# PART B

# SOLAR - GEOPHYSICAL DATA

ISSUED
DECEMBER 1957

U. S. DEPARTMENT OF COMMERCE
NATIONAL BUREAU OF STANDARDS
CENTRAL RADIO PROPAGATION LABORATORY
BOULDER, COLORADO

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PART B

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## INTRODUCTION

This monthly report series is intended to keep research workers abreast of the major particulars of solar activity and the associated ionospheric, radio propagation and other geophysical effects. It is made possible through the cooperation of many observatories, laboratories and agencies as recorded in the detailed description of the tables and graphs which follows. The report is edited by Miss J. V. Lincoln of the Sun-Earth Relationships Section.

## I DAILY SOLAR INDICES

Relative Sunspot Numbers -- The table includes (1) the daily American relative sunspot numbers, $R_A'$, as compiled by the Solar Division of the American Association of Variable Star Observers, and (2) the provisional daily Zürich relative sunspot numbers, $R_Z$, as communicated by the Swiss Federal Observatory. Because of the time required to collect and reduce the observations, $R_A'$ will normally appear one month later than $R_Z$.

The relative sunspot number is an index of the activity of the entire visible disk. It is determined each day without reference to preceding days. Each isolated cluster of sunspots is termed a sunspot group and it may consist of one or a large number of distinct spots whose size can range from 10 or more square degrees of the solar surface down to the limit of resolution (e.g. 1/8 square degrees). The relative sunspot number is defined as $R=K(10g+s)$, where $g$ is the number of sunspot groups and $s$ is the total number of distinct spots. The scale factor $K$ (usually less than unity) depends on the observer and is intended to effect the conversion to the scale originated by Wolf. The observations for sunspot numbers are made by a rather small group of extraordinarily faithful observers, many of them amateurs, each with many years of experience. The counts are made visually with small, suitably protected telescopes.

Final values of $R_Z$ appear in the IAU Quarterly Bulletin on Solar Activity, the Journal of Geophysical Research and elsewhere. They usually differ slightly from the provisional values. The American numbers, $R_A'$, are not revised.

Solar Flux Values, 2800 Mc -- The table also lists the daily values of solar flux at 2800 Mc recorded in watts/$M^2$/cycle/second bandwidth (x $10^{-22}$) in two polarizations by the National Research Council at Ottawa, Canada. These solar radio noise indices are being published in accordance with CCIR Report 25 that a basic solar index for ionospheric propagation should be measured objectively and "preferably refer to a property of the sun such as radiation flux which has direct physical relationship to the ionosphere."

Graph of Sunspot Cycle -- The graph illustrates the recent trend of Cycle 19 of the 11-year sunspot cycle and some predictions of the future level of activity. The customary "12-month" smoothed index, R, is used throughout, the data being final $R_Z$ numbers except for the current year. Predictions shown are those made for one year after the latest available datum by the method of A. G. McNish and J. V. Lincoln (Trans. Am. Geophys. Union, 30, 673-685, 1949) modified by the use of regression coefficients and mean cycle values recomputed for Cycles 8 through 18. Cycle 19 began April 1954, when the minimum $\bar{R}$ of 3.4 was reached.

## II SOLAR CENTERS OF ACTIVITY

Calcium Plage and Sunspot Regions -- The table gives particulars of the centers of activity visible on the solar disk during the preceding month. These are based on estimates made and reported on the day of observation and are therefore of limited reliability.

The table gives the heliographic coordinates of each center (taken as the calcium plage unless two or more significantly and individually active sunspot groups are included in an extended plage) in terms of the Greenwich date of passage of the sun's central meridian (CMP) and the latitude; the serial number of the plage as assigned by McMath-Hulbert Observatory; the serial number of the center in the previous solar rotation, if it is a persisting region; particulars of the plage at CMP: area, central intensity; a summary of the development of the plage during the current transit of the disk, where b = born on disk, $\ell$ = passed to or from invisible hemisphere, d = died on disk, and / = increasing, - = stable, \ = decreasing; and age in solar rotations; particulars of the associated sunspot group, if any, at CMP: area and spot count and the summary of development during the current disk transit, similar to the above. The unit of area is a millionth of the area of a solar hemisphere; the central intensity of calcium plages is roughly estimated on a scale of 1 = faint to 5 = very bright.

Calcium plage data are available through the cooperation of the McMath-Hulbert Observatory of the University of Michigan and the Mt. Wilson Observatory. The sunspot data are compiled from reports from the U. S. Naval Observatory, Mt. Wilson Observatory, and from reports from Europe and Japan received through the daily Ursigram messages.

Coronal Line Emission Indices -- In the table are summarized solar coronal emission intensity indices for the green (Fe XIV at $\lambda$5303) and red (Fe X at $\lambda$6374) coronal lines. The indices are based on measurements made at 5° intervals around the periphery of the solar disk by the High Altitude Observatory at Climax, Colorado, and by Harvard University observers at Sacramento Peak (The USAF Upper Air Research Observatory at Sunspot, New Mexico, under contract AF 19(604)-146). The measurements are expressed as the number of millionths of an Angstrom of the continum of the center of the solar disk (at the same wavelength as the line) that would contain the same energy as the observed coronal line. The indices have the following meanings:

$G_6$ = mean of six highest line intensities in quadrant for $\lambda$5303.

$R_6$ = same for $\lambda$6374.

$G_1$ = highest value of intensity in quadrant, for $\lambda$5303.

$R_1$ = same for $\lambda$6374.

The dates given in the table correspond to the approximate time of CMP of the longitude zone represented by the indices. The actual observations were made for the North East and South East quadrants 7 days before; for the South West and North West quadrants 7 days after the CMP date given.

To obtain rough measures of the integrated emission of the entire solar disk in either of the lines, assuming the coronal changes to be small in a half solar rotation, it is satisfactory to perform the following type of summation given in example for 15 October:

$$\left(\begin{matrix}\text{MEAN DISK EMISSION} \\ \text{IN } \lambda 5303\end{matrix}\right)_{15\ \text{OCT}} = \frac{1}{N}\left[\sum_{15\ \text{OCT}}^{22\ \text{OCT}}\left\{(G_6)_{NE} + (G_6)_{SE}\right\} + \sum_{8\ \text{OCT}}^{14\ \text{OCT}}\left\{(G_6)_{SW} + (G_6)_{NW}\right\}\right]$$

where N is the number of indices entering the summation.

Such integrated disk indices as well as integrated whole-sun indices are computed for each day and are published quarterly in the "Solar Activity Summary" issued by the High Altitude Observatory at Boulder, Colorado. In the same reports are given maps of the intensity distribution of coronal emission derived from all available Climax and Sacramento Peak observations, as well as other information on solar activity, such as maps made from daily limb prominence surveys in H$\alpha$ and notes regarding the history of active regions on the solar disk.

Preliminary summaries of solar activity, prepared on a fast schedule, are issued Friday of each week from High Altitude Observatory in conjunction with CRPL and include solar activity through the preceding day. These are useful to groups needing information on the current status of activity on the visible solar disk, but are not recommended for research uses unless such a prompt schedule of reporting is essential. The same information is included in the subsequent quarterly reports, with extensive additions, corrections and evaluations.

# III SOLAR FLARES

Optical Observations -- The table presents the preliminary record of solar flares as reported to the CRPL on a rapid schedule at the sacrifice of detailed accuracy. Definitive and complete data are published later in the Quarterly Bulletin on Solar Activity, I.A.U., in various observatory publications and elsewhere. The present listing serves to identify and roughly describe the phenomena observed.

Reporting directly to the CRPL are the following observatories: McMath-Hulbert, Wendelstein, Sacramento Peak, Mitaka and Swedish Astrophysical Station on Capri. The remainder report through the URSIgram centers or are available through the IGY World Data Center for Solar Activity in Boulder. Observations are in the light of the center of the H-alpha line unless noted otherwise. The reports from Sacramento Peak, New Mexico (communicated to CRPL by the High Altitude Observatory at Boulder) are from observations at the USAF Upper Air Research Observatory at Sunspot, New Mexico, by Harvard University observers, under contract AF 19(604)-146.

For each flare are listed the reporting observatory, the date, beginning and ending times, time of maximum phase, the heliographic coordinates in degrees, McMath serial number of the region, duration, the flare importance on the IAU scale of 1- to 3+, observing conditions where 1 means poor, 2 fair and 3 good, time of measurement for tabulated width of H$\alpha$ or tabulated area, measured (i.e. projected) maximum area in square degrees, corrected maximum area in square degrees which equals measured area times secant h where h is the heliocentric angle, maximum effective line-width in H$\alpha$ expressed in Angstroms, and maximum intensity of H$\alpha$ expressed in per cent of the continuous spectrum. The following symbols are used in the table:

| | |
|---|---|
| D = Greater than | F = Approximately |
| E = Less than | G = Plus |

A final column lists provisionally the occurrence of simultaneous ionospheric effects as observed on selected field-strength recordings of distant high-frequency radio transmissions; a more nearly definitive list of these ionospheric effects, including particulars, appears in these reports after the lapse of a month (see below). All times are Universal Time (UT or GCT). Subflares (importance 1-) are listed by date, time of beginning and their heliographic coordinates. A graph presents intervals for which there were no patrols for flare observations from the observatories whose complete data are published in the table.

Ionospheric Effects -- SID (and GID--gradual ionospheric disturbances) may be detected in a number of ways: short wave fadeouts, enhancement of low frequency atmospherics, increases in cosmic absorption, and so forth. The table lists events that have been recognized on field-strength recordings of distant high-frequency radio transmissions.

Under a coordinated program, the staffs at the following ionospheric sounding stations contribute reports that are screened and synthesized at CRPL-Boulder: Puerto Rico, Ft. Belvoir, Va., and Anchorage, Alaska (CRPL Stations: PR, BE, AN); Huancayo, Peru, and College, Alaska (CRPL-Associated Laboratories: HU, CO); and White Sands, N. Mex., Adak, Alaska, and Okinawa (U.S. Signal Corps Stations: WS, AD, OK). McMath-Hulbert Observatory (MC) also contributes such reports. In addition, reports are volunteered by RCA Communications Inc., Marconi Wireless, Netherlands Postal and Telecommunications Services, Swedish Telecommunications, and others; these usually specify times of SID and the radio paths involved.

In the coordinated program, the abnormal fades of field strength not obviously ascribable to other causes, are described as short wave fadeouts with the following further classification:

| | |
|---|---|
| S-SWF: | sudden drop-out and gradual recovery |
| Slow S-SWF: | drop-out taking 5 to 15 minutes and gradual recovery |
| G-SWF: | gradual disturbance; fade irregular in both drop-out and recovery. |

When there is agreement among the various reporting stations on the time (UT) of an event, it is accepted as a widespread phenomenon and listed in the table.

The degree of confidence in identifying the event, a subjective estimate, is reported by the stations and this is summarized in an index of certainty that the event is widespread, ranging from 1 (possible) to 5 (definite). The times given in the table for the event are from the report of a station (underlined in table) that identified it with high confidence. The criteria for the subjective importance rating assigned by each station on a scale of 1- to 3+ include amplitude of the fade, duration and confidence; greater consideration is given to reports on paths near the subsolar point in arriving at the summary importance rating given in the table.
Note: The tables of SID observed at Washington included in CRPL F-reports prior to F-135 were restricted to events classed here as S-SWF.

## IV SOLAR RADIO WAVES

### 2800 Mc Observations

The data on solar radio wave events made in Ottawa, Canada by the Radio and Electrical Engineering Division of the National Research Council (A. E. Covington) at 2800 Mc (10-cm emission) are presented. Near local noon (about 1700 UT) the sensitivity of the radiometer is determined and a mean flux for the whole day calculated. These values are given in a tabular form (see table I-1) in units of $10^{-22}$ watts/$M^2$/c/s. Burst phenomena are measured above this level and are given in terms especially suitable for the variations observed on this frequency. The basis for the classifications is described by Covington - J.R. Astro. Soc. Can. 45, 49, 1951 and Dodson, Hedeman and Covington, Ap. J. 119, 541, 1954. A modification in terminology with a view to simplification has been introduced and consists essentially of the omission of the descriptive word "Single" from the "Single-Simple" and "Single-Complex" classes; in designating the "Single", "Single-Simple" and "Rise and Fall" bursts into a single classification designated as "Simple Bursts" with an appropriate type number; in the addition of the letter "f" to indicate that the burst deviates from the basic pattern by the presence of one or more small fluctuations in intensity; and by the addition of the letter "A" to indicate that the event has another smaller duration event superimposed upon it.

Simple Burst

Any single burst which rises to one maximum and then decreases to the pre-burst level.

1 - Simple 1 -- Simple burst, type 1 (formerly "single"). Bursts of intensity less than 7 1/2 flux units and duration less than 7 1/2 minutes.

2 - Simple 2 -- Simple burst, type 2 (formerly "single-simple"). Bursts of impulsive nature with intensity greater than 7 1/2 flux units.

3 - Simple 3 -- Simple burst, type 3 (formerly "rise and fall"). Bursts of moderate intensity with duration greater than 7 1/2 minutes.

4 - Post-burst increase -- Postburst level is greater than the preburst level. The gradual return to normal flux may require as long as several hours.

5 - Absorption following burst (negative post).

6 - Complex -- (formerly "single-complex"). A single burst which shows two or more comparable maxima before the activity has declined to zero.

7 - Period of irregular activity or fluctuations -- Series of overlapping bursts of moderate intensity and duration.

8 - Group -- Series of single isolated bursts occurring in succession with intensity between the events equal to the level before and after the group.

9 - Precursor -- A small increase of intensity occurring before a larger increase.

## Great Burst

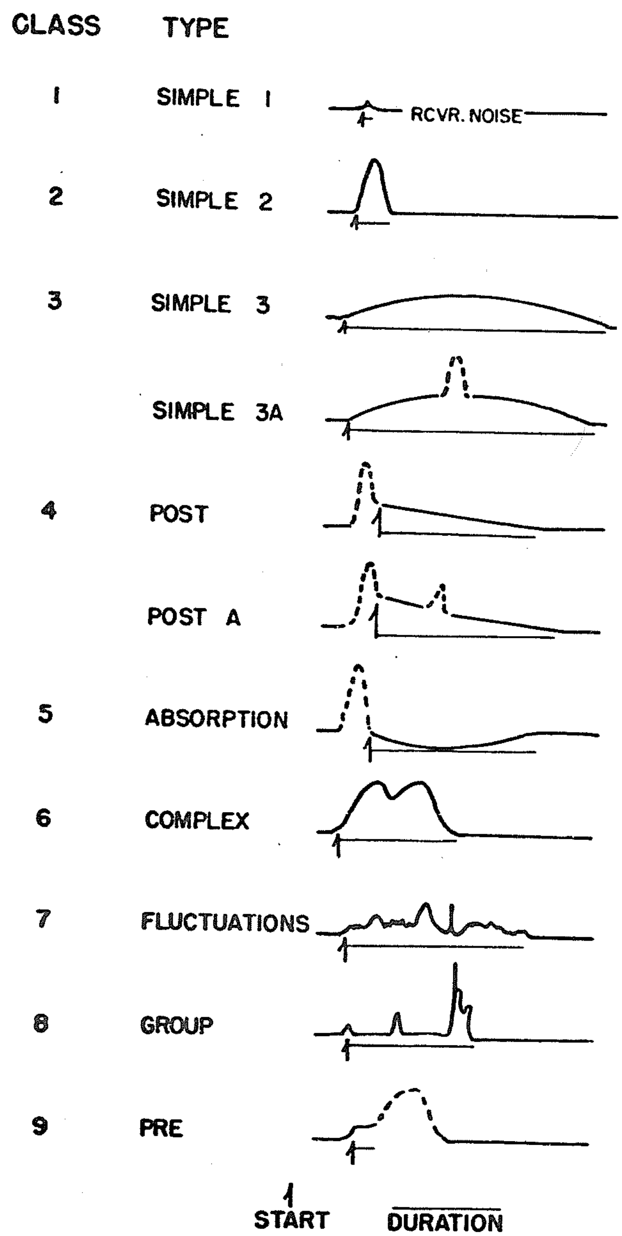
Infrequently occurring bursts of great intensity, often of complicated structure.

## Letter "A"

Indicates that this event has another event superimposed upon it.

## Letter "f"

Indicates that the basic form of the event is modified by secondary fluctuations.



## 200 Mc Observations

Data on solar radio waves made at Cornell University, Ithaca, N.Y. (Marshall Cohen) on 201.5 Mc are presented. All times are in Universal Time (UT or GCT). The antenna is linearly polarized and has a pattern appreciably broader than the solar disk. Flux is reported in units of $10^{-22}$ watts/$m^2$/cps and the tabulated numbers are twice the values observed in the one linear component.

Tables of flux and outstanding occurrences are given in general according to the systems used for the NBS 170 Mc and 450 Mc data.

## 170 Mc and 450 Mc Observations

Data on solar radio emission at the nominal frequencies of 170 Mc and 450 Mc recorded at the Gunbarrel Hill (Boulder) station of the National Bureau of Standards (R.S. Lawrence) are presented. The half width of the antenna lobe is appreciably greater than the solar disk. Polarization is not determined, but the dipole is oriented E-W. All times are in Universal Time (UT or GCT).

<u>3-Hourly and Daily Flux Density and Variability</u> -- Flux density is given in power units. These units are approximately $10^{-22}$ watts meter$^{-2}$(c/s)$^{-1}$ for both polarizations together. They will be subject to a correction factor when gain measurements of the antenna have been made. The median flux is measured for every one-hour period having at least thirty minutes of usable record and an applicable gain calibration. A three-hour value of flux is obtained by averaging the available one-hour medians (at least two required). A daily value of flux is obtained by averaging all available one-hour medians (at least four required). A dash indicates that insufficient measurements were made to meet the above requirements or that the records were not of usable quality. Flux values may be followed by the qualifying symbols D, S, and X defined subsequently.

The variability index, given for each three-hour interval, is on a scale 0 to 3 defined as follows:

0 - The instantaneous flux did not drop below one-half the median level or exceed twice the median level at any time.

1 - The instantaneous flux made from one to ten excursions

outside the range described above.

2 - The instantaneous flux made from ten to one hundred excursions outside the range described above.

3 - The instantaneous flux made more than one hundred excursions outside the range described above.

For the purpose of the variability index, an excursion whose maximum intensity is M times the median level is counted as M excursions. The variability index is omitted if measurements were made for less than one hour during the period. The variability for the day is the mean of the three-hourly values. The letter S follows variability indices which are in doubt because of atmospherics or local interference.

The observing periods are given in U. T. to the nearest 1/10 hour and they usually extend into the next Greenwich day.

Outstanding Occurrences -- A separate table lists the occurrences which are not adequately described by the three-hourly values of flux density and variability. Two classifications are given: (1) A system in general accord with that described and illustrated by Dodson, Hedeman, and Owren (Ap. J. 118, 169, 1953) and (2) the system described in the IGY Solar Activity Instruction Manual, prepared by the Radio Emission editor of the I.A.U. Quarterly Bulletin on Solar Activity.

In system (1) the occurrences are identified by numbers which do not necessarily indicate the magnitude of the event, as follows:

0 - Rise in base level -- A temporary increase in the continuum with duration of the order of tens of minutes to an hour.

1 - Series of bursts -- Bursts or groups of bursts, occurring intermittently over an interval of time of the order of minutes or hours. Such series of bursts are assigned as distinctive events only when they occur on a smooth record or show as a distinct change in the activity.

2 - Groups of bursts -- A cluster of bursts occurring in an interval of time of the order of minutes.

3 - Minor burst -- A burst of moderate or small amplitude, and duration of the order of one or two minutes.

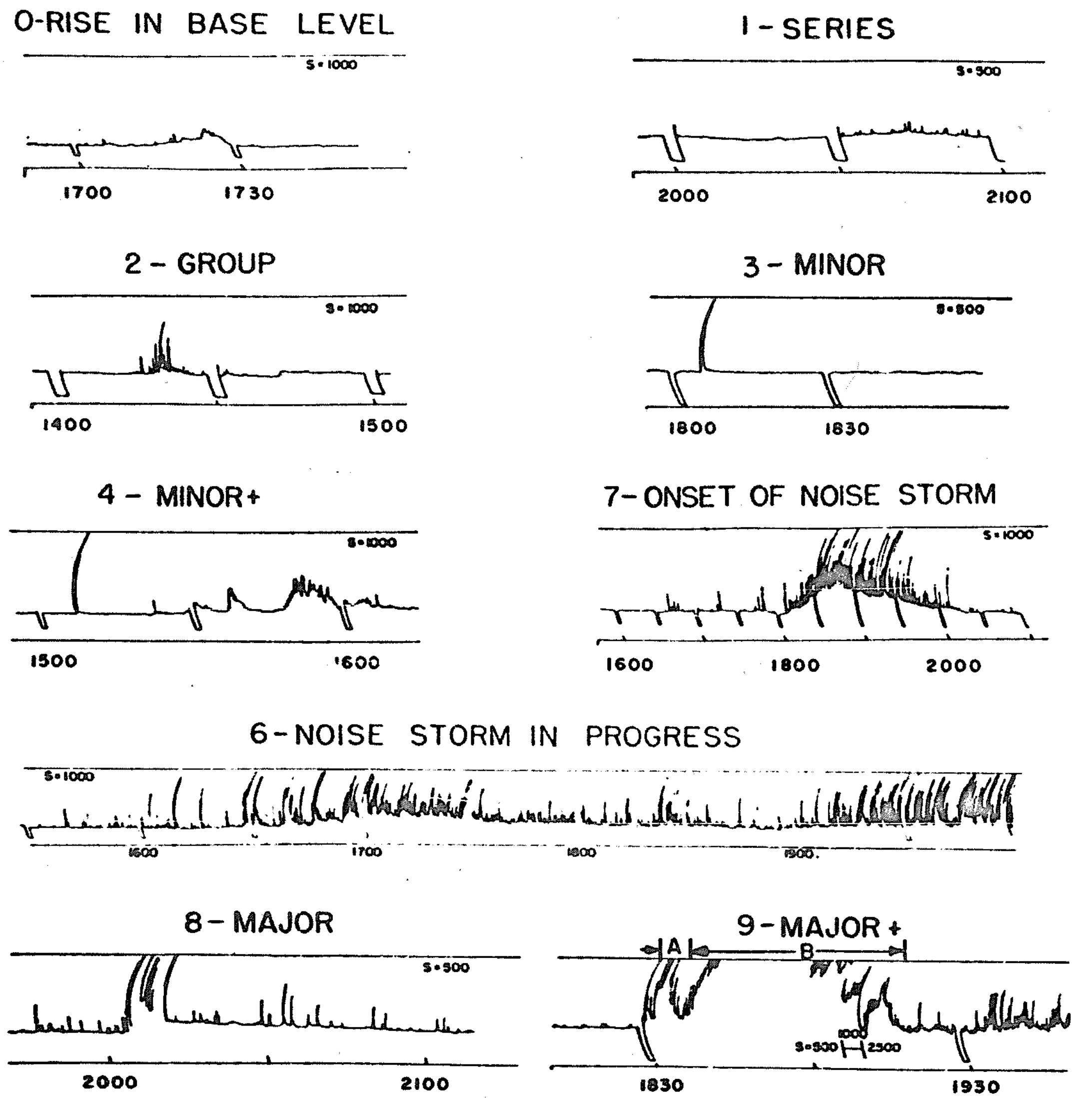
4 - Minor burst and second part -- A double rise in flux in which the early rise is a minor burst.

6 - Noise storm -- A temporary increase in radiation characterized by numerous closely spaced bursts, by an increase in the continuum, or by both. Duration is of the order of hours or days.

7 - Noise storm begins -- The onset of a noise storm occurs at some time during the observing period.

8 - Major burst -- An outburst, or other burst of large amplitude and more than average duration. A major burst is usually complex, with a duration of the order of one to ten minutes.

9A, 9B, or 9 - Major burst and second part or large event without distinct first and second parts -- If there is a double rise in flux, the first part, a major burst, is listed as 9A and the second part as 9B. The second part may consist of a rise in base level, a group or series of bursts, a noise storm. A major increase in flux with duration greater than ten minutes but without distinct first and second parts, is listed simply as 9.



In system (2) combinations of the following letters are used to describe some distinctive characteristics of the recorded disturbances:

S = simple rise and fall of intensity,
C = complex variation of intensity,
A = appears to be part of general activity,
D = distinct from (i.e. apparently superimposed upon) the general background,
M = multiple peaks separated by relatively long periods of quietness,
F = multiple peaks separated by relatively short periods of quietness,
E = sudden commencement or rise of activity.

Starting and maximum times are read to the nearest 1/10 minute if they are very definite and otherwise to the nearest minute. If the duration is less than five minutes, it is given to the nearest 1/10 minute; otherwise to the nearest minute (see also qualifying symbols below).

Maximum flux densities are given in units of $10^{-22}$ watts meter$^{-2}$(c/s)$^{-1}$. The instantaneous maximum flux density is the highest peak in the disturbance measured above the sky level. The smoothed maximum flux density is the maximum value of a smooth curve drawn through the outstanding occurrence with a smoothing period of 20 to 50 percent of the total duration; it is measured above the estimated level in the absence of the disturbance. The intention is that (smoothed maximum) x (duration) should give a measure of the energy radiated in the disturbance.

