PART B

SOLAR - GEOPHYSICAL DATA

ISSUED
MAY 1960

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

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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 prepared in the Radio Warning Services Section, edited by Miss J. V. Lincoln.

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 Zurich 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, these reports, 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 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, ℓ = 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. The sunspot data are compiled from reports from the U. S. Naval Observatory, and from reports from Europe and Japan received through the daily Ursigram messages.

Coronal Line Emission Indices -- In the table entitled Provisional Coronal Line Emission Indices are summarized solar coronal emission intensity indicies for the green (Fe XIV at λ 5303) and red (Fe X at λ 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 continuum 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 λ 5303.

R_6 = same for λ 6374.

G_1 = highest value of intensity in quadrant, for λ 5303.

R_1 = same for λ 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.

Once every three months Final Coronal Line Emission Indices are printed. These tables contain data from Pic du Midi and Kislovodsk as well as Sacramento Peak and Climax. The indices are computed in the same manner as for the provisional table.

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:

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

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 Hα 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.

Note: From calibrations in February - March 1960 it was determined that all intensities from the Climax and Sacramento Peak Observatories during the years 1956 - 1959, inclusive, if multiplied by the factor 0.60, will be expressed in millionths of equivalent Angstroms to a somewhat lower precision. Intensities prior to 1956 cannot be compared precisely with those obtained later because of changes in observing and reduction techniques. They may be converted roughly to millionths of equivalent Angstroms by the use of the table given by Billings and Varsavsky, 1955,[z] s.f. Ap. 38, 160.

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)-4961.

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	& = 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 ionosphericе effects, including particulars, appear 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, sudden ionospheric disturbances (and GID--gradual ionospheric disturbances) may be detected in a number of ways: short wave fadeouts (SWF), enhancement of low frequency atmospherics (SEA), increases in cosmic absorption (SCNA), and so forth.

A table lists SWF 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., Boulder, Colo., and Anchorage, Alaska (CRPL Stations: PR, BE, BO, AN); Huancayo, Peru (CRPL-Associated Laboratory: HU); and Ft. Monmouth, N. J., White Sands, N. Mex., Adak, Alaska, and Okinawa (U.S. Signal Corps Stations: FM, 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 SWF and the radio paths involved. Through the URSIgrams, reports are available from still other stations as given monthly in the footnotes.

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 either drop-out or recovery or both.

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 include in CRPL F-reports prior to F-135 were restricted to events classed here as S-SWF.

A second table lists sudden ionospheric disturbances which have been recognized on recorders for detecting cosmic absorption at about 18 Mc (SCNA) or on recorders for detecting enhancements of low frequency atmospherics at about 27 kc (SEA) together with solar radio bursts at 18 Mc as identified on the SCNA records.

Reports are received either directly or through the IGY World Data Center for Solar Activity at the High Altitude Observatory, Boulder, Colo. The following observatories report SCNA: Rensselaer Polytechnic Institute Observatory, Grafton, N.Y. (RE); McMath-Hulbert Observatory (MC); Sacramento Peak, N. Mex. (SP); High Altitude Observatory, Boulder, Colo. (BO); University of Hawaii, Makapuu Pt., Hawaii (HA). All of these also report solar noise bursts observed at 18 Mc. The SEA reports come from the following: Dunsink Observatory, Ireland (DU); three stations operated by the Netherlands PTT at Hollandia, Dutch West Indies (HO), Nederhorst den Berg, Netherland (NE), and Paramaribo, New Guinea (PA); Panska Ves Observatory near Prague, Czech. (PU); High Altitude Observatory, Boulder, Colo. (BO); Sacramento Peak, N.Mex. (SP); McMath-Hulbert Observatory (MC); University of Hawaii (HA); Neustrelitz (NU); Kuhlungsborn (KU); and a group of American Association of Variable Star Observers located at Brooklyn, N.Y. (A1), Pittsburgh, Pa. (A2), Paterson, N.J. (A3), Powell, Ohio (A4), Ramsey, N.J. (A5), Oshkosh, Wis. (A6), China Lake, Calif. (A7), Manhattan,Kansas (A8), Oakland, Calif, (A9), and Blauvelt, N. Y. (A10).

These reports are coordinated at CRPL-Boulder. 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. Some phenomena are listed, if noted at only one location, if there has been a flare or another type of flare-associated effect reported for that time.

In the table under the type of event the importance of the event is given on a scale of 1 minus to 3 plus. Next there is the index of widespread certainty ranging from 1 (possible) to 5 (definite). The time of beginning, maximum and end of the event in UT is given as reported by the station underlined in the group of observing stations. If the event is an SCNA, a percent absorption figure is given. This absorption is calculated by

$$SCNA\ \% = \frac{I_n - I_f}{I_n} \times 100$$

where I_n = noise diode current required to give a recorder deflection equal to that which would have occurred in the absence of a flare, i.e. a value extrapolated from cosmic noise level trend before and after a flare. The previous day's record may be considered if necessary.

and I_f = noise diode current required to give a recorder deflection equal to the level at the time of maximum absorption.

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 of 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

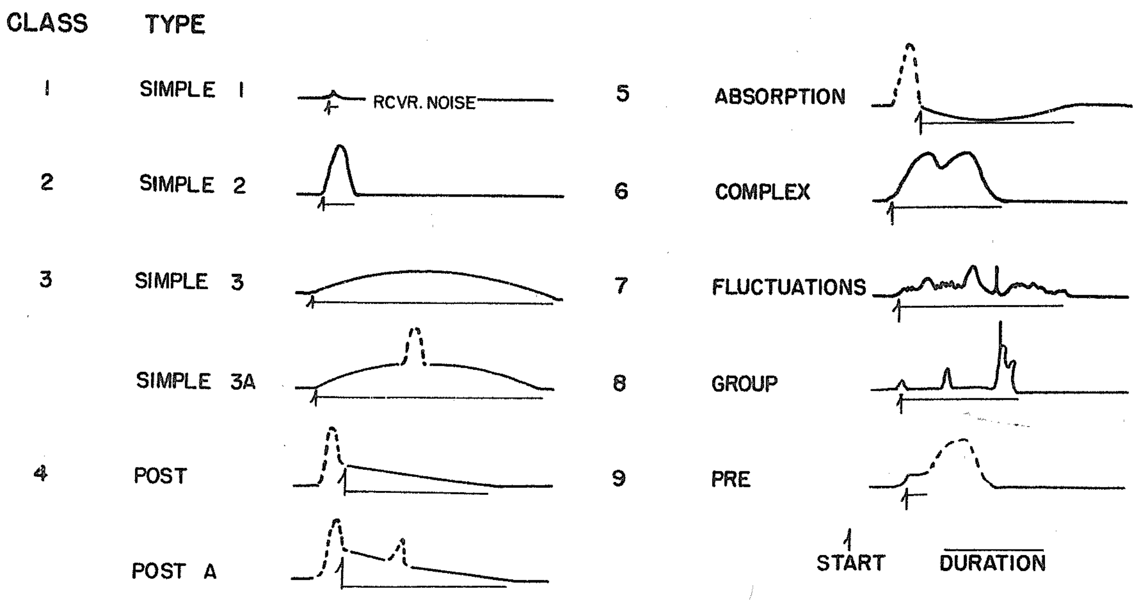
Infrequently occurring bursts of great intensity, often of complicated structure.

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 emission on 200 Mc recorded by the University of Hawaii (I. Miyake) at Makapuu Pt., Hawaii, are presented. The outstanding occurrences are reported as described under 170 Mc Observations with the exception that no intensity measurements are given.

170 Mc Observations

Data on solar radio emission at the nominal frequency of 170 Mc recorded at the Gunbarrel Hill (Boulder) station of the National Bureau of Standards (C.G. Little) 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). Observations are interrupted during the period from 26 to 29 minutes after each hour for calibrations.

Beginning January 1, 1959 the method of reducing the records has been changed. The 3-hourly and daily flux density and variability are no longer determined. The outstanding occurrences are reported. However, instead of giving the intensity to the nearest unit of 10^{-22} watts meter^{-2}(c/s)$^{-1}$, a scale of 1 to 3 is now used where for the estimate of smoothed maximum flux:

1 signifies $<100 \times 10^{-22}$ wm^{-2}(c/s)$^{-1}$

2 signifies >100 $<1000 \times 10^{-22}$ wm^{-2}(c/s)$^{-1}$

3 signifies $>1000 \times 10^{-22}$ wm^{-2}(c/s)$^{-1}$.

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. The following qualifying symbols are used:

E = Event in progress before observations began.
D = Event continues after observations cease.
I = Event apparently continued during an interruption of the observations. The period of the interruption may be given in the remarks.
S = Measurement may be influenced by interference or atmospherics.

The types of the outstanding occurrences follow the classification described by Dodson, Hedeman and Owren (Ap J. 118, 169, 1953), in which the types are identified by numbers which describe the character of the trace, but not 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.

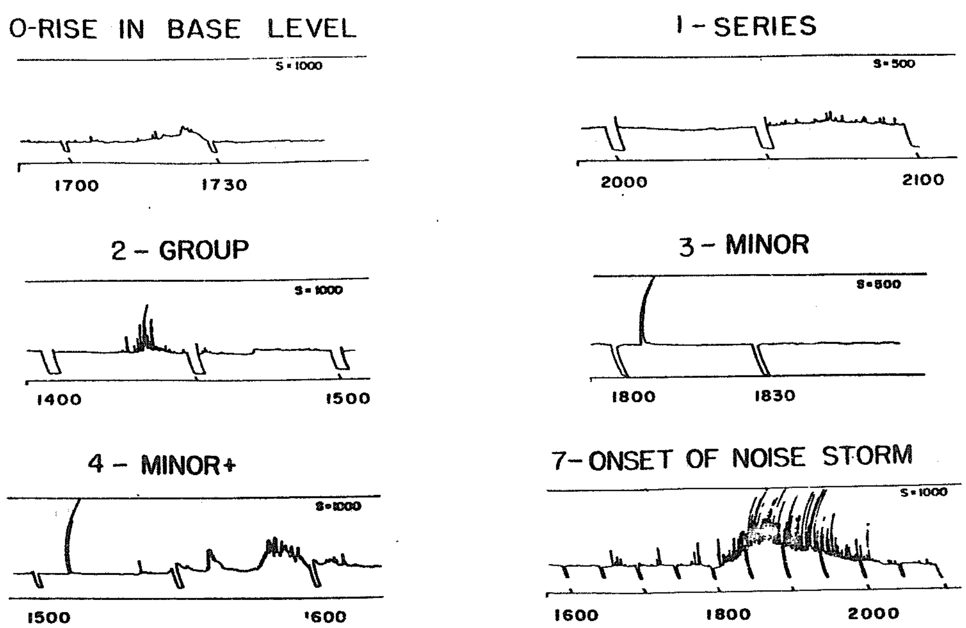
4 - Minor burst and second part -- A double rise in flux in which the early rise is a minor burst.

