes. The band width is comparable to that of the dipole itself" (1) The half power width is 12°.

We do not think that such a quite special type of aerial could cause sudden appearance and the sudden cessation of the 950 MHz atmosphe-s mentioned. We would bring our attention to the stepped and successive zations produced by the "leader" which precedes the main thunder stroke. ld these short lived and altogether small intensity streamers, acting as

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small radiating dipoles, raise these very high frequency atmospherics which are no more recorded once the thundercloud is no longer overhe at the station ? We do not believe that they are all high harmonics of the main stroke nor that they are due to any electrical shock-reaction sparks of the nearby Delta serial used simultaneously for recording or 20 kHz. Newman (2) has published an analysis of lightning discharges with their equivalent electric circuits and Malan (3) has given the deta of the radiation of the lightning discharge. We feel that some of their descriptions could substantiate our explanation of the ultra-high freque atmospherics we have recorded and their special shape: sudden appea- rance and sudden cessation. The same could perhaps be said concern the laboratory experiences made by Stekolnikov and Shkilyov (4). In th photography of a lightning stroke given by Stergys and Doyle, one can many separate discharges. Could these raise ultra-high frequency atr pherics? (5) Kitagawa experiments do not contradict our statements. thunderstorms they have examined were not overhead but 10 to 30 km distant.

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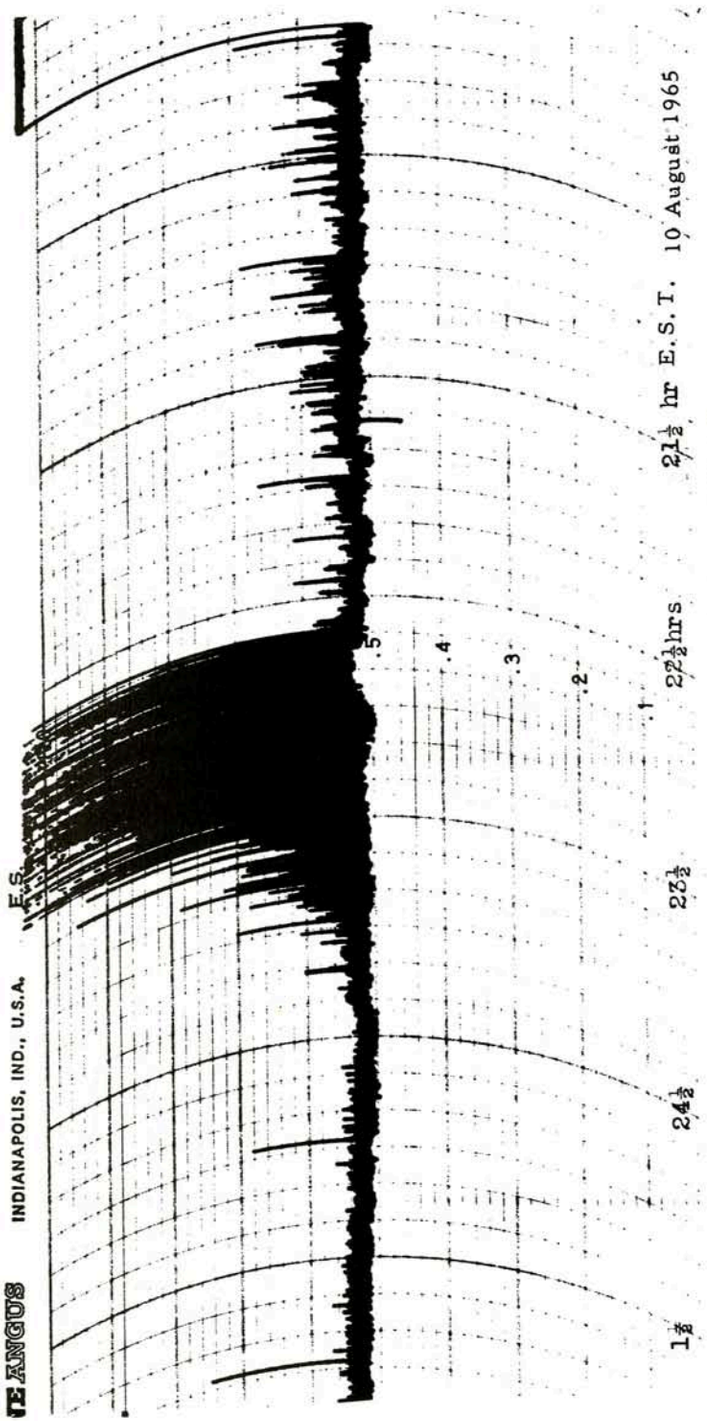


Plate 1— Local thunder atmospherics on 950 MHz.

DATE	Rayonnement total						Rayonnement diffus					
	Janvier	Février	Mars	Avril	Mai	Juin	Janvier	Février	Mars	Avril	Mai	Juin
1	82	67	388	331	M	552	76	67	80	231	161	216
2	70	90	221	363	357	616	69	90	197	139	202	218
3	89	213	272	449	208	684	88	78	203	157	178	164
4	61	84	390	511	485	682	60	84	79	126	235	158
5	26	205	205	177	430	652	25	121	166	137	237	221
6	178	265	280	150	653	349	52	63	174	149	176	272
7	61	148	191	183	393	157	58	144	181	172	232	150
8	70	237	364	474	110	560	69	134	148	211	108	208
9	156	176	376	434	69	461	74	129	129	138	68	274
10	86	185	280	348	187	491	82	132	212	172	168	226
11	72	128	193	586	298	423	72	98	159	92	245	347
12	54	292	407	576	626	236	54	67	110	94	175	227
13	128	275	63	571	610	612	92	97	63	102	191	229
14	94	63	289	442	654	222	78	63	154	214	153	202
15	52	133	376	76	89	406	50	123	162	75	86	325
16	195	173	425	69	406	498	51	145	140	67	297	(280)
17	(116)	294	448	184	444	78	74	(85)	112	170	262	73
18	198	282	(458)	75	441	732	57	105	M	73	272	204
19	153	271	448	265	136	722	103	(97)	132	225	124	197
20	113	96	430	603	365	639	109	96	124	122	227	281
21	82	134	333	428	532	507	82	133	262	215	289	360
22	64	296	258	176	603	131	64	(129)	241	96	244	129
23	10	106	377	172	531	474	10	106	254	155	193	278
24	145	249	396	326	682	440	96	(180)	221	238	190	245
25	39	310	485	614	356	230	39	(139)	88	(137)	323	201
26	73	363	464	(635)	(650)	699	54	(75)	138	(116)	248	182
27	27	280	230	M	513	709	26	177	187	M	218	156
28	84	106	209	628	718	684	82	105	188	128	178	166
29	146		469	M	689	548	131		148	M	187	267
30	231		502	M	551	236	58		109	M	227	218
31	214		(469)		712		82		133		131	
Moyenne	102	197	345	371	455	481	68	109	156	145	201	222

Unité de mesure: 1 langley (= 1 calorie-gramme par cm^2) M: manquant. E: une (plusieurs) heure (s) durant le jour fut (furent) estimée (s).

BULLETIN SEISMOLOGIQUE

INSTRUMENTS DE LA STATION

3 séismographes Benioff de 100 kg. avec 6 galvanomètres.
t_o=1 sec., t_g=0.2 sec. pour ZNE. Enregistreur, 60mm/min.
t_g=6 sec. pour Z'N'E'. Enregistreur, 30mm/min.
3 séismographes Sprengnether, type Columbia Z"N"E".
Avant le 13 février 1964, t_o=17 sec., t_g=100 sec.
Après le 13 février 1964, t_o=30 sec., t_g=100 sec.pour Z"N"E".
Enregistreur, 15mm/min.

Le 13 février 1964, l'amplification des Columbia a été augmentée. Cf. graphiques.

Dans notre bulletin, nous indiquons toujours sur quel séismogramme chaque phase a été lue en ajoutant après cette phase une des lettres suivantes:
ZNE pour celles données par les Benioff avec galvanomètres de 0,2 sec.
Z'N'E' pour celles données par les Benioff avec galvanomètres de 6 sec.
Z"N"E" pour celles données par les Columbia avec galvanomètres de 100 sec.

L'heure est inscrite à chaque minute sur les séismogrammes par la Société Radio-Canada au moyen d'une ligne téléphonique avec une précision de $\pm$ 0.1 sec. à l'année. Cette Société nous fournit en même temps un courant alternatif de 60 cycles de fréquence absolument constante, pour les moteurs des enregistreurs. De plus, le signal horaire de l'Observatoire du Dominion relayé par le poste local de radio CBF, à 01 00 00 p.m. s'enregistre automatiquement sur tous les séismogrammes.