A dash indicates missing or insignificant data. Observations are interrupted during the period from 26 to 29 minutes after each hour for calibrations. Observing periods are given in the Daily Data tables. The following qualifying symbols are used:

B - Event in progress before observations began.
D - Greater than.
I - Event apparently continued during an interruption of the observations. The period of the interruption may be given in the remarks.
N - See footnotes.
X - Measurement is uncertain or doubtful.
S - Measurement may be influenced by interference or atmospherics.

# V GEOMAGNETIC ACTIVITY INDICES

C, Kp, Ap, and Selected Quiet and Disturbed Days -- The data in the table are: (1) preliminary international character figures, C; (2) geomagnetic planetary three-hour range indices, Kp; (3) daily "equivalent amplitude," Ap; (4) magnetically selected quiet and disturbed days.

This table is made available by the Committee on Characterization of Magnetic Disturbance of IAGA, IUGG. The Meteorological Office, De Bilt, Holland collects the data from magnetic observatories distributed throughout the world, and compiles C and selected days. The Chairman of the Committee computes the planetary and equivalent amplitude indices. The same data are also published quarterly in the Journal of Geophysical Research along with data on sudden commencements (sc) and solar flare effects (sfe).

The C-figure is the arithmetic mean of the subjective classification by all observatories of each day's magnetic activity on a scale of 0 (quiet) to 2 (storm).

Kp is the mean standardized K-index from 12 observatories between geomagnetic latitudes 47 and 63 degrees. The scale is 0 (very quiet) to 9 (extremely disturbed), expressed in thirds of a unit, e.g. 5- is 4 2/3, 5o is 5 0/3, and 5+ is 5 1/3. This planetary index is designed to measure solar particle-radiation by its magnetic effects, specifically to meet the needs of research workers in the ionospheric field. A complete description of Kp has appeared in Bulletin 12b, "Geomagnetic Indices C and K, 1948" of the Association of Terrestrial Magnetism and Electricity (IATME), International Union of Geodesy and Geophysics.

Ap is a daily index of magnetic activity on a linear scale rather than on the quasi-logarithmic scale of the K-indices. It is the average of the eight values of an intermediate 3-hourly index "ap," defined as one-half the average gamma range of the most disturbed of the three force components, in the three-hour interval at standard stations; in practice, ap is computed from the Kp for the 3-hour interval. The extreme range of the scale of Ap is 0 to 400. The method is described in IATME Bulletin No. 12h (for 1953) p. viii f. Values of Ap (like Kp and Cp) have been published for the Polar Year 1932/33 and for the years 1937 onwards.

The magnetically quiet and disturbed days are selected in accordance with the general outline in Terr. Mag. (predecessor to J. Geophys. Res.) 48, pp 219-227, December 1943. The method in current use calls for ranking the days of a month by their geomagnetic activity as determined from the following three criteria with equal weight: (1) the sum of the eight Kp's; (2) the sum of the squares of the eight Kp's; and (3) the greatest Kp.

<u>Chart of Kp by Solar Rotations</u> -- The graph of Kp by solar rotations is furnished through the courtesy of Dr. J. Bartels, Geophysikalisches Institute, Göttingen.

## VI RADIO PROPAGATION QUALITY INDICES

One can take as the definition of a radio propagation quality index: the measure of the efficiency of a medium-powered radio circuit operated under ideal conditions in all respects, except for the variable effect of the ionosphere on the propagation of the transmitted signal. The indices given here are derived from monitoring and circuit performance reports, and are the nearest practical approximation to the ideal index of propagation quality.

Quality indices are usually expressed on a scale that ranges from one to nine. Indices of four or less are generally taken to represent significant disturbance. (Note that for geomagnetic K-indices, disturbance is represented by higher numbers.) The adjectival equivalents of the integral quality indices are as follows:

| | | |
|---|---|---|
| 1 = useless | 4 = poor-to-fair | 7 = good |
| 2 = very poor | 5 = fair | 8 = very good |
| 3 = poor | 6 = fair-to-good | 9 = excellent |

CRPL forecasts are expressed on the same scale. The tables summarizing the outcome of forecasts include categories P-Perfect; S-Satisfactory; U-Unsatisfactory; F-Failure. The following conventions apply:

P - forecast quality equal to observed

U - forecast quality two or more grades different from observed when <u>both</u> forecast and observed were > 5, or both < 5

S - forecast quality one grade different from observed

F - other times when forecast quality two or more grades different from observed

Full discussion of the reliability of forecasts requires consideration of many factors besides the over-simplified summary given.

The quality figures represent a consensus of experience with radio propagation conditions. Since they are based entirely on monitoring or traffic reports, the reasons for low quality are not necessarily known and may not be limited to ionospheric storminess. For instance, low quality may result from improper frequency usage for the path and time of day. Although, wherever it is reported, frequency usage is included in the rating of reports, it must often be an assumption that the reports refer to optimum working frequencies. It is more difficult to eliminate from the indices conditions of low quality for reasons such as multipath or interference. These considerations should be taken into account in interpreting research correlations between the Q-figures and solar, auroral, geomagnetic or similar indices.

North Atlantic Radio Path -- The CRPL quality figures, Qa, are compiled by the North Atlantic Radio Warning Service (NARWS), the CRPL forecasting center at Ft. Belvoir, Virginia, from radio traffic data for North Atlantic transmission paths closely approximating New York-to-London. These are reported to CRPL by the Canadian Defense Research Board, Canadian Broadcasting Corporation, and the following agencies of the U. S. Government:--Coast Guard, Navy, Army Signal Corps, U. S. Information Agency. Supplementing these data are CRPL monitoring, direction-finding observations and field-strength measurements of North Atlantic transmissions made at Belvoir.

The original reports are submitted on various scales and for various time intervals. The observations for each 6-hour interval are averaged on the original scale. These 6-hour indices are then adjusted to the 1 to 9 quality-figure scale by a conversion table prepared by comparing the distribution of these indices for at least four months, usually a year, with a master distribution determined from analysis of the reports originally made on the 1 to 9 quality-figure scale. A report whose distribution is the same as the master is thereby converted linearly to the Q-figure scale. The 6-hourly quality figure is the mean of the reports available for that period.

The 6-hourly quality figures are given in this table to the nearest one-third of a unit,e.g. 5o is 5 and 0/3; 5- is 4 and 2/3; 5+ is 5 and 1/3. Other data included are:

(a) Whole-day radio quality indices, which are weighted averages of the four 6-hourly indices, with half weight given to quality grades 5 and 6. This procedure tends to give whole-day indices suitable for comparison with whole-day advance forecasts which seek to designate the days of significant disturbance or unusually quiet conditions.

(b) Short-term forecasts, issued every six hours by the North Atlantic Radio Warning Service. These are issued one hour before $00^h$, $06^h$, $12^h$, $18^h$, UT and are applicable to the period 1 to 7 hours ahead.

(c) Advance forecasts, issued twice weekly by the NARWS (CRPL-J reports) and applicable 1 to 3 or 4 days ahead, 4 or 5 to 7 days ahead, and 8 to 25 days ahead. These forecasts are scored against the whole-day quality indices.

(d) Half-day averages of the geomagnetic K indices measured by the Fredericksburg Magnetic Observatory of the U. S. Coast and Geodetic Survey.

A chart compares the short-term forecasts with Qa-figures. A second chart compares the outcome of advance forecasts (1 to 3 or 4 days ahead) with a type of "blind" forecast. For the latter, the frequency for each quality grade, as determined from the distribution of quality grades in the four most recent months of the current season, is partitioned among the grades observed in the current month in proportion to the frequencies observed in the current month.

Ranges of useful frequencies on the North Atlantic radio path are shown in a series of diagrams, one for each day. The shaded area indicates the range of frequencies for which transmissions of quality 5 or greater were observed. The blacker the diagram, the quieter the day has been; a narrow strip indicates either high LUHF, low MUF, or both. These diagrams are based on data reported to CRPL by the German Post Office through the Fernmeldetechnischen Zentralamtes, Darmstadt, Germany, being observations every one and a half hours of selected transmitters located in the eastern portion of North America. The magnetic activity index, $A_{Fr}$, from Fredericksburg, Va., is also given for each day.

<u>Note</u>: Beginning with data for September 1955, Qa has been determined from reports that are available within a few hours or at most within a few days, including for the first time, the CRPL observations. Therefore these are the indices by which the forecasters assess every day the conditions in the recent past. Over a period of several years, they have closely paralleled the former Qa indices which excluded CRPL observations and included three additional reports received after a considerable lag. Qa was first published to the nearest one-third of a unit at the same time.

<u>North Pacific Radio Path</u> -- The CRPL quality figures, Qp, are compiled by the North Pacific Radio Warning Service (NPRWS), the CRPL forecasting center at Anchorage, Alaska, from radio traffic data for moderately long transmission paths in the North Pacific equivalent to Seattle-to-Anchorage or Anchorage-to-Tokyo. These include reports to CRPL by the Alaska Communications System, Aeronautical Radio, Inc., U. S. Air Force and Civil Aeronautical Administration. In addition, there are CRPL monitoring, direction finder observations and field strength measurements of suitable transmissions.

The original reports are on various scales and for various time intervals. The observations for each 8 hours or 24 hour period are averaged on the original scale. This average is compared with reports for the same period in the preceding two months and expressed as a deviation from the 3-month mean. The deviations are put on the 1 to 9 scale of quality which is assumed to have a standard deviation of 1.25 and a mean for the various periods as follows:

| | |
|---|---|
| 03-10 hours UT | 5.33 |
| 11-18 | 5.33 |
| 19-02 | 6.00 |
| 00-24 | 5.67 |

The 8-hour and 24-hour indices Qp are determined separately. Each index is a weighted mean where the CRPL observations have unit weight and the others are weighted by the correlation coefficient with the CRPL observations.

The table, analagous to that for Qa, includes the 8-hourly quality figures; whole day quality figures; short-term forecasts issued by NPRWS three times daily at $02^h$, $10^h$, and $18^h$ UT, applicable to the stated 8-hour periods; advance forecasts issued twice weekly by NPRWS (CRPL-Jp report); and half-day averages of geomagnetic K indices from Sitka.

The chart compares the outcome of advance forecasts, on the same basis as the similar chart for the North Atlantic Radio Path.

<u>Note</u>: Beginning with November 1956 the short-term forecast formerly made at 0900 UT was changed to 1000 UT. The North Pacific quality figures used for evaluation are now 8-hourly rather than 9-hourly.

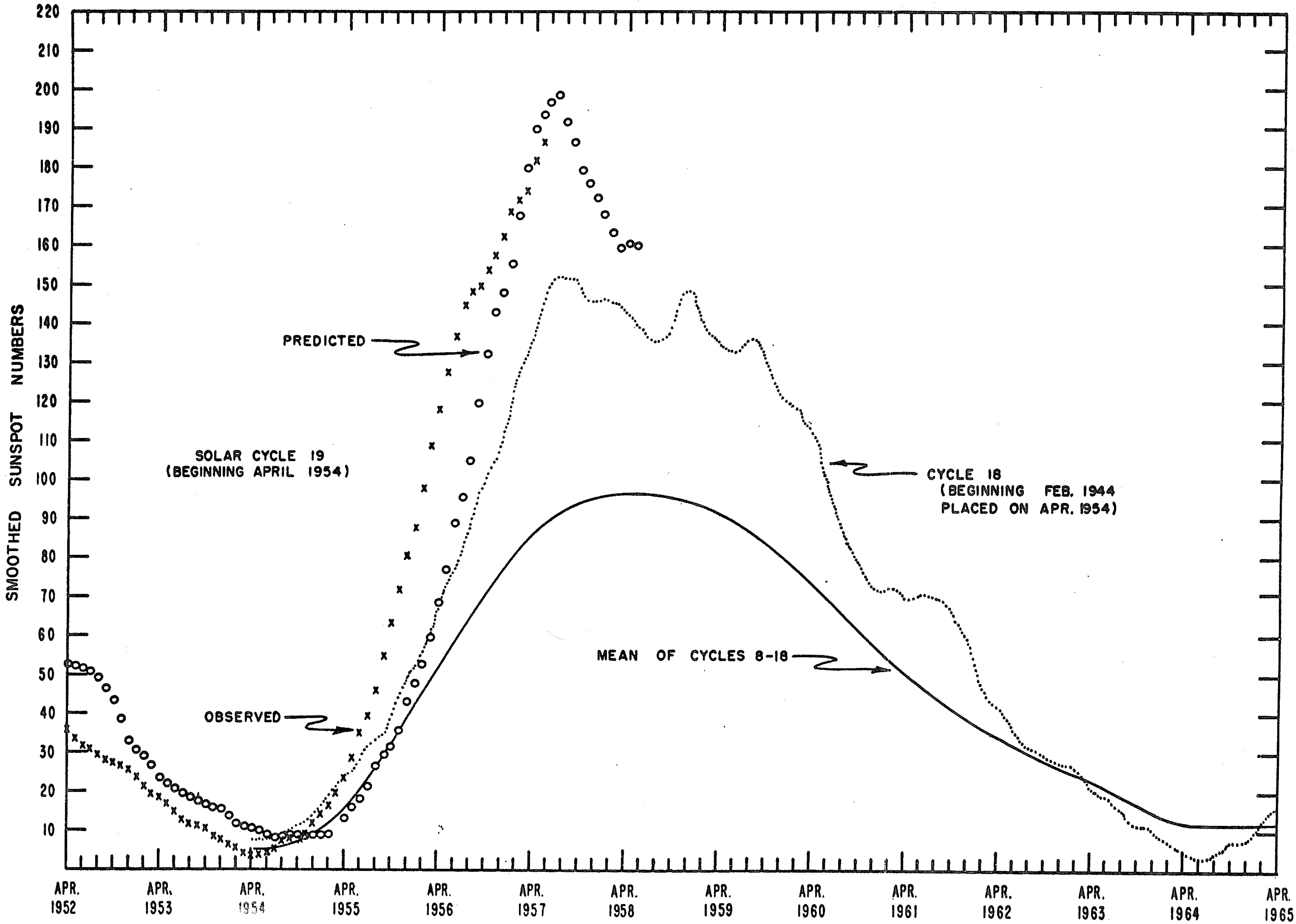
## VII ALERT PERIODS AND SPECIAL WORLD INTERVALS

A table gives the Alert Periods and Special World Intervals (SWI) as designated by the IGY World Warning Agency at Ft. Belvoir, Va. For each day of the Alert or SWI are given the number of flares of importance two or greater reported promptly to the IGY World Warning Agency and the magnetic activity index $A_{Be}$ observed at the IGY World Warning Agency.

# DAILY SOLAR INDICES

| Oct. 1957 | American Relative Sunspot Numbers $R_A'$ |
|---|---|
| 1 | 219 |
| 2 | 245 |
| 3 | 225 |
| 4 | 223 |
| 5 | 221 |
| 6 | 196 |
| 7 | 226 |
| 8 | 257 |
| 9 | 216 |
| 10 | 201 |
| 11 | 219 |
| 12 | 245 |
| 13 | 245 |
| 14 | 190 |
| 15 | 207 |
| 16 | 212 |
| 17 | 186 |
| 18 | 161 |
| 19 | 191 |
| 20 | 194 |
| 21 | 203 |
| 22 | 228 |
| 23 | 223 |
| 24 | 263 |
| 25 | 259 |
| 26 | 265 |
| 27 | 277 |
| 28 | 276 |
| 29 | 283 |
| 30 | 317 |
| 31 | 234 |
| Mean: | 229.2 |

| Nov. 1957 | Zürich Provisional Relative Sunspot Numbers $R_Z$ | Oct | Daily Values Solar Flux at 2800 Mc, Ottawa, Canada Flux | Oct |
|---|---|---|---|---|
| 1 | 265 | 244 | 300 | 268 |
| 2 | 256 | 240 | 289 | 252 |
| 3 | 230 | 249 | 266 | 265 |
| 4 | 210 | 233 | 236 | 237 |
| 5 | 200 | 230 | 240 | 245 |
| 6 | 180 | 239 | 239 | 250 |
| 7 | 175 | 224 | 243 | 253 |
| 8 | 155 | 250 | 235 | 261 |
| 9 | 190 | 274 | 230 | 275 |
| 10 | 230 | 270 | 232 | 275 |
| 11 | 224 | 220 | 246 | 278 |
| 12 | 220 | 260 | 257 | 284 |
| 13 | 185 | 246 | 250 | 281 |
| 14 | 180 | 258 | 248 | 289 |
| 15 | 177 | 250 | 242 | 277 |
| 16 | 180 | 289 | 242 | 289 |
| 17 | 191 | 268 | 228 | 272 |
| 18 | 225 | 228 | 247 | 294 |
| 19 | 183 | 223 | 251 | 291 |
| 20 | 208 | 235 | 261 | 303 |
| 21 | 235 | 250 | 274 | 282 |
| 22 | 275 | 255 | 294 | 274 |
| 23 | 250 | 260 | 280 | 295 |
| 24 | 236 | 285 | 285 | 280 |
| 25 | 200 | 247 | 271 | 259 |
| 26 | 198 | 310 | 259 | 266 |
| 27 | 171 | 286 | 258 | 296 |
| 28 | 235 | 340 | 255 | 323 |
| 29 | 192 | 350 | 247 | 342 |
| 30 | 162 | 330 | 278 | 344 |
| | | 306 | | 318 |
| Mean: | 207.3 | 262.9 | 256.1 | 281.2 |




PREDICTED AND OBSERVED SUNSPOT NUMBERS

# CALCIUM PLAGE AND SUNSPOT REGIONS

## NOVEMBER 1957

| CMP Nov. 1957 | Lat | McMath Plage Number | Return of Region | Calcium Plage Data: CMP Values Area | Int. | History | Age | Sunspot Data: CMP Values Area | Count | History |
|---|---|---|---|---|---|---|---|---|---|---|
| 02.0 | N08 | 4217 | New | 900 | 2.5 | b\—ℓ | 1 | | | |
| 02.5 | S14 | 4222 | New | 900 | 2 | b—ℓ | 1 | | | |
| 03.8 | N11 | 4211 | 4172 | 1800 | 2 | ℓ\—ℓ | 2 | 200 | 2 | ℓ—ℓ |
| 04.0 | S16 | 4210 | 4176 | 600 | 2 | ℓ\—d | 5 | 80 | 1 | b—d |
| 05.2 | N41 | 4212 | 4171 | 3800 | 3 | ℓ\—ℓ | 2 | 20 | 1 | b—d |
| 05.9 | S40 | 4219 | 4173 | 1000 | 1.5 | ℓ—d | 2 | | | |
| 06.1 | S17 | 4218 | 4177 | 3200 | 3.5 | ℓ—ℓ | 3 | 600 | 4 | ℓ—ℓ |
| 07.0 | N16 | 4231 | 4179? | 500 | 1.5 | b⌐ℓ | 2? | | | |
| 07.6 | N33 | 4220 | 4179? | 1500 | 2.5 | ℓ—ℓ | 2? | 130 | 4 | ℓ—ℓ |
| 07.9 | N23 | 4229 | 4179? | 600 | 2 | b—ℓ | 2? | 50 | 1 | ℓ—d |
| 09.0 | S28 | 4224 | 4187 | 1300 | 1.5 | ℓ—ℓ | 7 | | | |
| 09.2 | N23 | 4221 | 4182? | 2400 | 2.5 | ℓ\—ℓ | 2? | 50 | 1 | ℓ\d |
| 09.7 | N14 | 4228 | 4180 | 2600 | 2 | ℓ—ℓ | 7 | 50 | 1 | ℓ\d |
| 10.8 | S33 | 4225 | New | 2100 | 2 | ℓ—ℓ | 1 | 100 | 1 | ℓ∧d |
| 11.1 | S18 | 4240 | 4185 | 2000 | 2 | ℓ—ℓ | 2 | | | |
| 11.4 | S11 | 4227 | 4185 | 800 | 2 | ℓ\—d | 2 | | | |
| 11.9 | S24 | 4226 | 4185 | 1000 | 1 | ℓ—d | 2 | 50 | 1 | ℓ\d |
| 12.2 | N18 | 4230 | New | 7800 | 4 | ℓ∨ℓ | 1 | 820 | 11 | ℓ¬ℓ |
| 13.1 | S22 | 4236 | 4189 | 6000 | 3 | ℓ⌐ℓ | 3 | 740 | 12 | b∧ℓ** |
| 13.6 | N19 | 4235 | 4188 | 1800 | 3.5 | ℓ¬d | 7 | 220 | 4 | b—ℓ |
| 14.2 | N06 | 4233 | New | 2100 | 2.5 | ℓ—ℓ | 1 | 340 | 13 | b/ℓ |
| 14.9 | S21 | 4237 | 4189 | 6500 | 3 | ℓ—ℓ | 3 | 70 | 2 | ℓ\d |
| 14.9 | N26 | 4234 | 4188 | 1500 | 2.5 | ℓ\—ℓ | 7 | | | |
| 16.2 | S15 | 4238 | 4191 | 700 | 2 | ℓ\—ℓ | 4 | | | |
| 17.9 | N16 | 4242 | New | 2800 | 2.5 | ℓ—/ℓ | 1 | 390 | 8 | b—ℓ |
| 18.2 | S10 | 4243 | New | 6300 | 3 | ℓ—ℓ | 1 | 160 | 4 | ℓ—ℓ |
| 18.6 | S25 | 4245 | 4193 | (900) | (2) | ℓ⌐ℓ | 2 | (370) | (8) | b—ℓ |
| 19.5 | N12 | 4252 | 4196 | 1000 | 1.5 | ℓ—ℓ | 6 | 100 | 2 | b—d |
| 20.3 | N25 | 4246 | 4196 | 4300 | 3.5 | ℓ⌐ℓ | 6 | 300 | 7 | ℓ/ℓ |
| 20.3 | S16 | 4259 | New | 300 | 1 | b—ℓ | 1 | | | |
| 21.2 | N13 | 4247 | 4197 | 3500 | 5 | ℓ⌐ℓ | 6 | 760 | 8 | ℓ∧—ℓ |
| 22.4 | S26 | 4248 | 4201 | 5000 | 2 | ℓ⌐¬ℓ | 3 | | | |
| 23.1 | S09 | 4256 | 4203 | 1400 | 3.5 | ℓ⌐ℓ | 2 | | | |
| 23.6 | N20 | 4254 | * | 6000 | 3 | ℓ\—ℓ | 4 | (270) | (1) | ℓ—ℓ |
| 23.8 | S14 | 4255 | 4203 | 4000 | 3.5 | ℓ—ℓ | 2 | (620) | (7) | ℓ¬ℓ |
| 25.4 | S15 | 4257 | 4214 | 5700 | 3 | ℓ—ℓ | 2 | 510 | 6 | ℓ¬ℓ |
| 26.2 | N37 | 4266 | 4215? | 400 | 1 | ℓ—d | 2 | | | |
| 26.2 | S23 | 4264 | 4207 | 1000 | 1.5 | ℓ¬d | # | | | |
| 26.5 | N22 | 4261 | 4205 | 900 | 1.5 | ℓ—d | 3 | | | |
| 26.8 | N11 | 4262 | 4206 | (400) | (1.5) | ℓ\d | 2 | | | |
| 27.1 | S16 | 4263 | 4207 | 8800 | 4 | ℓ—ℓ | # | 610 | 12 | ℓ∧ℓ |
| 28.2 | S15 | 4267 | 4207 | 800 | 1 | ℓ\—ℓ | # | 40 | 3 | b—d |
| 28.3 | N27 | 4268 | 4208 | 2800 | 2.5 | ℓ—ℓ | 2 | 70 | 4 | b—d |
| 28.5 | S26 | 4265 | 4207 | 3200 | 3 | ℓ—ℓ | # | 150 | 1 | ℓ\d |
| 29.7 | S18 | 4269 | 4210 | 1200 | 3 | ℓ/ℓ | 6 | 630 | 7 | b⌐ℓ*** |
| 30.4 | S08 | 4279 | New | 700 | 3 | b—ℓ | 1 | 50 | 3 | b—ℓ |
| 30.5 | N15 | 4271 | 4211 | 2500 | 3 | ℓ—ℓ | 5 | | | |

*4202, 4213, and part of 4197.
**Spot group grew in rapidly.
***Spot group grew to maximum area of 2280 millionths.
McMath re-identifies region 4209 (CRPL-F159B) as a new region.
#Age 4,5.