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.

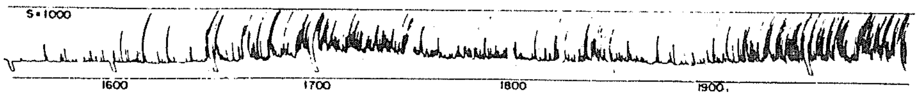
7 - Noise storm begins -- The onset of a noise storm occurs at some time during the observing period.

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.

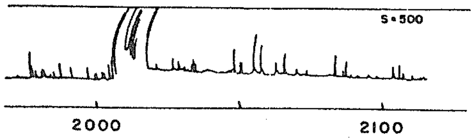
9A, 9B, or 9 -- Major burst and second part or large event without distinct first and second parts -- If there is a double rise in flux, the first part, a major burst, is listed as 9A and the second part as 9B. The second part may consist of a rise in base level, a group or series of bursts, a noise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



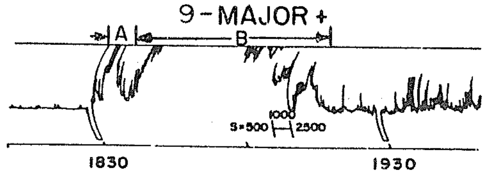
6-NOISE STORM IN PROGRESS



8-MAJOR



9-MAJOR+



Note: In the present table, the type classifications 0 and 1 are not used; they have been included above only for information.

169 Mc Interferometric Observations

The 169 Mc interferometric observations are recorded around local noon at Nançay (Cher), France, (N47°23', E8^{m}47^s) the field station of the Meudon Observatory.

The main lobes are parallel to the meridian plane: the half-power width is 3.8 minutes in the East-West direction and much larger than the solar diameter in the North-South direction. The main lobes are about 2° apart (Ann. Astrophys. 20, 155, 1957). The records give the strip intensity distribution from the center of the disk to 30' to the West and East.

These daily distributions are plotted on the same chart giving diagrams of evolution (C.R. 244, 1460, 1957). Points of intensity 0.5 - 0.75 - 1.0 - 1.5 and 2.0 times 10^{-22} watts/m^2/c/s are joined day after day in the form of isophotes. Black dots give the position of the center of the radio spots for each day; a line indicates the width of the recorded lobe pattern when it can be measured with certainty. For each radio spot the smoothed intensity around noon is given in 10^{-22} watts/m^2/c/s.

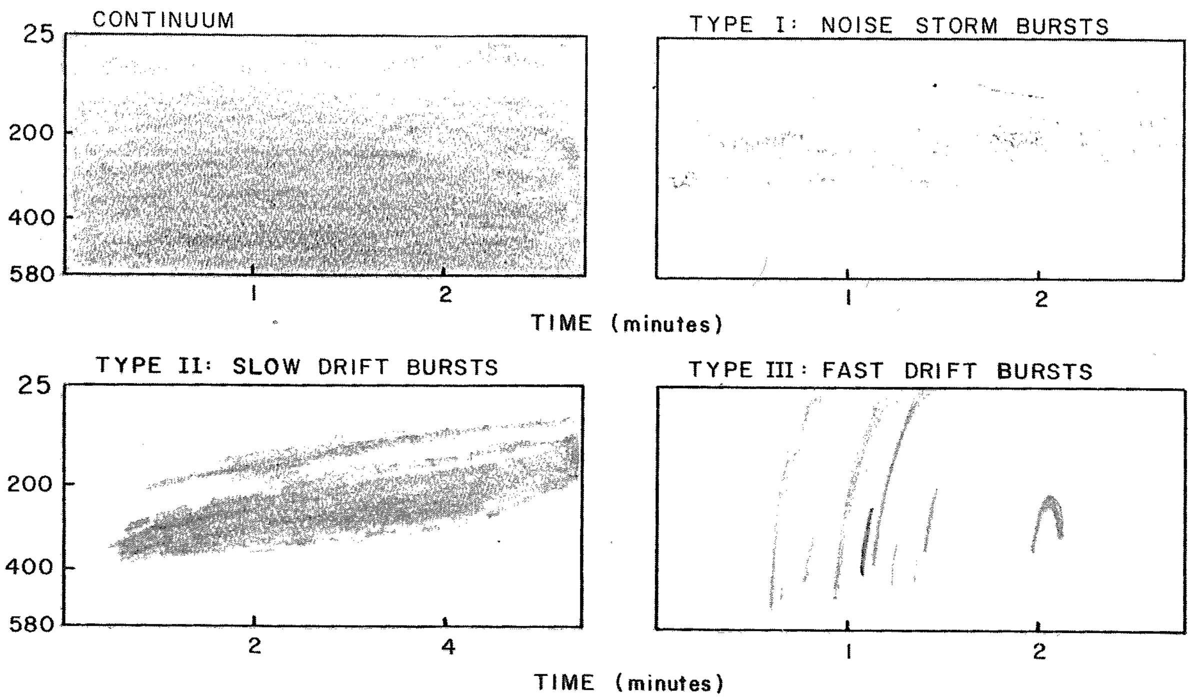
Note that the isophotes cannot be measured when a radio spot of large intensity is on the disk.

Spectrum Observations

Data on solar radio emission in the spectral range 25-580 Mc/s recorded at the Radio Astronomy Station of Harvard College Observatory, Fort Davis, Texas, are presented. The research program is supported by financial assistance from the Air Force Cambridge Research Center, through the offices of Sacramento Peak Observatory.

The receiving equipment consists of five separate sweep frequency receivers covering the bands 25-50, 50-100, 100-180, 170-320, 300-580 Mc/s. The 25-50 and 50-100 Mc/s receivers are each connected to broad band dipoles which are cross polarized and mounted over a reflecting screen. The other three receivers are attached to separate broad band feeds mounted coaxially at the primary focus of an 8.55 meter diameter paraboloid, the 170-320 Mc/s feed being cross polarised with the other two feeds. The effective collecting area of the antenna is 40 sq. meters at 100 Mc/s and 45 sq. meters at 500 Mc/s.

The four types of recognized spectral activity are idealized below:



The large scale examples of continuum, sometimes called Type IV, are listed as "Cont. IV" in the tables. Photographic examples of the bursts have been published by Maxwell, Swarup, and Thompson (Proc. IRE 46, 142, 1958), and Maxwell (Sky and Telescope 17, 388, 1958; 18, 544, and 556, 1959). A few remaining solar radio bursts are tabulated as unclassified.

The symbols used in the tables are:

b = single burst
g = small group (<10) of bursts
G = large group ($\geq$10) of bursts
→ = Arrows indicate continuity of solar activity between two Greenwich days.

The minimum detectable level of solar activity is a function of frequency: approximately 5 x 10^{-22} watts meter $^{-2}$ $(c/s)^{-1}$ at 500 Mc/s. The equipment records signals over an intensity range of approximately 10,000:1. There are three classes of intensity given in the tables. For 100 Mc/s they are:

1 = Faint, 5 to 40 x 10^{-22} watts meter^{-2} $(c/s)^{-1}$.

2 = Moderate, 30 to 200 x 10^{-22}.

3 = Strong, >200 x 10^{-22}.

The times are Universal Time (U. T.). The accuracy is to the nearest half minute, except in the case of major outbursts which are specified to the nearest 0.1 minute.

Details of the frequency ranges of activity may be obtained on request to the Radio Astronomy Station, Ft. Davis, Texas.

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 Disturbances of IAGA, IUGG. The Meteorological Office, De Bilt, Holland collects the data from magnetic observatories distributed throughout the world, and complies C and selected days. The Chairman of the Committee computes the planetary and equivalent amplitude indices. The same data are also published in the Journal of Geophysical Research along with data on sudden commencements (sc) and solar flare effects (sfe), and principal magnetic storms.

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, 5 is t 0/3, and 5+ is t 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.

Chart of Kp by Solar Rotations -- The graph of Kp by solar rotations is furnished through the courtesy of Dr. J. Bartels, Geophysikalisches Institute, Gottingen.

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

S - forecast quality one grade different from observed

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

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 (CRPL-J) are issued once a week and are applicable 1 to 7 days ahead. They are modified as necessary by the Special Disturbance Warning (CRPL-SDW) applicable 1 to 3 days ahead, which may be followed by a supplementary forecast (CRPL-Js) applicable to days remaining until next CRPL-J forecast. The forecast entitled "final" consists of the most recent of the above forms and is scored against the whole-day quality index.

(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 the final advance forecasts 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 Fermeldetechnischen Zentralamtes, Darmstadt, Germany, being observations every one and a half hours of selected transmitters located in the eastern portion of North America. Since January 6, 1958 the transmitters monitored are restricted to those located north of 39° latitude. The magnetic activity index, A_{Fr}, from Fredericksburg, Va., is also given for each day.

Note: 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.