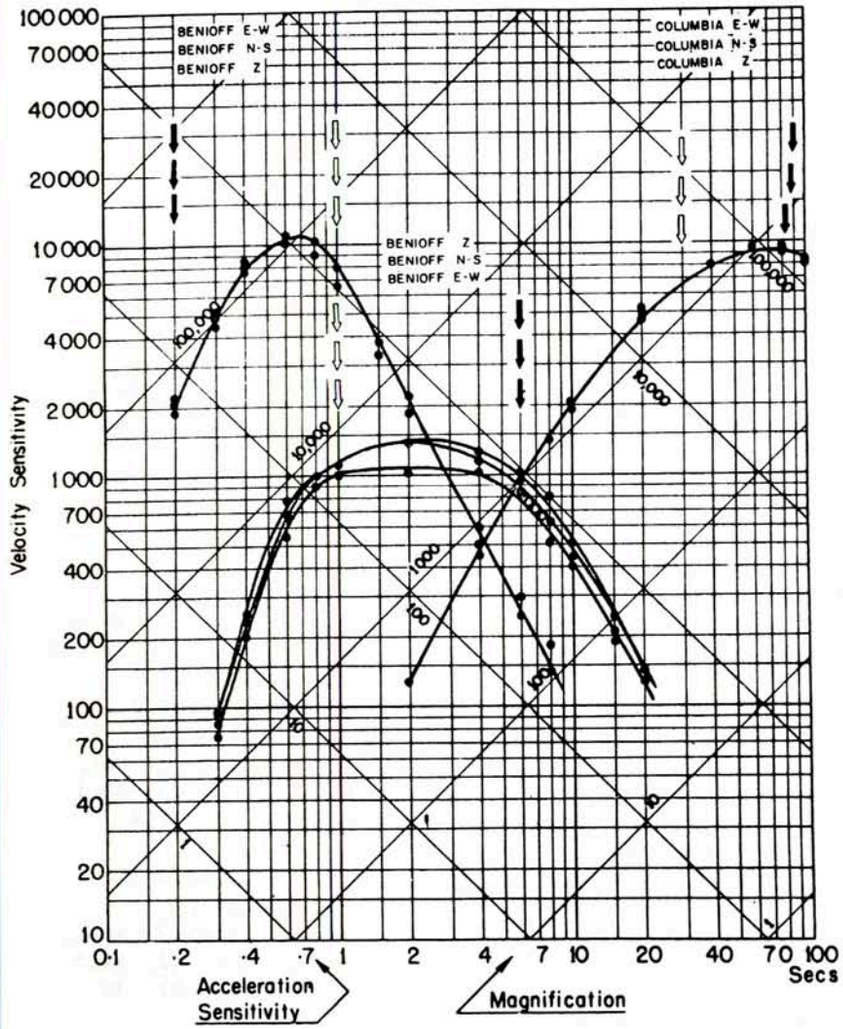
Les positions géographiques des épicentres ainsi que l'heure d'origine et la profondeur sont toujours empruntées à U.S.C.G.S. pour les séismes éloignés. Pour les locaux, ces données nous sont fournies par l'Observatoire du Dominion, et cela est indiqué chaque fois. Pour sauver de l'espace, nous ne mentionnons pas U.S.C.G.S. à chaque séisme.

Nous indiquons aussi quelques fois, après une phase, sur la ligne suivante, la période de l'onde du sol et son amplitude en microns.

Nous tenons à exprimer publiquement notre reconnaissance à l'Observatoire du Dominion qui envoie chaque année ses techniciens refaire l'étalonnage complet de tous les séismographes et pour toute la gamme des fréquences, par la méthode de Willmore.

M. Buist, S.J.

STATION: MONTREAL



ϕ = 45°30'09"N λ = 73°37'23"W Altitude 112M

Foundation : Ordovician Limestone (Trenton)

T_s T_g

Date of Calibration: April - 1962
Feb. - 1964

BENIOFF'S		BENIOFF'S		COLUMBIA'S	
S.P. - Z	Apr. 4	I.P. - Z	Apr. 4	L.P. - Z.	Feb. 13
S.P.H. - N.S.	Apr. 4	I.P.H. - N.S.	Apr. 4	L.P.H. - N.S.	Feb. 12
S.P.H. - E.W.	Apr. 5	I.P.H. - E.W.	Apr. 5	L.P.H. - E.W.	Feb. 11

1 juil. 52.3 N., 174.2 E.
Near Isl. Aleutian Isl.
h about 56 km.
H 19 05 26.5
ePZ 19 16 11

1 juil. 13.7N., 88.4 W.
El Salvador
h about 201 km.
H 20 17 49.3
iPZ 20 24 16.1 c

3 juil. 52.5 N., 170.2 W.
Fox Isl. Aleutian Isl.
h about 69 km.
H 03 55 15.7
ePZ 04 05 09

4 juil. 51.8 N., 176.4 E.
Rat Isl. Aleutian Isl.
h about 28 km.
H 02 55 35.9
iPZ 03 06 19.2 c

4 juil. 37.5 N., 24.8 W.
Azores Isl. region
h about 33 km.
H 12 15 28.1
ePZ 12 22 35

4 juil. 51.7 N., 179.9 E.
Rat Isl. Aleutian Isl.
h about 13 km.
H 18 33 35.7
ePZ 18 44 12.5 d

5 juil. 52.2 N., 178.4 W.
Andreanof Isl. Aleutian Isl.
h about 66 km.
H 02 21 43.8
ePZ 02 32 13

5 juil. 37.6 N., 24.6 W.
Azores Isl. region
h about 12 km.
H 05 09 03.6
eN" 05 24.5

6 juil, 15.3 S., 75.5 W.
Near Isl. Aleutian Isl.
h about 7 km.
H 00 05 51.0
iPZ 00 16 04 c

6 juil. 4.4 S., 104.9 W.
N. Easter Isl. Cordillera
h about 33 km.
H 19 23 37.8
ePZ 19 33 28

7 juil. 6.9 N., 73.0 W.
N. Colombia
h about 147 km.
H 00 10 30.5
iPZ 00 17 41.5 d

10 juil. 30.5 S., 177.8 W.
Kermadec Isl. region
h about 40 km.
H 10 00 39.1
eSSE" 10 37.4

10 juil. 24.2 N., 125.2 E.
S-W. Ryukyu Isl.
h about 28 km.
H 16 12 41.5
ePZ 16 31 30

11 juil. 53.6 N., 167.6 W.
Fox Isl. Aleutian Isl.
h about 23 km.
H 01 11 17.8
ePZ 01 21 03

11 juil. 19.2 S., 173.6 W.
Tonga Isl.
h about 120 km.
H 22 46 05.7
eSKSN" 23 12 48

12 juil. 35.5 N., 22.4 E.
Mediterranean Sea
h about 15 km.
H 02 56 23.5
ePZ 03 07 36

12 juil, 21.3 S., 68.9 W.
Chile-Bolivia border region
h about 99 km.
H 08 01 37.0
iPZ 08 12 18.5 d
ipPZ 44.1

12 juil. 44.6 N., 37.4 E.
W. Caucasus
h about 26 km.
H 18 53 08.5
iPZ 19 04 28.6 c

13 juil. 12.6 N., 87.7 W.
Near Coast of Nicaragua
h about 61 km.
H 08 20 59.4
ePZ 08 27 46.6
ipPZ 28 02.9

13 juil. 2.3 S., 77.3 W.
Peru-Ecuador border region
h about 158 km.
H 08 32 49.9
iPZ 08 41 44.9

13 juil. 56.8 N., 34.1 W.
N. Atlantic Ocean
h about 24 km.
H 10 34 02.8
eSN" 10 44 38

14 juil. 23.0 S., 70.1 W.
Near Coast of N. Chile
h about 49 km.
H 01 49 37.6
ePZ 02 00 36

14 juil. 35.6 N., 140.0 E.
Near S. Coast of Honshu, Japan
H 06 18 47.6
eE" 07 02

14 juil. 56.2 N., 149.8 W.
Gulf of Alaska
h about 33 km.
H 12 18 17.0
ePZ 12 26 46

14 juil. 53.1 N., 171.1 E.
Near Isl. Aleutian Isl.
h about 29 km.
H 18 07 04.1
iPZ 18 17 56.5 d

15 juil. 16.9 N., 61.5 W.
Leeward Isl.
h about 89 km.
H 08 00 00.7
iPZ 08 06 05.4

16 juil. 10.9 S., 165.9 E.
Santa Cruz Isl.
h about 68 km.
H 07 19 55.8
eN" 08 10

17 juil. 21.6 S., 169.9 E.
Loyalty Isl. region
h about 63 km.
H 02 24 06.9
ePZ 02 42 57.5

17 juil. 5.5 S., 153.6 E.
New Ireland region
h about 72 km
H 06 48 27.6
eN" 07 52