# CORONAL LINE EMISSION INDICES

## NOVEMBER 1957

| CMP Nov. 1957 | North East Quadrant (observed 7 days earlier) | | | | South East Quadrant (observed 7 days earlier) | | | | South West Quadrant (observed 7 days later) | | | | North West Quadrant (observed 7 days later) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | G6 | G1 | R6 | R1 | G6 | G1 | R6 | R1 | G6 | G1 | R6 | R1 | G6 | G1 | R6 | R1 |
| 1 | x | x | x | x | x | x | x | x | 175 | 300 | 98 | 156 | 122* | 135 | 41 | 48 |
| 2 | 126 | 158 | 48 | 57 | 190 | 240 | 79 | 108 | 160* | 206 | 46 | 57 | 171* | 326 | 55 | 96 |
| 3 | 169 | 248 | x | x | x | x | x | x | 111 | 144 | 25a | 46a | 87 | 112 | 46a | 68a |
| 4 | x | x | x | x | x | x | x | x | 93 | 158 | x | x | 74 | 93 | x | x |
| 5 | 238 | 188 | 55 | 78 | 190 | 210 | 43 | 76 | x | x | x | x | x | x | x | x |
| 6 | 118 | 140 | 101 | 123 | 152* | 212 | 45 | 58 | x | x | x | x | x | x | x | x |
| 7 | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x |
| 8 | 242 | 376 | x | x | x | x | x | x | x | x | x | x | x | x | x | x |
| 9 | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x |
| 10 | 118 | 202 | 47 | 68 | 143 | 208 | 53 | 78 | x | x | x | x | x | x | x | x |
| 11 | 159 | 231 | 82 | 147 | 159 | 216 | 80 | 108 | x | x | x | x | x | x | x | x |
| 12 | 178a | 236a | 83a | 174a | x | x | 48a | 60a | x | x | x | x | x | x | x | x |
| 13 | 109 | 130 | x | x | 111 | 126 | x | x | x | x | x | x | x | x | x | x |
| 14 | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x |
| 15 | 139 | 269 | 41 | 65 | x | x | 63 | 91 | 110 | 144 | 31 | 56 | 93 | 108 | 11 | 24 |
| 16 | 120 | 152 | 39 | 52 | 221 | 400 | 74 | 135 | 117 | 135 | 40 | 93 | 99 | 136 | 17 | 39 |
| 17 | 191 | 249 | 26a | 39a | 164 | 200 | 53a | 121a | x | x | x | x | x | x | x | x |
| 18 | 96 | 132 | x | x | 124 | 167 | x | x | 120 | 143 | x | x | 159* | 201 | x | x |
| 19 | x | x | x | x | x | x | x | x | 82 | 102 | 51 | 96 | 127* | 152 | 40 | 58 |
| 20 | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x |
| 21 | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x |
| 22 | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x |
| 23 | x | x | x | x | x | x | x | x | 127 | 202 | 65 | 99 | 104 | 140 | 54 | 82 |
| 24 | x | x | x | x | x | x | x | x | 154 | 352 | 54 | 90 | 110 | 176 | 26 | 33 |
| 25 | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x |
| 26 | x | x | x | x | x | x | x | x | 75 | 96 | 43 | 78 | 106 | 164 | 29 | 36 |
| 27 | x | x | x | x | x | x | x | x | 133 | 184 | 36 | 72 | 85 | 188 | 45 | 94 |
| 28 | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x |
| 29 | 158 | 294 | 59 | 81 | 138 | 300 | 23 | 28 | x | x | x | x | x | x | x | x |
| 30 | 118 | 160 | 59 | 116 | 107 | 168 | 17 | 24 | x | x | x | x | x | x | x | x |

* = yellow line observed.
a = index computed from low weight data.
x = no observations.

# SOLAR FLARES

| Observatory | Date Nov. 1957 | Observed Universal Time: Start | End | Max. Phase | Location: Approx. Lat. | Mer. Dist. | McMath Plage Region | Duration – Minutes | Importance | Obs. Cond. | Measurements: Time – U T | Meas. Area Sq. Deg. | Corr. Area Sq. Deg. | Max. Width Hα | Max. Int. % | Provisional Ionospheric Effect |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MITAKA | 01 | 0021 E | 0026 D | | N28 | W06 | 4208 | 5 D | 1 | 2 | 0021 | .89 | .98 | 1.31 | 134 | |
| MITAKA | 01 | 0439 E | 0448 | | N22 | W60 | 4202 | 9 D | 1 | 1 | 0439 | .89 | 1.73 | 2.10 | 107 | |
| ZURICH | 01 | 1104 | 1116 | | S18 | E57 | 4218 | 12 | 1 | 3 | 1106 | | 3.00 | | | |
| ZURICH | 01 | 1117 | 1143 | | S25 | W03 | 4207 | 26 | 1 | 3 | 1120 | | 3.00 | | | |
| HUANCAYO | 01 | 1700 E | 1709 | 1704 | S17 | E53 | 4218 | 9 D | 1 | 2 | | | | | | |
| HAWAII | 01 | 2346 | 2358 D | 2350 | S18 | W22 | 4207 | 12 D | 1 | 3 | 2350 | 2.30 | 2.60 | | | |
| ZURICH | 02 | 1533 | 1539 D | | S20 | W19 | 4207 | 6 D | 1 | 2 | 1533 | | 7.00 | | | |
| SAC PEAK | 02 | 2050 E | 2115 D | 2052 | S18 | W24 | 4207 | 25 D | 1 | 1 | | 3.70 | | | 17 | |
| MITAKA | 02 | 2335 | 2344 | 2336 | S24 | W24 | 4207 | 9 | 1& | 3 | 2336 | 4.45 | 5.34 | 2.21 | 134 | |
| MITAKA | 03 | 0112 | 0118 | | S18 | W27 | 4207 | 6 | 1 | 2 | 0112 | 1.84 | 2.21 | 1.62 | 100 | |
| WENDEL | 03 | 0928 | 0942 | | S15 | W35 | 4207 | 14 | 1 | | | | 3.00 | | | |
| WENDEL | 03 | 1119 | 1131 | | N12 | W82 | 4213 | 12 | 1 | | | | 4.00 | | | |
| SAC PEAK | 03 | 1747 | 1940 D | 1836 | S20 | W34 | 4207 | 113 D | 1 | 2 | | 4.90 | | | 17 | |
| HAWAII | 04 | 0058 | 0116 | 0102 | S20 | W42 | 4207 | 18 | 1 | 3 | 0102 | 1.60 | 2.30 | | | |
| MITAKA | 04 | 0106 E | 0111 D | | S21 | W34 | 4207 | 5 D | 1 | 1 | 0106 | 3.80 | 5.10 | 1.46 | 125 | |
| ARCETRI | 04 | 0937 E | 0953 D | | S10 | W20 | 4222 | 16 D | 1 | 3 | | | | | | |
| WENDEL | 04 | 0937 | 1004 | | S13 | W20 | 4222 | 27 | 1& | | | | 5.00 | | | |
| WENDEL | 04 | 1059 | 1115 | | S22 | W39 | 4207 | 16 | 1& | | | | 6.00 | | | |
| USNRL | 04 | 1735 | 1750 | 1735 | S27 | W45 | 4207 | 15 | 1 | 1 | 1735 | .85 | 1.40 | | 113 | |
| USNRL | 04 | 1949 | 1959 | 1949 | N23 | W58 | 4208 | 10 | 1 | 1 | 1949 | .34 | .64 | | 99 | |
| UCCLE | 05 | 1102 E | 1109 | | N24 | W68 | 4208 | 7 D | 1 | 1 | | | | | | |
| UCCLE | 05 | 1120 | 1132 | 1122 | S34 | E62 | 4225 | 12 | 1 | 3 | | | | | | |
| CAPRI S | 05 | 1205 E | 1223 D | | S23 | W54 | 4207 | 18 D | 1 | 2 | 1215 | 1.20 | 2.40 | | | S-SWF |
| USNRL | 05 | 1231 | 1257 | 1237 | S25 | W58 | 4207 | 26 | 1 | 2 | 1237 | 1.13 | 2.41 | | 87 | |
| UCCLE | 06 | 0835 | 0851 | 0841 | S28 | W73 | 4207 | 16 | 2 | 3 | 0841 | 9.10 | 15.00 | | | |
| ATHENS | 06 | 0839 | 0848 | 0843 | S28 | W63 | 4207 | 9 | 2 | 3 | | 1.90 | 4.80 | | | S-SWF |
| R O HERST | 06 | 0842 E | 0850 | 0842 E | S27 | W67 | 4207 | 8 D | 1 | 1 | 0842 | 1.00 | 1.80 | | | |
| UCCLE | 06 | 0854 | 0900 | 0857 | S28 | W73 | 4207 | 6 | 1 | 4 | 0857 | 2.30 | 4.10 | | | |
| USNRL | 06 | 1553 | 1608 | 1554 | S28 | W70 | 4207 | 15 | 1 | 2 | 1554 | 1.13 | 4.30 | | 70 | |
| OTTAWA | 06 | 1555 | 1608 | 1557 | S30 | W68 | 4207 | 13 | 1& | 1 | 1557 | 1.86 | 6.66 | | | |
| USNRL | 06 | 1728 | 1837 | 1736 | S40 | W10 | 4219 | 69 | 1 | 2 | 1736 | 1.70 | 2.34 | | 67 | |
| CLIMAX | 06 | 1728 | 1927 D | 1750 | S41 | W09 | 4219 | 119 D | 1 | | 1750 | 4.00 | | | | |
| SAC PEAK | 06 | 1740 | 1837 U | 1755 | S42 | W10 | 4219 | 57 D | 1 | 2 | | 2.50 | | | 14 | |
| USNRL | 06 | 1806 E | 1902 | | S27 | W80 | 4207 | 56 D | 1 | 1 | 1806 | .45 | 2.29 | | 66 | |
| HAWAII | 06 | 2158 | 2204 | 2200 | N09 | E64 | 4232 | 6 | 1& | 2 | 2200 | 3.30 | 7.60 | | | |
| HAWAII | 06 | 2228 | 2246 | 2228 | S13 | W16 | 4218 | 18 | 1 | 2 | 2228 | 2.60 | 2.80 | | | |
| MITAKA | 07 | 0229 E | 0238 D | | N19 | E59 | 4230 | 9 D | 1 | 1 | 0229 | 1.84 | 3.31 | 2.15 | 89 | S-SWF |
| MITAKA | 07 | 0253 E | 0313 D | 0255 | S16 | W14 | 4218 | 20 D | 1 | 1 | 0254 | 2.73 | 3.00 | 2.37 | 149 | |
| UCCLE | 07 | 0848 E | 0856 | | N20 | E75 | 4235 | 8 D | 1 | 1 | | | | | | |
| UCCLE | 07 | 1016 E | 1055 | | N30 | W01 | 4220 | 39 D | 1 | 2 | 1016 | 2.20 | 2.20 | | | |
| UCCLE | 07 | 1023 | 1046 | 1030 | S35 | E35 | 4225 | 23 | 1 | 2 | 1030 | 1.50 | 2.10 | | | |
| UCCLE | 07 | 1046 E | 1115 D | 1054 | S35 | E35 | 4225 | 29 D | 2 | 2 | 1054 | 5.00 | 7.50 | 1.00 | | |
| WENDEL | 07 | 1048 E | 1118 | | S33 | E34 | 4225 | 30 D | 1& | | | | 6.00 | | | |
| WENDEL | 08 | 1014 | 1042 D | 1017 | S23 | E86 | 4237 | 28 D | 1& | | | | 6.00 | | | |
| UCCLE | 08 | 1042 E | | | S25 | E70 | 4237 | | 1 | 1 | | | | | | |
| UCCLE | 08 | 1047 E | | | N17 | E73 | 4235 | | 1 | 1 | | | | | | |

CAPRI S — ANACAPRI SWEDISH
KODAIKNL — KODAIKANAL
KRASNYA — KRASNAYA PAKHRA
R.O EDIN — ROYAL OBSERVATORY, EDINBURGH
R O HERST — GREENWICH ROYAL OBSERVATORY, HERSTMONCEUX
SAC PEAK — SACRAMENTO PEAK
SCHAUINS — SCHAUINSLAND
USNRL — UNITED STATES NAVAL RESEARCH LABORATORY

* RATED AS IMPORTANCE 1- BY OTHER OBSERVATORIES.

SAC PEAK: ALL VALUES IN MAX. INT. COLUMN ARE ARBITRARY UNITS (0-40), NOT PERCENT OF CONTINUOUS SPECTRUM.

E -- LESS THAN
D -- GREATER THAN
U -- APPROXIMATE
& -- PLUS
- -- MINUS

# SOLAR FLARES

| OBSERVATORY | DATE Nov. 1957 | OBSERVED UNIVERSAL TIME START | END | MAX. PHASE | LOCATION APPROX. LAT. | MER. DIST. | McMATH PLAGE REGION | DURATION — MINUTES | IMPORTANCE | OBS. COND. | MEASUREMENTS TIME — U T | MEAS. AREA Sq. Deg. | CORR. AREA Sq. Deg. | MAX. WIDTH Hα | MAX. INT. % | PROVISIONAL IONOSPHERIC EFFECT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HUANCAYO | 08 | 1628 E | 1641 | 1631 | N19 | E36 | 4230 | 13 D | 1 | 2 | | | | | | |
| HUANCAYO | 08 | 2003 E | 2005 D | 2003 | S21 | E72 | 4237 | 2 D | 1 | 2 | | | | | | S-SWF |
| WENDEL | 09 | 0740 | 0757 D | | S14 | E67 | 4237 | 17 D | 1+ | | | | 6.00 | | | |
| OTTAWA | 09 | 1510 | | | S12 | E65 | 4237 | | 1 | 1 | 1512 | 1.04 | 2.76 | | | |
| ATHENS | 10 | 0653 E | 0728 D | 0655 | S23 | E63 | 4237 | 30 D | 2 | 4 | | 3.20 | 8.00 | | | S-SWF |
| WENDEL | 10 | 1005 | 1022 D | | S21 | E35 | 4236 | 17 D | 1 | | | | 3.00 | | | |
| WENDEL | 10 | 1205 E | 1217 D | | S25 | E57 | 4237 | 12 D | 1+ | | | | 6.00 | | | |
| USNRL | 11 | 1410 | 1438 | 1420 | S35 | E45 | 4237 | 28 | 1+ | 3 | 1420 | 2.60 | 4.33 | | 108 | S-SWF |
| OTTAWA | 11 | 1426 E | | | S23 | E45 | 4237 | | 1 | 1 | 1428 | 1.86 | 2.99 | | | |
| CAPRI S | 12 | 0833 E | 0931 D | | S21 | E12 | 4236 | 58 D | 1 | 3 | 0835 | 2.50 | 2.70 | | | |
| CAPRI S | 12 | 1217 | 1320 | | S21 | E18 | 4236 | 63 | 1+ | 3 | 1220 | 3.00 | 3.30 | | | |
| USNRL | 12 | 1439 | 1449 | 1441 | S19 | W81 | 4218 | 10 | 1 | 2 | 1441 | .73 | 3.71 | | 72 | |
| {HUANCAYO | 12 | 1619 E | 1634 | 1621 | S07 | E78 | 4243 | 15 D | 1 | 3 | | | | | | |
| {USNRL | 12 | 1619 | 1638 | 1622 | S10 | E85 | 4243 | 19 | 1 | 2 | 1622 | .62 | 4.53 | | 72 | |
| USNRL | 12 | 1925 | 1939 | 1927 | S18 | W85 | 4218 | 14 | 1 | 2 | 1927 | .68 | 3.43 | | 62 | |
| USNRL | 12 | 1926 | 1941 | 1929 | N08 | E13 | 4233 | 15 | 1 | 2 | 1929 | .56 | .58 | | 127 | |
| HAWAII | 12 | 2104 | 2114 | 2106 | S13 | W27 | 4240 | 10 | 1 | 2 | 2106 | 2.10 | 2.40 | | | |
| HAWAII | 12 | 2216 | 2236 | 2218 | S22 | W03 | 4236 | 20 | 1 | 2 | 2218 | 2.60 | 2.80 | | | |
| MITAKA | 13 | 0058 | 0108 D | | S25 | E26 | 4237 | 10 D | 1 | 2 | 0058 | 1.34 | 1.75 | 2.39 | 96 | |
| MITAKA | 13 | 0112 | 0122 | | S25 | E26 | 4237 | 10 | 1 | 2 | 0114 | 1.84 | 2.41 | 2.56 | 125 | |
| {ARCETRI | 13 | 0800 E | 0900 D | | N19 | W16 | 4230 | 60 D | 2 | 2 | | | | | | |
| {ATHENS | 13 | 0810 | 0903 | | N19 | W20 | 4230 | 53 | 1 | 3 | | 2.00 | 2.20 | | | |
| {ATHENS | 13 | 0812 | 0917 | | N18 | W13 | 4230 | 5 | 2 | 3 | | 4.80 | 5.40 | | | |
| {CAPRI S | 13 | 0815 E | 0916 D | | N20 | W20 | 4230 | 61 D | 1+ | 3 | 0838 | 3.50 | 3.90 | | | |
| USNRL | 13 | 1515 E | 1548 | | S18 | W08 | 4236 | 33 D | 1 | 1 | 1518 | 2.26 | 2.45 | | 97 | |
| {HUANCAYO | 13 | 1932 E | 2057 | 2000 | N19 | W23 | 4230 | 85 D | 1+ | 2 | | | | | | |
| {SAC PEAK | 13 | 1935 | 2100 U | 2015 | N18 | W24 | 4230 | 85 D | 1 | 2 | | 3.30 | | | 15 | |
| {USNRL | 13 | 1940 E | 2007 D | | N19 | W26 | 4230 | 27 D | 1+ | 1 | 2003 | 2.48 | 2.86 | | 118 | |
| HUANCAYO | 13 | 1955 E | 2004 D | 1955 | S23 | E17 | 4237 | 9 D | 1 | 2 | | | | | | |
| WENDEL | 14 | 1158 | 1208 D | | S20 | W14 | 4236 | 10 D | 1 | | | | 3.00 | | | |
| HYDERABAD | 15 | 0529 | 0605 | 0540 | N18 | W45 | 4230 | 36 | 1+ | 2 | 0540 | 3.65 | 5.34 | 2.00 | | |
| ATHENS | 15 | 0735 | 0746 | | N08 | W19 | 4233 | 11 | 1 | 3 | | 2.00 | 2.10 | | | |
| {WENDEL | 15 | 0902 | 0944 | | N20 | W39 | 4230 | 42 | 2 | | | | 8.00 | | | |
| {WENDEL | 15 | 0902 | 0944 | | N19 | W47 | 4230 | 42 | 1+ | | | | 7.00 | | | |
| {CAPRI S | 15 | 0908 | 0935 D | | N17 | W50 | 4230 | 27 D | 1 | 3 | 0927 | 3.00 | 4.80 | | | |
| UCCLE | 15 | 1055 E | | | N08 | W21 | 4233 | | | 1 | | | | | | |
| UCCLE | 15 | 1057 E | 1058 D | | N19 | W67 | | | | 1 | | | | | | |
| WENDEL | 16 | 0810 E | 0816 | | N12 | W33 | 4233 | 16 D | 1+ | | | | 6.00 | | | |
| HYDERABAD | 17 | 0539 E | 0552 | 0542 | N28 | E36 | 4246 | 13 D | 1+ | 2 | 0542 | 3.04 | 4.15 | 2.30 | | Slow S-SWF |
| {ATHENS | 17 | 0755 | 0819 | | S17 | W55 | 4236 | 24 | 1 | 3 | | 1.80 | 3.20 | | | |
| {CAPRI S | 17 | 0759 E | 0840 | | S17 | W60 | 4236 | 41 D | 1 | 3 | 0822 | 1.30 | 2.90 | | | |
| {WENDEL | 17 | 0808 E | 0840 | | S20 | W54 | 4236 | 32 D | 2+ | | | | 9.00 | | | |
| WENDEL | 17 | 0829 | 0850 | | N27 | E23 | 4246 | 21 | 1+ | | | | 5.00 | | | |
| WENDEL | 17 | 1031 | 1049 | | N14 | E06 | 4242 | 18 | 1 | | | | 3.00 | | | |

# SOLAR FLARES

| OBSERVATORY | DATE Nov. 1957 | OBSERVED UNIVERSAL TIME START | END | MAX. PHASE | LOCATION APPROX. LAT. | MER. DIST. | McMATH PLAGE REGION | DURA-TION — MINUTES | IM-POR-TANCE | OBS. COND. | MEASUREMENTS TIME — U T | MEAS. AREA Sq. Deg. | CORR. AREA Sq. Deg. | MAX. WIDTH Hα | MAX. INT. % | PROVISIONAL IONOSPHERIC EFFECT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| WENDEL | 17 | 1134 | 1228 D | | N27 | E31 | 4246 | 54 D | 1 | | | | 4.00 | | | |
| WENDEL | 17 | 1239 | 1254 | | N14 | E05 | 4242 | 15 | 1 | | | | 4.00 | | | |
| WENDEL | 17 | 1339 | 1359 | | N04 | W44 | 4233 | 20 | 1& | | | | 5.00 | | | |
| HAWAII | 17 | 2048 | 2102 | 2054 | N26 | E26 | 4246 | 14 | 1 | 3 | 2054 | 3.30 | 3.80 | | | |
| HAWAII | 17 | 2226 | 2230 | 2228 | N20 | E25 | 4246 | 4 | 1 | 3 | 2228 | 2.30 | 2.60 | | | |
| HAWAII | 18 | 0126 | 0138 | 0132 | N08 | W54 | 4233 | 12 | 1 | 3 | 0132 | 1.80 | 3.30 | | | |
| ATHENS | 18 | 0725 | 0817 | | N30 | E21 | 4246 | 52 | 1 | 2 | | 2.70 | 3.20 | | | |
| UCCLE | 18 | 0853 | 0857 | 0854 | N26 | E22 | 4246 | 4 | 1 | 3 | 0854 | 3.20 | 3.80 | | | |
| UCCLE | 18 | 1007 | 1030 | 1013 | S25 | E60 | 4248 | 23 | 1& | 3 | 1013 | 4.00 | 6.00 | | | |
| UCCLE | 18 | 1021 | 1106 | 1033 | N07 | W60 | 4233 | 45 | 1 | 3 | | | | | | |
| UCCLE | 18 | 1114 | 1130 | 1116 | N10 | E40 | 4247 | 16 | 1 | 4 | 1116 | 3.20 | 4.00 | | | |
| WENDEL | 19 | 1320 | 1342 | | N18 | E20 | 4247 | 22 | 1 | | | | 4.00 | | | |
| WENDEL | 19 | 1347 | 1358 | | N30 | E05 | 4246 | 11 | 1 | | | | 3.00 | | | |
| WENDEL | 19 | 1352 | 1414 D | | S15 | E60 | 4255 | 22 | 2 | | | | 9.00 | | | |
| MITAKA | 20 | 0314 E | 0328 D | | N25 | W01 | 4246 | 14 D | 1 | 1 | 0314 | .89 | .96 | 2.04 | 115 | |
| MITAKA | 20 | 0533 E | 0548 D | | N17 | E09 | 4247 | 15 D | 1 | 1 | 0533 | .89 | .93 | 1.72 | 85 | |
| WENDEL | 20 | 0845 | 0906 D | | S07 | E29 | 4256 | 21 | 1 | | | | 4.00 | | | |
| OTTAWA | 20 | 1452 | 1507 | 1455 | N14 | W36 | 4242 | 15 | 1& | 1 | 1455 | 1.86 | 2.36 | | | |
| OTTAWA | 20 | 1457 | 1520 | 1504 | N27 | W10 | 4246 | 23 | 1 | 1 | 1504 | 1.68 | 1.89 | | | |
| USNRL | 20 | 1742 | 1858 | 1746 | S15 | E75 | 4257 | 76 | 2 | 2 | 1746 | 1.47 | 7.10 | | 68 | |
| MITAKA | 21 | 0406 E | 0410 D | | N17 | W04 | 4247 | 4 D | 1 | 1 | 0407 | .89 | .93 | 1.39 | 100 | |
| MITAKA | 21 | 0454 | 0517 D | | N11 | W44 | 4242 | 23 D | 1 | 1 | 0505 | 5.52 | 7.50 | 2.03 | 96 | |
| SAC PEAK | 21 | 1435 E | 1531 | 1449 U | N15 | W02 | 4247 | 56 D | 1 | 3 | | 3.30 | | | 18 | |
| OTTAWA | 21 | 1436 E | | | N16 | W09 | 4247 | | 2 | 1 | 1502 | 7.31 | 7.66 | | | Slow S-SWF |
| USNRL | 21 | 1437 | 1548 | 1507 | N17 | W09 | 4247 | 71 | 2 | 2 | 1507 | 5.86 | 6.18 | 1.00 | 100 | |
| MITAKA | 22 | 0409 E | 0446 | 0409 | N30 | W29 | 4246 | 37 D | 2& | 1 | 0409 | 7.12 | 8.75 | 2.93 | 251 | S-SWF |
| MITAKA | 22 | 0536 | 0542 D | | N27 | W33 | 4246 | 6 D | 1 | 1 | 0536 | 3.71 | 4.66 | 1.52 | 105 | |
| MITAKA | 22 | 0555 | 0602 | | N20 | W17 | 4247 | 7 | 1 | 1 | 0559 | 1.84 | 1.99 | 1.69 | 96 | |
| WENDEL | 22 | 0822 | 0855 | | N19 | W19 | 4247 | 33 | 1 | | | | 4.00 | | | |
| WENDEL | 22 | 1314 E | 1334 D | 1317 | N20 | W22 | 4247 | 20 D | 1& | | | | 5.00 | | | |
| WENDEL | 22 | 1329 | 1402 | | S13 | E60 | 4263 | 33 | 1& | | | | 6.00 | | | |
| WENDEL | 22 | 1340 | 1430 D | 1359 | N12 | E18 | 4254 | 50 D | 2 | | | | 9.00 | | | |
| CLIMAX | 22 | 1654 | 1700 | 1656 | N21 | W26 | 4247 | 6 | 1 | | 1656 | 3.10 | | | | |
| MITAKA | 22 | 2312 E | 2338 | 2312 | N28 | W43 | 4246 | 26 D | 1 | 3 | 2312 | 2.31 | 3.74 | 2.36 | 156 | |
| MITAKA | 22 | 2329 E | 2337 | | S10 | E48 | 4263 | 8 D | 1 | 2 | 2332 | 7.57 | 11.58 | 2.22 | 96 | |
| MITAKA | 23 | 0044 | 0106 | 0048 | N20 | W27 | 4247 | 22 | 1 | 2 | 0046 | 3.71 | 4.20 | 2.51 | 134 | |
| MITAKA | 23 | 0330 | 0340 D | 0332 | S13 | E09 | 4255 | 10 D | 1 | 1 | 0330 | 1.84 | 1.95 | 2.93 | 118 | |
| MITAKA | 23 | 0403 | 0408 D | | S10 | E45 | 4263 | 5 D | 1 | 1 | 0403 | 3.80 | 5.80 | 2.51 | 96 | |
| CAPRI S | 23 | 0801 E | 0842 | | N24 | W51 | 4246 | 41 D | 2 | 2 | 0808 | 4.50 | 8.10 | | | |
| WENDEL | 23 | 0825 | 0904 D | | N28 | W52 | 4246 | 39 D | 1 | | | | 4.00 | | | |
| WENDEL | 23 | 0826 | 0845 D | | N21 | W32 | 4247 | 19 D | 1 | | | | 4.00 | | | |
| R O EDIN | 23 | 1111 E | 1125 | 1114 | S13 | E26 | 4257 | 14 D | 1 | 2 | 1114 | 2.00 | 2.30 | 2.23 | | |
| UCCLE | 23 | 1112 | | 1114 | S15 | E27 | 4257 | | 1& | 2 | 1114 | 4.40 | 5.20 | | | |
| WENDEL | 23 | 1302 | 1331 D | | S15 | E22 | 4257 | 29 D | 1 | | | | 4.00 | | | |
| WENDEL | 23 | 1319 | 1338 D | | N16 | W33 | 4247 | 19 D | 1 | | | | 4.00 | | | |
| SAC PEAK | 23 | 1515 | 1945 | 1550 | S14 | E46 | 4263 | 270 | 1 | 2 | | 4.30 | | | 15 | |
| HUANCAYO | 23 | 1623 | 1640 | 1624 | S09 | E37 | 4263 | 17 | 1 | 1 | | | | | | |