North Pacific Radio Path -- 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 Army Command and Administrative Network, U. S. Air Force and Federal 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:

07-18 hours UT	5.33	00-24 hours UT	5.67
19-06	6.00		

The 12-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, analogous to that for Qa, includes the 12-hourly quality figures; whole day quality figures; short-term forecasts issued by NPRWS twice daily at 06^h and 18^h UT, applicable to the stated 12-hour periods; advance forecasts issued weekly by NPRWS (CRPL-Jp report) modified as necessary by Special Disturbance Warnings (CRPL-SDW) and supplementary forecasts (CRPL-Jps); and half-day averages of geomagnetic K indices from Sitka.

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

Note: Beginning with March 15, 1959 the short-term forecast schedule was changed from three times daily to twice daily. The North Pacific quality figures used for evaluation are now 12-hourly rather than 8-hourly.

VII ALERT PERIODS AND SPECIAL WORLD INTERVALS

This table gives the Advance Geophysical Alerts as initiated by the Western Hemisphere Regional Warning Center at Ft. Belvoir, Va., and also the Worldwide Geophysical Alerts and Special World Intervals as designated by the World Warning Agency, Ft. Belvoir, Va.

Advance Alerts are of four types, defined as follows:

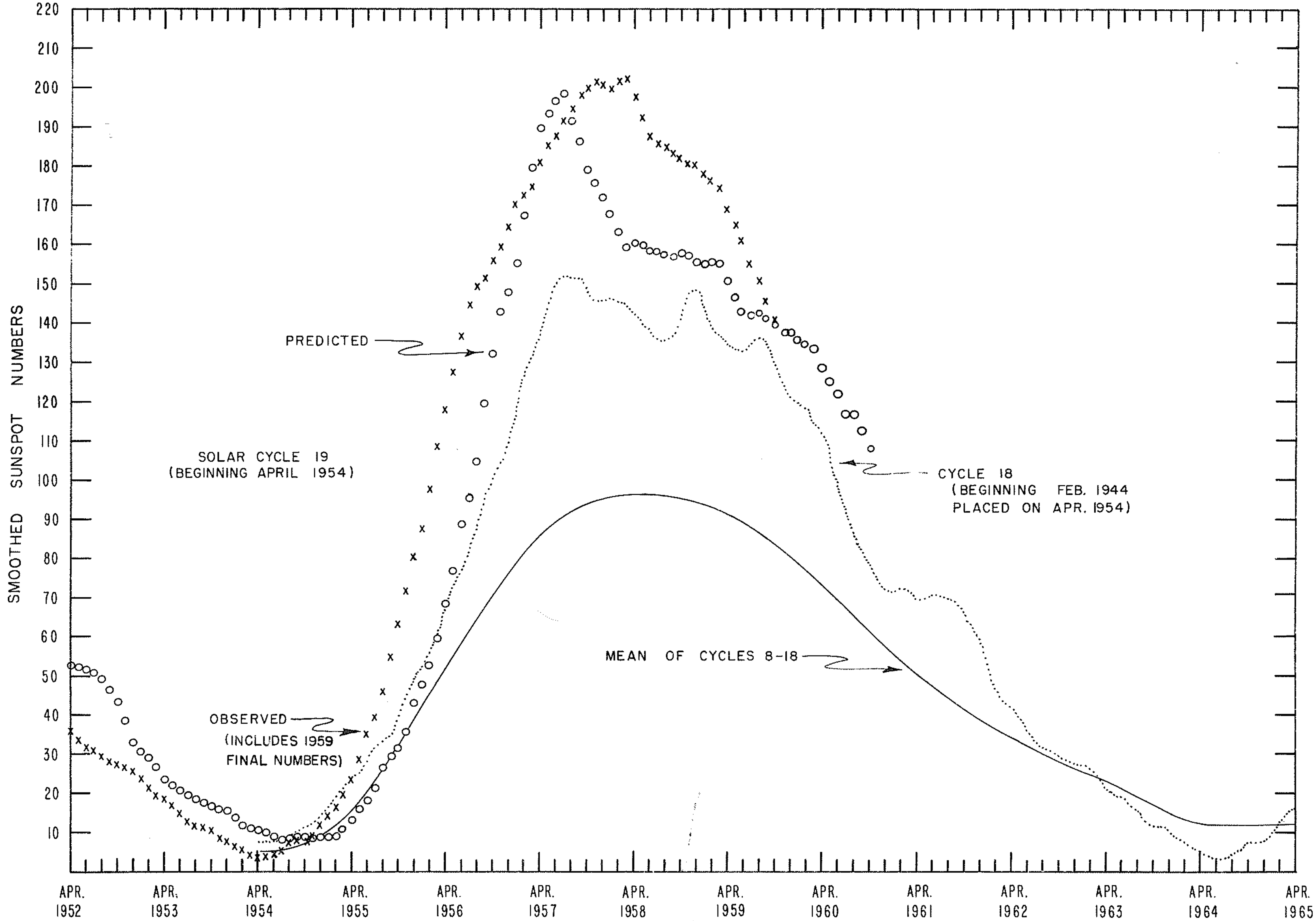
1 - Solar Flare Alert -- this warning is issued whenever a solar flare of median importance 2 plus or greater has been reported. There will be only one alert issued per flare and only one a day at most.
2 - Magnetic Storm Alert -- this warning is issued whenever a significant magnetic storm, K figure 5 or greater at a middle latitude station has begun.
3 - Cosmic Ray Alert -- this warning is issued whenever a very outstanding change in cosmic ray flux has been observed -- increase or decrease.
4 - Aurora Alert -- this warning is issued whenever a magnetic storm in middle latitudes has reached K figure 7 intensity or whenever selected auroral stations report the presence of outstanding aurora.

Worldwide Alerts are of the same types as the Advance Alerts, except that the Solar Flare Alert and Cosmic Ray Decrease Alert are omitted. Alert announcements include the event and time of event upon which the alert is based, and, in the case of the Advance Alerts, the station reporting the event.

The World Alerts and Special World Intervals are issued by the World Warning Agency on decisions based on Advance Alerts, advice received from Regional Warning Centers and overall policy.

Mar. 1960	American Relative Sunspot Numbers R_A'
1	66
2	63
3	57
4	81
5	87
6	83
7	103
8	119
9	107
10	92
11	94
12	65
13	57
14	66
15	82
16	88
17	92
18	94
19	93
20	103
21	100
22	133
23	121
24	119
25	128
26	53
27	88
28	118
29	115
30	121
31	97
Mean:	93.1

Apr. 1960	Zürich Provisional Relative Sunspot Numbers R_Z	Daily Values Solar Flux at 2800 Mc, Ottawa, Canada Flux
1	140	201
2	143	184
3	152	179
4	162	188
5	156	182
6	143	169
7	123	165
8	112	147
9	98	148
10	103	156
11	107	159
12	136	168
13	128	179
14	133	183
15	162	190
16	159	183
17	110	178
18	116	176
19	128	170
20	116	175
21	123	163
22	108	160
23	99	166
24	96	165
25	95	147
26	96	143
27	86	140
28	99	142
29	82	153
30	100	161
Mean:	120.4	167.3



PREDICTED AND OBSERVED SUNSPOT NUMBERS

CALCIUM PLAGE AND SUNSPOT REGIONS

APRIL 1960

CMP Apr. 1960	Lat	McMath Plage Number	Return of Region	Calcium Plage Data: CMP Values Area	Int.	History	Age	Sunspot Data: CMP Values Area	Count	History
02.5	N07	5616	5588	2000	2.5	ℓ — ℓ	5	10	1	b ∧ d
02.5	S23	5617	5587	1400	2	ℓ — ℓ	4			
04.1	S10	5618	New	4500	3	ℓ — ℓ	1	700	6	ℓ \ ℓ
05.9	N13	5619	*	3200	3	ℓ — ℓ	2	520	14	ℓ — ℓ
06.7	S10	5620	5593	2300	2.5	ℓ — ℓ	2	170	3	ℓ \ ℓ
07.2	N07	5623	**	700	2.5	ℓ — ℓ	2	100	4	b ∧ d
07.5	N27	5621	5592	3000	2.5	ℓ — ℓ	3			
08.3	S20	5622	New	2400	2.5	ℓ — ℓ	1	270	7	ℓ \ ℓ
09.5	N11	5624	***	1900	2	ℓ — ℓ	4			
09.6	N27	5626	5592	500	1.5	ℓ ¬\ d	3			
10.8	S09	5625	New	1800	3.5	ℓ — ℓ	1	840	2	ℓ \ ℓ
12.2	N29	5629	New	1000	2.5	b /‾ ℓ	1	70	2	b ∧ d
13.7	N08	5627	New	5000	3	ℓ — ℓ	1	930	13	ℓ / ℓ
14.7	N28	5628	5599	2000	3	ℓ — ℓ	2	70	1	ℓ ‾\ d
16.0	S11	5630	5600	3000	3	ℓ — ℓ	2	1010	26	ℓ \ ℓ
17.8	N16	5631	5604	2500	2.5	ℓ — ℓ	6			
19.3	S23	5632	5605	1000	2.5	ℓ — ℓ	3			
19.6	N10	5633	New	6000	3	ℓ — ℓ	1	660	11	ℓ ∧ ℓ
19.6	S08	5639	5605	900	2	b /‾ d	1			
19.9	N22	5634	5607	4000	3	ℓ — ℓ	2	650	7	ℓ ∧ ℓ
22.1	N12	5636	New	1600	2.5	ℓ — ℓ	1	150	2	b / ℓ
22.7	S14	5635	5609	2500	2	ℓ — ℓ	2			
24.8	N24	5640	5611	1000	1.5	ℓ — ℓ	5			
25.2	S18	5641	****	2400	3	ℓ / ℓ	5	70	3	ℓ — ℓ
27.4	N11	5642	5615	3700	3	ℓ — ℓ	2	690	7	ℓ — ℓ
28.4	S30	5643	5617	800	2	ℓ — ℓ	5			
29.4	N09	5644	5616	1200	2.5	ℓ — ℓ	6			
30.6	S08	5645	5618	4000	3	ℓ — ℓ	2	570	7	ℓ — ℓ

* 5590 and part of 5591
** Part of 5591
*** 5595 and 5597
**** 5612 and 5613 or new