17 juil. 61.9 N., 152.0 W.
S. Alaska
h about 103 km.
H 08 46 25.8
eN" 09 16

18 juil. 38.3 S., 93.7 W.
W. Chile Rise
h about 33 km.
H 22 15 38.3
eN" 22 48

19 juil. 55.5 N., 35.4 W.
N. Atlantic Ocean

h	about 33 km.		
H	00	20	11.0
eE"	00	32.5	

19 juil. 56.2 N., 164.9 E.
Komandorski Isl. region

h	about 18 km.		
H	01	40	53.9
ePZ	01	51	51

19 juil. 55.4 N., 34.8 W.
North Atlantic Ocean

h	about 33 km.		
H	02	05	06.4
ePZ	02	10	41

19 juil. 23.2 S., 66.8 W.
Jujuy Prov. Argentina

h	about 183 km.		
H	07	25	27.6
iPZ	07	36	12.2 d

19 juil. 51.7 N., 173.3 W.
Andreanof Isl. Aleutian Isl.

h	about 47 km.		
H	19	20	33.4
iPZ	19	30	44.0 d

20 juil. 35.7 N., 101.2 W.
Texas Panhandle region

h	about 33 km.		
H	09	04	58.2
eZ	09	16	49

20 juil. 4.1 S., 104.5 W.
N. Easter Isl. Cordillera

h	about 33 km.		
H	10	55	56.8
ePZ	11	05	39.5

20 juil. 13.3 S., 111.4 W.
N. Easter Isl. Cordillera

h	about 33 km.		
H	13	22	54.0
eSN"	13	42	52

20 juil. 38.2 S., 73.5 W.
Near Coast of Central Chile

h	about 28 km.		
H	19	58	44.4
eN"	20	44	

21 juil. 52.8 S., 160.3 E.
Macquarie Isl. region

h	abpit 34 km.		
H	03	33	09.6
ePZ	03	52	43

21 juil. 49.7 N., 77.9 E.
E. Kazakh S.S.R.

h	about o km.		
H	03	57	57.8
ePZ	04	10	21.5

21 juil. 3.9 S., 104.3 W.
N. Easter Isl. Cordillera

h	about 33 km.		
H	05	32	18.2
eSN"	05	49	50

21 juil. 52.0 N., 170.0 W.
Fox Isl. Aleutian Isl.

h	about 30 km.		
H	09	02	27.2
iPZ	09	12	26.9 d

21 juil. 51.5 N., 173.3 W.
Andreanof Isl. Aleutian Isl.

h	about 47 km.		
H	10	02	48.3
iPZ	10	13	00.2 d

21 juil. 17.8 S., 178.6 W.
Fiji Isl. region

h	about 591 km.		
H	18	30	14.9
ePZ	18	48	43.5

22 juil. 51.7 N., 173.5 W.
Andreanof Isl. Aleutian Isl.

h	about 56 km.		
H	10	17	22.5
iPZ	10	27	33.0 c

23 juil. 51.7 N., 173.6 W.
Andreanof Isl. Aleutian Isl.

h	about 41 km.		
H	03	37	55.8
iPZ	03	48	07.4 c

23 juil. 51.9 N., 173.5 W.
Andreanof Isl. Aleutian Isl.

h	about 33 km.		
H	08	28	10.1
eN"	08	54	

23 juil. 51.7 N., 173.5 W.
Andreanof Isl. Aleutian Isl.

h	about 55 km.		
H	14	31	51.2
iPZ	14	42	02.0 d

23 juil. 51.8 N., 173.5 W.
Andreanof Isl. Aleutian Isl.

h	about 36 km.		
H	20	12	00.1
ePZ	20	22	11.5 c

24 juil. ePZ 02 01 53

24 juil. 12.3 N., 88.2 W,
Off Coast of Central America

h	about 61 km.		
H	06	11	55.6
ePZ	06	18	46.5

24 juil. 53.5 N., 167.4 W.
Fox Isl. Aleutian Isl.

h	about 60 km.		
H	07	50	14.0
ePZ	07	59	06

24 juil. 19.4 N., 108.4 W.
Revilla Gigedo Isl. region

h	about 33 km.		
H	08	52	39.3
eSSN"	09	09	02

24 juil. e(P)Z 22 22 09

24 juil. ePZ 23 58 25

25 juil. 31.9 S., 69.7 W.
San Juan Prov. Argentina

h	about 116 km.		
H	08	42	18.9
ePZ	08	54	31

25 juil. 52.1 N., 170.0 W.
Fox Isl. Aleutian Isl.

H	09	18	36.7
ePZ	09	28	36.5

25 juil. eLN" 13 15

26 juil. 56.2 N., 164.6 E.
Komandorski Isl. region

h	about 33 km.		
H	03	48	28.8
ePZ	03	59	23

26 juil. 3.8 S., 103.3 W.
N. Easter Isl. Cordillera

h	about 33 km.		
H	06	26	39.3
eSE"	06	44	06

26 juil. 52.0 N., 173.5 W.
Andreanof Isl. Aleutian Isl.

h	about 36 km.		
H	12	50	19.3
iPZ	13	00	30.5 d

26 juil. 27.5 S., 177.9 W.
Kermadec Isl.

h	about 143 km.		
H	22	39	47.8
iPZ	22	56	40.0 d

27 juil. 24.2 S., 70.3 W.
Near Coast of N. Chile

h	about 35 km.		
H	04	48	59.4
iPZ	05	00	05.6 c

27 juil. 32.6 N., 48.8 E.
W. Iran

h	about 36 km.		
H	14	49	02.0
eN"	15	29	

27 juil. 18.1 S., 71.7 W.
Off Coast of N. Chile

h	about 56 km.		
H	23	10	54.7
ePZ	23	21	20.5

28 juil. 17.2 S., 167.7 E.
New Hebrides Isl.

h about 17 km.
H 01 18 27.4
eN" 01 58

28 juil. 20.0 S., 69.1 W.
N. Chile
h about 124 km.
H 05 41 54.7
iPZ 05 52 24.8 d

28 juil. 29.0 S., 177.5 W.
Kermadec Isl. region
h about 59 km.
H 12 07 52.5
eN" 12 58

29 juil. 36.6 N., 74.1 W.
Off E. Coast of U.S.A.
(Chase VIII 400 tons)
h about 1 km.
H 04 36 24.8
iPZ 04 38 36.2

29 juil. 44.0 N., 145.3 E.
Hokkaido, Japan region
h about 96 km.
H 07 08 14.6
iPZ 07 20 37.8 d

29 juil. 10.5 S., 162.8 E.
Solomon Isl.
h about 75 km.
H 11 46 15.6
eN" 12 36.7

29 juil. ePZ 18 32 18

31 juil. 18.1 S., 173.7 W.
Tonga Isl.
h about 33 km.
H 11 47 04.7
eN" 12 49.5

31 juil. 12.3 N., 88.1 W.
Off Coast of Central America
h about 56 km.
H 19 10 45.0
iPZ 19 17 36.7 c

1 août 10.2 S., 161.1 E.
Solomon Isl.
h about 70 km.
H 03 23 03.1
iPZ 03 41 49.4 c

1 août 51.5 N., 177.6 E.
Rat Isl. Aleutian Isl.
h about 43 km.
H 06 25 57.6
ePZ 06 36 36

1 août 1.2 S., 78.6 W.
Ecuador
h about 62 km.
H 09 48. 02.6
ePZ 09 56 27.