# SOLAR FLARES

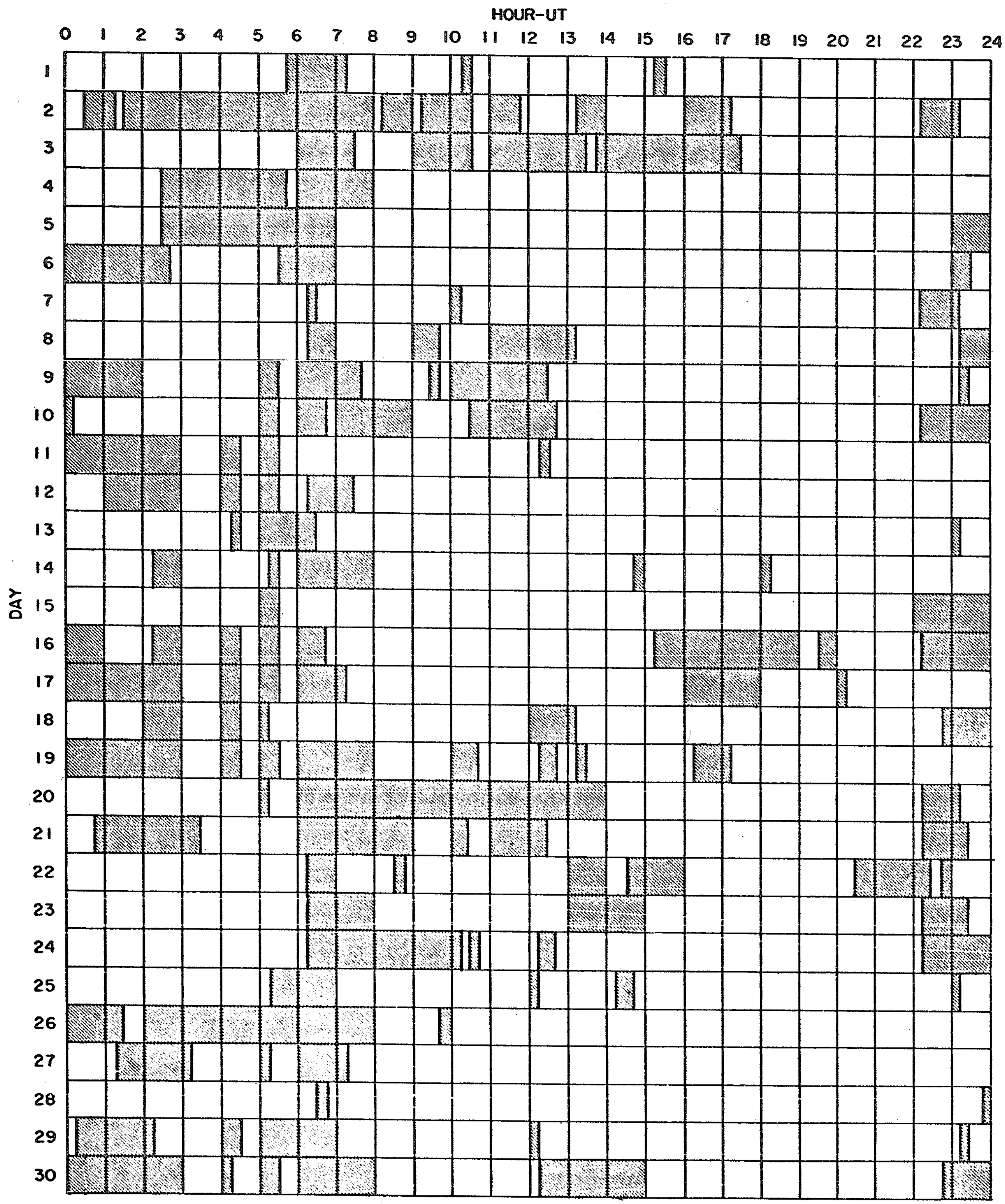
| OBSERVATORY | DATE Nov. 1957 | OBSERVED UNIVERSAL TIME START | END | MAX. PHASE | LOCATION APPROX. LAT. | MER. DIST. | McMATH PLAGE REGION | DURATION — MINUTES | IMPORTANCE | OBS. COND. | MEASUREMENTS TIME — U T | MEAS. AREA Sq. Deg. | CORR. AREA Sq. Deg. | MAX. WIDTH Hα | MAX. INT. % | PROVISIONAL IONOSPHERIC EFFECT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MITAKA | 24 | 0159 | 0205 D | | N20 | W42 | 4247 | 6 D | 1 | 2 | 0159 | 1.84 | 2.58 | 1.65 | 113 | |
| MITAKA | 24 | 0237 E | 0240 | | N16 | W40 | 4247 | 3 D | 1& | 2 | 0239 | 11.39 | 15.60 | | 80 | |
| MITAKA | 24 | 0242 E | 0249 | | S16 | E56 | 4267 | 7 D | 1 | 2 | 0245 | 4.70 | 10.00 | 1.75 | 87 | |
| MITAKA | 24 | 0457 E | 0503 | | N19 | W45 | 4247 | 6 D | 1 | 1 | 0457 | 1.34 | 1.88 | 1.70 | 122 | |
| MITAKA | 24 | 0516 | 0531 | 0521 | N20 | W44 | 4247 | 15 | 1 | 1 | 0521 | 1.34 | 1.84 | 1.72 | 115 | |
| WENDEL | 24 | 0848 | 1140 | 0911 | S15 | E37 | 4263 | 172 | 3& | | | | 25.00 | | | |
| WENDEL | 24 | 0947 E | 1109 D | | S11 | E46 | 4263 | 82 D | 1& | | | | 7.00 | | | |
| R O HERST | 24 | 0954 E | 1045 | 0954 E | S13 | E35 | 4263 | 51 D | 2 | 2 | 0954 | 7.40 | 9.80 | | | |
| UCCLE | 24 | 1006 E | 1021 | 1007 | S08 | E48 | 4267 | 15 D | 2 | 4 | 1007 | 5.60 | 7.80 | | | |
| UCCLE | 24 | 1006 E | 1021 | 1008 | S07 | E46 | 4267 | 15 D | 1& | 4 | 1008 | 3.40 | 5.10 | | | |
| UCCLE | 24 | 1006 E | 1021 D | 1008 | S10 | E32 | 4263 | 15 D | 1 | 2 | 1008 | 2.20 | 2.60 | | | |
| UCCLE | 24 | 1006 E | 1038 | 1012 | S17 | E44 | 4267 | 32 D | 1& | 4 | 1012 | 3.60 | 4.90 | | | |
| UCCLE | 24 | 1006 E | 1107 | 1006 | S12 | E40 | 4267 | 61 D | 1& | 4 | 1006 | 4.50 | 5.40 | | | |
| UCCLE | 24 | 1006 E | 1138 | 1006 | S16 | E38 | 4263 | 92 D | 2& | 4 | 1006 | 7.30 | 9.10 | | | |
| UCCLE | 24 | 1038 | 1043 | 1039 | N30 | W50 | 4246 | 5 | 1& | 3 | 1039 | 3.40 | 5.40 | | | |
| UCCLE | 24 | 1038 E | 1051 | 1042 | S12 | E52 | 4267 | 13 D | 1& | 4 | 1042 | 3.40 | 5.20 | | | |
| UCCLE | 24 | 1054 | 1059 | 1056 | S15 | E29 | 4263 | 5 | 1 | 4 | 1056 | 2.20 | 2.40 | | | |
| UCCLE | 24 | 1059 | 1108 | 1103 | S14 | E29 | 4263 | 9 | 1 | 4 | 1103 | 2.20 | 2.50 | | | |
| UCCLE | 24 | 1102 | 1202 D | 1109 | S13 | E35 | 4263 | 60 D | 2 | 4 | 1109 | 6.80 | 8.20 | | | |
| UCCLE | 24 | 1103 | 1114 | 1104 | S17 | E12 | 4257 | 11 | 1& | 4 | 1104 | 4.50 | 4.80 | | | |
| UCCLE | 24 | 1108 | 1136 | 1109 | S14 | E30 | 4263 | 28 | 1 | 4 | 1109 | 2.20 | 2.40 | | | |
| UCCLE | 24 | 1108 | 1201 | 1109 | S12 | E32 | 4263 | 53 | 2 | 4 | 1109 | 6.80 | 8.00 | | | |
| UCCLE | 24 | 1134 | 1147 | 1136 | S14 | E28 | 4263 | 13 | 1 | 4 | 1136 | 2.20 | | | | |
| UCCLE | 24 | 1135 | 1138 | 1136 | S16 | E28 | 4263 | 3 | 1 | 4 | 1136 | 2.20 | | | | |
| UCCLE | 24 | 1138 | 1143 | 1140 | S28 | E28 | 4264 | 5 | 1 | 4 | 1140 | 2.20 | 2.40 | | | |
| UCCLE | 24 | 1148 | 1202 D | 1152 | N20 | W50 | 4247 | 14 D | 1& | 4 | 1152 | 4.00 | 6.00 | | | |
| WENDEL | 24 | 1151 | 1213 D | | S20 | W49 | 4259 | 22 D | 1 | | | | 3.00 | | | |
| UCCLE | 24 | 1200 | 1202 D | 1201 | S15 | W12 | 4255 | 2 D | 1 | 4 | 1201 | 2.20 | | | | |
| ZURICH | 24 | 1252 E | 1301 | | N24 | W69 | 4246 | 9 D | 1 | 2 | 1252 | | 2.00 | | | |
| ZURICH | 24 | 1252 E | 1325 | | N21 | W50 | 4246 | 33 D | 1 | 2 | 1255 | | 3.00 | | | |
| ZURICH | 24 | 1303 | 1320 | | S13 | E25 | 4263 | 17 | 1 | 2 | 1303 | | 1.00 | | | |
| ZURICH | 24 | 1319 | 1327 | | S30 | E50 | 4265 | 8 | 1 | 2 | 1319 | | 3.00 | | | |
| CLIMAX | 24 | 1611 | 1622 | 1613 | S15 | E23 | 4263 | 11 | 1 | | 1613 | 4.30 | | | | |
| HUANCAYO | 24 | 1612 | 1621 | 1615 | S12 | E23 | 4263 | 9 | 1 | 1 | | | | | | |
| SAC PEAK | 24 | 1612 | 1625 | 1615 | S14 | E23 | 4263 | 13 | 1 | 2 | | 3.00 | | | 17 | |
| CLIMAX | 24 | 1909 | 2032 | 1927 | S11 | E15 | 4257 | 83 | 1 | | 1927 | 2.70 | | | | |
| SAC PEAK | 24 | 1930 | 2015 U | 1932 | S14 | E06 | 4257 | 45 | 1& | 2 | | 5.60 | | | 18 | |
| CLIMAX | 24 | 1930 | 2032 | 1939 | S12 | E10 | 4257 | 62 | 2 | | 1939 | 6.40 | | | | |
| MITAKA | 25 | 0108 E | 0116 | | N19 | W56 | 4247 | 8 D | 1& | 2 | 0108 | 7.63 | 13.59 | 1.47 | 96 | |
| MITAKA | 25 | 0142 E | 0146 | | N24 | W79 | 4246 | 4 D | 1 | 2 | 0142 | .89 | 2.85 | 2.27 | | |
| MITAKA | 25 | 0219 | 0236 | | N19 | W57 | 4247 | 17 | 1 | 2 | 0226 | 1.84 | 3.28 | 1.65 | 96 | |
| MITAKA | 25 | 0226 | 0230 | | N24 | W79 | 4246 | 4 | 1 | 2 | 0228 | .89 | 2.85 | 1.41 | | |
| MITAKA | 25 | 0301 | 0313 | | N23 | W13 | 4254 | 12 | 1 | 1 | 0306 | 2.78 | 3.00 | 2.03 | 102 | |
| MITAKA | 25 | 0457 E | 0509 D | | N29 | W71 | 4246 | 12 D | 1& | 1 | 0509 | 4.69 | 12.43 | 3.19 | | |
| ATHENS | 25 | 0717 | 0743 | | N23 | W55 | 4247 | 26 | 2& | 4 | | 5.30 | 9.70 | | | |
| WENDEL | 25 | 1021 E | 1041 D | | S12 | W22 | 4255 | 20 D | 1 | | | | 3.00 | | | |
| HUANCAYO | 25 | 1550 E | 1602 | 1551 | S15 | E00 | 4257 | 12 D | 1 | 2 | | | | | | |
| HUANCAYO | 25 | 1555 E | 1631 | 1555 | N16 | W66 | 4247 | 36 D | 1 | 2 | | | | | | |
| CLIMAX | 25 | 1937 | 1959 | 1948 | S32 | E39 | 4265 | 22 | 1 | | 1948 | 3.40 | | | | |
| HAWAII | 25 | 1942 | 1954 | 1944 | S38 | E32 | 4265 | 12 | 1 | 1 | 1944 | 2.90 | 4.40 | | | |
| SAC PEAK | 25 | 1942 | 2010 U | 1952 | S32 | E39 | 4267 | 28 D | 1 | 2 | | 3.30 | | | 17 | |
| HUANCAYO | 25 | 1943 | 2007 | 1944 | S29 | E39 | 4265 | 24 | 1 | 2 | | | | | | |

# SOLAR FLARES

| OBSERVATORY | DATE Nov. 1957 | OBSERVED UNIVERSAL TIME START | END | MAX. PHASE | LOCATION APPROX. LAT. | MER. DIST. | McMATH PLAGE REGION | DURA-TION — MINUTES | IM-POR-TANCE | OBS. COND. | MEASUREMENTS TIME — U T | MEAS. AREA Sq. Deg. | CORR. AREA Sq. Deg. | MAX. WIDTH Hα | MAX. INT. % | PROVISIONAL IONOSPHERIC EFFECT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| WENDEL | 26 | 0911 | 0926 | 0921 | S33 | E33 | 4265 | 15 | 1 | | | | 3.00 | | | Slow S-SWF |
| WENDEL | 26 | 1030 | 1101 | | S16 | W11 | 4257 | 31 | 1 | | | | 4.00 | | | |
| WENDEL | 26 | 1130 | 1204 | | S15 | E05 | 4263 | 34 | 1+ | | | | 5.00 | | | |
| CAPRI S | 26 | 1132 E | 1144 D | | S16 | E03 | 4263 | 12 D | 1 | 3 | 1134 | 2.50 | 2.50 | | | |
| WENDEL | 26 | 1237 | 1255 | 1240 | S18 | E02 | 4263 | 18 | 1 | | | | 4.00 | | | |
| ZURICH | 26 | 1347 E | 1418 | | N23 | W26 | 4254 | 31 D | 1 | 2 | 1350 | | 1.00 | | | |
| OTTAWA | 26 | 1447 | 1519 | | S14 | W13 | 4257 | 32 | 1 | 2 | 1455 | 1.97 | 2.11 | | | |
| HUANCAYO | 26 | 1530 E | 1540 | 1530 | S14 | E04 | 4263 | 10 D | 1 | 2 | | | | | | |
| HUANCAYO | 26 | 1530 E | 1551 | 1530 | S33 | E29 | 4265 | 21 D | 1 | 2 | | | | | | |
| OTTAWA | 26 | 1702 | 1720 | | S18 | W37 | 4255 | 18 | 1 | 2 | 1703 | 1.68 | 2.27 | | | |
| HAWAII | 26 | 2252 | 2302 | 2256 | S17 | W08 | 4257 | 10 | 1+ | 2 | 2256 | 4.70 | 5.00 | | | |
| MITAKA | 27 | 0435 E | 0443 D | | S17 | W03 | 4263 | 8 D | 1 | 1 | 0435 | .89 | .93 | 1.77 | 128 | |
| USNRL | 27 | 1249 | 1309 | 1250 | S17 | W29 | 4257 | 20 | 1 | 2 | 1250 | 2.26 | 2.72 | | 95 | |
| WENDEL | 27 | 1258 | 1325 D | | S13 | W13 | 4263 | 27 D | 1+ | | | | 5.00 | | | |
| USNRL | 27 | 1259 | 1324 | 1307 | S14 | W15 | 4263 | 25 | 1 | 2 | 1307 | .68 | .72 | | 142 | |
| USNRL | 27 | 1704 | 1721 | 1712 | S15 | W18 | 4263 | 17 | 1 | 2 | 1712 | .68 | .74 | | 145 | Slow S-SWF |
| CLIMAX | 27 | 1902 | 1955 | 1925 | S28 | E09 | 4265 | 53 | 2 | | 1925 | 5.40 | | | | |
| SAC PEAK | 27 | 1902 | 1957 | 1910 | S28 | E09 | 4265 | 55 | 1 | 2 | | 2.50 | | | 16 | |
| CLIMAX | 27 | 2006 | 2029 | 2014 | S06 | E71 | 4278 | 23 | 1 | | 2014 | 2.40 | | | | |
| CLIMAX | 27 | 2031 | 2051 | 2037 | S13 | W18 | 4263 | 20 | 1 | | 2037 | 2.40 | | | | |
| HAWAII | 27 | 2036 | 2054 | 2036 | S11 | W32 | 4257 | 18 | 1 | 2 | 2036 | 2.40 | 2.60 | | | |
| MITAKA | 27 | 2353 E | 2404 D | | S14 | W12 | 4263 | 11 D | 1+ | 2 | 2353 | 5.67 | 6.00 | 2.22 | 137 | |
| HAWAII | 28 | 0116 | 0126 | 0118 | S15 | E70 | 4288 | 10 | 1 | 2 | 0118 | 1.60 | 3.80 | | | |
| MITAKA | 28 | 0118 E | 0126 D | 0121 | S06 | E65 | 4278 | 8 D | 1+ | 2 | 0118 | 3.80 | 9.50 | 1.87 | | |
| MITAKA | 28 | 0510 | 0517 | 0511 | S14 | W22 | 4263 | 7 | 1 | 2 | 0512 | 1.84 | 2.02 | 1.87 | 134 | |
| MITAKA | 28 | 0536 | 0547 | | S17 | E62 | 4272 | 11 | 1+ | 2 | 0539 | 2.78 | 6.95 | 2.20 | | |
| CAPRI S | 28 | 1418 E | 1445 | | S12 | W27 | 4263 | 27 D | 1 | 3 | 1428 | 2.00 | 2.30 | | | Slow S-SWF |
| SAC PEAK | 28 | 1440 E | 1520 U | 1440 E | S12 | W27 | 4263 | 40 D | 1 | 2 | | 4.40 | | | 16 | |
| HUANCAYO | 28 | 2046 E | 2053 | 2047 | S21 | E67 | 4272 | 7 D | 1 | 2 | | | | | | |
| HUANCAYO | 29 | 1544 | 1555 | 1544 | S14 | E50 | 4272 | 11 | 1 | 2 | | | | | | S-SWF |
| HUANCAYO | 29 | 1636 E | 1744 | 1636 | S18 | W03 | 4269 | 68 D | 1+ | 2 | | | | | | |
| HUANCAYO | 29 | 1716 E | 1802 | 1722 | S13 | E45 | 4272 | 46 D | 1 | 2 | | | | | | Slow S-SWF |
| UCCLE | 30 | 0843 E | 0846 | 0843 | S19 | W09 | 4269 | 3 D | 1+ | 4 | 0843 | 4.50 | | | | |
| UCCLE | 30 | 0843 E | 0849 | 0843 | S27 | W25 | 4263 | 6 D | 1 | 4 | 0843 | 3.20 | | | | |
| UCCLE | 30 | 0843 E | 0903 | 0843 | S14 | W50 | 4263 | 20 D | 1 | 4 | 0843 | 2.20 | | | | |
| UCCLE | 30 | 0843 E | 0910 | 0850 | N15 | E05 | 4271 | 27 D | 1+ | 4 | 0850 | 5.00 | | | | |
| UCCLE | 30 | 0843 E | 0913 | 0844 | N05 | E90 | 4287 | 30 | 1+ | 4 | 0844 | 3.40 | 6.00 | | | |
| UCCLE | 30 | 0843 E | 0920 | 0903 | S16 | E48 | 4288 | 37 D | 1 | 4 | 0903 | 2.20 | 3.30 | | | |
| UCCLE | 30 | 0902 | 0917 | 0910 | S30 | E88 | 4285 | 15 | 2 | 3 | 0910 | 6.80 | 12.00 | | | |
| UCCLE | 30 | 0944 | 0953 D | 0949 | S30 | E88 | 4285 | 9 D | 1+ | 3 | 0949 | 4.50 | 8.80 | | | |
| UCCLE | 30 | 1050 | 1207 D | | N15 | E04 | 4271 | 77 D | 1+ | 4 | 1055 | 5.00 | | | | |
| UCCLE | 30 | 1053 | 1107 | 1058 | S15 | W48 | 4263 | 14 | 1 | 4 | 1058 | 3.40 | 4.90 | | | |
| UCCLE | 30 | 1113 | 1132 | 1118 | S20 | E45 | 4288 | 19 | 2 | 4 | 1118 | 5.60 | 7.00 | | | |
| UCCLE | 30 | 1114 | 1147 | 1117 | S23 | W07 | 4269 | 33 | 1 | 4 | 1117 | 2.20 | | | | |
| UCCLE | 30 | 1121 | 1207 D | 1126 | S18 | W09 | 4269 | 46 D | 1 | 4 | 1126 | 3.40 | | | | |
| UCCLE | 30 | 1154 | 1207 D | 1157 | S20 | W10 | 4269 | 13 D | 1+ | 4 | 1157 | 4.50 | | | | |
| UCCLE | 30 | 1157 | 1207 D | 1203 | S28 | W25 | 4280 | 10 D | 1 | 4 | 1203 | 3.40 | | | | |
| WENDEL | 30 | 1258 | 1408 | 1312 | S17 | E45 | 4288 | 70 | 2 | | | | 9.00 | | | |
| HUANCAYO | 30 | 1528 E | 1620 D | 1529 | S03 | E79 | 4286 | 52 D | 1 | 2 | | | | | | |
| CLIMAX | 30 | 1852 | 1923 | 1859 | S06 | E33 | 4278 | 31 | 1 | | 1859 | 3.50 | | | | |
| SAC PEAK | 30 | 1852 | 1930 | 1902 | S06 | E33 | 4278 | 38 | 1 | 2 | | 2.10 | | | 16 | |
| SAC PEAK | 30 | 2112 | 2130 | 2117 | S19 | W14 | 4269 | 18 | 1 | 2 | | 2.50 | | | 17 | |
| CLIMAX | 30 | 2227 | 2242 | 2231 | S21 | E20 | 4272 | 15 | 1 | | 2231 | 2.70 | | | | |

# INTERVALS OF NO FLARE PATROL OBSERVATIONS

NOVEMBER 1957




**Reporting Observatories**

Anacapri S
Arcetri
Athens
Climax
Dunsink
Greenwich R. O., Herstmonceux
Hawaii
Huancayo
Mitaka
Nizamiah (Hyderabad)
Ottawa
Uccle
U.S. Naval Research Lab.
R. O. Edinburgh
Sacramento Peak
Zurich