PROVISIONAL CORONAL LINE EMISSION INDICES

APRIL 1960

CMP Apr 1960	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)			
	G_6	G_1	R_6	R_1	G_6	G_1	R_6	R_1	G_6	G_1	R_6	R_1	G_6	G_1	R_6	R_1
1	65	95	x	x	55	68	x	x	x	x	11a	18a	x	x	17a	38a
2	65	100	x	x	37	47	x	x	70	95	x	x	48	79	18	24
3	x	x	x	x	x	x	x	x	86	130	29	102	56	74	30	54
4	x	x	x	x	x	x	x	x	56a	95a	10a	27a	50a	69a	9a	12a
5	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
6	75	114	x	x	68	96	x	x	59	104	12	24	69	92	12	22
7	x	x	x	x	x	x	x	x	70a	108a	11a	18a	74a	119a	12a	19a
8	x	x	x	x	x	x	x	x	46a	74a	x	x	47a	56a	x	x
9	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
10	x	x	x	x	x	x	x	x	38	80	16	27	44	62	16	19
11	27a	38a	5a	8a	11a	24a	9a	20a	31a	46a	18a	48a	61a	92a	11a	15a
12	48	65	11	15	27	52	12	18	42a	64a	14a	31a	71a	105a	15a	47a
13	105	147	x	x	52	66	x	x	43a	62a	11a	15a	44a	63a	18a	32a
14	x	x	x	x	x	x	x	x	60a	94a	10a	13a	95a	150a	10a	17a
15	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
16	50	54	x	x	49	69	x	x	x	x	x	x	x	x	x	x
17	71	97	15	28	49	61	17	44	47	62	10a	18a	56	79	14a	29a
18	91a	151a	12a	22a	48a	60a	10a	24a	x	x	x	x	x	x	x	x
19	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
20	105	132	12	18	52	80	5	12	x	x	x	x	x	x	x	x
21	x	x	18a	30a	x	x	11a	17a	x	x	x	x	x	x	x	x
22	x	x	x	x	20a	28a	x	x	x	x	x	x	x	x	x	x
23	x	x	x	x	x	x	x	x	148a	244a	x	x	102a	126a	x	x
24	44	66	x	x	46	56	x	x	x	x	x	x	x	x	x	x
25	64a	109a	12a	18a	67a	134a	12a	24a	x	x	x	x	x	x	x	x
26	50a	65a	13a	23a	67a	132a	17a	34a	x	x	x	x	x	x	x	x
27	61a	84a	11a	29a	65a	88a	9a	12a	x	x	x	x	x	x	x	x
28	58a	90a	16a	24a	43a	55a	10a	17a	x	x	x	x	x	x	x	x
29	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
30	x	x	x	x	x	x	x	x	137a	205a	x	x	66a	120a	x	x

COMMERCE - STANDARDS - BOULDER

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

Note: These coronal line intensities, expressed in millionths of equivalent angstroms are believed to be correct to ± 10 per cent, probable error, according to the calibrations of February-March 1960. All intensities from the Climax and Sacramento Peak Observatories during the years 1956-1959, inclusive, if multiplied by the factor 0.60, will be expressed in the same scale to a somewhat lower precision.

Intensities prior to 1956 cannot be compared precisely with those obtained later because of changes in observing and reduction techniques. They may be converted roughly to millionths of equivalent angstroms by use of the table given by Billings and Varsavsky, 1955, Zs. f. Ap. 38, 160.

FINAL CORONAL LINE EMISSION INDICES

JANUARY 1960

CMP Jan 1960	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)			
	G_6	G_1	R_6	R_1	G_6	G_1	R_6	R_1	G_6	G_1	R_6	R_1	G_6	G_1	R_6	R_1
1	89	111	9	11	62	121	5	7	45	74	11	29	96	120	18	32
2	126	177	10	14	59	81	8	15	31	51	4	5	55	65	8	10
3	x	x	x	x	x	x	x	x	76	87	8	15	72	95	6	34
4	56	72	12	22	55	69	14	34	x	x	x	x	x	x	x	x
5	84	100	9	14	89	222	16	31	x	x	x	x	x	x	x	x
6	97	117	17	22	88	109	20	45	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	x	x	x	x	x	x	x	x	76	109	25	39	79	100	19	25
9	85	116	x	x	62	98	x	x	x	x	x	x	x	x	x	x
10	53	61	x	x	59	75	x	x	x	x	x	x	x	x	x	x
11	70	79	14	20	x	x	11	14	112	141	31	51	112	148	7	16
12	130	171	x	x	49	86	x	x	52	81	13	22	68	82	25	41
13	108	153	17	24	78	146	10	14	x	x	x	x	x	x	x	x
14	60	68	x	x	33	48	x	x	35	59	14	23	50	64	15	23
15	66	77	15	24	44	62	9	12	46	59	7	12	49	59	8	14
16	48	64	11	19	34	47	5	6	x	x	x	x	x	x	x	x
17	85	105	3	9	81	91	0	0	31	68	x	x	64	104	x	x
18	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
19	x	x	x	x	x	x	x	x	18	28	8	10	82	125	28	38
20	x	x	x	x	x	x	x	x	54	94	20	46	152	210	27	42
21	x	x	x	x	x	x	x	x	39	93	3	13	138	173	49	71
22	74	94	31	41	28	32	9	10	x	x	x	x	x	x	x	x
23	x	x	x	x	x	x	x	x	31	44	11	15	110	131	26	38
24	x	x	x	x	x	x	x	x	36	54	10a	13a	95	114	11a	14a
25	118	182	7	11	x	x	8	12	64	95	x	x	87	93	x	x
26	74	83	13	22	56	81	8	14	x	x	x	x	x	x	x	x
27	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
28	79	91	24	50	37	62	14	23	96	152	3	7	179	208	16	49
29	86	107	18	32	31	70	6	12	x	x	x	x	x	x	x	x
30	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
31	131	160	x	x	94	156	x	x	x	x	x	x	x	x	x	x

COMMERCE - STANDARDS - BOULDER

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

FINAL CORONAL LINE EMISSION INDICES

FEBRUARY 1960

CMP Feb 1960	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)			
	G_6	G_1	R_6	R_1	G_6	G_1	R_6	R_1	G_6	G_1	R_6	R_1	G_6	G_1	R_6	R_1
1	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
2	103	137	16	26	89	139	27	45	80	125	x	x	112	128	x	x
3	144	180	20	29	142	215	23	44	152	197	13	25	128	157	8	20
4	110	158	9	18	116	126	19	28	205	279	26	54	148	217	6	21
5	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
6	99	118	20	27	134	179	28	47	x	x	x	x	x	x	x	x
7	93	110	16a	29a	107	129	42a	60a	71	86	x	x	92	109	x	x
8	111	138	x	x	98	118	x	x	61	75	x	x	97	123	x	x
9	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
10	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
11	119	144	10	16	69	91	11	15	34	49	x	x	63	90	x	x
12	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
13	x	x	x	x	x	x	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	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
16	85	116	x	x	25	50	x	x	x	x	x	x	x	x	x	x
17	101	144	21	45	38	55	0	0	71	153	7	13	96	142	8	18
18	177	246	20	51	41	48	4	11	58	97	0	0	107	130	6	14
19	72	88	x	x	40	62	x	x	x	x	x	x	x	x	x	x
20	x	x	x	x	x	x	x	x	39	69	x	x	86	97	x	x
21	92	128	x	x	65	111	x	x	22a	42a	8a	10a	72a	89a	7a	1Ca
22	75	90	x	x	72	116	x	x	20	34	7	8	47	57	11	14
23	x	x	x	x	x	x	x	x	68	89	4	14	98	127	12	20
24	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
25	117	198	x	x	34	52	x	x	29	50	11	14	79	128	14	23
26	x	x	x	x	x	x	x	x	50	65	x	x	81	108	x	x
27	x	x	x	x	x	x	x	x	72	100	x	x	87	122	x	x
28	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
29	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

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

FINAL CORONAL LINE EMISSION INDICES

MARCH 1960

CMP Mar 1960	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)			
	G_6	G_1	R_6	R_1	G_6	G_1	R_6	R_1	G_6	G_1	R_6	R_1	G_6	G_1	R_6	R_1
1	x	x	x	x	x	x	x	x	70	111	x	x	46	67	x	x
2	84	106	8	14	132	229	10	17	x	x	x	x	x	x	x	x
3	73	108	x	x	109	179	x	x	x	x	x	x	x	x	x	x
4	x	x	x	x	x	x	x	x	89	108	x	x	56	76	x	x
5	57	75	x	x.	76	88	x	x	79	129	12	22	72	101	2	11
6	78a	109a	20a	37a	49a	58a	19a	29a	35	45	6	13	72	92	7	15
7	79	103	12	23	30	39	10	10	50	63	6	9	70	77	7	22
8	122	163	5	19	52	75	0	0	40	48	0	0	78	104	4	6
9	x	x	x	x	x	x	x	x	53	64	1	8	70	86	10	20
10	103*	140	31	54	79	118	14	28	x	x	x	x	x	x	x	x
11	106	136	x	x	87	116	x	x	41	56	17	25	76	100	12	30
12	131	154	x	x	94	136	x	x	16	22	7	10	43	48	9	15
13	x	x	x	x	x	x	x	x	27	38	16	22	57	69	19	40
14	x	x	x	x	x	x	x	x	52	67	x	x	74	84	x	x
15	76	110	x	x	20	37	x	x	20	25	x	x	68	95	x	x
16	x	x	x	x	x	x	x	x	27	53	x	x	77	94	x	x
17	x	x	x	x	x	x	x	x	58	100	17	25	135	192	20	40
18	70	83	x	x	57	76	x	x	71	114	x	x	70	112	x	x
19	91	111	0	0	88	161	6	9	56	101	x	x	53	80	x	x
20	43	50	0	0	63	70	4	5	72	147	9	16	60	79	5	7
21	74	77	2	14	87	96	11	20	56	76	4	12	81	102	8	12
22	79	118	0	1	70	86	1	7	x	x	x	x	x	x	x	x
23	90	146	2	7	66	96	4	8	67	73	x	x	70	99	x	x
24	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
25	70	108	15	30	39	62	14	18	x	x	x	x	x	x	x	x
26	78	100	21	35	25	42	6	10	x	x	x	x	x	x	x	x
27	86	129	37	75	50	68	17	40	81	157	x	x	81	111	x	x
28	68	97	23a	40a	55	70	10a	16a	32a	44a	7a	8a	42a	62a	10a	22a
29	52	80	9a	14a	71	92	14a	24a	70	99	27	44	44	61	12	15
30	40	52	x	x	85	106	x	x	109	180	x	x	64	86	x	x
31	79	98	21	27	148	200	25	43	90	124	x	x	81	98	x	x