1 août 17.7 S., 70.7 W.
Near Coast of Peru
h about 109 km.
H 09 50 38.5
ePZ 10 00 54

1 août 29.9 N., 68.8 E.
W. Pakistan
h about 33 km.
H 19 09 55.1
eN" 19 36.5

1 août 44.6 N., 150.4 E.
Kurile Isl. region
h about 24 km.
H 20 32 01.3
iPZ 20 44 21.2 d

1 août 30.0 N., 68.7 E.
W. Pakistan
h about 33 km.
H 21 02 59.6
ePZ 21 16 38

2 août 14.0 S., 165.9 E.
New Hebrides Isl.
h about 50 km.
H 18 25 22.6
eN" 19 36

5 août 21.6 S., 68.5 W.
Chile-Bolivia border region
h about 134 km.
H 00 50 08.4
ePZ 01 01 22

5 août 10.9 S., 162.3 E.
Solomon Isl.
h about 93 km.
H 04 33 07.4
eN" 05 24

6 août 42.2 N., 18.8 E.
Yugoslavia
h about 33 km.
H 02 31 07.8
ePZ 02 41 34

6 août 7.8 S., 75.1 W.
N. Peru
h about 149 km.
H 14 38 41.4
iPZ 14 47 43.7
ipPZ 48 17.8

6 août 44.9 N., 150.2 E.
Kurile Isl. region
h about 36 km.
H 19 33 22.3
eN" 20 24

6 août 51.9 N., 175.3 E.
Rat Isl. Aleutian Isl.
h about 30 km.
H 21 04 32.5
ePZ 21 15 18

7 août 50.6 N., 171.3 W.
Aleutian isl. region
h about 39 km.
H 02 13 05.1
iPZ 02 23 12.7 d

7 août 11.2 N., 86.1 W.
Near Coast of Nicaragua
h about 134 km.
H 04 11 32.0
ePZ 04 18 20

7 août 13.5 N., 89.8 W.
El Salvador
h about 71 km.
H 05 33 40.2
ePZ 05 40 26

7 août 6.9 N., 73.1 W.
N. Columbia
h about 142 km.
H 08 20 58.2
ePZ 08 28 10

7 août 59.6 N., 144.4 W.
Gulf of Alaska
h about 4 km.
H 14 11 51.2
ePZ 14 19 56

7 août 31.8 N., 114.5 W.
Gulf of California
h about 33 km.
H 17 36 26.7
ePZ 17 43 13

7 août 42.3 N., 143.0 E.
Hokkaido, Japan region
h about 66 km.
H 20 18 41.5
iPZ 20 31 19.2 d

7 août 17.5 S., 72.2 W.
Near Coast of Peru
h about 46 km.
H 20 22 26.2
ePZ 20 32 52

8 août 19.3 N., 108.1 W.
Revilla Gigedo Isl. Region
h about 33 km.
H 08 02 45.8
ePZ 08 10 07

8 août 27.7 S., 69.0 W.
N. Chile
h about 83 km.
H 09 57 29.7
ePZ 10 08 51

8 août 19.4 N., 103.9 W.
Jalisco, Mexico
h about 33 km.
H 23 10 46.5
eZ" 23 32

9 août 9.3 N., 83.8 W.
Costa Rica

h	about 35 km.		
H	11	12	39.4
ePZ	11	19	51

9 août 17.2 S., 167.5 E.
New Hebrides Isl.

h	about 33 km.		
H	22	25	42.3
eN"	23	30	

10 août 20.1 S., 175.3 W.
Tonga Isl.

h	about 96 km.		
H	05	01	09.4
ePPZ	05	20	17
eZ		30	26

10 août 5.5 S., 151.8 E.
New Britain region

h	about 40 km.		
H	12	33	42.2
ePPZ"	12	54	15

10 août 2.1 N., 103.3 W.
E. Central Pacific Ocean

h	about 33 km.		
H	17	47	41.5
iPZ	17	56	38

11 août 19.3 S., 173.9 W.
Tonga Isl.

h	about 33 km.		
H	05	12	42.2
eSKSE"	05	37.9	

11 août 52.8 N., 169.7 W.
Fox Isl. Aleutian Isl.

h	about 61 km.		
H	10	45	59.6
ePZ	10	55	51

11 août 19.8 N., 108.9 W.
Revilla Gigedo Isl. region

h	about 33 km.		
H	13	25	37.3
eSSN"	13	41.9	

11 août 19.8 N., 109.0 W.
Revilla Gigedo Isl. region

h	about 33 km.		
H	14	47	04.4
eN"	15	07	

11 août 23.5 S., 175.9 W.
Tonga Isl. region

h	about 32 km.		
H	20	39	55.9
eN"	21	26.5	

11 août 23.4 S., 175.9 W.
Tonga Isl. region

h	about 77 km.		
H	23	25	37.9
eSKKSN"	23	53	05

12 août 23.3 S., 175.9 W.
Tonga Isl. region

h	about 33 km.		
H	00	12	37.9
eP'Z	00	31	31

12 août 23.6 S., 176.0 W.
Tonga Isl. region

h	about 63 km.		
H	14	37	56.0
eE"	15	34	

12 août 52.9 N., 161.6 W.
S. of Alaska

h	about 31 km.		
H	20	16	59.8
iPZ	20	26	25.6 d

14 août 21.9 S., 170.0 E.
Loyalty Isl. region

h	about 18 km.		
H	04	51	04.5
eN"	05	43	

15 août 13.3 N., 121.3 E.
Mindanao, Philippine Isl.

h	about 14 km.		
H	02	45	32.3
eP'Z	03	04	24

15 août 3.8 N., 64.0 E.
Carlsberg Ridge

h	about 37 km.		
H	10	20	42.2
ePPZ"	10	40	50

15 août 60.4 N., 146.0 W.
S. Alaska

h	about 9 km.		
H	13	36	23.7
ePZ	13	44	32

16 août 36.4 N., 70.8 E.
Hindu Cush region

h	about 199 km.		
H	02	16	19.7
ePZ	02	29	09

16 août 30.2 N., 113.5 W.
Gulf of California

h	about 33 km.		
H	04	43	25.3
iPZ	04	50	15.0 d

16 août 37.4 N., 114.2 W.
S. Nevada

h	about 33 km.		
H	18	02	36.1
ePZ	18	08	55.0 d

16 août 21.4 S., 171.3 E.
Loyalty Isl. region

h	about 36 km.		
H	19	45	38.7
eSSE"	20	22.8	

17 août 21.5 S., 171.2 E.
Loyalty Isl. region

h	about 51 km.		
H	00	53	43.2
eN"	01	46	

17 août 51.7 N., 176.1 E.
Rat Isl. Aleutian Isl.

h	about 50 km.		
H	05	37	54.3
ePZ	05	48	37

17 août 5.0 S., 125.2 E.
Banda Sea

h	about 538 km.		
H	19	54	06.2
iP'Z	20	15	11.7 d

17 août 52.3 N., 174.9 E.
Near Isl. Aleutian Isl.

h	about 32 km.		
H	20	58	35.9
ePZ	21	09	23

17
S. Nevada

h	about 33 km.		
H	23	07	58.9
eN"	23	23	

18 août 51.5 N., 177.8 E.
Rat Isl. Aleutian Isl.

h	about 44 km.		
H	06	38	03.5
ePZ	06	48	39

18 août 37.3 N., 114.1 W.
S. Nevada

h	about 9 km.		
H	09	15	34.9
eSE"	09	27.2	

18 août 14.6 N., 91.7 W.
Guatemala

h	about 76 km.		
H	10	33	16.5
iPZ	10	39	58.6 c

18 août 37.4 N., 114.2 W.
S. Nevada

h	about 33 km.		
H	13	33	20.8
eN"	13	49.7	

18 août 0.2 S., 125.1 E.
Molucca Sea

h	about 56 km.		
H	14	33	59.8
iP'Z	14	53	10
iPKSZ		56	32.3

18 août 0.1 S., 125.1 E.
Molucca Sea

h	about 33 km.		
H	14	37	52.6
iP'Z	14	57	04.5 d
iPKSZ	15	00	26.6

18 août 37.4 N., 114.2 W.
S. Nevada

h	about 33 km.		
H	17	35	06.4
eN"	17	51	

19 août 59.5 N., 144.6 W.
Gulf of Alaska

h about 33 km.
H 03 10 04.2
ePZ 03 18 10

19 août 37.4 N., 114.1 W.
S. Nevada
h about 11 km.
H 10 51 38.5
eN" 11 07

19 août 53.6 N., 167.6 W.
Fox Isl. Aleutian Isl.
h about 54 km.
H 11 23 13.5
iPZ 11 32 55.8

19 août 39.2 N., 41.2 E.
Turkey (3000 killed)
h about 26 km.
H 12 22 09.6
iPZ 12 34 08.0

20 août 3.2 S., 77.2 W.
Peru-Ecuador border region
h about 116 km.
H 07 43 27.6
iPZ 07 52 01.2 d

20 août 43.1 N., 140.6 E.
Hokkaido, Japan region
h about 161 km.
H 09 32 31.7
iPZ 09 44 58.4

20 août 39.3 N., 40.9 E.
Turkey
h about 37 km.
H 11 59 12.1
ePZ 12 11 04

20 août 39.0 N., 40.9 E.
Turkey
h about 33 km.
H 12 01 43.4
ePZ 12 13 36

20 août 42.3 N., 18.6 E.
Yugoslavia
h about 22 km.
H 12 05 19.0
iPZ 12 15 45.3 d

20 août 23.4 S., 176.0 W.
S. of Fiji Isl.
h about 57 km.
H 22 55 03.0
ePSN" 23 22 30

21 août 40.3 N., 27.4 E.
Turkey
h about 33 km.
H 01 30 45.2
eZ 01 41 52

21 août 8.5 N., 126.7 E.
Mindanao, Philippine Isl.
h about 67 km.
H 05 00 26.8
eP'Z 05 19 18.0 d