# SUBFLARES NOTED AS FOLLOWS. DATE – UNIVERSAL TIME – COORDINATES

## OCTOBER 1957

| | | | | | |
|---|---|---|---|---|---|
| | ATHENS | 01 | 0734 | | N13 W46 |
| | UCCLE | 01 | 0846 | | S27 W40 |
| | UCCLE | 01 | 0909 | | N24 W48 |
| * | CAPRI S | 01 | 0938 | E | N29 E17 |
| | UCCLE | 01 | 1000 | E | S24 E39 |
| | UCCLE | 01 | 1008 | | S12 W01 |
| | UCCLE | 01 | 1014 | | N23 W07 |
| | UCCLE | 01 | 1018 | | S12 W01 |
| | UCCLE | 01 | 1021 | | N16 W86 |
| | UCCLE | 01 | 1046 | | N24 W49 |
| | UCCLE | 01 | 1110 | | N23 W49 |
| | UCCLE | 01 | 1126 | | N28 E20 |
| | UCCLE | 01 | 1144 | | S27 W43 |
| | SAC PEAK | 01 | 1420 | | N25 W55 |
| | R O HERST | 01 | 1424 | E | N23 W56 |
| | SAC PEAK | 01 | 1520 | | N16 W41 |
| | SAC PEAK | 01 | 1522 | | N16 W09 |
| | SAC PEAK | 01 | 1557 | | N17 W10 |
| | SAC PEAK | 01 | 1650 | | N17 W11 |
| | CLIMAX | 01 | 1654 | E | N18 W11 |
| | CLIMAX | 01 | 1656 | | N22 W51 |
| | SAC PEAK | 01 | 1705 | | S15 E61 |
| | CLIMAX | 01 | 1708 | | N19 E64 |
| | SAC PEAK | 01 | 1727 | | N30 E07 |
| | CLIMAX | 01 | 1748 | | S30 E42 |
| | SAC PEAK | 01 | 1750 | | S28 E42 |
| | HAWAII | 01 | 1844 | | S43 W05 |
| | SAC PEAK | 01 | 1950 | | S29 E36 |
| * | SAC PEAK | 01 | 2127 | | S27 E33 |
| * | HAWAII | 01 | 2128 | | S33 E28 |
| | SAC PEAK | 01 | 2135 | | S32 E40 |
| | CLIMAX | 01 | 2138 | E | S28 E32 |
| | SAC PEAK | 01 | 2220 | | S24 E35 |
| | ONDREJOV | 02 | 0700 | E | N32 E58 |
| * | R O HERST | 02 | 0850 | E | N28 E09 |
| | ZURICH | 02 | 0852 | E | N17 W21 |
| * | UCCLE | 02 | 1015 | | S26 E32 |
| * | WENDEL | 02 | 1020 | E | S28 E30 |
| * | WENDEL | 02 | 1039 | E | S29 E30 |
| | UCCLE | 02 | 1052 | | N27 E02 |
| | WENDEL | 02 | 1056 | E | N27 E09 |
| | WENDEL | 02 | 1106 | E | N16 W18 |
| | USNRL | 02 | 1254 | | N27 E02 |
| | USNRL | 02 | 1256 | | N18 W22 |
| * | SAC PEAK | 02 | 1435 | | S24 E25 |
| | SAC PEAK | 02 | 1453 | | S26 W60 |
| | SAC PEAK | 02 | 1520 | | N14 W90 |
| | SAC PEAK | 02 | 1522 | | N26 W01 |
| | USNRL | 02 | 1524 | | N28 W03 |
| * | SAC PEAK | 02 | 1745 | | S37 E66 |
| * | SAC PEAK | 02 | 1755 | | N27 W02 |
| | SAC PEAK | 02 | 1757 | | S15 E43 |
| * | USNRL | 02 | 1758 | | N28 W05 |
| | USNRL | 02 | 1800 | | S15 E44 |
| | USNRL | 02 | 1836 | | S22 E24 |
| | SAC PEAK | 02 | 1840 | | S20 E25 |
| | SAC PEAK | 02 | 2100 | | N27 W10 |
| | SAC PEAK | 02 | 2107 | | N27 W04 |
| | SAC PEAK | 02 | 2110 | | S22 E22 |
| | SAC PEAK | 02 | 2152 | | S34 W47 |
| | SAC PEAK | 02 | 2202 | | S16 E00 |
| | SAC PEAK | 02 | 2302 | | N15 W76 |
| | ATHENS | 03 | 0658 | | N22 W34 |
| | ATHENS | 03 | 0658 | | N16 W35 |
| | ATHENS | 03 | 0738 | | N18 W38 |
| | ATHENS | 03 | 0739 | | S10 E27 |
| * | ATHENS | 03 | 0739 | | S15 E37 |
| | ATHENS | 03 | 0857 | | S16 E39 |
| | ONDREJOV | 03 | 0931 | E | S12 E33 |
| | OTTAWA | 03 | 1232 | | S14 E35 |
| | OTTAWA | 03 | 1301 | | S17 W10 |
| | MC MATH | 03 | 1347 | E | S27 W63 |
| * | SAC PEAK | 03 | 1400 | | S26 E18 |
| * | OTTAWA | 03 | 1402 | | S26 E19 |
| | SAC PEAK | 03 | 1412 | | S14 E70 |
| * | SAC PEAK | 03 | 1427 | | N30 W02 |
| * | OTTAWA | 03 | 1429 | | N28 W03 |
| * | USNRL | 03 | 1431 | | N30 W05 |
| | SAC PEAK | 03 | 1522 | | S24 E13 |
| * | SAC PEAK | 03 | 1532 | | S26 E17 |
| * | USNRL | 03 | 1537 | | S27 E18 |
| | USNRL | 03 | 1545 | | N15 W90 |
| | SAC PEAK | 03 | 1645 | | S25 E14 |
| | USNRL | 03 | 1645 | | S26 E13 |
| | CLIMAX | 03 | 1647 | | S25 E12 |
| | SAC PEAK | 03 | 1707 | | S19 E27 |
| * | USNRL | 03 | 1725 | | N18 E20 |
| | USNRL | 03 | 1728 | | S27 E15 |
| * | SAC PEAK | 03 | 1730 | | N16 E19 |
| | CLIMAX | 03 | 1828 | | S25 E12 |
| | SAC PEAK | 03 | 1830 | E | S24 E12 |
| | USNRL | 03 | 1830 | | S25 E12 |
| | USNRL | 03 | 1945 | | N27 W18 |
| | SAC PEAK | 03 | 2022 | | S14 E25 |
| | SAC PEAK | 03 | 2257 | | N29 W14 |
| | SAC PEAK | 03 | 2257 | | S37 E51 |
| | ARCETRI | 04 | 0846 | E | S14 E13 |
| | ONDREJOV | 04 | 1212 | | S15 W58 |
| | USNRL | 04 | 1309 | | N29 W25 |
| * | USNRL | 04 | 1337 | | S30 W88 |
| | USNRL | 04 | 1341 | | N21 E52 |
| * | MC MATH | 04 | 1344 | E | S25 E05 |
| * | USNRL | 04 | 1344 | | S27 E00 |
| | USNRL | 04 | 1355 | | S42 E46 |
| | USNRL | 04 | 1413 | | S27 E23 |
| | MC MATH | 04 | 1426 | E | S25 E05 |
| | USNRL | 04 | 1437 | | S15 E22 |
| * | USNRL | 04 | 1506 | | N18 E88 |
| | UCCLE | 04 | 1535 | | S18 E16 |
| | USNRL | 04 | 1627 | | N26 W28 |
| * | SAC PEAK | 04 | 1645 | | N26 W27 |
| * | USNRL | 04 | 1646 | | N26 W28 |
| | SAC PEAK | 04 | 1650 | | S41 E44 |
| | SAC PEAK | 04 | 1730 | E | S41 E44 |
| | SAC PEAK | 04 | 1802 | | N17 E89 |
| | SAC PEAK | 04 | 1917 | | S42 E45 |
| | SAC PEAK | 04 | 2017 | | S10 E21 |
| * | WENDEL | 05 | 0805 | E | S26 E02 |
| | WENDEL | 05 | 0828 | E | S18 E07 |
| * | UCCLE | 05 | 0843 | | S17 E10 |
| | UCCLE | 05 | 0856 | | S15 E05 |
| | WENDEL | 05 | 0921 | E | N17 E64 |
| * | WENDEL | 05 | 1135 | E | N26 W33 |
| | WENDEL | 05 | 1213 | E | S42 E33 |
| * | WENDEL | 05 | 1240 | E | S26 W01 |
| * | OTTAWA | 05 | 1244 | E | S27 W06 |
| | OTTAWA | 05 | 1250 | E | S39 E34 |
| | OTTAWA | 05 | 1537 | | N25 W40 |
| | OTTAWA | 05 | 1603 | | S16 E42 |
| | CLIMAX | 05 | 1603 | | S24 E42 |
| | CLIMAX | 05 | 1740 | | N13 W70 |
| * | HAWAII | 05 | 1800 | E | S16 E01 |
| | HAWAII | 05 | 2100 | | S23 W19 |
| | HAWAII | 05 | 2336 | | S20 W06 |
| | HAWAII | 06 | 0048 | | S23 W25 |
| * | ATHENS | 06 | 0750 | E | N41 E01 |
| | ATHENS | 06 | 0844 | E | S26 W24 |
| | UCCLE | 06 | 1018 | | S25 W27 |
| | UCCLE | 06 | 1056 | | S25 W28 |
| | UCCLE | 06 | 1059 | | S27 W21 |
| | CAPRI S | 06 | 1214 | E | N19 E67 |
| | HUANCAYO | 06 | 1631 | E | S13 E30 |
| * | HAWAII | 06 | 2038 | | S19 W31 |
| | SAC PEAK | 06 | 2225 | | N15 E12 |
| | UCCLE | 07 | 1151 | | N39 W60 |
| | USNRL | 07 | 1247 | | N14 E05 |
| | WENDEL | 07 | 1249 | E | N13 E05 |
| | WENDEL | 07 | 1315 | E | N41 W55 |
| * | WENDEL | 07 | 1339 | E | N07 E77 |
| * | SAC PEAK | 07 | 1420 | | N15 E04 |
| * | SAC PEAK | 07 | 1450 | | N09 E75 |
| * | WENDEL | 07 | 1450 | E | N07 E76 |
| | SAC PEAK | 07 | 1650 | | N20 W04 |
| | SAC PEAK | 07 | 1915 | | N25 W73 |
| | SAC PEAK | 07 | 2030 | E | N15 E01 |
| | SAC PEAK | 07 | 2112 | | S38 W07 |
| | HAWAII | 07 | 2118 | | S29 W09 |
| * | SAC PEAK | 07 | 2140 | | S13 W70 |
| | CLIMAX | 07 | 2337 | | N25 W69 |
| | ATHENS | 08 | 0700 | | N34 W69 |
| * | ATHENS | 08 | 0721 | | N40 W24 |
| * | ATHENS | 08 | 0728 | | S38 W07 |
| * | ATHENS | 08 | 0728 | | S39 W00 |
| * | WENDEL | 08 | 0728 | E | S37 W08 |
| * | WENDEL | 08 | 0907 | E | N20 W12 |
| | WENDEL | 08 | 1035 | E | N17 E35 |
| | WENDEL | 08 | 1037 | E | S27 W50 |
| | WENDEL | 08 | 1049 | E | N19 W09 |
| | UCCLE | 08 | 1156 | | N19 W17 |
| | SAC PEAK | 08 | 1432 | | N20 W16 |
| | SAC PEAK | 08 | 1600 | | S18 E90 |
| * | SAC PEAK | 08 | 1617 | | N07 E60 |
| * | CLIMAX | 08 | 1620 | | N06 E63 |
| * | R O EDIN | 08 | 1622 | E | N08 E59 |
| | SAC PEAK | 08 | 1640 | | S42 W08 |
| * | SAC PEAK | 08 | 1642 | | N20 W18 |
| | SAC PEAK | 08 | 1650 | | S17 W35 |
| * | SAC PEAK | 08 | 1710 | | N19 W16 |
| * | CLIMAX | 08 | 1712 | | N19 W17 |
| * | HUANCAYO | 08 | 1712 | E | N17 W15 |
| | HUANCAYO | 08 | 1926 | E | N35 W67 |
| | SAC PEAK | 08 | 2205 | | N20 E27 |
| | SAC PEAK | 08 | 2220 | E | S18 E90 |
| | SAC PEAK | 08 | 2240 | | N17 E21 |
| | HAWAII | 08 | 2300 | | S25 E90 |
| | ATHENS | 09 | 0728 | | N12 W19 |
| * | ATHENS | 09 | 0741 | | N17 W26 |
| * | CAPRI S | 09 | 0746 | E | N17 W24 |
| * | WENDEL | 09 | 0940 | E | N17 W19 |
| | WENDEL | 09 | 1021 | E | N21 E38 |
| | ONDREJOV | 09 | 1052 | E | N38 W41 |
| * | WENDEL | 09 | 1138 | E | N17 W20 |
| | USNRL | 09 | 1223 | | N26 E36 |
| * | USNRL | 09 | 1313 | | N27 E37 |
| | USNRL | 09 | 1353 | | N14 W22 |
| | USNRL | 09 | 1401 | | S40 W20 |
| | SAC PEAK | 09 | 1405 | E | S42 W20 |
| | SAC PEAK | 09 | 1405 | E | N24 E36 |
| | USNRL | 09 | 1405 | | N23 E90 |
| | SAC PEAK | 09 | 1410 | | N22 E90 |
| | USNRL | 09 | 1423 | | N25 E35 |
| | USNRL | 09 | 1511 | | N14 W23 |
| | WENDEL | 09 | 1511 | E | N17 W21 |
| | USNRL | 09 | 1631 | | N14 W22 |
| | USNRL | 09 | 1645 | | N23 E90 |
| | USNRL | 09 | 1817 | | N26 E31 |
| | HAWAII | 09 | 1818 | | S22 E35 |
| | SAC PEAK | 09 | 1821 | E | N25 E34 |
| | USNRL | 09 | 1823 | | N14 W26 |
| * | HAWAII | 09 | 1842 | | S25 E75 |
| | USNRL | 09 | 1845 | | N12 W28 |
| * | USNRL | 09 | 1959 | | S17 E75 |
| * | HUANCAYO | 09 | 2007 | E | N13 W28 |
| | SAC PEAK | 09 | 2131 | | S18 E90 |
| | HAWAII | 09 | 2206 | | N08 E80 |
| | CAPRI S | 10 | 0736 | E | S18 E63 |
| | ATHENS | 10 | 0804 | E | S24 W80 |
| | USNRL | 10 | 1224 | | S16 W25 |
| | USNRL | 10 | 1239 | | N14 W39 |
| | WENDEL | 10 | 1302 | E | S11 W27 |
| | USNRL | 10 | 1336 | | N18 E06 |
| | USNRL | 10 | 1542 | | N24 E19 |
| | CLIMAX | 10 | 1630 | | N24 E33 |
| | USNRL | 10 | 1659 | E | S26 E90 |
| | USNRL | 10 | 1659 | E | N42 W51 |
| | USNRL | 10 | 1741 | | N23 E19 |
| | USNRL | 10 | 1748 | | N28 E20 |
| | USNRL | 10 | 1938 | | S15 W29 |
| | CLIMAX | 10 | 2027 | E | S16 W54 |
| | SAC PEAK | 10 | 2040 | | S15 W65 |
| | CLIMAX | 10 | 2049 | E | N44 W50 |
| | SAC PEAK | 10 | 2102 | | S17 E58 |
| | SAC PEAK | 10 | 2105 | | N46 W58 |
| | CAPRI S | 11 | 0708 | E | S20 E53 |
| | ARCETRI | 11 | 0840 | E | S18 E50 |
| | WENDEL | 11 | 1036 | E | N18 E43 |
| | USNRL | 11 | 1202 | | S29 W90 |
| | USNRL | 11 | 1304 | | S26 E70 |
| | USNRL | 11 | 1434 | | S15 W36 |
| | USNRL | 11 | 1444 | | S18 E50 |
| | SAC PEAK | 11 | 1505 | | S12 E32 |
| | SAC PEAK | 11 | 1627 | | S22 W90 |
| * | SAC PEAK | 11 | 1630 | | S16 E52 |
| | USNRL | 11 | 1632 | E | S23 W90 |
| | USNRL | 11 | 1842 | | N13 W55 |
| | USNRL | 11 | 1900 | | N09 E63 |
| | CLIMAX | 11 | 1921 | | N09 E64 |
| | UCCLE | 12 | 0950 | | N11 E57 |
| | WENDEL | 12 | 1156 | E | N14 W61 |
| | OTTAWA | 12 | 1158 | E | N13 W61 |
| | USNRL | 12 | 1222 | | N07 E44 |
| | OTTAWA | 12 | 1223 | | N08 E44 |
| | OTTAWA | 12 | 1226 | | N13 W61 |
| | WENDEL | 12 | 1227 | E | N05 E43 |
| * | USNRL | 12 | 1254 | | S15 W69 |
| | OTTAWA | 12 | 1352 | | N11 W63 |
| * | OTTAWA | 12 | 1353 | | S24 E67 |
| | USNRL | 12 | 1515 | | N24 E31 |
| | OTTAWA | 12 | 1517 | E | N26 E30 |
| | OTTAWA | 12 | 1530 | | S17 E58 |
| | USNRL | 12 | 1531 | | S19 E58 |
| | USNRL | 12 | 1555 | | S17 E40 |
| | ATHENS | 13 | 0713 | | S25 E52 |
| | CAPRI S | 13 | 0714 | E | S22 E50 |
| | ATHENS | 13 | 0728 | | N12 W55 |
| | ATHENS | 13 | 0733 | E | S26 E57 |
| | ATHENS | 13 | 0808 | | N06 E35 |
| | WENDEL | 13 | 0902 | E | N11 E41 |
| | UCCLE | 13 | 0930 | | N26 W17 |
| | UCCLE | 13 | 1047 | | N05 E32 |
| | WENDEL | 13 | 1109 | E | S24 E51 |
| * | WENDEL | 13 | 1132 | E | S14 E25 |
| * | USNRL | 13 | 1318 | | S23 E54 |
| * | OTTAWA | 13 | 1322 | | S22 E53 |
| * | CAPRI S | 13 | 1322 | | S23 E55 |
| | USNRL | 13 | 1359 | | S32 E58 |
| | MC MATH | 13 | 1400 | E | S18 E23 |
| | USNRL | 13 | 1433 | | S23 E54 |
| | SAC PEAK | 13 | 1435 | E | S22 E41 |
| * | CLIMAX | 13 | 1455 | E | N26 E48 |
| * | CAPRI S | 13 | 1532 | | S23 E55 |
| | SAC PEAK | 13 | 1611 | E | S27 E53 |
| | SAC PEAK | 13 | 1716 | | S27 E53 |
| | SAC PEAK | 13 | 1947 | E | S27 E51 |
| | SAC PEAK | 13 | 2055 | E | N28 E54 |
| | SAC PEAK | 13 | 2115 | E | S16 E21 |
| | SAC PEAK | 13 | 2235 | E | N26 E46 |
| | UCCLE | 14 | 0851 | | S25 E38 |
| | UCCLE | 14 | 1009 | | N24 W42 |
| | UCCLE | 14 | 1025 | | S27 E47 |
| | WENDEL | 14 | 1028 | E | S25 E48 |
| | UCCLE | 14 | 1104 | | S16 E05 |
| | WENDEL | 14 | 1111 | E | S15 E05 |
| | UCCLE | 14 | 1116 | E | N24 E08 |
| | UCCLE | 14 | 1140 | E | S26 E46 |
| | UCCLE | 14 | 1145 | E | S30 E44 |
| * | UCCLE | 14 | 1155 | E | S28 E39 |
| * | WENDEL | 14 | 1155 | E | S27 E42 |
| | WENDEL | 14 | 1240 | E | S27 E42 |
| | USNRL | 14 | 1241 | | S28 E42 |
| | CAPRI S | 14 | 1255 | E | N40 W90 |
| | USNRL | 14 | 1309 | | S23 E32 |
| | USNRL | 14 | 1316 | | S23 E47 |
| * | USNRL | 14 | 1319 | | N40 W90 |
| | USNRL | 14 | 1323 | | N12 W79 |
| | WENDEL | 14 | 1340 | E | S26 E38 |
| | WENDEL | 14 | 1421 | E | S22 E36 |
| | WENDEL | 14 | 1431 | E | S15 E04 |
| * | MC MATH | 14 | 1452 | E | S18 E08 |
| * | SAC PEAK | 14 | 1452 | E | S20 E10 |
| * | USNRL | 14 | 1453 | | S20 E12 |