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

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STOCKHOLM	01	0845	1222		N13	W09	5615	217	3	3	0908	12.00	13.00			
ONDREJOV	01	0854 E	1239 D	0858	N12	W09	5615	225 D	3	3	0858			6.00		
ARCETRI	01	0856 E	1212 D		N11	W15	5615	196 D	2+	2						S-SWF
R O HERST	01	1020 E			N12	W12	5615		2?	1						
CAPRI S	01	1138 E	1355 D		N12	W11	5615	17 D	1	1	1246	5.00	5.00			Slow S-SWF
HUANCAYO	01	1634	1702	1639	N21	E50	5619	28	1	2	1639			2.40		
HAWAII	01	2202	2222 D	2210	N07	W23	5615	20 D	1	2	2210	1.20				G-SWF
LOCKHEED	01	2203	2235	2210	N11	W20	5615	32	1	2	2210	2.10			30	
HAWAII	02	0020 E	0028	0020	N07	W20	5615	8 D	1	2	0020	1.10				
CAPRI S	02	0644 E	0710 D		N08	W20	5615	26 D	1	1	0659	4.00	4.40			
ONDREJOV	02	0650	0704	0657	N08	W22	5615	14	1	3	0657			3.30		
ONDREJOV	02	0834	0905	0847	N09	W27	5615	31	2	3	0847			3.00		
STOCKHOLM	02	0835	0912		N12	W26	5615	37	1+	2	0842	2.00	2.40			
CAPRI S	02	0837 E	0919 D		N10	W24	5615	42 D	1	1	0850	2.00	2.20			S-SWF
WENDEL	02	0853 E	0916 D		N12	W24	5615	23 D	1+				7.00			
ARCETRI	02	0857 E	0911 D		N11	W25	5615	14 D	1	3	0904	4.10	4.70			
CAPRI S	02	0858 E	1016 D		S16	E75	5622	78 D	1	1	0900	.80	4.20			
ARCETRI	02	0859 E	1000 D		S20	E80	5622	61 D	1	3						
WENDEL	02	0912 E	1000 D		S18	E76	5622	48 D	1+				5.00			
STOCKHOLM	02	0913 E	1050 D		S25	E80	5622	97 D	1	1	0926	.60	3.00			
CAPRI S	02	1223 E	1230 D		N08	W20	5615	7 D	1	1	1225	2.00	2.20			
CAPRI S	02	1237 E	1254 D		N08	W20	5615	17 D	2	1	1245	5.00	5.50			
WENDEL	02	1240	1245 D		N08	W25	5615	5 D	2				8.00			
ONDREJOV	02	1241	1255	1245	N08	W25	5615	14	2	3	1245			2.40		
CAPRI S	02	1254 E	1305 D		N12	E55	5619	11 D	1	1	1300	2.00	3.50			
WENDEL	02	1305 E	1312 D		N10	E54	5619	7 D	1				3.00			
WENDEL	02	1441	1506 D		N11	W30	5615	25 D	1				4.00			
ONDREJOV	02	1448 E	1455		N09	W30	5615	7 D	1	3	1449			2.90		
WENDEL	02	1516	1542		N10	W32	5615	26	1+				7.00			S-SWF
ONDREJOV	02	1521 E	1537		N09	W30	5615	16 D	1+	3	1526			3.20		
SAC PEAK	02	2040 E	2110	2040 U	N12	W32	5615	30 D	1	2		3.99			23	G-SWF
SAC PEAK	02	2126	2200	2152	N07	W34	5615	34	1+	2		4.99			15	
LOCKHEED	02	2353	0050	0001	N09	W31	5615	57	1+	2	0001	3.50			40	
SAC PEAK	02	2358	0010 D	0002	N09	W30	5615	12 D	1	1		3.53			28	
CAPRI S	03	0815	0826 D		N08	W36	5615	11 D	1	3	0820	2.00	2.50			
ONDREJOV	03	0815	0826	0819	N09	W37	5615	11	1	3	0819			2.60		
CAPRI S	03	1045	1110 D		N12	W39	5615	25 D	1	3	1054	4.00	5.20			
WENDEL	03	1045	1139 D		N09	W39	5615	54 D	1+				8.00			
ONDREJOV	03	1109 E	1138 D		N09	W43	5615	29 D	1	3	1109			2.40		
CAPRI S	03	1140	1322 D		N14	W38	5615	102 D	2	3	1212	6.00	7.80			S-SWF
WENDEL	03	1142	1259	1205	N12	W39	5615	77	2+				12.00			
ONDREJOV	03	1210 E	1324		N09	W43	5615	14 D	2	3	1211			3.30		
MCMATH	03	1220 E	1245 D		N13	W40	5615	25 D	1+	2	1225		4.00			
WENDEL	03	1321	1339	1325	N07	W41	5615	18	1+				6.00			
MCMATH	03	1321	1340	1326	N10	W41	5615	19	1	2	1326		3.00			
WENDEL	03	1337 E	1412		N17	E23	5619	35 D	1				5.00			
WENDEL	03	1559	1626 D		N08	W39	5615	27 D	1				4.00			
LOCKHEED	03	1950	2340 D	2040	N12	W45	5615	230 D	1+	2	2040	4.00			30	
LOCKHEED	03	1950	2340 D	2210	N12	W45	5615	230 D	1+	2	2040	4.00			30	
SAC PEAK	03	2000	0004 D	2212	N10	W45	5615	244 D	1	3		4.05			16	
HAWAII	03	2020	0200 D	2242	N05	W48	5615	340 D	1	3	2242	1.10				

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LOCKHEED	04	0010 E	0040 D	0030 U	N14	W48	5615	30 D	1	1	0030	2.50			20	
ONDREJOV	04	0758	0817		N08	W48	5615	19	1	3	0703			2.20		
ONDREJOV	04	0846	1020	0900	N13	W49	5615	94	1+	3	0900			3.90		
STOCKHOLM	04	0848 E	0933 D		N11	W51	5615	45 D	1+	3	0906	3.00	4.20			S-SWF
CAPRI S	04	0850 E	0948 D		N12	W51	5615	58 D	2	1	0902	3.50	6.00			
ONDREJOV	04	1117	1126	1120	N12	W52	5615	9	1	3	1120			2.20		
SAC PEAK	04	1814	1842	1822	N12	E68	5624	28	1	3		3.12			16	
SAC PEAK	04	1840	1946	1900	S20	E44	5622	66	1	3		2.39			19	
STOCKHOLM	05	1057	1122 D		S08	W23	5618	25 D	1	3	1100	2.00	2.20			
CAPRI S	05	1058 E	1130 D		S12	W23	5618	32 D	1	3	1100	4.00	4.40			
ONDREJOV	05	1114 E	1120		S09	W25	5618	6 D	1	3	1115			2.20		
CAPRI S	05	1129 E	1141 D		N09	W80	5615	12 D	1	3	1133	1.00	4.00			
ONDREJOV	05	1130 E	1140 D		N10	W71	5615	10 D	1	3	1132			2.50		
STOCKHOLM	05	1134 E	1140		N12	W71	5615	6 D	1	3	1134	.50	2.00			
ONDREJOV	05	1400 E	1413		N09	W69	5615	13 D	1	3	1401			1.90		
ARCETRI	05	1603 E	1620 D		N11	W68	5615	17 D	1	2						S-SWF
CAPRI S	05	1606 E	1623 D		N14	W70	5615	17 D	1	2	1608	1.30	3.50			
SAC PEAK	05	1736	1940 U	1748	S10	W22	5618	124 D	1	2		2.51			15	S-SWF
LOCKHEED	05	1932	2030	1939	N19	W08	5619	58	1	2	1939	2.00			30	Slow S-SWF
SAC PEAK	05	1934	2018	1940	N17	W08	5619	44	1	2		2.58			18	
WENDEL	06	0639 E	0702 D		N08	W83	5615	23 D	1				4.00			
CAPRI S	06	0801 E	0810 D		N08	W82	5615	9 D	1	3	0803	.40	2.50			
ARCETRI	06	0802 E	0804 D		N11	W86	5615	2 D	1	3						
WENDEL	06	0803	0821 D		N08	W79	5615	18 D	1				4.00			
WENDEL	06	0854 E	0913 D		N08	W78	5615	19 D	1				3.00			
ONDREJOV	06	0928 E	0935		N11	W80	5615	7 D	1	3	0929			2.40		
WENDEL	06	0931 E	0944 D		N16	W08	5619	13 D	1				3.00			
WENDEL	06	0949 E	1012 D		N13	W72	5615	23 D	1				4.00			
CAPRI S	06	1132 E	1150 D		N08	W77	5615	18 D	2	3	1135	2.20	9.00			
WENDEL	06	1132	1157		N09	W83	5615	25	2				9.00			S-SWF
STOCKHOLM	06	1134	1148 D		N12	W80	5615	14 D	2	3	1135	2.00	10.00			
ONDREJOV	06	1142 E	1155		N13	W80	5615	13 D	1	3	1142			2.40		
WENDEL	06	1204	1234		N09	W83	5615	30	1+				5.00			
WENDEL	06	1303 E	1317 D		S09	E62	5625	14 D	1				3.00			
WENDEL	06	1327 E	1337 D		N10	W79	5615	10 D	1				4.00			
ONDREJOV	06	1401	1409	1406	N13	W85	5615	8	1	3	1406			2.90		
ARCETRI	06	1450 E	1511 D		S07	E64	5625	21 D	2	4	1450	3.30	6.50			
WENDEL	06	1456 E	1506 D		S19	E15	5622	10 D	1				3.00			
CAPRI S	07	0658	0820 D		S12	E55	5625	82 D	1	2	0710	3.00	4.80			
WENDEL	07	0740 E	0814 D		S08	E52	5625	34 D	1				3.00			
WENDEL	07	1252	1314		S08	E50	5625	22	1				3.00			
STOCKHOLM	07	1425	1505		S09	E46	5625	40	1	3	1434	1.50	2.10			
ARCETRI	08	0852 E	0907 D		S08	E38	5625	15 D	1	3	0852	3.90	4.90			
CAPRI S	08	1411	1453 D		S10	W23	5620	42 D	1	3	1420	3.00	3.30			
ONDREJOV	09	0707	0719	0714	N11	W57	5619	12	1	3	0714			2.40		
ONDREJOV	09	0817 E	0824		N11	W58	5619	7 D	1	3	0817			2.20		
ONDREJOV	09	1045 E	1106		N11	W61	5619	21 D	2	3	1053			6.90		
CAPRI S	09	1050 E	1102 D		N10	E58	5627	12 D	1+	3	1056	1.50	3.00			