22 août 50.3 N., 147.6 E.
Sea of Okhotsk
h about 628 km.
H 14 21 13.7
iPZ 14 32 09.8 c

22 août 22.5 S., 74.4 W.
Near Coast of N. Chile
h about 59 km.
H 17 00 57.2
ePZ 17 12 06

22 août 1.8 S., 134.2 E.
W. New Guinea region
h about 13 km.
H 17 02 03.5
eP'Z 17 21 15

22 août 22.4 S., 170.6 E.
Loyalty Isl. region
h about 39 km.
H 17 42 10.6
eP'Z 18 01 05

22 août 24.9 N., 61.8 E.
Near Coast of W. Pakistan
h about 33 km.
H 21 28 29.3
eN" 22 05

23 août 23.8 N., 123.2 E.
S.W. Ryukyu Isl.

h about 37 km.
H 18 22 16.7
eN" 19 14

24 août 19.9 S., 69.2 W.
N. Chile
h about 100 km.
H 07 17 17.8
iPZ 07 27 50.7 c

24 août 1.5 S., 77.6 W.
Ecuador
h about 194 km.
H 20 10 08.1
iPZ 20 18 20.8 c

25 août 22.5 S., 68.6 W.
N. Chile
h about 115 km.
H 22 20 34.8
ePZ 22 31 22

25 août 22.4 S., 68.6 W.
N. Chile
h about 112 km.
H 23 18 50.8
iPZ 23 29 37.7 d

26 août 27.5 S., 177.3 W.
Kermadec Isl.
h about 59 km.
H 00 51 51.3
eE" 01 46

26 août 22.1 S., 170.0 E.
Loyalty Isl. region
h about 33 km.
H 09 06 50.4
eP'Z 09 25 47

26 août 67.1 N., 161.9 W.
Alaska
h about 14 km.
H 10 19 34.8
ePZ 10 28 19.8

26 août 22.2 S., 170.2 E.
Loyalty Isl. region
h about 33 km.
H 13 44 21.3
eN" 14 23

27 ac
Mindanao, Philippine Isl.
h about 119 km.
H 04 35 48.0
eP'Z 04 54 37

27 août 13.9 N., 123.6 E
Luzon, Philippine Isl.
h about 13 km.
H 17 10 44.2
eE" 18 03

28 août 42.2 N., 18.7 E.
Yugoslavia
h about 39 km.
H 04 18 13.3
eE" 04 50

28 août 35.8 S., 178.5 E.
Off. E. Coast of North Isl. N.Z.
h about 94 km.
H 07 29 34.7
eZ 07 45 40
iP'Z 07 48 24.0 c

28 août 4.6 S., 155.2 E.
Solomon Isl.
h about 509 km.
H 10 03 03.0
iP'Z 10 20 58.0 d

28 août 51.7 N., 176,8 E.
Rat Isl. Aleutian Isl.
h about 66 km.
H 13 29 14.7
ePZ 13 39 53

28 août 38.6 N., 138.2 E.
Honshu, Japan
h about 17 km.
H 15 36 18.5
eN" 16 43

28 août 2.3 N., 128.4 E.
Halmahera
h about 75 km.
H 22 30 55.1
eN" 23 10

29 août 18.6 S., 71.5 W.
Off Coast of N. Chile

h about 40 km.
H 05 48 10.7
iPZ 05 58 39.7 d

29 août 65.2 S., 176.9 E.
Balleny Isl. region
h about 33 km.
H 13 10 27.0
eN" 13 51

29 août 6.8 N., 82.2 W.
S. of Panama
h about 28 km.
H 19 31 23.7
ePZ 19 39 03

29 août 37.3 N., 114.3 W.
S. Nevada
h about 33 km.
H 22 22 36.3
eN" 22 45

30 août 51.7 N., 104.4 E.
Lake Baikal region
h about 33 km.
H 06 10 33.4
eE" 06 48

30 août 13.4 N., 120.7 E.
Mindoro, Philippine Isl.
h about 81 km.
H 12 40 27.5
eN" 13 38

30 août 61.3 N., 147.5 W.
S. Alaska
h about 36 km.
H 20 20 54.0
iPZ 20 29 00.0 d

30 août 18.7 N., 107.0 W.
Off Coast of Jalisco, Mexico
h about 54 km.
H 23 37 19.4
ePZ 23 44 39

31 août 71.6 N., 2.7 W.
Jan Mayen Isl. region
h about 33 km.
H 18 15 39.5
eN" 18 33