# SUBFLARES NOTED AS FOLLOWS, DATE - UNIVERSAL TIME - COORDINATES

OCTOBER 1957

| Station | Date | Time | | Coordinates |
|---|---|---|---|---|
| WENDEL | 14 | 1521 | E | S19 E13 |
| * SAC PEAK | 14 | 1527 | | S26 E36 |
| * SAC PEAK | 14 | 1532 | | S19 E10 |
| * USNRL | 14 | 1534 | | S20 E12 |
| USNRL | 14 | 1534 | | S27 E35 |
| USNRL | 14 | 1624 | | S15 E07 |
| USNRL | 14 | 1747 | | S29 E48 |
| * SAC PEAK | 14 | 1847 | | N20 E14 |
| USNRL | 14 | 1919 | | S27 W30 |
| MITAKA | 15 | 0327 | | S24 E24 |
| * CAPRI S | 15 | 0757 | E | S21 E32 |
| WENDEL | 15 | 1138 | E | N23 E05 |
| OTTAWA | 15 | 1214 | | N12 E41 |
| WENDEL | 15 | 1215 | E | N10 E43 |
| WENDEL | 15 | 1227 | E | N24 E06 |
| WENDEL | 15 | 1303 | E | S23 E41 |
| * USNRL | 15 | 1335 | E | S21 E31 |
| * CAPRI S | 15 | 1337 | E | N12 E15 |
| WENDEL | 15 | 1350 | E | N10 E42 |
| OTTAWA | 15 | 1350 | | N11 E40 |
| USNRL | 15 | 1351 | | N10 E41 |
| OTTAWA | 15 | 1452 | | S21 E35 |
| USNRL | 15 | 1537 | | S20 E30 |
| USNRL | 15 | 1618 | | S22 E22 |
| HUANCAYO | 15 | 1629 | E | S24 E27 |
| USNRL | 15 | 1711 | | N23 E08 |
| USNRL | 15 | 1927 | | N10 W21 |
| USNRL | 15 | 1957 | | S26 E26 |
| NIZAMIAH | 16 | 0326 | | S26 E22 |
| * CAPRI S | 16 | 0654 | E | S24 E18 |
| ARCETRI | 16 | 0805 | E | S22 E17 |
| * R O EDIN | 16 | 1146 | E | S14 W20 |
| * CAPRI S | 16 | 1148 | E | S16 W19 |
| USNRL | 16 | 1324 | | S15 W23 |
| CAPRI S | 16 | 1338 | E | S16 W19 |
| USNRL | 16 | 1347 | | S23 E08 |
| SAC PEAK | 16 | 1450 | | S26 E11 |
| USNRL | 16 | 1451 | | S26 E11 |
| ATHENS | 16 | 1453 | E | S25 E11 |
| SAC PEAK | 16 | 1512 | | S15 W24 |
| USNRL | 16 | 1515 | | S14 W22 |
| SAC PEAK | 16 | 1552 | | S23 E06 |
| USNRL | 16 | 1633 | | S14 W22 |
| SAC PEAK | 16 | 1635 | E | S14 W25 |
| SAC PEAK | 16 | 1745 | E | S15 W25 |
| USNRL | 16 | 1827 | E | S23 E18 |
| NIZAMIAH | 17 | 0427 | | S27 E09 |
| * SAC PEAK | 17 | 1402 | E | S26 E06 |
| SAC PEAK | 17 | 1737 | E | S23 W02 |
| SAC PEAK | 17 | 1815 | | S26 E06 |
| SAC PEAK | 17 | 1902 | E | N24 W55 |
| HUANCAYO | 17 | 2202 | E | S25 E07 |
| UCCLE | 18 | 1126 | | S25 W15 |
| ONDREJOV | 19 | 0703 | E | N22 W68 |
| * CAPRI S | 19 | 0825 | E | S24 W16 |
| CAPRI S | 19 | 0856 | E | N25 W75 |
| ONDREJOV | 19 | 0957 | | S24 W26 |
| * ONDREJOV | 19 | 1019 | E | S24 W26 |
| ONDREJOV | 19 | 1137 | | S25 W30 |
| USNRL | 19 | 1210 | | S25 W30 |
| USNRL | 19 | 1218 | | N21 W77 |
| USNRL | 19 | 1222 | | S18 W64 |
| USNRL | 19 | 1244 | | S26 W19 |
| CAPRI S | 19 | 1319 | | N08 W90 |
| MC MATH | 19 | 1324 | E | N20 W90 |
| USNRL | 19 | 1350 | E | S20 W19 |
| USNRL | 19 | 1418 | E | N21 W77 |
| USNRL | 19 | 1525 | | N12 W81 |
| UCCLE | 20 | 0849 | | S20 W31 |
| UCCLE | 20 | 1023 | | N13 E83 |
| UCCLE | 20 | 1025 | | N32 W60 |
| UCCLE | 20 | 1036 | | N16 E26 |
| UCCLE | 20 | 1041 | | N25 E63 |
| UCCLE | 20 | 1045 | | N23 E45 |
| UCCLE | 20 | 1114 | | N22 E49 |
| UCCLE | 20 | 1122 | | S25 E26 |
| UCCLE | 20 | 1143 | | S28 W34 |
| UCCLE | 20 | 1158 | | S25 W34 |
| USNRL | 20 | 1227 | E | S29 W33 |
| USNRL | 20 | 1433 | | S21 W51 |
| USNRL | 20 | 1433 | | S25 W40 |
| USNRL | 20 | 1502 | E | S28 W33 |
| USNRL | 20 | 1521 | | S26 W41 |
| USNRL | 21 | 1523 | | N20 W60 |
| USNRL | 21 | 1535 | | N27 W48 |
| CLIMAX | 21 | 1536 | | N28 W50 |
| * CLIMAX | 21 | 1608 | | S13 E80 |
| USNRL | 21 | 1732 | | S35 W41 |
| USNRL | 21 | 1745 | | N24 W52 |
| USNRL | 21 | 1814 | | N22 E58 |
| SAC PEAK | 21 | 1820 | E | S34 W45 |
| USNRL | 21 | 1820 | | S22 W45 |
| CLIMAX | 21 | 1826 | | S22 W44 |
| USNRL | 21 | 1830 | | N27 W49 |
| USNRL | 21 | 1926 | | N24 W49 |
| USNRL | 21 | 1926 | | N21 E57 |
| USNRL | 21 | 1926 | | N15 W87 |
| MITAKA | 22 | 0135 | | N27 W53 |
| ATHENS | 22 | 0725 | E | S22 W51 |
| ATHENS | 22 | 0902 | | N23 W04 |
| UCCLE | 22 | 0905 | | N14 E54 |
| R O EDIN | 22 | 0958 | | N15 E00 |
| ARCETRI | 22 | 1013 | E | N14 W01 |
| * USNRL | 22 | 1511 | | N16 W05 |
| * SAC PEAK | 22 | 1528 | E | N16 W05 |
| USNRL | 22 | 1657 | | N37 W65 |
| USNRL | 22 | 1701 | | S20 W58 |
| SAC PEAK | 22 | 1702 | | S25 E45 |
| SAC PEAK | 22 | 1702 | E | S21 W60 |
| USNRL | 22 | 1703 | | S23 E43 |
| USNRL | 22 | 1715 | | N27 W10 |
| USNRL | 22 | 1817 | | S23 E43 |
| CAPRI S | 23 | 0815 | E | N22 E37 |
| ONDREJOV | 23 | 1002 | | N06 W62 |
| CAPRI S | 23 | 1020 | E | S23 E37 |
| * CAPRI S | 23 | 1313 | E | N19 W75 |
| USNRL | 23 | 1320 | | N17 E21 |
| * SAC PEAK | 23 | 1410 | | S29 W79 |
| USNRL | 23 | 1424 | | N14 E17 |
| SAC PEAK | 23 | 1425 | | N14 E16 |
| USNRL | 23 | 1522 | | N15 E33 |
| * SAC PEAK | 23 | 1532 | | N14 E15 |
| CLIMAX | 23 | 1659 | | N21 E27 |
| * SAC PEAK | 23 | 1700 | | N22 E36 |
| * USNRL | 23 | 1701 | | N22 E35 |
| * SAC PEAK | 23 | 1707 | | S24 W90 |
| SAC PEAK | 23 | 1742 | | N19 E05 |
| * SAC PEAK | 23 | 1757 | | N29 W80 |
| * USNRL | 23 | 1800 | | N28 W79 |
| USNRL | 23 | 1841 | | N10 E65 |
| SAC PEAK | 23 | 1842 | | N15 E19 |
| USNRL | 23 | 1842 | | N13 E13 |
| SAC PEAK | 23 | 1847 | | S23 W13 |
| SAC PEAK | 23 | 2132 | | N32 E90 |
| SAC PEAK | 23 | 2150 | | S30 W90 |
| SAC PEAK | 23 | 2220 | | N13 E29 |
| UCCLE | 24 | 1324 | | S26 E22 |
| UCCLE | 24 | 1324 | | S24 E18 |
| * CAPRI S | 24 | 1332 | E | N16 W29 |
| ZURICH | 24 | 1336 | E | S23 E17 |
| * SAC PEAK | 24 | 1532 | | N12 E15 |
| SAC PEAK | 24 | 2052 | U | N13 E12 |
| * CAPRI S | 25 | 0948 | E | N26 W45 |
| ZURICH | 25 | 1105 | | S12 E24 |
| ZURICH | 25 | 1123 | | N23 W22 |
| ZURICH | 25 | 1343 | E | S26 E09 |
| * CAPRI S | 25 | 1501 | | N15 W00 |
| * MC MATH | 25 | 1615 | E | N20 E03 |
| USNRL | 25 | 1647 | | S23 E05 |
| SAC PEAK | 25 | 1755 | | S10 E88 |
| USNRL | 25 | 1756 | | S19 E90 |
| SAC PEAK | 25 | 1820 | | N13 E01 |
| USNRL | 25 | 1821 | | N14 E02 |
| USNRL | 25 | 1937 | E | S27 E05 |
| USNRL | 25 | 2013 | | N15 E00 |
| SAC PEAK | 25 | 2055 | | N23 E61 |
| UCCLE | 26 | 1102 | E | N14 W59 |
| UCCLE | 26 | 1102 | E | S24 W16 |
| UCCLE | 26 | 1103 | | S12 E18 |
| UCCLE | 26 | 1108 | E | S30 W05 |
| UCCLE | 26 | 1109 | | N24 E54 |
| UCCLE | 26 | 1146 | | N24 E55 |
| UCCLE | 26 | 1150 | | N11 W11 |
| UCCLE | 26 | 1153 | | S11 E14 |
| * USNRL | 26 | 1240 | E | N13 W24 |
| OTTAWA | 26 | 1327 | | S18 E69 |
| SAC PEAK | 26 | 1402 | E | S24 W18 |
| * SAC PEAK | 26 | 1405 | | S26 E75 |
| * SAC PEAK | 26 | 1407 | | N24 E50 |
| * OTTAWA | 26 | 1409 | E | N27 E48 |
| SAC PEAK | 26 | 1420 | | N24 E50 |
| USNRL | 26 | 1420 | | N26 E51 |
| SAC PEAK | 26 | 1505 | | S24 E17 |
| * SAC PEAK | 26 | 1510 | | S29 E80 |
| CLIMAX | 26 | 1512 | | S23 W19 |
| * USNRL | 26 | 1519 | | S28 E75 |
| CLIMAX | 26 | 1609 | | N21 E13 |
| CLIMAX | 26 | 1613 | | N25 E52 |
| SAC PEAK | 26 | 1622 | E | N21 E13 |
| * CLIMAX | 26 | 1634 | | S21 E74 |
| * SAC PEAK | 26 | 1635 | | S22 E75 |
| CLIMAX | 26 | 1718 | | N12 W16 |
| SAC PEAK | 26 | 1720 | | N13 W16 |
| SAC PEAK | 26 | 1730 | | N12 W16 |
| SAC PEAK | 26 | 1825 | | S23 E68 |
| CLIMAX | 26 | 1842 | | N15 W26 |
| SAC PEAK | 26 | 1842 | | N14 W20 |
| SAC PEAK | 26 | 1955 | E | N13 W16 |
| SAC PEAK | 26 | 2007 | | N17 W65 |
| CLIMAX | 26 | 2009 | | N14 W46 |
| * SAC PEAK | 26 | 2055 | | N14 W17 |
| SAC PEAK | 26 | 2117 | | S26 E17 |
| CLIMAX | 26 | 2118 | E | S25 E73 |
| CAPRI S | 27 | 0815 | E | N14 W24 |
| CAPRI S | 27 | 0915 | E | N14 W24 |
| CAPRI S | 27 | 1000 | E | S26 W23 |
| USNRL | 27 | 1209 | | N13 W36 |
| * USNRL | 27 | 1318 | | S23 E60 |
| USNRL | 27 | 1333 | | N13 W20 |
| USNRL | 27 | 1341 | | N14 W73 |
| USNRL | 27 | 1343 | | N28 E53 |
| USNRL | 27 | 1347 | | N21 W03 |
| USNRL | 27 | 1353 | | N21 W00 |
| USNRL | 27 | 1436 | | N15 W77 |
| * USNRL | 27 | 1453 | E | N12 W29 |
| USNRL | 27 | 1517 | E | N27 E56 |
| USNRL | 27 | 1520 | | S16 E57 |
| CLIMAX | 27 | 1534 | E | S17 E56 |
| USNRL | 27 | 1552 | | S09 W04 |
| CLIMAX | 27 | 1622 | | S25 E56 |
| SAC PEAK | 27 | 2105 | | S24 W35 |
| SAC PEAK | 27 | 2152 | | N22 W06 |
| SAC PEAK | 27 | 2152 | | S10 W05 |
| * CAPRI S | 28 | 1143 | | S20 W37 |
| USNRL | 28 | 1224 | E | S23 W36 |
| USNRL | 28 | 1240 | | N13 W90 |
| USNRL | 28 | 1248 | | N22 W15 |
| USNRL | 28 | 1254 | | S22 W37 |
| USNRL | 28 | 1256 | | N21 W15 |
| OTTAWA | 28 | 1320 | | N22 W07 |
| ZURICH | 28 | 1347 | E | N22 W04 |
| * USNRL | 28 | 1350 | | S16 E11 |
| SAC PEAK | 28 | 1507 | | S22 W37 |
| USNRL | 28 | 1545 | | S23 W36 |
| USNRL | 28 | 1612 | | N10 W45 |
| SAC PEAK | 28 | 1625 | | N12 W45 |
| SAC PEAK | 28 | 1642 | | S22 W38 |
| USNRL | 28 | 1656 | | N22 W15 |
| USNRL | 28 | 1658 | | N12 W45 |
| SAC PEAK | 28 | 1705 | | N12 W45 |
| SAC PEAK | 28 | 1707 | | S21 W38 |
| * SAC PEAK | 28 | 1722 | | S25 E48 |
| * USNRL | 28 | 1724 | | S24 E49 |
| USNRL | 28 | 1820 | | N21 W19 |
| USNRL | 28 | 1904 | | N25 E21 |
| SAC PEAK | 28 | 1910 | | S16 E07 |
| USNRL | 28 | 1912 | E | S16 E08 |
| SAC PEAK | 28 | 1937 | | S29 E45 |
| USNRL | 28 | 1948 | | N20 W20 |
| * USNRL | 28 | 2058 | | N21 W11 |
| * SAC PEAK | 28 | 2100 | U | N21 W10 |
| SAC PEAK | 28 | 2147 | E | S22 W04 |
| ONDREJOV | 29 | 0819 | | S20 E35 |
| CAPRI S | 29 | 0819 | | S18 E31 |
| USNRL | 29 | 1229 | E | N18 W55 |
| USNRL | 29 | 1307 | | N18 E69 |
| USNRL | 29 | 1335 | | N28 E32 |
| USNRL | 29 | 1355 | | S22 W50 |
| ZURICH | 29 | 1448 | E | S24 E33 |
| USNRL | 29 | 1511 | | N20 W30 |
| * USNRL | 29 | 1535 | E | S19 E29 |
| * USNRL | 29 | 1535 | E | N21 W30 |
| USNRL | 29 | 1649 | E | N12 W12 |
| CLIMAX | 29 | 1729 | | N22 W31 |
| USNRL | 29 | 1731 | | N20 W32 |
| USNRL | 29 | 1820 | E | S10 W29 |
| CLIMAX | 29 | 1847 | | N27 E31 |
| CLIMAX | 29 | 1848 | | N21 W24 |
| USNRL | 29 | 1853 | | N20 W25 |
| * USNRL | 29 | 1919 | | S23 W04 |
| HAWAII | 29 | 1922 | | S13 W07 |
| * USNRL | 29 | 2005 | | N22 W31 |
| CLIMAX | 29 | 2007 | | S21 E24 |
| USNRL | 29 | 2007 | | S21 E22 |
| USNRL | 29 | 2015 | | S18 E28 |
| USNRL | 29 | 2039 | | S13 W06 |
| CLIMAX | 29 | 2138 | | N15 W70 |
| CLIMAX | 29 | 2152 | | N11 W76 |
| * CAPRI S | 30 | 0815 | E | S12 W40 |
| ONDREJOV | 30 | 0855 | E | N16 E59 |
| * CAPRI S | 30 | 0856 | E | S12 W40 |
| * CAPRI S | 30 | 0956 | E | S12 W40 |
| UCCLE | 30 | 1032 | E | S09 W44 |
| UCCLE | 30 | 1032 | E | N24 E12 |
| UCCLE | 30 | 1033 | | N15 W87 |
| UCCLE | 30 | 1035 | | S20 E19 |
| UCCLE | 30 | 1036 | E | N25 E21 |
| * ONDREJOV | 30 | 1039 | E | N21 W35 |
| UCCLE | 30 | 1119 | E | N17 W86 |
| CAPRI S | 30 | 1310 | E | N33 E50 |
| USNRL | 30 | 1327 | E | S22 E20 |
| * SAC PEAK | 30 | 1420 | | S20 E13 |
| * SAC PEAK | 30 | 1450 | | S11 W41 |
| SAC PEAK | 30 | 1457 | | S20 E12 |
| SAC PEAK | 30 | 1532 | | S10 W42 |
| SAC PEAK | 30 | 1802 | | S10 W43 |
| SAC PEAK | 30 | 1850 | | N39 E54 |
| SAC PEAK | 30 | 1915 | | S11 W44 |
| * SAC PEAK | 30 | 2100 | | N07 E30 |
| CLIMAX | 30 | 2212 | | N39 E54 |
| SAC PEAK | 30 | 2215 | | N38 E51 |
| ZURICH | 31 | 1437 | | N26 W23 |
| ZURICH | 31 | 1517 | | N24 E01 |

* Rated as flare of importance ≥1 by other observatories (See CRPL-F 159 Part B).

# IONOSPHERIC EFFECTS OF SOLAR FLARES

## (SHORT-WAVE RADIO FADEOUTS)

## OCTOBER 1957

| Oct. 1957 | Start UT | End UT | Type | Wide Spread Index | Importance | Observation Stations | Known Flare, UT CRPL-F 159B |
|---|---|---|---|---|---|---|---|
| 02 | 0235 | 0310 | G-SWF | 3 | 1 | CA, TO | |
| 02 | 1528 | 1556 | Slow S-SWF | 5 | 1 | BE, HU, MC, PR, WS | 1520E |
| 02 | 2317 | 2340 | Slow S-SWF | 4 | 1- | AD, AN | |
| 03 | 0040 | 0140 | Slow S-SWF | 5 | 1+ | AD, CA, TO | 0040E |
| 03 | 0625 | 0715 | G-SWF | 1 | 2 | NE | 0625E |
| 03 | 0727 | 0747 | S-SWF | 1 | 2 | NE | 0739E |
| 03 | 1536 | 1604 | Slow S-SWF | 3 | 1 | HU, MC, PR | 1536E |
| 04 | 1505 | 1610 | G-SWF | 3 | 1 | CO, HU, PR | 1508 |
| 05 | 0900 | 0909 | S-SWF | 1 | 1 | NE | 0901 |
| 05 | 2210 | 2254 | Slow S-SWF | 1 | 2 | AD | 2209 |
| 06 | 1232 | 1320 | G-SWF | 4 | 2 | PR, PU | 1228 |
| 06 | 1645 | 1707 | G-SWF | 4 | 1 | HU, MC, PR | 1625 |
| 08 | 0230 | 0254 | Slow S-SWF | 5 | 2- | AD, CA, OK | 0240E |
| 08 | 1056 | 1126 | S-SWF | 1 | 3 | HH | 1049 |
| 09 | 1905 | 1925 | Slow S-SWF | 4 | 1 | HU, MC, PR, WS | 1902 |
| 09 | 0340 | 0424 | Slow S-SWF | 5 | 1+ | AN, CA, OK, TO | 0340 |
| 10 | 0902 | 0914 | S-SWF | 1 | 3? | HH | 0855 |
| 10 | 1607 | 1810 | Slow S-SWF | 5 | 3 | AN, BE, CR, HU, MC, PR, WS, CW* | 1659E |
| 10 | 1810 | 1930 | S-SWF | 3 | 2 | BE, MC, PR, WS | |
| 11 | 1430 | 1502 | G-SWF | 3 | 1 | HU, MC, PR | 1420 |
| 11 | 1512 | 1527 | S-SWF | 2 | 1- | HU, MC | 1515E |
| 11 | 1632 | 1712 | Slow S-SWF | 5 | 1 | AN, BE, CR, HU, MC, PR, WS | |
| 12 | 0900 | 0916 | S-SWF | 1 | 3 | HH | 0859E |
| 12 | 1013 | 1022 | S-SWF | 1 | 1 | PU | 1013 |
| 12 | 1358 | 1408 | S-SWF | 2 | 1- | HU, MC | 1353 |
| 13 | 0541 | 0606 | S-SWF | 1 | 1 | NE | 0534E |
| 13 | 1530 | 1615 | S-SWF | 5 | 2 | BE, CR, HU, MC, NE, PR, WS | 1523 |
| 13 | 1745 | 1820 | Slow S-SWF | 5 | 1 | BE, CR, HU, MC, PR, WS | |
| 14 | 0144 | 0223 | S-SWF | 4 | 2 | AN, TO | |
| 14 | 0412 | 0504 | S-SWF | 4 | 2 | AN, TO | |
| 14 | 1135 | 1200 | Slow S-SWF | 1 | 2. | NE | 1158E |
| 14 | 1324 | 1415 | Slow S-SWF | 5 | 1+ | BE, CR, HU, MC, NE, PR, WS | 1319 |
| 14 | 1712 | 1800 | S-SWF | 5 | 2+ | AN, BE, CR, DA, HU, MC, PR, WS, RCA* | |
| 15 | 0242 | 0317 | S-SWF | 5 | 2 | AD, CA, OK, TO, CW+ | 0241E |
| 15 | 2013 | 2030 | Slow S-SWF | 3 | 1 | AN, HU, MC | |
| 15 | 2150 | 2202 | S-SWF | 5 | 1+ | AD, AN, BE, HU, MC, PR, TO, WS | |
| 16 | 0050 | 0115 | Slow S-SWF | 1 | 2 | CA | 0045 |
| 16 | 0150 | 0210 | S-SWF | 5 | 2+ | AD, AN, CA, OK, TO, CW+, RCA+ | 0152 |
| 16 | 0417 | 0447 | Slow S-SWF | 5 | 2 | CA, NE, OK, TO, CW+ | 0415E |
| 16 | 0534 | 0624 | S-SWF | 1 | 2 | NE | 0529E |
| 17 | 1420 | 1510 | Slow S-SWF | 5 | 2 | BE, CR, HH, HU, MC, NE, PR, WS, CW* ** *** | 1415 |
| 17 | 1732 | 1753 | Slow S-SWF | 5 | 1 | AN, BE, HU, MC, PR | |
| 17 | 1830 | 1910 | G-SWF | 2 | 1 | MC, PR | |
| 18 | 0005 | 0135 | S-SWF | 3 | 2 | AD, CA | |
| 18 | 0247 | 0317 | S-SWF | 1 | 2 | TO | |
| 18 | 0820 | 0840 | S-SWF | 1 | 3? | HH | 0816 |
| 18 | 2200 | 2235 | S-SWF | 5 | 2+ | AD, AN, BE, HU, MC, TO, WS, RCA+ | |
| 19 | 0126 | 0146 | Slow S-SWF | 5 | 1+ | AD, CA, OK, TO | 0118 |
| 19 | 0406 | 0430 | S-SWF | 3 | 1 | OK, CW+ | 0406E |
| 19 | 0620 | 0715 | Slow S-SWF | 5 | 1+ | OK, PU, CW+, CW** | 0613E |

# IONOSPHERIC EFFECTS OF SOLAR FLARES

**(SHORT-WAVE RADIO FADEOUTS)**

**OCTOBER 1957**

| Oct. 1957 | Start UT | End UT | Type | Wide Spread Index | Impor-tance | Observation Stations | Known Flare, UT CRPL-F 159B |
|---|---|---|---|---|---|---|---|
| 19 | 0807 | 0851 | S-SWF | 1 | 2 | PU | 0757 |
| 19 | 1031 | 1138 | Slow S-SWF | 1 | 2 | PU | 1035E |
| 19 | 1700 | 1840 | G-SWF | 3 | 1+ | MC, PR | |
| 19 | 1918 | 1955 | S-SWF | 5 | 2 | AN, BE, CR, HU, MC, PR, TO, WS | 1916 |
| 20 | 0149 | 0350 | G-SWF | 1 | 3 | OK | |
| 20 | 0242 | 0320 | S-SWF | 5 | 2+ | AD, AN, TO, CW+++ | |
| 20 | 0945 | 1000 | S-SWF | 4 | 3 | HH, NE, PU | 0939 |
| 20 | 1639 | 1915 | S-SWF | 5 | 3+ | BE, CR, DA, HU, MC, NE, PR, TO, WA, WS, CW***, RCA+* | 1637 |
| 21 | 1215 | 1250 | S-SWF | 5 | 2 | DA, HU, NE, PU | 1212 |
| 21 | 1610 | 1635 | Slow S-SWF | 5 | 1 | BE, MC, PR, WS | 1610 |
| 21 | 1813 | 1852 | G-SWF | 3 | 1 | MC, PR | |
| 22 | 0400 | 0417 | Slow S-SWF | 1 | 1 | OK | 0406E |
| 22 | 0500 | 0520 | Slow S-SWF | 1 | 1 | OK | 0503E |
| 23 | 0227 | 0255 | S-SWF | 4 | 1+ | OK, TO | 0240E |
| 23 | 0428 | 0447 | S-SWF | 1 | 1+ | OK | |
| 23 | 0620 | 0652 | S-SWF | 5 | 2 | OK, CW+, CW** | 0623E |
| 23 | 2347 | 0007 | S-SWF | 5 | 1 | AD, OK, TO | |
| 24 | 0020 | 0033 | S-SWF | 4 | 1 | AD, | |
| 24 | 0705 | 0732 | S-SWF | 1 | - | CW+ | 0703E |
| 24 | 1420 | 1500 | Slow S-SWF | 5 | 1 | BE, CR, HU, MC, PR | |
| 24 | 1520 | 1700 | Slow S-SWF | 3 | 1 | BE, MC, PR | 1553E |
| 24 | 2259 | 2308 | S-SWF | 5 | 1 | AD, AN, TO | |
| 25 | 0855 | 0910 | S-SWF | 1 | 3? | HH | 0836 |
| 25 | 0948 | 1018 | S-SWF | 1 | 3? | HH | 0943 |
| 25 | 1044 | 1104 | S-SWF | 3 | 2 | HH, NE | 1043 |
| 25 | 1502 | 1528 | Slow S-SWF | 5 | 2- | BE, HH, HU, MC, PR, WS | 1500 |
| 25 | 1658 | 1715 | Slow S-SWF | 5 | 1 | BE, HU, MC, PR | 1649 |
| 25 | 1833 | 1940 | Slow S-SWF | 5 | 3- | BE, CR, HU, MC, PR, WS | 1855E |
| 25 | 2325 | 2345 | Slow S-SWF | 1 | 2 | CA | |
| 26 | 0135 | 0155 | S-SWF | 5 | 2 | AN, CA, OK | |
| 26 | 0758 | 0823 | S-SWF | 1 | 3? | HH | 0755E |
| 27 | 0037 | 0101 | S-SWF | 5 | 2- | AD, CA, OK, TO | |
| 27 | 0130 | 0152 | S-SWF | 5 | 2 | AD, CA, OK, TO, CW+ | |
| 27 | 1207 | 1222 | S-SWF | 3 | 2- | PR, PU | 1207E |
| 27 | 1228 | 1309 | S-SWF | 3 | 2- | PR, PU | 1227 |
| 27 | 1933 | 1942 | Slow S-SWF | 3 | 1 | MC, PR | |
| 29 | 0420 | 0454 | Slow S-SWF | 4 | 1+ | AN, OK | |
| 29 | 0828 | 0843 | S-SWF | 1 | 2 | PU | 0819E |
| 29 | 1047 | 1117 | S-SWF | 5 | 2 | DA, HU, PU | 1050E |
| 29 | 1514 | 1525 | Slow S-SWF | 5 | 2 | HH, HU, MC, PR | 1515 |
| 29 | 1533 | 1555 | Slow S-SWF | 5 | 1+ | BE, CR, HU, MC, PR, WS | 1531 |
| 29 | 1730 | 1755 | Slow S-SWF | 3 | 1 | MC, PR | |
| 30 | 1427 | 1448 | Slow S-SWF | 4 | 1 | HU, MC, PR | 1427E |
| 31 | 1720 | 1745 | Slow S-SWF | 5 | 2 | BE, CR, HU, MC, PR, WS | 1735E |

CA = Canberra, Australia.
CR = Cornell University, N.Y.
DA = Darmstadt, G.F.R.
HH = Heinrich Hertz Institute, Berlin.
NE = Nederhorst den Berg, Netherlands.
PU = Prague, Czech.
TO = Hiraiso Radio Wave Observatory, Japan.
CW* = Cable and Wireless, Barbadoes.
CW** = Cable and Wireless, Somerton, England.
CW*** = Cable and Wireless, Brentwood, England.
CW+ = Cable and Wireless, Hongkong.
CW+++ = Cable and Wireless, Accra.
RCA+ = RCA Communications, Inc., Pt. Reyes, Calif.
RCA* = RCA Communications, Inc., Riverhead, N.Y.
WA = Watheroo.