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{ STOCKHOLM	09	1145 E	1159 D		N15	E65	5627	14 D	1	3	1153	1.40	3.50			
{ CAPRI S	09	1147	1230 D		N12	E59	5627	43 D	1	3	1208	4.00	10.00			
ONDREJOV	09	1215 E	1404 D		N17	W70	5619	109 D	2	1	1216			2.50		
ONDREJOV	09	1313 E	1404 D		S06	W23	5620	51 D	1	1	1346			2.40		
CAPRI S	09	1315 E	1352 D		S04	E21	5625	37 D	1	3	1337	2.00	2.20			
CAPRI S	09	1517	1529	1521	N10	E56	5627	12	1	3	1523	1.50	2.70			
ONDREJOV	09	1520 E	1525 D		N11	W62	5619	5 D	1+	2	1521			2.30		Slow S-SWF
{ SAC PEAK	09	1644	1708	1648	N10	E55	5627	24	1	3		2.14			22	Slow S-SWF
{ CAPRI S	09	1645 E	1709 D		N10	E52	5627	24 D	1	2	1647	2.50	4.20			
{ LOCKHEED	10	0039	0112	0045	N12	E49	5627	33	1	2	0045	2.00			30	S-SWF
{ LOCKHEED	10	0039	0112	0048	N12	E49	5627	33	1	2	0045	2.00			30	
CAPRI S	10	1353 E	1455 D		N10	E45	5627	62 D	2	2	1411	5.00	8.00			
WENDEL	10	1649	1712 D		N17	W82	5619	23 D	1+				5.00			
{ LOCKHEED	10	2312	0000	2321	S08	W04	5625	48	1	1	2321	2.50			20	
{ HAWAII	10	2316	0016	2320	S09	W03	5625	60	1	2	2320	2.10				
CAPRI S	11	0617 E	0623 D		N10	E33	5627	6 D	1	3	0620	3.00	3.60			
CAPRI S	11	0745	0800 D		S13	E67	5630	15 D	1	3	0750	1.00	2.60			
CAPRI S	11	1056 E	1109 D		S13	E65	5630	13 D	1	3	1106	1.00	2.40			
HAWAII	12	0130	0142	0140	N15	E22	5627	12	3	3	0140	.50				
CAPRI S	12	1206 E	1236 D		N08	E18	5627	30 D	2	1	1217	5.00	5.20			
HAWAII	12	2134 E	2142	2136	N13	E11	5627	8 D	1	2	2136	1.30				
{ HAWAII	12	2236	2306	2244	N15	E11	5627	24	1+	3	2244	2.30				
{ LOCKHEED	12	2239	2325	2242	N14	E13	5627	46	1	2	2242	2.00			20	
{ LOCKHEED	12	2239	2325	2250	N14	E13	5627	46	1	2	2242	2.00			20	
{ LOCKHEED	12	2239	2325	2313	N14	E13	5627	46	1	2	2242	2.00			20	
{ HAWAII	12	2328	0030	2358	N13	E12	5627	62	1	3	2358	1.20				
{ LOCKHEED	12	2347	0030 U	2357	N13	E14	5627	43 D	1	2	2357	2.70			20	
ONDREJOV	13	1003 E	1008		N28	E28	5628	5 D	1	3	1003			3.10		
ONDREJOV	13	1213	1224		S07	E36	5630	11	1	3	1220			2.10		
{ ONDREJOV	13	1521	1537	1528	N09	W05	5627	16	1	3	1528			2.40		
{ WENDEL	13	1528 E	1543 D		N09	W10	5627	15 D	1				3.00			
WENDEL	13	1718	1726 D		S12	E36	5630	8 D	1				3.00			
LOCKHEED	13	2150	2325	2220	N11	E00	5627	95	1	2	2220	3.00			30	
{ CAPRI S	14	0917 E	0951 D		S11	W49	5625	34 D	1	3	0921	2.50	4.00			
{ WENDEL	14	0918 E	0940 D		S09	W51	5625	22 D	1				3.00			
CAPRI S	15	0741 E	0746 D		N14	E58	5633	5 D	1	3	0844	2.00	4.00			
CAPRI S	15	0950 E	1011 D		N22	E69	5634	21 D	2	3	0958	2.00	5.80			
SAC PEAK	15	1942	2006	1946	S12	E08	5630	24	1	1		2.58			15	
CAPRI S	16	0907	0924 D		N13	E38	5633	17 D	1	1	0913	2.50	3.20			
CAPRI S	16	1150 E	1204 D		N06	E42	5633	14 D	1	2	1153	2.00	2.80			
{ HAWAII	16	1856	1933	1902	S10	W06	5630	37	1+	3	1902	2.00				
{ SAC PEAK	16	1858	1926	1904	S10	W08	5630	28	1	2		3.28			18	
{ LOCKHEED	16	1858	1945	1903	S10	W06	5630	47	1	2	1903	2.50			30	
{ LOCKHEED	16	1858	1945	1928	S10	W06	5630	47	1	2	1903	2.50			30	
LOCKHEED	17	0030	0100	0040	S11	W09	5627	30	1	2	0040	2.10			20	

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LOCKHEED	17	0040	0050	0045	S04	W90	5625	10	1	2	0045	2.00			10	
LOCKHEED	18	1740	1835	1756	S11	W34	5630	55	1	2	1756	2.20			20	S-SWF
MCMATH	18	1758 E	1815		S10	W34	5630	17 D	1	1	1800		2.00			
WENDEL	19	0847 E	0906		N11	E07	5633	19 D	1				3.00			
STOCKHOLM	19	0913 E	0936 D		N13	E07	5633	23 D	1	3	0926	2.50	2.60			
WENDEL	19	0918	1006		N10	E07	5633	48	1+				7.00			
MCMATH	19	1442	1600 D	1500	S09	W44	5630	78 D	1	3	1500		2.00			
STOCKHOLM	19	1447	1520 D		S09	W44	5630	33 D	1	3	1453	1.70	2.40			
WENDEL	19	1500 E	1610 D		S12	W43	5630	70 D	1+				7.00			
CAPRI S	19	1515 E	1615 D		N22	E18	5634	60 D	1	2	1535	2.50	2.60			
LOCKHEED	19	2117	2157	2124	S10	W50	5630	40	1	2	2124	2.10			20	
LOCKHEED	20	0059	0130 U	0115	N14	W11	5633	31 D	1	1	0115	2.00			20	
WENDEL	20	0625 E	0714		N13	W12	5633	49 D	1				4.00			
ONDREJOV	20	0835 E	0844		S14	E60	5641	9 D	1	3	0838			2.50		
WENDEL	20	0859 E	0924		S30	E64	5641	25 D	1				3.00			
ONDREJOV	20	0905 E	0912		N10	E16	5636	7 D	1	3	0906			2.20		
WENDEL	20	1021	1054		N25	E08	5634	33	1+				5.00			
ONDREJOV	20	1256	1326	1302	N25	E04	5634	30	1	3	1302			3.00		
WENDEL	20	1304 E	1316 D		N25	E04	5634	12 D	1+				6.00			
ONDREJOV	20	1314	1343	1318	N12	W17	5633	29	2	3	1318			4.30		
STOCKHOLM	20	1316	1330 D		N12	W12	5633	14 D	1+	3	1319	3.50	3.80			
ONDREJOV	20	1530 E	1544	1535	S16	E56	5641	14 D	1	3	1535			2.30		
LOCKHEED	20	1607	1650	1625	N26	E03	5634	43	1	2	1625	2.00			30	
LOCKHEED	20	1735	1830	1744	N27	E03	5634	105	1	2	1744	2.70			30	
HAWAII	20	2016	2038	2024	S11	E61	5641	22	1	3	2024	1.00				
HAWAII	20	2136	2140	2136	N10	E90	5642	4	1+	3	2136	1.00				
HAWAII	20	2142	2210	2148	N10	E09	5636	28	1+	3	2148	1.90				
LOCKHEED	21	0020	0130	0045	N26	W08	5634	70	2−	2	0045	4.70			30	
CAPRI S	21	0629 E	0720 D		S17	E54	5641	51 D	1	1	0639	2.00	3.50			
ONDREJOV	21	0641	0717	0643	N23	W04	5634	36	1	3	0643			2.10		
WENDEL	21	1001 E	1100		S15	E55	5641	59 D	1+				5.00			
ONDREJOV	21	1233	1248		N13	W30	5633	15	1	1	1235			1.50		
WENDEL	21	1237 E	1252 D		N13	W28	5633	15 D	1+				5.00			
WENDEL	21	1243 E	1252 D		S15	E52	5641	9 D	1				3.00			
ONDREJOV	21	1252	1316 D		N13	W30	5633	24 D	1	1	1305			2.00		
CAPRI S	21	1340 E	1405 D		S17	E50	5641	25 D	1	3	1343	1.50	3.00			
CAPRI S	22	1125 E	1148 D		N23	W25	5634	23 D	1	3	1138	2.00	2.40			
CAPRI S	22	1213 E	1225 D		S19	E36	5641	12 D	1	3	1217	3.00	3.60			
SAC PEAK	22	1440	1500	1446	S18	E34	5641	20	1	1		2.33			17	Slow S-SWF
CAPRI S	22	1443	1502 D		S18	E35	5641	19 D	1	3	1444	2.00	2.50			
MCMATH	22	1812	1905	1833	N20	W25	5634	53	1	2	1833		2.50			
SAC PEAK	22	1818	1900	1832	N22	W26	5634	42	1	1		3.10			19	G-SWF
HAWAII	22	1824	1844 D	1836	N19	W30	5634	20 D	1	2	1836	1.30				
SAC PEAK	22	1848	1900 D	1852	S17	E32	5641	12 D	1	1		3.10			18	
CAPRI S	23	0606 E	0624 D		N25	W31	5634	18 D	1	3	0611	2.00	2.50			
CAPRI S	23	0809 E	0817 D		N19	E57	5642	8 D	2	3	0812	2.50	7.20			
CAPRI S	23	0931	1018 D		N22	W32	5634	47 D	2	3	0943	5.00	6.40			