1 Sept. 50.6 N., 129.5 W.
Vancouver Isl. region
h about 33 km.
H 14 11 25.4
eN" 14 29

1 Sept. 37.5 N., 22.1 E.
S. Greece
h about 17 km.
H 14 22 57.0
ePZ 14 34 02

1 Sept. 71.6 N., 2.9 W.
Jan Mayen Isl. region
h about 33 km.
H 19 18 00.6
eE" 19 35

1 Sept. 58.3 N., 32.6 W.
N. Atlantic Ocean
h about 33 km.
H 21 27 38.6
eE" 21 42

1 Sept. 61.8 N., 149.6 W.
S. Alaska
h about 77 km.
H 23 19 09.8
ePZ 23 27 19.0

2 Sept. 51.0 N., 177.9 E.
Rat Isl. Aleutian Isl.
h about 14 km.
H 00 54 40.7
ePZ 01 06 06

2 Sept. 4.5 S., 105.9 W.
N. Easter Isl. Cordillera
h about 33 km.
H 07 59 05.7
iPZ 08 08 55.2
iSN" 16 54

2 Sept. 26.8 N., 110.8 W.
Gulf of California
h about 34 km.
H 21 20 16.7
eN" 21 36

2 Sept. 53.1 N., 169.8 W.
Fox Isl. Aleutian Isl.

h about 33 km.
H 22 14 50.9
iPZ 22 24 46.2 c

2 Sept. 60.2 N., 146.9 W.
S. Alaska
h about 31 km.
H 22 46 39.5
ePZ 22 54 47

3 Sept. 10.2 N., 104.2 W.
Off Coast of Mexico
h about 47 km.
H 16 24 20.7
ePZ 16 32 24

4 Sept. 19.8 S., 69.4 W.
N. Chile
h about 112 km.
H 00 31 15.2
ePZ 00 41 45

4 Sept. 17.8 S., 74.0 W.
Off Coast of Peru
h about 8 km.
H 05 37 49.7
iPZ 05 48 19.4 c

4 Sept. 2.5 S., 138.8 E.
W. New Guinea
h about 39 km.
H 09 41 23.8
ePZ 10 00 29

4 Sept. 4.6 N., 74.0 W.
Colombia
h about 5 km.
H 22 14 49.0
ePZ 22 22 34

7 Sept. 9.5 S., 74.6 W.
Peru
h about 139 km.
H 10 20 48.4
iPZ 10 30 06.1 c

8 Sept. 23.5 S., 66.6 W.
Jujuy Prov. Argentina
h about 204 km.
H 08 28 52.1
iPZ 08 39 36.5 d

8 Se
Halmahera
h about 96 km.
H 21 15 52.8
ePZ 21 34 50.8 c

8 Sept. 45.4 N., 150.5 E.
Kurile Isl.
h about 32 km.
H 21 55 40.1
iPZ 22 07 54.9 d

9 Sept. 8.2 S., 74.2 W.
Peru-Brazil border region
h about 156 km.
H 04 04 03.7
iPZ 04 13 11.1 c

9 Sept. 10.8 N., 69.5 W.
Venezuela
h about 12 km.
H 18 39 58.2
ePZ 18 47 04

10 Sept. 46.6 N., 144.1 E.
Sea of Okhotsk
h about 335 km.
H 02 27 47.7
iPZ 02 39 34.1 c

10 Sept. 19.3 N., 67.9 W.
Mona Passage
h about 28 km.
H 21 58 46.8
ePN 22 04 52

11 Sept. 27.8 N., 111.1 W.
Gulf of California
h about 33 km.
H 01 42 10.5
eN" 01 58

11 Sept. 6.8 N., 73.1 W.
N. Colombia
h about 149 km.
H 03 20 52.1
ePN 03 28 03

11 Sept. 6.8 N., 72.9 W.
N. Colombia
h about 167 km.

H	17	38	04.2
iPZ	17	45	13.7 c

12 Sept. 23.1 S., 170.6 E.
Loyalty Isl. region

h	about 49 km.		
H	11	29	40.3
ePZ	11	48	33.5

12 Sept. 39.4 N., 120.1 W.
N. California

h	about 8 km.		
H	16	41	01.7
ePZ	16	47	54

13 Sept. 23.0 S., 170.6 E.
Loyalty Isl. region

h	about 28 km.		
H	00	50	42.8
eN"	01	43	

13 Sept. 24.1 S., 175.4 W.
S. of Tonga Isl.

h	about 46 km.		
H	22	53	57.9
eN"	23	55	

14 Sept. 60.1 S., 27.0 W.
S. Sandwich Isl. region

h	about 33 km.		
H	23	18	41.6
ePZ"	23	33	18
eP'Z		37	18

15 Sept. 53.4 N., 167.3 W.
Fox Isl. Aleutian Isl.

h	about 33 km.		
H	03	58	21.9
ePZ	04	08	05.5

15 Sept. 23.6 E., 175.8 W.
Tonga Isl. region

h	about 67 km.		
H	04	07	04.8
eE"	05	04.5	

15 Sept. 60.3 S,, 26.7 W.
S. Sandwich Isl. region

h	about 33 km.		
H	11	51	55.7
eP'Z"	12	11	10

15 Sept. 22.8 N., 121.4 E.
Taiwan region

h	about 47 km.		
H	17	10	46.8
eN"	18	01	

16 Sept. 54.1 N., 163.5 W.
Unimak Isl. region

h	about 39 km.		
H	02	48	21.8
eN"	03	17.5	

16 Sept. 53.8 N., 163,1W.
Unimak Isl. region

h	about 34 km.		
H	17	10	39.0
eN"	17	39	

17 Sept. 27.7 S., 176.6 W.
Kermadec Isl.

h	about 37 km.		
H	20	17	26.0
eE"	21	18.5	

18 Sept. 42.3 N., 142.8 E.
Hokkaido, Japan region

h	about 73 km.		
H	05	22	31.2
ePZ	05	35	08

18 Sept. 22.6 N., 102.1 E.
Yunnan Prov. China

h	about 33 km.		
H	14	15	57.2
eE"	15	12	

18 Sept. 60.4 S., 27.0 W.
S. Sandwich Isl. region

h	about 33 km.		
H	15	14	24.9
eSSN"	15	49.7	

18 Sept. e(P)Z 16 00 37

18 Sept. 27.8 N., 54.3 E.
S. Iran

h	about 16 km.		
H	20	43	53.3
iPZ	20	57	06.3

19 Sept. 47.6 N., 153.8 E.

Kurile Isl.

h	about 80 km.		
H	04	24	05.1
iPZ	04	35	57.8 c

19 Sept. 23.9 N., 97.6 E.
Burma-China border region

h	about 15 km.		
H	05	03	46.6
eE"	05	55.5	

19 Sept. 3.7 S., 144.2 E.
Near N. Coast of New Guinea

h	about 19 km.		
H	06	06	37.8
eN"	07	10	

20 Sept. 35.6 S., 104.7 W.
S. Pacific Ocean

h	about 33 km.		
H	00	06	11.5
eE"	00	41.5	

20 Sept. 28.0 S., 176.6 W.
Kermadec Isl.

h	about 68 km.		
H	17	32	06.9
eE"	18	33	

22 Sept. 52.6 N., 159.5 E.
Off E. Coast of Kamchatka

h	about 61 km.		
H	00	04	28.0
iPZ	00	15	47.9 c

22 Sept. 37.3 N., 114.1 W.
S. Nevada

h	about 33 km.		
H	18	56	40.9
eSE"	19	09.0	

22 Sept. 26.2 N., 104.4 E.
E. China

h	about 9 km.		
H	21	54	12.1
eE"	22	32	

23 Sept. 44.7 N., 150.3 E.
Kurile Isl. region

h	about 34 km.		
H	01	29	47.2
ePZ	01	42	14

23 S[illegible]
Off E. Coast of Kamchatka

h	about 68 km.		
H	02	07	02.4
ePZ	02	18	18

24 Sept. 12.0 N., 130.8 W.
N. Pacific Ocean

h	about 33 km.		
H	08	57	10.2
eN"	09	26	

25 Sept. 19.7 S., 69.5 W.
N. Chile

h	about 123km.		
H	05	57	26.1
iPZ	06	07	55.4 c
ipPZ	06	07	22.1

25 Sept. 18.3 N., 108.8 W.
Guerrero, Mexico

h	about 60 km.		
H	06	02	26.4
iPZ	06	09	16.0 c

26 Sept. 27.5 N., 92.6 E.
India-China border region

h	about 33 km.		
H	05	10	58.1
eE"	06	10	

28 Sept. 27.4 N., 100.1 E.
Yunnan Prov. China

h	about 33 km.		
H	14	00	22.9
eSKSN"	14	25.6	

30 Sept. 18.3 S., 69.7 W.
N. Chile

h	about 122 km.		
H	09	29	11.6
iPZ	09	39	29.8 c

2 Oct. 51.6 N., 174.5 W.
Andreanof Isl. Aleutian Isl.

h	about 34 km.		
H	07	23	35.3
iPZ	07	33	51.6 d

7 Oct. 21.6 S., 170.5 E.
Loyalty Isl. region

h	about 161 km.		