# SOLAR RADIO EMISSION

## OUTSTANDING OCCURRENCES

## NOVEMBER 1957

**OTTAWA**

2800 MC

| Nov. 1957 | Type* | Start UT Hrs:Mins | Duration Hrs:Mins | Maximum Time UT Hrs:Mins | Maximum Peak Flux | Remarks |
|---|---|---|---|---|---|---|
| 1 | 2 Simple 2 | 16 57.9 | 1.5 | 16 58.1 | 9 | |
| 2 | 3 Simple 3 | 14 01.5 | 12 | 14 06 | 13 | |
| 2 | 3 Simple 3 | 16 23 | 11 | 16 25 | 9 | |
| 2 | 1 Simple 1 | 17 54 | 4 | 17 55.5 | 7 | |
| 5 | 2 Simple 2 f | 12 05 | 8 | 12 07.3 | 550 | |
| | 4 Post Increase | | 4 30 | | 16 | |
| 7 | 2 Simple 2 | 17 18.7 | 1 | 17 19 | 11 | |
| 7 | 6 Complex f | 19 41.3 | 12 | 19 46 | 163 | |
| 8 | 2 Simple 2 | 16 13.5 | 1.5 | 16 14 | 13 | |
| 8 | 8 Group (2) | 20 01.2 | 5.7 | | | |
| | 2 Simple 2 f | 20 01.2 | 3.5 | 20 02.6 | 14 | |
| | 2 Simple 2 f | 20 05 | 1.9 | 20 05.8 | 31 | |
| 9 | 1 Simple 1 | 15 09 | 5 | 15 11.5 | 5 | |
| 10 | 7 Fluctuations | 14 46 | 12 | 14 47.2 | 10 | |
| 10 | 6 Complex | 16 10 | 3 | 16 10.8 | 9 | |
| 10 | 8 Group (4) | 18 04.7 | 14.3 | | | |
| | 2 Simple 2 | 18 04.7 | 0.5 | 18 04.9 | 15 | |
| | 1 Simple 1 | 18 10 | 2 | 18 10.8 | 5 | |
| | 1 Simple 1 | 18 14.2 | 1 | 18 14.5 | 4 | |
| | 2 Simple 2 | 18 17 | 2 | 18 17.3 | 10 | |
| 10 | 1 Simple 1 | 19 36 | 4 | 19 37.5 | 6 | |
| 11 | 6 Complex f | 14 12.2 | 17 | 14 18.8 | 167 | |
| 12 | 2 Simple 2 | 12 48 | 4 | 12 49.2 | 10 | |
| 12 | 8 Group (2) | 13 53 | 5.5 | | | |
| | 1 Simple 1 | 13 53 | 2 | 13 54 | 6 | |
| | 1 Simple 1 | 13 57.5 | 1 | 13 57.8 | 5 | |
| 13 | 3 Simple 3 A f | 19 32.5 | >1 50 | 20 04.5 | 18 | |
| | 2 Simple 2 | 19 32.5 | 3 | 19 33.7 | 18 | |
| 14 | 1 Simple 1 | 19 07 | 2 | 19 08 | 7 | |
| 14 | 1 Simple 1 | 19 46.3 | 1.5 | 19 46.8 | 5 | |
| 15 | 6 Complex f | 15 30.5 | 9 | 15 36.3 | 21 | |
| 15 | 1 Simple 1 | 16 29.8 | 1.5 | 19 30.5 | 5 | |
| 16 | 3 Simple 3 | 18 08 | 12 | 18 14 | 4 | |
| 17 | 1 Simple 1 | 13 59.5 | 1 | 14 00 | 4 | |
| 17 | 3 Simple 3 A | 14 20 | 7.5 | 14 22 | 5 | |
| | 2 Simple 2 | 14 23.5 | 1.5 | 14 23.9 | 20 | |
| 17 | 2 Simple 2 | 14 40 | 6 | 14 42 | 10 | |
| 17 | 1 Simple 1 | 16 29.4 | 2 | 16 29.8 | 3 | |
| 20 | 8 Group (2) | 14 38.4 | 1.8 | | | |
| | 1 Simple 1 | 14 38.4 | 0.5 | 14 38.6 | 6 | |
| | 1 Simple 1 | 14 39.7 | 0.5 | 14 40 | 4 | |
| 20 | 2 Simple 2 | 14 52 | 3.5 | 14 53 | 8 | |
| 20 | 3 Simple 3 A | 17 15 | 4 | 19 05 | 22 | |
| | 1 Simple 1 | 17 30 | 1.5 | 17 30.5 | 7 | |
| | 2 Simple 2 | 18 19.8 | 2 | 18 20.4 | 10 | |
| | 2 Simple 2 | 18 58.8 | 2 | 18 59.3 | 17 | |

# SOLAR RADIO EMISSION

## OUTSTANDING OCCURRENCES

## NOVEMBER 1957

OTTAWA 2800 MC

| Nov. 1957 | Type* | Start UT Hrs:Mins | Duration Hrs:Mins | Maximum Time UT Hrs:Mins | Maximum Peak Flux | Remarks |
|---|---|---|---|---|---|---|
| 21 | 3 Simple 3 A | 14 36 | >6 30 | 15 12.5 | 22 | |
| | 1 Simple 1 | 14 59 | 2.5 | 15 00 | 6 | |
| | 1 Simple 1 | 16 32 | 6 | 16 35 | 7 | |
| | 3 Simple 3 | 16 48 | 20 | 16 56 | 7 | |
| | 2 Simple 2 | 18 33 | 6 | 18 34 | 35 | |
| 22 | 1 Simple 1 | 13 17.3 | 1 | 13 17.8 | 4 | |
| 22 | 8 Group (2) | 13 24.5 | 5.8 | | | |
| | 2 Simple 2 | 13 24.5 | 2 | 13 25 | 8 | |
| | 2 Simple 2 | 13 27.3 | 3 | 13 28.2 | 32 | |
| 22 | 2 Simple 2 | 13 46.9 | 2 | 13 47.2 | 12 | |
| 22 | 2 Simple 2 | 18 00 | 1.5 | 18 00.2 | 29 | |
| 23 | 3 Simple 3 f A | 15 02 | 3 30 | 15 47 | 26 | |
| | 1 Simple 1 | 16 10 | 2.5 | 16 10.8 | 7 | |
| 24 | 1 Simple 1 | 14 00.8 | 1 | 14 01 | 7 | |
| 24 | 3 Simple 3 f A | 18 11 | >3 | 18 55 | 38 | |
| | 2 Simple 2 f | 19 31 | 3.5 | 19 32.6 | 27 | |
| 25 | 1 Simple 1 | 14 32.8 | 0.5 | 14 32.9 | 7 | |
| 25 | 3 Simple 3 | 15 50 | 20 | 15 56 | 7 | |
| 25 | 2 Simple 2 | 17 11.5 | 1 | 17 12 | 155 | |
| 25 | 8 Group (2) | 18 56.8 | 2.9 | | | |
| | 1 Simple 1 | 18 56.8 | 1 | 18 57 | 5 | |
| | 2 Simple 2 | 18 58.2 | 1.5 | 18 58.9 | 8 | |
| 25 | 8 Group (3) | 19 40.7 | 7.1 | | | |
| | 1 Simple 1 | 19 40.7 | 1 | 19 41 | 4 | |
| | 1 Simple 1 | 19 42.7 | 2.5 | 19 43.9 | 7 | |
| | 6 Complex | 19 46.3 | 1.5 | 19 47 | 20 | |
| 26 | 6 Complex | 14 46.7 | 6 | 19 47.4 | 10 | |
| 27 | 2 Simple 2 | 13 06 | 5 | 13 07.4 | 42 | |
| 27 | 3 Simple 3 A | 19 03 | 1 | 19 23 | 10 | |
| | 2 Simple 2 | 19 03 | 8 | 19 06.5 | 17 | |
| 27 | 2 Simple 2 | 20 34.5 | 2 | 20 35.5 | 10 | |
| 28 | 3 Simple 3 A | 14 11 | 6 | indet. | 19 | |
| | 2 Simple 2 | 14 21.7 | 1.5 | 14 22.2 | 15 | |
| 29 | 2 Simple 2 | 12 34.9 | 1 | 12 35.2 | 68 | (In sunrise) |
| 29 | 6 Complex | 17 13 | 4.5 | 17 14.4 | 45 | |
| | 4 Post Increase | | 1 10 | | 17 | |
| 29 | 2 Simple 2 | 20 32.3 | 0.5 | 20 32.6 | 10 | |
| 30 | 2 Simple 2 | 13 04.8 | 8 | 13 07 | 60 | |

IVc

# SOLAR RADIO EMISSION

## DAILY DATA

### NOVEMBER 1957

CORNELL

200 MC

| Nov. 1957 | Flux Density $10^{-22}$w $m^{-2}(c/s)^{-1}$ Hours UT | | | Variability 0 to 3 Hours UT | | | Observing Periods Hours UT |
|---|---|---|---|---|---|---|---|
| | 12 15 | 15 18 | 18 21 | 12 15 | 15 18 | 18 21 | |
| 1 | [[15 | 15 | 20 | [[1 | 1 | 1 | 1340-2100 |
| 2 | [[16 | 15 | - | [[2 | 1 | - | 1335-1720 |
| 3 | [[15 | 15 | - | [[1 | 1 | - | 1330-1730 |
| 4 | [124 | 23 | 14 | [1 | 1 | 0 | 1330-2130 |
| 5 | [[12 | 13 | 13 | [[0 | 0 | 1 | 1335-1630, 1650-2100 |
| 6 | [[21 | 19 | 15] | [[2 | 2 | 1] | 1350-1940 |
| 7 | [[12 | 12 | 12]] | [[1 | 1 | 1]] | 1330-1915 |
| 8 | [[12 | 13 | 13 | [[0 | 1 | 1 | 1335-1530, 1610-2105 |
| 9 | [[12 | 13] | - | [[0 | 1] | - | 1330-1700 |
| 10 | [[11 | 11] | - | [[1 | 0] | - | 1340-1700 |
| 11 | [[12 | 13 | 12] | [[1 | 0 | 0] | 1345-2110 |
| 12 | [[11 | 13 | 12 | [[0 | 1 | 1 | 1350-2045 |
| 13 | [13 | 13 | 13] | [[1 | 0 | 1] | 1350-2005 |
| 14 | [[14 | [[13 | 12] | [[2 | [[0 | 1] | 1345-1450, 1645-1925 |
| 15 | [[15 | 14 | 13]] | [[2 | 1 | 0]] | 1335-2035 |
| 16 | [[14 | 14] | - | [[0 | 1] | - | 1335-1710 |
| 17 | [[13 | 14] | - | [[1 | 1] | - | 1340-1705 |
| 18 | [[11 | 11 | 11] | [[0 | 0 | 0] | 1335-2100 |
| 19 | [[11 | 11 | 11] | [[1 | 0 | 0] | 1335-1945 |
| 20 | [[11 | 12 | 32]] | [[0 | 0 | 1]] | 1340-1915 |
| 21 | [[11 | [12 | 11] | [[1 | [0 | 1] | 1335-1440, 1600-1940 |
| 22 | [[13 | 13 | 13] | [[0 | 0 | 0] | 1335-1435, 1450-1515, |
| 23 | [[26 | 25] | - | [[2 | 2] | - | 1345-1700 1525-1925 |
| 24 | [[42 | 60] | - | [[2 | 2] | - | 1335-1700 |
| 25 | [[117 | 104 | 49] | [[2 | 2 | 2] | 1355-2110 |
| 26 | [[31 | 25 | 26] | [[2 | 1 | 1] | 1350-2045 |
| 27 | [[28 | 27 | 22] | [[1 | 1 | 1] | 1340-2045 |
| 28 | - | - | - | - | - | - | |
| 29 | - | [54 | 180] | - | [2 | 1] | 1340-2115 |
| 30 | [[50 | 40] | - | [[2 | 2] | - | 1335-1705 |

[=first hour missing.
[[=first two hours missing.
]=last hour missing.
]]=last two hours missing.

# SOLAR RADIO EMISSION

## OUTSTANDING OCCURRENCES

## NOVEMBER 1957

CORNELL

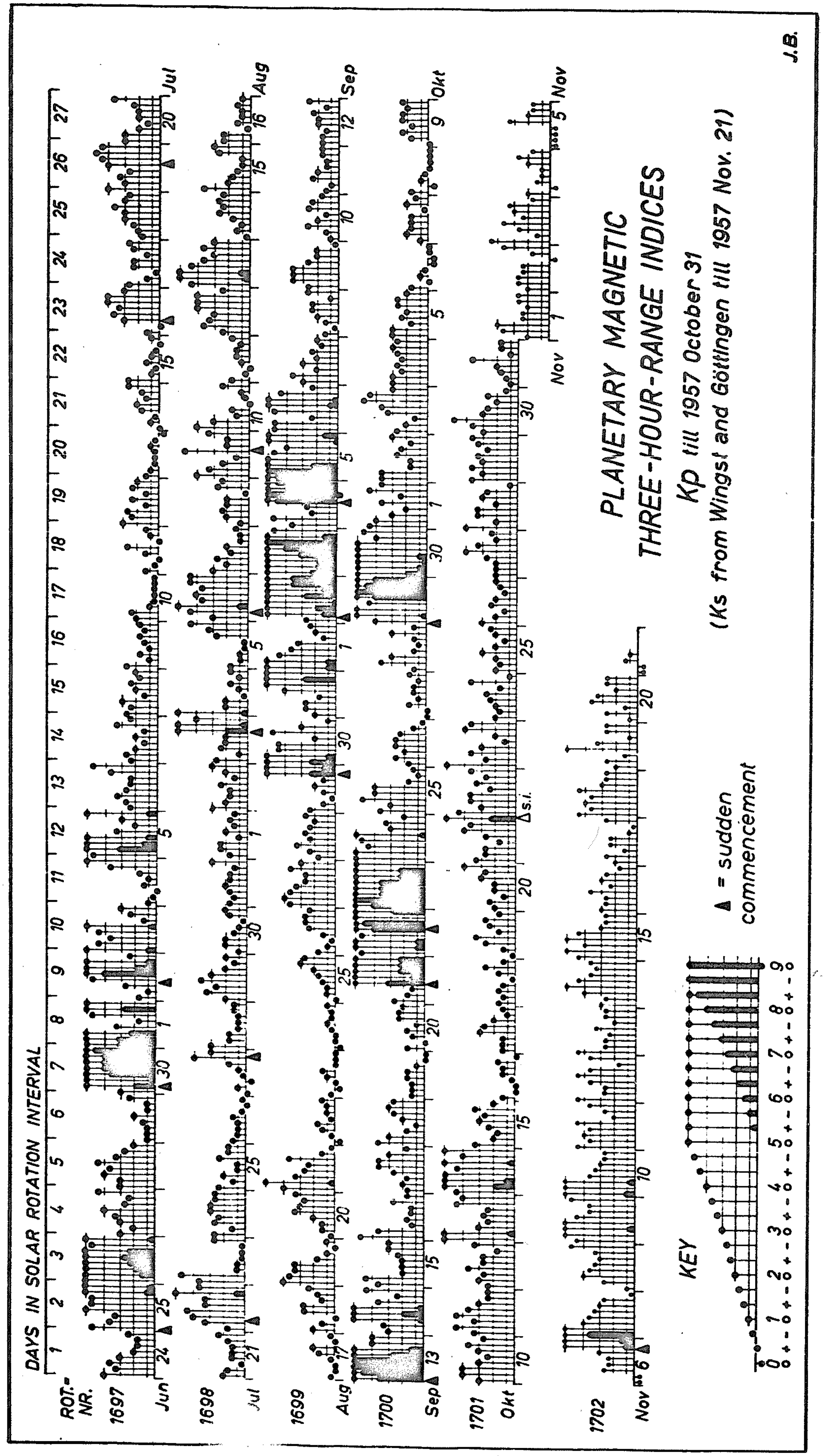
200 MC

| Nov. 1957 | Type Ap.J | Start UT | Time of Maximum | Duration Minutes | Type IAU | Max. Flux Density $10^{-22}W\ m^{-2}(c/s)^{-1}$ Inst. | Smooth | Remarks |
|---|---|---|---|---|---|---|---|---|
| 1 | 0 | 1441.5 | | 106 | CD | 27 | 10 | |
| | 0 | 1837 | | 96 | SA | 34 | 16 | |
| | 0 | 2021 | | >38 | SA | | | |
| 3 | 8 | 1651.5 | | 5 | ECD | >45 | >23 | off-scale 1652-53.5 UT |
| 4 | 9 | b1330 | 1343.5 | >15 | CD | >450 | 71 | |
| | 9 | 1346 | | 131 | M | | | |
| 8 | 3 | 1745.5 | | 2 | ECD | >45 | >26 | |
| 9 | 2 | 1643 | | 1.5 | ECD | >45 | >27 | off-scale 1643-43.5 UT |
| 10 | 2 | 1453 | | 3.5 | ECD | >45 | >28 | |
| 11 | 8 | 1413 | | 17 | ECD | >45 | >27 | off-scale 1418.5-21, 1421.5-22.5, 1424, 1427 UT |
| 12 | 1 | 1712.5 | | 44 | E | | | |
| 15 | 1 | 1341 | | 63 | E | | | |
| 16 | 2 | 1534.5 | | 3 | ECD | | | |
| | 2 | 1636 | | 1 | ECD | | | |
| | 2 | 1639.5 | | 1 | ECD | | | |
| 17 | 2 | 1418.5 | | 11 | ECD | | | off-scale 1424.5-25 UT |
| | 2 | 1636 | | 7 | ECD | | | |
| | 3 | 1650 | | 1 | ECD | >45 | 24 | |
| 18 | 3 | 1633 | | .5 | ECD | >45 | >27 | off-scale |
| | 3 | 2056.5 | | 1.5 | ECD | >45 | >28 | |
| 19 | 3 | 1358 | | .5 | ECD | >45 | >29 | off-scale |
| | 3 | 1422 | | .5 | ECD | >45 | >29 | off-scale |
| 20 | 3 | 1347 | | 1 | ECD | >45 | 27 | |
| | 0 | 1728.5 | | 99 | E | >45 | 17 | off-scale 1746.5, 1747-1752.5, 1814.5-15 UT |
| 21 | 3 | 1416 | 1416.5 | 1 | ECD | >45 | >28 | |
| 25 | 3 | 1711.5 | 1712 | 1.5 | CA | >450 | 180 | |
| | 3 | 1858 | | 2 | ECD | >250 | >91 | |
| | 3 | 2009.5 | 2010 | 1 | CA | >250 | 110 | |
| 27 | 1 | 1342 | | 96 | F | | | |
| | 2 | 1631.5 | | 45 | E | | | |
| | 3 | 1843 | | 1.5 | ECA | >45 | >21 | |
| | 3 | 1947.5 | | 1.5 | ECA | >45 | >22 | off-scale 1948-48.5 UT |
| | 3 | 2019 | | .5 | ECA | >45 | >22 | |
| 29 | 0 | 1625 | | >288 | E | | | |

# GEOMAGNETIC ACTIVITY INDICES

## OCTOBER 1957

| Oct. 1957 | C | Values Kp, Three hour Gr. interval 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | Sum | Ap | Final Selected Days |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1.1 | 4+ | 4o | 3o | 2o | 4- | 2+ | 4+ | 4- | 27+ | 21 | Five |
| 2 | 0.8 | 4- | 4- | 2- | 2- | 3- | 2+ | 2- | 3o | 20+ | 12 | Quiet |
| 3 | 1.0 | 3- | 2o | 1+ | 3+ | 4- | 5- | 4+ | 3o | 25o | 19 | |
| 4 | 0.8 | 3o | 3o | 2+ | 3- | 2+ | 3- | 3o | 3- | 22- | 12 | 6 |
| 5 | 0.7 | 3o | 3o | 2- | 2+ | 2o | 3- | 3- | 2o | 19+ | 10 | 7<br>8 |
| 6 | 0.1 | 2- | 0+ | 1o | 1- | 0o | 0o | 0+ | 0+ | 4+ | 2 | 16 |
| 7 | 0.2 | 1o | 2o | 2- | 2- | 2- | 1- | 2o | 1+ | 12o | 6 | 18 |
| 8 | 0.0 | 2- | 0o | 1o | 1- | 0+ | 0+ | 0+ | 0+ | 5- | 3 | |
| 9 | 0.5 | 0+ | 2- | 2+ | 2- | 2+ | 2+ | 2o | 2+ | 15o | 7 | |
| 10 | 1.0 | 3o | 4o | 4o | 3o | 2+ | 3o | 4- | 3- | 26- | 18 | |
| 11 | 1.1 | 3+ | 4+ | 3+ | 4+ | 4- | 3o | 2+ | 2+ | 27- | 19 | Five |
| 12 | 0.9 | 2+ | 3o | 3- | 4- | 3- | 3- | 2- | 3+ | 22o | 13 | Disturbed |
| 13 | 1.2 | 5o | 5+ | 3o | 2+ | 3- | 2+ | 4+ | 4o | 29o | 26 | |
| 14 | 1.5 | 4+ | 6+ | 6- | 5o | 4+ | 5+ | 4o | 5o | 40o | 50 | 1 |
| 15 | 0.8 | 3+ | 2o | 2- | 2+ | 3o | 3- | 3+ | 2o | 20+ | 12 | 11<br>13 |
| 16 | 0.1 | 1+ | 0+ | 0+ | 1- | 1+ | 1+ | 2- | 0+ | 7+ | 4 | 14 |
| 17 | 0.4 | 1+ | 1+ | 1+ | 3o | 3- | 2o | 1o | 1+ | 14o | 7 | 21 |
| 18 | 0.2 | 2- | 1+ | 2- | 1+ | 1- | 2- | 3- | 1+ | 12+ | 6 | |
| 19 | 0.5 | 1- | 1+ | 3- | 3+ | 2- | 2+ | 3- | 2- | 16+ | 9 | |
| 20 | 0.7 | 2o | 2+ | 1+ | 2o | 2o | 3o | 3- | 4o | 19+ | 11 | |
| 21 | 1.3 | 3+ | 3- | 3- | 2- | 3- | 4o | 4- | 7- | 27+ | 28 | Ten |
| 22 | 1.1 | 4+ | 3o | 4- | 4- | 2+ | 3+ | 3- | 4- | 27- | 19 | Quiet |
| 23 | 1.1 | 5o | 3- | 4- | 3o | 1+ | 2o | 4o | 4- | 25+ | 20 | |
| 24 | 0.5 | 2o | 2- | 2o | 2+ | 3- | 2- | 4- | 1o | 17o | 9 | 6 |
| 25 | 0.4 | 2o | 2- | 2o | 3o | 2o | 1+ | 2o | 2+ | 16+ | 8 | 7<br>8 |
| 26 | 0.4 | 3o | 2o | 1+ | 2+ | 2o | 1+ | 2- | 2o | 16- | 8 | 9 |
| 27 | 0.7 | 2o | 2o | 2o | 3- | 4o | 3+ | 2o | 2+ | 20+ | 12 | 16 |
| 28 | 0.7 | 4o | 2o | 3+ | 3+ | 2o | 3o | 3- | 1o | 21+ | 14 | 17 |
| 29 | 1.0 | 4- | 3o | 4- | 3o | 3+ | 3- | 3+ | 4- | 26+ | 18 | 18 |
| 30 | 0.9 | 3o | 4- | 5- | 3o | 3- | 2o | 3- | 1+ | 23o | 16 | 25 |
| 31 | 0.5 | 1o | 1+ | 2- | 2o | 4- | 1o | 2- | 2- | 14o | 8 | 26<br>31 |
| Mean: | 0.72 | | | | | | | | | Mean: | 14 | |


DAYS IN SOLAR ROTATION INTERVAL
ROT.-NR.
1697
1698
1699
1700
1701
1702
PLANETARY MAGNETIC
THREE-HOUR-RANGE INDICES
Kp till 1957 October 31
(Ks from Wingst and Göttingen till 1957 Nov. 21)
KEY
▲ = sudden commencement
Δs.i.
J.B.