SOLAR FLARES

APRIL 1960

OBSERVATORY	DATE APR 1960	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
ARCETRI	23	0938	1009		N22	W35	5634	31	1+	3	0943	3.70	5.00			
CAPRI S	23	1031	1043 D		N26	W32	5634	12 D	1	3	1035	3.00	3.90			
ARCETRI	23	1035 E	1039 D		N24	W35	5634	4 D	1	3	1035	3.30	4.50			
CAPRI S	23	1232	1314 D		S15	E22	5641	42 D	1	2	1246	2.50	2.80			S-SWF
MCMATH	23	1324	1410	1342	N12	W50	5633	46	1	2	1342		2.00			
SAC PEAK	23	1336	1356	1342	N12	W53	5633	20	1	1		2.28			14	
SAC PEAK	23	1514	1640	1524	S18	E22	5641	86	1	1		3.01			22	
CAPRI S	23	1516 E	1554 D		S15	E20	5641	38 D	1	2	1526	3.00	3.30			Slow S-SWF
LOCKHEED	23	1527 E	1632	1530 U	S17	E23	5641	65 D	1+	1	1530	3.50			20	
SAC PEAK	23	1914	1958	1926	S17	E20	5641	44	1	1		2.60			17	Slow S-SWF
LOCKHEED	23	1920 U	2000	1925 U	S17	E20	5641	40 D	1	1	1925	2.00			10	
MCMATH	23	1920 E	1950 D		N08	W28	5636	30 D	1	1	1925		2.00			
HAWAII	23	2338 E	0036	2354	S15	E19	5641	58 D	1	2	2354	1.60				
MCMATH	24	1142 E	1210 D		N10	W35	5636	28 D	1	1	1150		2.00			
MCMATH	24	1550 E	1700 D		N08	W39	5636	70 D	1	1	1550		2.50			
LOCKHEED	24	2332	0030	2345	N15	E35	5642	58	1	1	2345	2.00			10	
LOCKHEED	25	0025 E	0105	0030 U	S07	E79	5645	40 D	1	1	0030	3.00			10	
LOCKHEED	25	0040	0200	0110	N06	E35	5642	80	1+	1	0110	3.50			30	
HAWAII	25	0058 E	0200 D	0129	N18	E32	5642	62 D	1+	2	0129	2.20				
ONDREJOV	25	1319	1330 D		N13	W82	5633	11 D	1	1	1325			2.40		
CAPRI S	25	1320	1334 D		N13	W80	5633	14 D	1	2	1323	.50	2.60			
HAWAII	25	2116	2134	2122	N14	E54	5644	18	1	3	2122	1.00				S-SWF
HAWAII	25	2240	2250	2246	N13	E54	5644	10	1	3	2246	1.10				
MCMATH	27	1805	1850	1813	N04	W90	5636	45	1+	1						
HAWAII	27	2008	2022	2008	N10	W04	5642	14	1	3	2008	1.10				
HAWAII	27	2028	2036	2030	N04	W10	5642	8	1	3	2030	1.00				
HAWAII	28	0130 E	0145 D	0137	S05	E34	5645	15 D	3	1	0137	10.80				Slow S-SWF
LOCKHEED	29	0107 D	0230 D	0205	N12	W20	5642	83 D	2+	1	0205	7.90			30	G-SWF
ONDREJOV	29	0533 E	0549 D		N14	W20	5642	16 D	1	1	0542			2.90		G-SWF
CAPRI S	29	0612 E	0822 D		N15	W20	5642	130 D	2+	1	0617	10.00	11.00			G-SWF
ARCETRI	29	0816 E	0828 D		N15	W21	5642	12 D	1	3	0823	2.90	3.20			
CAPRI S	29	1136	1149 D		N15	W23	5642	13 D	1	3	1143	3.00	3.30			
STOCKHOLM	29	1138	1145 D		N13	W23	5642	7 D	1	3	1140	2.90	3.30			
CAPRI S	29	1333	1350 D		N15	W25	5642	17 D	1	2	1341	3.00	3.30			
STOCKHOLM	29	1335 E	1345		N13	W24	5642	10 D	1	3	1339	2.50	3.00			
LOCKHEED	29	1620	1700	1625	N17	W28	5642	40	1	2	1625	3.00			30	
CAPRI S	29	1621	1641 D		N15	W27	5642	20 D	1	1	1625	1.50	1.70			
LOCKHEED	29	1957	2140	2010	N15	W23	5642	103	1	2	2010	2.40			20	
LOCKHEED	29	1957	2140	2033	N15	W23	5642	103	1	2	2010	2.40			20	
SAC PEAK	29	2018	2114	2030	N14	W21	5642	56	1	1		4.15			16	
LOCKHEED	29	2153	2230	2200	S13	E90	5653	37	1	2	2200	3.80			20	
SAC PEAK	29	2154	2228	2200	S15	E90	5653	34	1	1		2.70			19	
HAWAII	29	2156	2220	2208	S08	E90	5653	24	1	3	2208	.40				
CAPRI S	30	1108 E	1213 D		N13	W28	5642	65 D	1	1	1021	3.00	3.40			
LOCKHEED	30	1438	1507	1441	S08	E85	5653	29	1	2	1441	2.10			20	S-SWF

CAPRI G ANACAPRI - GERMAN
CAPRI S ANACAPRI - SWEDISH
GOOD HOPE ROYAL OBSERVATORY, CAPE OF GOOD HOPE
KIEV* KIEV UNIVERSITY
KODAIKNAL KODAIKANAL
KRASNYA KRASNAYA PAKHRA
LOCKHEED LOS ANGELES

MOSCOW-G MOSCOW - GAISH
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

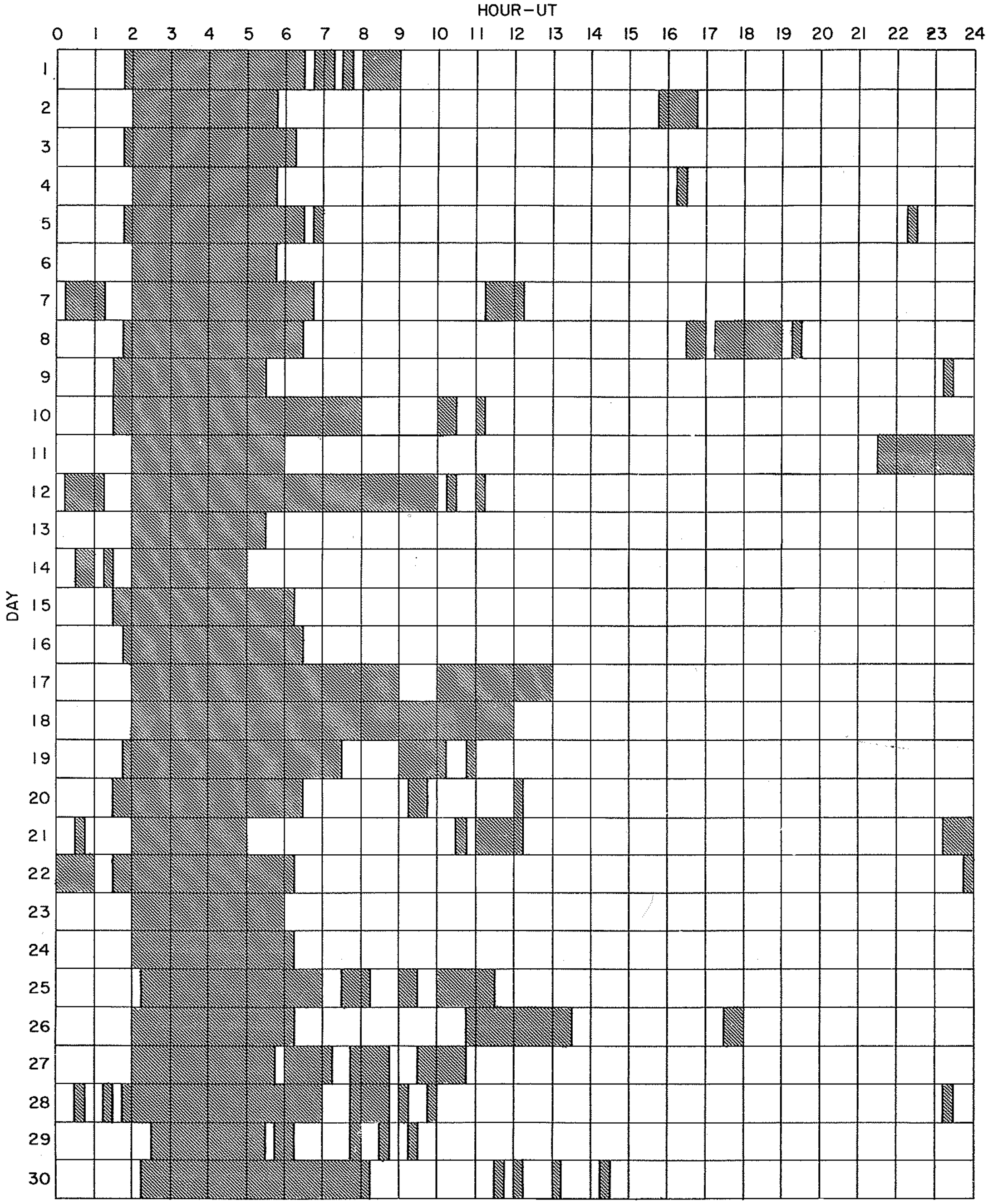
SAC PEAK: ALL VALUES IN MAX. INT. COLUMN ARE ARBITRARY UNITS (0-40), NOT PERCENT OF CONTINUOUS SPECTRUM.