H 15 55 10.8
ePZ 16 13 47.7 d

7 Oct. 61.6 N., 150.1 W.
S. Alaska
h about 56 km.
H 20 55 56.0
iPZ 21 04 09.0 c

8 Oct. 16.4 S., 177.6 W.
Fiji Isl. region
h about 33 km.
H 00 12 18.1
eN" 00 58

8 Oct. 32.1 S., 67.4 W.
Mendoza Prov. Argentina
h about 141km.
H 04 23 07.7
iPZ 04 34 48.7

8 Oct. 51.6 N., 173.8 W.
Andreanof Isl. Aleutian Isl.
h about 35 km.
H 17 43 56.1
iPZ 17 54 09.6

9 Oct. 12.6 N., 30.8 E.
Sudan
h about 9 km.
H 06 48 40.3
ePZ 07 01 50

9 Oct. 31.3 N., 114.3 W.
Gulf of California
h about 33 km.
H 08 10 28.0
iPZ 08 17 17.8 d

10 Oct. 16.1 N., 98.1 W.
Near Coast of Guerrero, Mexico
h about 43 km.
H 01 19 44.9
ePZ 01 26 43

10 Oct. 19.7 S., 71.1 W.
Off Coast of N. Chile
h about 33 km.
H 20 28 33.6
iPZ 20 39 11.0 d

11 Oct. 29.8 S., 71.2 W.
Near Coast of Central Chile
h about 33 km.
H 05 39 07.1
ePZ 05 50 50

11 Oct. 60.3 S., 26.0 W.
S. Sandwich Isl. region
h about 37 km.
H 06 25 55.1
eSKSN" 06 51.2

11 Oct. 4.9 N., 76.0 W.
Colombia
h about 101 km.
H 06 57 45.0
ePZ 07 05 17

11 Oct. 35.1 N., 117.3 W.
Central California
h about 24 km.
H 16 59 12.3
eN" 17 16.5

11 Oct. 32.6 S., 178.7 W.
S. of Kermadec Isl.
h about 73 km.
H 20 40 39.8
eSSN" 21 17.8

12 Oct. 11.9 S., 121.8 E.
S. of Timor
h about 33 km.
H 00 06 37.8
ePZ 00 26 10.8 c

12 Oct. 60.5 N., 144.4 W.
S. Alaska
h about 33 km.
H 03 19 25.4
eN" 03 42

12 Oct. 31.2 S., 177.8 W.
Kermadec Isl.
h about 14 km.
H 04 22 14.0
eN" 04 59.3

12 Oct. 60.4 N., 145.0 W.
S. Alaska

h about 25 km.
H 08 20 38.4
eSN" 08 43 18

12 Oct. 16.4 N., 99.3 W.
Near Coast of Guerrero, Mex.
h about 33 km.
H 19 04 04.6
eN" 19 18

12 Oct. 11.2 N., 86.2 W.
Near Coast of Nicaragua
h about 43 km.
H 20 20 06.8
iPZ 20 27 04.7 d

13 Oct. 59.5 N., 145.2 W.
Gulf of Alaska
h about 10 km.
H 02 15 45.2
iZ 02 23 50.0

13 Oct. 8.8 S., 74.3 W.
Peru-Brazil border region
h about 155 km.
H 15 45 15.6
iPN 15 54 25.4 d

13 Oct. eZ" 18 55 40

13 Oct. 19.2 N., 67.9 W.
Mona Passage
h about 43 km.
H 01 49 28.0
ePZ 01 55 49

14 Oct. 15.1 S., 173.5 W.
Tonga Isl.
h about 33 km.
H 02 32 31.8
eSSE" 03 06.7

15 Oct. 37.0 N., 121.7 W.
Central California
h about 9 km.
H 20 34 28.9
ePZ 20 40 50

15 Oct. 41.8 N., 142.9 E.
Hokkaido, Japan region
H 18 00 07.3
ePZ 18 13 48

16 Oct. 19.7 S., 70.4 W.
Near Coast of N. Chile
h about 45 km.
H 06 48 38.6
iPZ 06 59 17.0

17 Oct. 11.0 S., 166.7 E.
Santa Cruz Isl.
h about 55 km.
H 10 15 40.6
eSSE" 10 45.5

17 Oct. 10.7 S., 78.7 W.
Near Coast of Peru
h about 38 km.
H 21 41 56.3
iPZ 21 51 34.2 c

17 Oct. 10.5 S., 78.6 W.
Near Coast of Peru
h about 39 km.
H 23 04 22.1
iPZ 23 13 58

17 Oct. 10.0 S., 79.6 W.
Off Coast of Peru
h about 46 km.
H 23 46 51.6
ePZ 23 56 24

18 Oct. 3.6 N., 74.2 W.
Colombia
h about 47 km.
H 18 43 34.9
iPZ 18 51 23.9 d

19 Oct. 10.2 S., 79.5 W.
Off Coast of Peru
h about 33 km.
H 02 17 44.3
ePZ 02 27 19

19 Oct. 1.6 S., 15.5 W.
N. of Ascension Isl.
h about 33 km.
H 08 01 33.8
i(P)Z 08 12 44.7

20 Oct. 3.5 S., 146.1 E.
Bismarck Sea

h	about 34 km.		
H	15	03	46.9
eN"	16	02	

21 Oct. 14.4 N., 90.8 W.
Guatemala

h	about 46 km.		
H	10	36	16.7
ePZ	10	43	02

22 Oct. 55.2 N., 162.0 E.
Near E. Coast of Kamchatka

h	about 59 km.		
H	12	47	18.2
ePZ	12	58	20

23 Oct. 51.0 N., 159.2 E.
Off E. Coast of Kamchatka

h	about 38 km.		
H	07	09	20.9
ePZ	07	20	51

23 Oct. 10.8 S., 78.9 W.
Near Coast of Peru

h	about 44 km.		
H	15	32	54.2
ePZ	15	42	31

25 Oct. 37.3 N., 114.2 W.
S. Nevada

h	about 33 km.		
H	16	39	33.0
eN"	16	55.6	

25 Oct. 36.8 N., 138.2 E.
Honshu, Japan

h	about 28 km.		
H	18	04	11.6
eN"	18	51	

26 Oct. eN" 13 55.5

26 Oct. 37.4 N., 114.3 W.
S. Nevada

h	about 33 km.		
H	15	17	41.0
eN"	15	33.5	

26 Oct. eN" 18 17

27 Oct. 73.4 N., 54.8 E.
Novaya Zemlya

h	about 0 km.		
H	05	57	58.0
iPN	06	07	40.8 c

27 Oct. 10.0 S., 79.3 W.
Central California

h	about 63 km.		
H	12	08	37.4
eSN"	12	25	48

27 Oct. 22.2 N., 145.9 E.
N. Pacific Ocean

h	about 29 km.		
H	14	21	04.8
eSKSN"	14	45	42

27 Oct. 41.7 N., 141.9 E.
Hokkaido, Japan region

h	about 71 km.		
H	23	46	47.7
iPZ	23	59	30.5 c

28 Oct. 20.1 S., 168.8 E.
Loyalty Isl.

h	about 19 km.		
H	22	11	47.6
eE"	23	03	

29 Oct. 39.2 N., 21.2 E.
Greece

h	about 20 km.		
H	02	39	29.4
ePZ	02	50	19

29 Oct. 41.8 N., 144.0 E.
Hokkaido, Japan region

h	about 32 km.		
H	06	30	21.9
ePZ	06	43	15

29 Oct. 10.7 S., 79.0 W.
Off Coast of Peru

h	about 22 km.		
H	15	32	18.9
eSE"	15	49	48

1 Nov. 43.1 N., 143.4 E.
Hokkaido, Japan region

h	about 127 km.		
H	07	01	00.4
iPZ	07	13	26.2 d

3 Nov. 19.1 N., 67.9 W.
Mona Passage

h	about 47 km.		
H	11	37	22.7
eE"	11	47	36

3 Nov. 19.2 N., 67.9 W.
Mona Passage

h	about 22 km.		
H	16	24	31.0
ePZ	16	30	12

6 Nov. 20.3 S., 69.2 W.
N. Chile

h	about 100 km.		
H	23	49	54.1
ePZ	00	00	28

7 Nov. 7.8 S., 75.9 W.
N. Peru

h	about 147 km.		
H	20	31	33.0
iPZ	20	40	37.4 c

8 Nov. 52.4 N., 173.0 E.
Near Isl. Aleutian Isl.

h	about 41 km.		
H	11	35	57.0
ePZ	11	46	46

9 Nov. 14.9 S., 71.8 W.
Peru

h	about 126 km.		
H	02	01	57.7
ePZ	02	11	53

9 Nov. 51.9 N., 173.7 W.
Andreanof Isl. Aleutian Isl.

h	about 47 km.		
H	14	09	44.4
iPZ	14	19	54.6

10 Nov. 31.9 S., 68.4 W.
San Juan Prov. Argentina

h	about 113 km.		

iPZ 03 14 19.2 d

11 Nov. 52.3 N., 169.1 W.
Fox Isl. Aleutian Isl.

h	about 38 km.		
H	15	31	04.2
ePZ	15	41	03

11 Nov. 31.6 S., 71.5 W.
Near Coast of Central Chile

h	about 33 km.		
H	22	33	33.7
ePZ	22	45	23

12 Nov. 8.7 N., 83.6 W.
Costa Rica

h	about 35 km.		
H	04	07	27.0
iPZ	04	14	42.1 c

12 Nov. 23.8 S, 67.6 W.
Chile-Argentina border region

h	about 126 km.		
H	11	50	31.6
iPZ	12	01	26.2 d
ipPZ			42.6

12 Nov. 41.8 N., 144.1 E.
Hokkaido, Japan region

h	about 33 km.		
H	12	49	43.6
iPZ	13	02	25.7 d

12 Nov. 15.6 S., 167.3 E.
New Hebrides Isl.

h	about 40 km.		
H	18	45	01.0
ePZ	19	03	53

13 Nov. 11.0 S., 74.7 W.
Peru

h	about 40 km.		
H	01	18	58.1
iPZ	01	28	36.8

13 Nov. 17.1 N., 61.9 W.
Leeward Isl.

h	about 65 km.		