# CRPL RADIO PROPAGATION QUALITY FIGURES AND FORECASTS

## NORTH ATLANTIC

### OCTOBER 1957

| Oct. 1957 | North Atlantic 6-hourly quality figures | | | | Short-term forecasts issued about one hour in advance of: | | | | Whole day index | Advance forecasts (J-reports) for whole day; issued in advance by: | | | Geomagnetic $K_{Fr}$ | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 00 to 06 | 06 to 12 | 12 to 18 | 18 to 24 | 00 | 06 | 12 | 18 | | 1-4 days | 4-7 days | 8-25 days | Half (1) | Day (2) |
| 1 | 6- | 6o | 7o | 6o | 5 | 5 | 7 | 7 | 6o | 6 | 7 | | 3 | 3 |
| 2 | 6- | 6+ | 7+ | 7- | 6 | 6 | 7 | 7 | 7- | 7 | 7 | | 3 | 3 |
| 3 | 7- | 6+ | 7o | 7- | 6 | 7 | 7 | 7 | 7- | 7 | 7 | | 2 | 3 |
| 4 | 6+ | 5+ | 7+ | 7- | 6 | 6 | 7 | 7 | 7- | 6 | 7 | | 2 | 3 |
| 5 | 7- | 7- | 7+ | 7o | 7 | 7 | 7 | 7 | 7o | 6 | 7 | | 2 | 2 |
| 6 | 7o | 7o | 7+ | 7o | 7 | 7 | 7 | 7 | 7o | 7 | 7 | | 1 | 1 |
| 7 | 7o | 7o | 7+ | 7o | 7 | 7 | 7 | 7 | 7o | 7 | 7 | | 2 | 2 |
| 8 | 7+ | 7o | 7+ | 7o | 7 | 7 | 7 | 7 | 7o | 7 | 7 | | 1 | 1 |
| 9 | 7o | 7o | 7o | 7+ | 7 | 7 | 7 | 7 | 7o | 7 | 7 | | 2 | 3 |
| 10 | 6+ | 7- | 7- | 7- | 7 | 7 | 7 | 7 | 7- | 7 | 7 | | (4) | 2 |
| 11 | 6+ | 6- | 7- | 6+ | 6 | 6 | 7 | 7 | 6+ | 6 | 7 | | (4) | 3 |
| 12 | 6+ | 6o | 7o | 7- | 6 | 6 | 7 | 7 | 7- | 6 | 7 | | 3 | 2 |
| 13 | 6- | 6o | 7o | 7- | 6 | 6 | 7 | 7 | 6+ | 6 | 7 | | (4) | 3 |
| 14 | 6- | 5o | 7- | 6+ | 6 | 5 | 5 | 6 | 6- | 7 | 7 | | (5) | (4) |
| 15 | 6o | 6+ | 7- | 7- | 5 | 6 | 7 | 7 | 6+ | 6 | 7 | | 2 | 2 |
| 16 | 7- | 7- | 7o | 7o | 7 | 7 | 7 | 7 | 7- | 6 | 7 | | 0 | 1 |
| 17 | 7o | 7+ | 7o | 7o | 7 | 7 | 7 | 7 | 7o | 6 | 7 | | 1 | 2 |
| 18 | 7o | 7o | 7+ | 7+ | 7 | 7 | 7 | 7 | 7o | 7 | 5 | | 2 | 2 |
| 19 | 7o | 7- | 7+ | 7o | 7 | 7 | 7 | 7 | 7o | 6 | 5 | | 2 | 2 |
| 20 | 7o | 7o | 7- | 7- | 7 | 7 | 7 | 7 | 7- | 5 | 6 | | 2 | 3 |
| 21 | 7- | 7- | 7+ | 6+ | 6 | 6 | 7 | 7 | 7- | 5 | 6 | | 2 | (4) |
| 22 | 6- | 6+ | 7+ | 7o | 4 | 5 | 6 | 7 | 7- | 4 | 6 | | 3 | 3 |
| 23 | 7- | 7- | 7- | 7- | 6 | 6 | 7 | 7 | 7- | 3 | 7 | | 3 | 2 |
| 24 | 7- | 7o | 7o | 7o | 7 | 7 | 7 | 7 | 7o | 5 | 7 | | 2 | 2 |
| 25 | 7o | 7o | 7+ | 7+ | 7 | 7 | 7 | 7 | 7+ | 7 | 6 | | 2 | 2 |
| 26 | 7- | 7o | 7+ | 7+ | 7 | 7 | 7 | 7 | 7o | 7 | 6 | | 2 | 2 |
| 27 | 7o | 7o | 7o | 7o | 7 | 7 | 7 | 7 | 7o | 7 | 6 | | 2 | 3 |
| 28 | 7- | 7o | 7o | 7+ | 7 | 6 | 7 | 7 | 7+ | 7 | 6 | | 3 | 2 |
| 29 | 7- | 7- | 7+ | 7o | 7 | 7 | 7 | 7 | 7o | 7 | 7 | | 3 | 3 |
| 30 | 7- | 7o | 7o | 7- | 7 | 7 | 7 | 7 | 7- | 7 | 7 | | 3 | 2 |
| 31 | 7o | 7- | 7+ | 7o | 7 | 7 | 7 | 7 | 7o | 7 | 7 | | 1 | 2 |
| Score: Quiet Periods | | | | P | 24 | 25 | 29 | 28 | | 19 | 17 | | | |
| | | | | S | 6 | 6 | 1 | 3 | | 7 | 12 | | | |
| | | | | U | 0 | 0 | 1 | 0 | | 3 | 2 | | | |
| | | | | F | 1 | 0 | 0 | 0 | | 2 | 0 | | | |
| Disturbed Periods | | | | P | 0 | 0 | 0 | 0 | | 0 | 0 | | | |
| | | | | S | 0 | 0 | 0 | 0 | | 0 | 0 | | | |
| | | | | U | 0 | 0 | 0 | 0 | | 0 | 0 | | | |
| | | | | F | 0 | 0 | 0 | 0 | | 0 | 0 | | | |

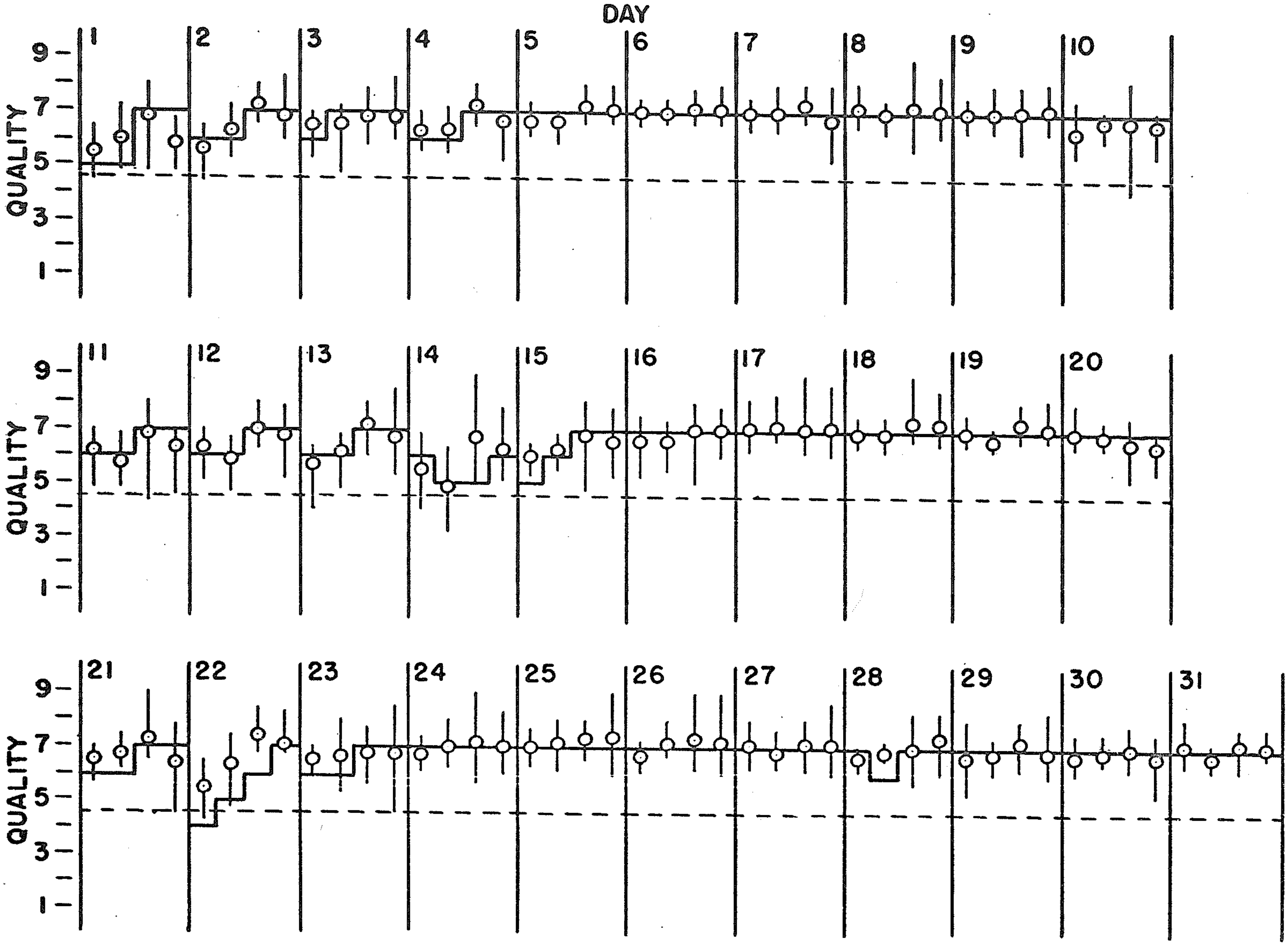
( ) represent disturbed values.

# CRPL RADIO PROPAGATION QUALITY FIGURES AND FORECASTS

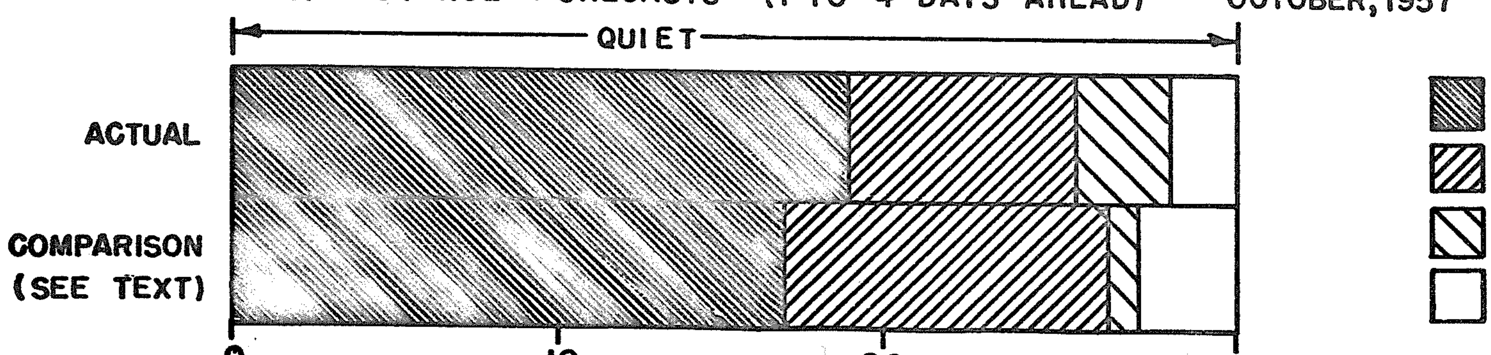
## NORTH ATLANTIC

### OCTOBER 1957

— Short-term forecast
o Quality figure
| Range of reports

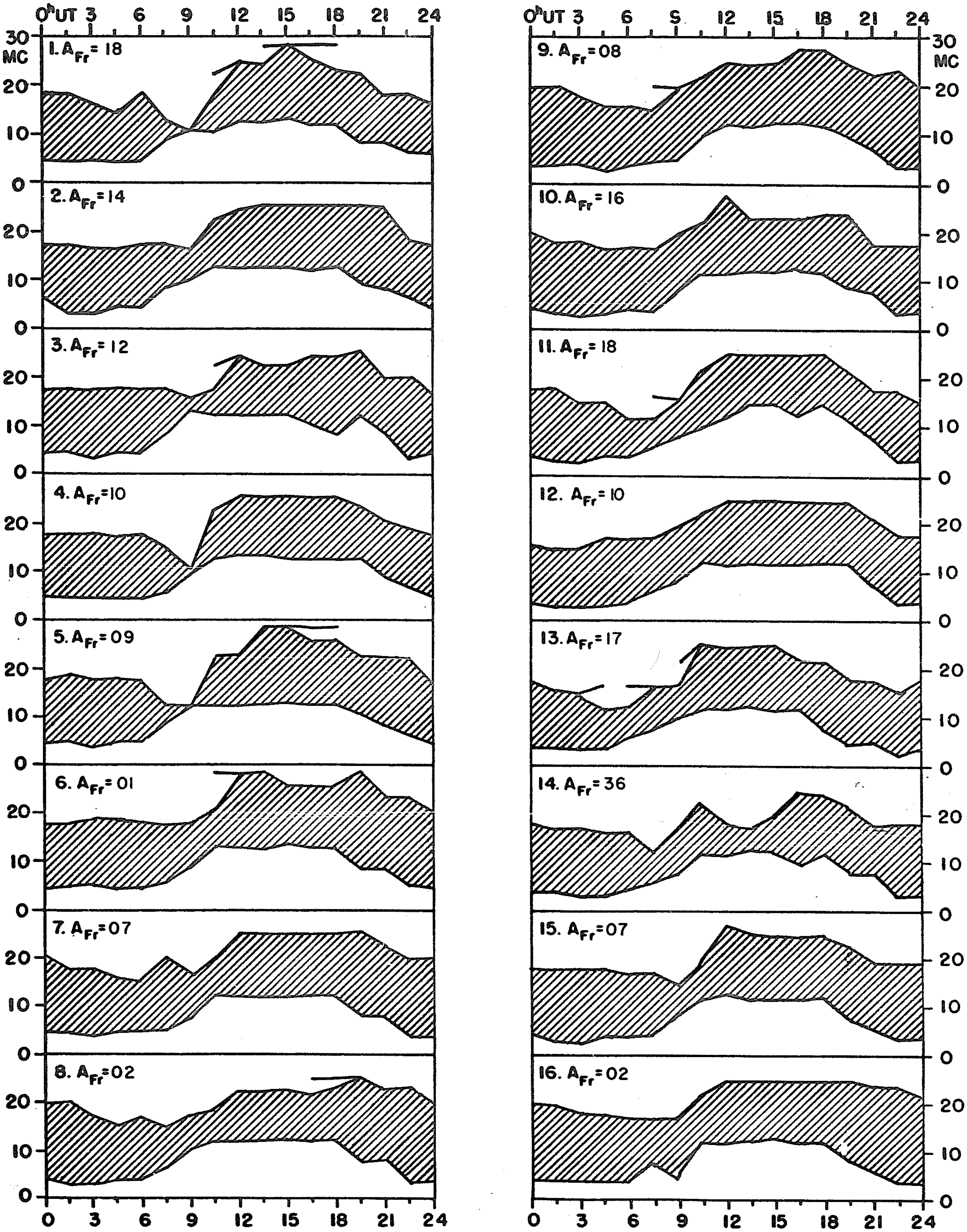


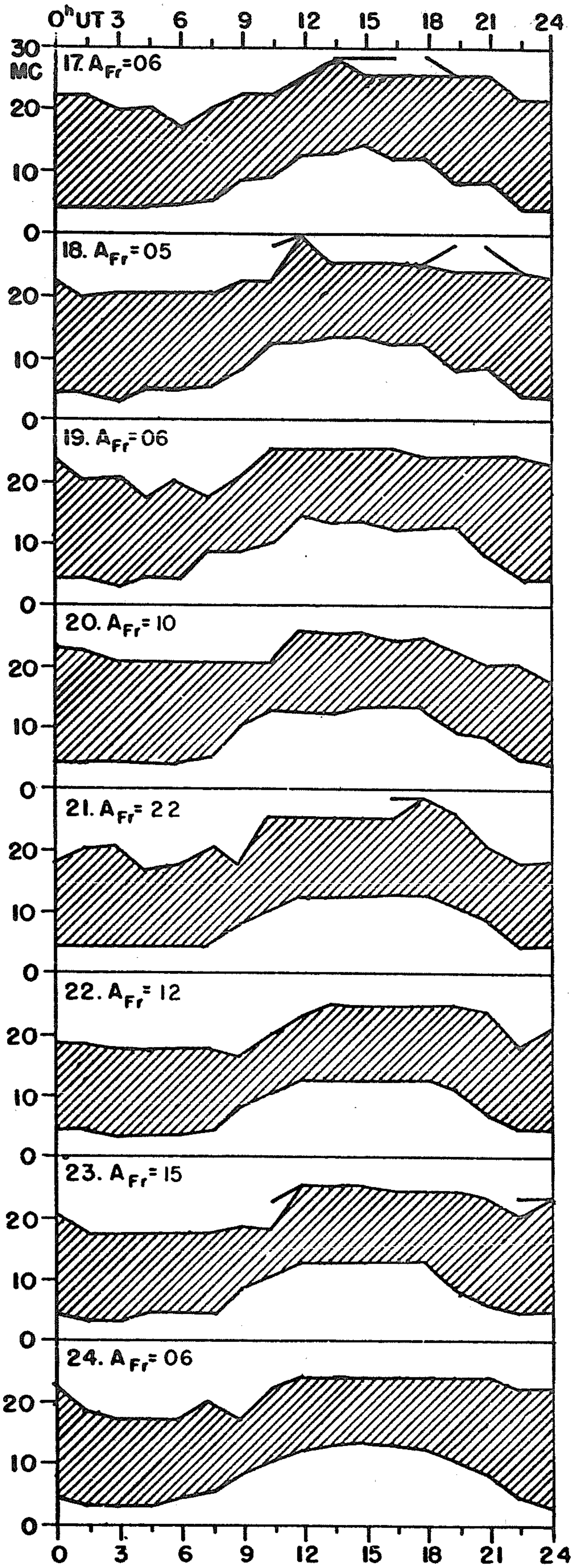

OUTCOME OF ADVANCE FORECASTS (I TO 4 DAYS AHEAD) — OCTOBER, 1957

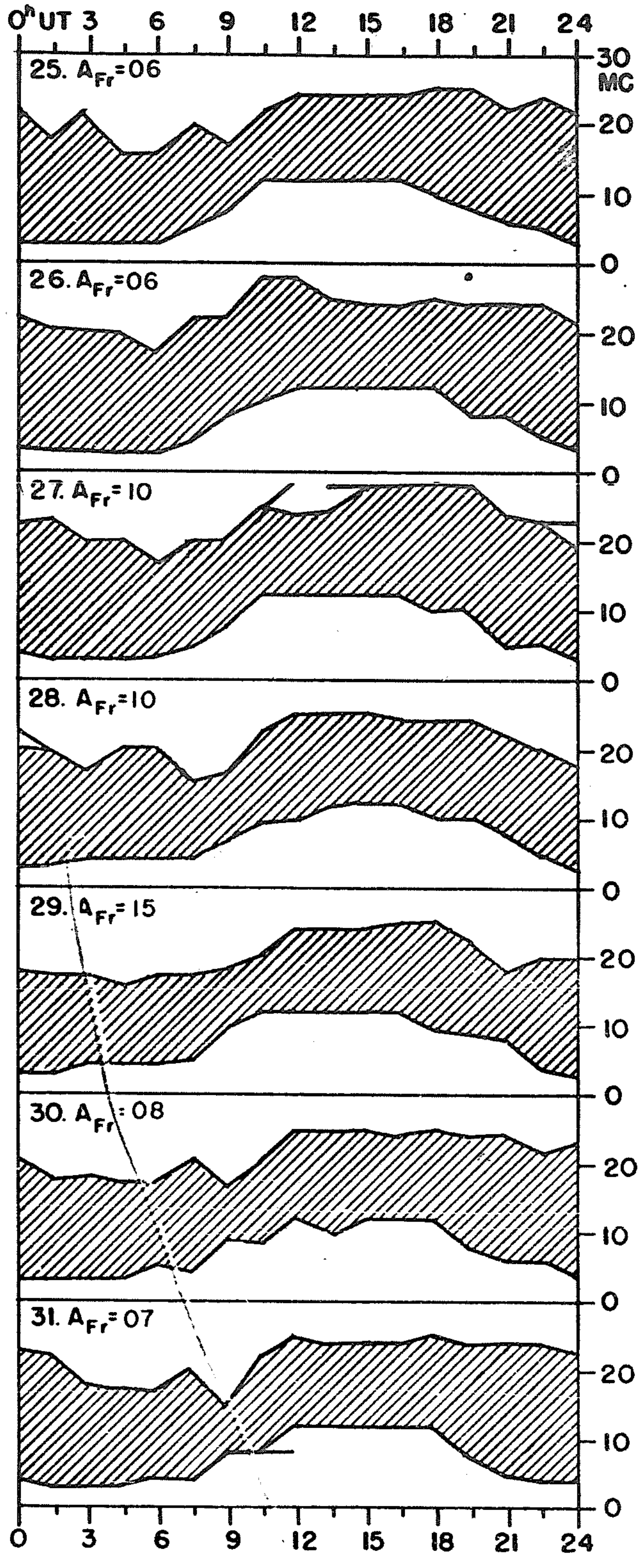


# USEFUL FREQUENCY RANGES -- NORTH ATLANTIC PATH

## OCTOBER 1957






Adapted from Observations by Deutsches Bundespost

# CRPL RADIO PROPAGATION QUALITY FIGURES AND FORECASTS

## NORTH PACIFIC

## OCTOBER 1957

| Oct. 1957 | North Pacific 8-hourly quality figures | | | Short-term forecasts issued at | | | Whole day index | Advance forecasts (Jp reports) for whole day; issued in advance by: | | | Geomagnetic $K_{Si}$ | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 03 to 11 | 11 to 19 | 19 to 03 | 02 | 10 | 18 | | 1-4 days | 4-7 days | 8-25 days | Half (1) | Day (2) |
| 1 | 6 | 5 | 6 | 5 | 5 | 6 | 6 | 5 | 4 | | 3 | 3 |
| 2 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | | 3 | 2 |
| 3 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | | 2 | (4) |
| 4 | 6 | 7 | 6 | 6 | 6 | 6 | 7 | 6 | 6 | | 2 | 3 |
| 5 | 7 | 6 | 6 | 6 | 7 | 6 | 7 | 6 | 6 | | 3 | 2 |
| 6 | 7 | 6 | 7 | 6 | 6 | 6 | 7 | 6 | 6 | | 1 | 0 |
| 7 | 7 | 7 | 7 | 6 | 7 | 7 | 7 | 6 | 6 | | 1 | 2 |
| 8 | 7 | 6 | 6 | 7 | 7 | 7 | 7 | 6 | 6 | | 1 | 0 |
| 9 | 7 | 6 | 6 | 7 | 7 | 6 | 7 | 7 | 7 | | 1 | 2 |
| 10 | 6 | 6 | 6 | 7 | 5 | 6 | 6 | 7 | 7 | | (4) | 3 |
| 11 | 6 | 4 | 6 | 6 | 6 | 6 | 5 | 7 | 7 | | (4) | (4) |
| 12 | 6 | 5 | 6 | 6 | 4 | 6 | 6 | 6 | 7 | | 3 | 3 |
| 13 | 6 | 6 | 7 | 6 | 6 | 6 | 6 | 6 | 7 | | (4) | 3 |
| 14 | 4 | 4 | 5 | 6 | 4 | 5 | 5 | 6 | 7 | | (6) | (5) |
| 15 | 6 | 6 | 6 | 5 | 6 | 6 | 6 | 6 | 7 | | 2 | 3 |
| 16 | 6 | 6 | 6 | 6 | 7 | 7 | 6 | 6 | 6 | | 0 | 1 |
| 17 | 7 | 7 | 6 | 7 | 7 | 7 | 7 | 6 | 6 | | 1 | 2 |
| 18 | 7 | 6 | 6 | 7 | 7 | 7 | 7 | 3 | 6 | | 1 | 2 |
| 19 | 6 | 7 | 5 | 7 | 6 | 7 | 6 | 7 | 3 | | 2 | 2 |
| 20 | 6 | 6 | 6 | 7 | 7 | 7 | 6 | 7 | 4 | | 1 | 3 |
| 21 | 7 | 7 | 7 | 6 | 7 | 6 | 7 | 7 | 6 | | 2 | 3 |
| 22 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | | (4) | 3 |
| 23 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | | 3 | 2 |
| 24 | 7 | 7 | 7 | 6 | 7 | 7 | 7 | 6 | 6 | | 1 | 3 |
| 25 | 7 | 7 | 6 | 7 | 7 | 7 | 7 | 6 | 6 | | 1 | 2 |
| 26 | 7 | 7 | 7 | 7 | 6 | 7 | 7 | 7 | 6 | | 1 | 2 |
| 27 | 7 | 6 | 6 | 6 | 6 | 7 | 7 | 6 | 6 | | 2 | 3 |
| 28 | 6 | 6 | 7 | 7 | 6 | 7 | 7 | 6 | 6 | | 3 | 2 |
| 29 | 7 | 6 | 7 | 7 | 6 | 7 | 7 | 6 | 6 | | 3 | 3 |
| 30 | 7 | 7 | 7 | 7 | 6 | 6 | 7 | 7 | 7 | | 3 | 2 |
| 31 | 7 | 6 | 6 | 7 | 7 | 7 | 7 | 7 | 7 | | 1 | 3 |

| Score: | | | 02 | 10 | 18 | 1-4 days | 4-7 days |
|---|---|---|---|---|---|---|---|
| | Quiet Periods | P | 18 | 16 | 18 | 13 | 8 |
| | | S | 12 | 13 | 12 | 16 | 18 |
| | | U | 0 | 0 | 1 | 1 | 2 |
| | | F | 0 | 0 | 0 | 1 | 3 |
| | Disturbed Periods | P | 0 | 1 | 0 | 0 | 0 |
| | | S | 0 | 0 | 0 | 0 | 0 |
| | | U | 0 | 0 | 0 | 0 | 0 |
| | | F | 1 | 1 | 0 | 0 | 0 |

( ) represent disturbed values.