H 02 51 50.6
ePZ 02 57 55

13 Nov. 8.3 S., 72.4 W.
Peru-Brazil border region
h about 176 km.
H 14 24 40.1
iPZ 14 33 44.5 c
ipPZ 34 22.8

14 Nov. 18.3 S., 69.2 W.
N. Chile
h about 123 km.
H 12 58 36.2
iPZ 13 08 56.6 d

15 Nov. 51.4 N., 179.9 W.
Andreanof Isl. Aleutian Isl.
h about 43 km.
H 00 08 07.1
ePZ 00 18 39.5

15 Nov. 51.2 N., 176.6 W.
Andreanof Isl. Aleutian Isl.
h about 48 km.
H 16 19 07.4
iPZ 16 29 30.0 d

16 Nov. 19.5 S., 176.3 W.
Fiji Isl. region
h about 48 km.
H 05 58 30.3
eN" 06 46

16 Nov. 52.6 N., 169.5 W.
Fox Isl. Aleutian Isl.
h about 33 km.
H 23 16 09.1
iPZ 23 26 03.9 d

17 Nov. 51.1 N., 176.5 W.
Andreanof Isl. Aleutian Isl.
h about 45 km.
H 14 43 10.2
eP 14 53 33

18 Nov. 36.3 S., 100.7 W.
S. Pacific Ocean
h about 33 km.
H 09 12 09.9
ePZ 09 24 45

18 Nov. 73.4N ., 6.8 E.
Greenland Sea
h about 33 km.
H 18 48 43.9
eSN" 19 03 27

18 Nov. 24.0 N., 46.3 W.
N. Atlantic Ridge
h about 33 km.
H 19 43 35.2
ePZ 19 49 54

19 Nov. 35.0 N., 23.5 E.
Crete
h about 33 km.
H 07 12 39.7
iPZ 07 23 54.0 d

19 Nov. 24.2 N., 46.4 W.
N. Atlantic Ridge
h about 33 km.
H 17 40 58.2
ePZ 17 47 11

19 Nov. 10.7 S., 79.1 W.
Off Coast of Peru
h about 34 km.
H 18 20 30.0
ePZ 18 30 08

20 Nov. 51.4 N., 176.6 W.
Andreanof Isl. Aleutian Isl.
h about 54 km.
H 09 29 59.1
ePZ 09 40 20

21 Nov. 18.8 N., 102.3 W.
Michoacan, Mexico
h about 87 km.
H 11 12 02.4
ePZ 11 18 53

21 Nov. 46.7 N., 152.5 E.
Kurile Isl.
h about 40 km.
H 12 19 27.3
iPZ 12 31 31.6

22 Nov. 48.2 N., 146.7 E.
Sea of Okhotsk

h about 453 km.
H 06 29 53.5
iPZ 06 41 16.5 c

22 Nov. 52.1 N., 172.7 E.
Near Isl. Aleutian Isl.
h about 55 km.
H 08 52 18.2
eN" 09 19

23 Nov. 14.9 S., 166.9 E.
New Hebrides Isl.
h about 48 km.
H 02 19 13.8
eE" 02 49.5

24 Nov. 56.5 N., 152.9 W.
Kodiak Isl. region
h about 33 km.
H 06 53 37.1
eN" 07 17

24 Nov. 38.3 S., 92.1 W.
W. Chile Rise
h about 33 km.
H 16 45 47.1
eSKSN" 17 08 50

25 Nov. 15.6 S., 179.1 E.
Fiji Isl.
h about 67 km.
H 03 18 54.7
eE" 04 12

26 Nov. 25.6 S., 70.6 W.
Near Coast of N. Chile
h about 54 km.
H 02 18 17.0
iPZ 02 29 29.9 d

26 Nov. 78.4 N., 5.2 E.
Svalbard region
h about 33 km.
H 03 23 44.3
eSN" 03 38.5

27 Nov. 60.1 N., 146.2 W.
S. Alaska
h about 28 km.
H 04 10 42.8
ePZ 04 18 48

27 No
Svalbard region
h about 33 km.
H 20 13 01.5
ePZ 20 21 05 c
iPZ 05.9 d

28 Nov. 6.6 N., 82.7 W.
S. of Panama
h about 33 km.
H 07 32 53.4
ePZ 07 40 23.5

29 Nov. 26.3 N., 44.7 W.
N. Atlantic Ridge
h about 33 km.
H 05 03 50.1
eN" 05 16.5

29 Nov. 14.7 S., 167.4 E.
New Hebrides Isl.
h about 161 km.
H 22 17 29.9
eE" 22 47.2

1 Déc. 60.1 N., 146.4 W.
S. Alaska
h about 38 km.
H 04 29 23.3
iPZ 04 37 28

1 Déc. 14.0 S., 167.1 E.
New Hebrides Isl.
h about 132 km.
H 04 56 58.2
iPZ 05 15 35.0 d

1 Déc. iPZ 17 26 33.2

5 Déc. eN" 04 03.9

6 Déc. 50.1 N., 159.8 E.
Kurile Isl. region
h about 27 km.
H 07 18 39.9
iPZ 07 30 14.8 c

7 Déc. 44.3 N., 151.7 E.
Kurile Isl. region
h about 26 km.
H 17 17 42.0
iPZ 17 30 00.0

7 Déc. 18.3 N., 68.5 W.
Mona Passage

h	about 141km.		
H	23	54	35.9
e(P)Z	00	00	12

8 Déc. 42.2 N., 18.9 E.
Yugoslavia

h	about 24 km.		
H	11	31	18.0
ePZ	11	41	46

9 Déc. 14.5 S., 70.7 W.
Peru

h	about 218 km.		
H	10	06	55.0
ePZ	10	16	36

9 Déc. 51.7 N., 174.6 E.
Near Isl. Aleutian Isl.

h	about 21 km.		
H	16	43	57.7
eN"	17	08.7	

10 Déc. 24.2 S., 67.9 W.
Chile-Argentina border region

h	about 91 km.		
H	10	38	35.6
iPZ	10	49	36.8 c

10 Déc. 14.3 N., 92.0 W.
Guatemala

h	about 70 km.		
H	13	06	32.6
iPZ	13	13	17.8 c

10 Déc. 41.0 N., 33.5 E.
Turkey

h	about 13 km.		
H	17	08	32.2
e(P)Z	17	20	09

11 Déc. 13.9 N., 92.1 W.
Off Coast of Chiapas, Mexico

h	about 9 km.		
H	06	59	26.4
ePZ	07	06	23

11 Déc. 42.9 N., 144.6 E.
Hokkaido, Japan region

h	about 57 km.		
H	19	47	34.2
ePZ	20	00	08.2 d

14 Déc. 52.9 N., 177.6 W.
Andreanof Isl. Aleutian Isl.

h	about 243 km.		
H	03	44	01.9
iPZ	03	53	59.0 d

14 Déc. 11.0 N., 43.1 W.
N. Atlantic Ridge

h	about 33 km.		
H	06	42	24.3
ePZ	06	50	19

14 Déc. 4.8 S., 143.9 E.
New Guinea

h	about 74 km.		
H	21	07	52.1
iPZ	21	26	52.2 d

16 Déc. 29.6 N., 81.0 E.
Nepal

h	about 9 km.		
H	20	52	13.5
ePSN"	21	19	32

17 Déc. 70.7 N., 14.0 W.
Jan Mayen Isl. region

h	about 27 km.		
H	05	59	10.2
ePZ	06	06	28

17 Déc. 22.8 S., 68.9 W.
N. Chile

h	about 105 km.		
H	17	41	20.4
iPZ	17	52	09.9 d
ipPZ			36.0

18 Déc. 49.9 N., 77.7 E.
E. Kazakh

h	about 0 km.		
H	04	57	57.8
iPZ	05	10	19.2 c

18 Déc. 10.8 S., 79.0 W.
Near Coast of Peru

h	about 19 km.		
H	23	59	30.8
ePZ	00	09	11

19 Déc. 16.0 S., 71.8 W.
S. Peru

h	about 118 km.		
H	02	10	31.7
iPZ	02	20	35.8 c

20 Déc. 66.7 N., 148.7 W.
Alaska

h	about 33 km.		
H	00	26	27.8
eE"	00	48	

20 Déc. 26.1 S., 63.2 W.
Santiago Del Espero Pr. Arg.

h	about 589 km.		
H	12	26	55.0
iPZ	12	37	20.9 d

20 Déc. iPZ 15 36 34.2 c

20 Déc. 14.3 N., 122.1 E.
Luzon, Philippine Isl.

h	about 37 km.		
H	18	39	40.3
eN"	19	09.6	

21 Déc. 20.0 S., 169.7 E.
New Hebrides Isl.

h	about 245 km.		
H	08	52	00.2
iPZ	09	10	25.8 c

23 Déc. 7.1 S., 148.3 E.
E. New Guinea region

h	about 43 km.		
H	15	50	20.4
iPZ	16	09	21.3 c

23 Déc. 7.4 S., 74.8 W.
Peru-Brazil border region

h	about 136 km.		
H	18	59	04.8
iPZ	19	08	06.5 d
ipPZ			40.8

23 Déc. 12.7 N., 87.6 W.
Near Coast of Nicaragua

H	22	10	25.6
ePZ	22	17	18.2

24 Déc. 25.4. N., 142.6 E.
Volcano Isl. region

h	about 18 km.		
H	06	00	58.6
iPZ	06	12	51.0 c

24 Déc. 59.9 N., 153.4 W.
S. Alaska

h	about 113 km.		
H	22	28	59.6
iPZ	22	37	22.7 d

27 Déc. 37.1 N., 141.0 E.
Honshu, Japan

h	about 60 km.		
H	01	22	17.3
ePZ	01	35	21

27 Déc. 13.2 N., 88.8 W.
El Salvador

h	about 66 km.		
H	21	22	14.8
iPZ	21	29	00.6

28 Déc. 25.5 S., 70.7 W.
Near Coast of N. Chile

h	about 47 km.		
H	08	18	07.4
iPZ	08	29	20.0 c

29 Déc. 25.7 S., 70.7 W.
Near Coast of N. Chile

h	about 33 km.		
H	01	48	28.9
iPZ	01	59	44.0 d

29 Déc. 32.6 S., 111.8 W.
Easter Isl. Cordillera

h	about 33 km.		
H	11	56	23.0
eSE"	12	19	36

29 Déc. 32.8 S., 111.7 W.
Easter Isl. Cordillera

h	about 33 km.		
H	22	16	22.7
eSE"	22	39	34

30 Déc. 25.2 S., 70.6 W.
Near Coast of N. Chile

h	about 33 km.		
H	09	53	33.8
iPZ	10	04	46.3 d

31 Déc. 11.8 S., 166.5 E.
Santa Cruz Isl.

h	about 33 km.		
H	18	23	03.9
ePE"	18	38.5	
ePPE"		43.5	

31 Déc. 11.3 S., 164.8 E.
Santa Cruz Isl. region

h	about 33 km.		
H	22	15	14.0
eZ	22	34	18

1967

1 Jan. 15.3 S., 173.6 W.
Tonga Isl.

h	about 33 km.		
H	07	05	48.6
eSKSE"	07	30.8	

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