E - LESS THAN & - PLUS
D - GREATER THAN - - MINUS
U - APPROXIMATE ☐ - NOT REPORTED

LOCKHEED OBSERVATIONS: ALL VALUES IN THE MAXIMUM INTENSITY COLUMN ARE ARBITRARY UNITS ON A SCALE OF 10 TO 40 - NOT PERCENT OF THE CONTINUOUS SPECTRUM.

INTERVALS OF NO FLARE PATROL OBSERVATIONS

APRIL 1960



Stations Include:

Anacapri (Swedish)
Arcetri
Hawaii
Huancayo
Lockheed
McMath
Ondrejov
Royal Greenwich Observatory
Herstmonceux
Sacramento Peak

COMMERCE - STANDARDS - BOULDER

SUBFLARES

Noted as follows: Date - Universal Time - Coordinates

MARCH 1960

	MCMATH	01	1505	N23 W09
	MCMATH	01	1718	N23 W10
	HAWAII	01	2012	N04 W45
	MCMATH	01	2047	N14 W43
	WENDEL	02	1012 E	S22 W82
*	MCMATH	02	1403	N23 W23
*	MCMATH	02	1509	N23 W23
	LOCKHEED	02	1725	N24 W25
	LOCKHEED	02	1801	N24 W25
	LOCKHEED	02	1801	N24 W25
	LOCKHEED	02	1931	N23 W25
	MCMATH	02	1934	N24 W26
	SAC PEAK	02	1942 E	N22 W27
	LOCKHEED	02	2113	N23 W26
	SAC PEAK	02	2118 E	N22 W26
	LOCKHEED	02	2158	N23 W26
	LOCKHEED	02	2338	N11 E81
	LOCKHEED	02	2346	N23 W25
	SAC PEAK	03	1518	N23 W34
	LOCKHEED	03	1700 U	N25 W35
	SAC PEAK	03	1714	N23 W35
	LOCKHEED	03	1727	N00 E90
	LOCKHEED	03	1750	N00 E90
	LOCKHEED	03	1815	N21 E90
	SAC PEAK	03	2114	S12 W05
	SAC PEAK	03	2214	N23 W41
	SAC PEAK	03	2216	S13 E04
	LOCKHEED	04	1616	N09 E27
	LOCKHEED	04	1730	N10 E25
	LOCKHEED	04	1801	N02 E79
	LOCKHEED	04	1830	N10 E25
	LOCKHEED	04	1830	N10 E25
	HUANCAYO	04	1908 E	N08 E23
	LOCKHEED	04	1921	N10 E25
	LOCKHEED	04	1942	N08 E60
	LOCKHEED	04	1943	N00 E80
	LOCKHEED	04	1943	N00 E80
	LOCKHEED	04	1943	N00 E80
	LOCKHEED	04	1943	N00 E80
	LOCKHEED	04	1945	N09 E24
	SAC PEAK	04	1952	N08 E24
	SAC PEAK	04	2018	S08 E88
	LOCKHEED	04	2020	N09 E24
	LOCKHEED	04	2020	N09 E24
	LOCKHEED	04	2022	S09 E85
*	SAC PEAK	04	2044 E	N01 E81
	LOCKHEED	04	2105	N10 E25
	HAWAII	04	2140 E	N12 E77
	MCMATH	05	1543 E	N11 W90
	SAC PEAK	05	1544 E	N11 W90
	MCMATH	05	1600	N11 E15
	MCMATH	05	1705 E	N10 E15
	LOCKHEED	05	1750	N09 E12
	LOCKHEED	05	1905	N06 E60
	MCMATH	05	1918	N09 E10
	LOCKHEED	05	1918	N10 E10
	SAC PEAK	05	1920	N10 W90
	LOCKHEED	05	1921	N11 W90
	LOCKHEED	05	2120	N12 00
	LOCKHEED	05	2159	N05 E61
	LOCKHEED	05	2218	N10 E10
	LOCKHEED	05	2227	S07 E71
	LOCKHEED	05	2227	S07 E71
	LOCKHEED	05	2304	N11 W90
	LOCKHEED	05	2304	N11 W90
	SAC PEAK	05	2308	S06 E71
	LOCKHEED	05	2310 U	N12 E00
	LOCKHEED	05	2329	N12 E00
	ONDREJOV	06	0853	N20 E58
	WENDEL	06	0855 E	S09 E66
*	ARCETRI	06	0943 E	N25 E65
	ARCETRI	06	0945 E	S08 E65
	ARCETRI	06	0945 E	N10 E36
	MCMATH	06	1438	S09 E62
	SAC PEAK	06	1438	S08 E63
	CAPRI S	06	1439	S08 E62
	MCMATH	06	1500	S02 E58
	MCMATH	06	1520 E	N22 E57
	MCMATH	06	1542	N07 E34
	MCMATH	06	1555	S09 E60
	SAC PEAK	06	1700	N22 E55
	SAC PEAK	06	1700	N22 E55
	MCMATH	06	1702 E	N22 E57
	LOCKHEED	06	1730 E	N17 E90
	LOCKHEED	06	1805	N00 E50
	SAC PEAK	06	1814	N23 E55
	LOCKHEED	06	1815	N10 E90
	MCMATH	06	1820 E	N22 E56
	SAC PEAK	06	1904	S12 W49
	LOCKHEED	06	1915	N43 E00
*	SAC PEAK	06	1916	N14 E85
	HAWAII	06	1918	N30 E90
	SAC PEAK	06	1928	S08 E60
	HAWAII	06	2004	N16 E27
	LOCKHEED	06	2026	N23 E54
	LOCKHEED	06	2032	S09 E60
	LOCKHEED	06	2032	S09 E60
	SAC PEAK	06	2036	S08 E60
	HAWAII	06	2036	N03 E57
	LOCKHEED	06	2036	N15 E81
	LOCKHEED	06	2036	N15 E81
	LOCKHEED	06	2036	N15 E81
	LOCKHEED	06	2045	N11 W07
	LOCKHEED	06	2045	N11 W07
	LOCKHEED	06	2052	N08 E31
	SAC PEAK	06	2112	S08 E60
	LOCKHEED	06	2139	N11 W15
	LOCKHEED	06	2150	S08 E59
	LOCKHEED	06	2159	N24 E54
	LOCKHEED	06	2159	N24 E54
	SAC PEAK	06	2200	S08 E59
	HAWAII	06	2220 E	N28 E90
	SAC PEAK	06	2226	S11 W57
	LOCKHEED	06	2226	S11 W58
	LOCKHEED	06	2245	N15 E78
	HAWAII	06	2246	N08 W11
	LOCKHEED	06	2246	N09 W07
	SAC PEAK	06	2252	N15 E83
	HAWAII	06	2308	S30 W25
	SAC PEAK	06	2310	S27 W27
	HAWAII	06	2314	N07 W19
	LOCKHEED	06	2320 U	S27 W22
	LOCKHEED	06	2340	N15 E78
	LOCKHEED	07	0057	S08 E56
	WENDEL	07	0850 E	N25 E50
	WENDEL	07	1348 E	N26 E48
	LOCKHEED	08	1820	N26 E31
	LOCKHEED	08	1820	N26 E31
	LOCKHEED	08	1830	N01 E25
	LOCKHEED	08	1830	N01 E25
	SAC PEAK	08	1920	N00 E25
	MCMATH	08	2033	N00 E20
	SAC PEAK	08	2046 E	N00 E20
	SAC PEAK	08	2136	N00 E22
	LOCKHEED	08	2332 E	N25 E26
	LOCKHEED	08	2332 E	N25 E26
	HAWAII	08	2354	N30 E12
	HAWAII	09	0022	S01 E32
	CAPRI S	09	1151 E	S01 E14
*	SAC PEAK	09	1426 E	N01 E09
	SAC PEAK	09	1606 E	N11 W49
	LOCKHEED	09	1718	N17 E12
	LOCKHEED	09	1728	S02 E04
*	LOCKHEED	09	2057	N13 E48
	HAWAII	09	2204	N03 E05
	LOCKHEED	09	2205	N01 E07
	HAWAII	10	0134	N03 E06
	WENDEL	10	1153 E	N24 E11
*	MCMATH	10	1325	N25 E10
	WENDEL	10	1414 E	N24 E10
	WENDEL	10	1416 E	N09 W54
	WENDEL	10	1534 E	N01 W01
	HUANCAYO	10	1631 E	N25 E09
	MCMATH	10	1635	N24 E08
	SAC PEAK	10	1638 E	N25 E08
	SAC PEAK	10	1702	S08 E02
	MCMATH	10	1703	S07 E03
*	LOCKHEED	10	1734 E	N26 E08
	LOCKHEED	10	1930	N01 E02
	LOCKHEED	10	1948	N25 E07
	LOCKHEED	10	2100	N01 E02
	LOCKHEED	10	2330	N15 E64
	LOCKHEED	10	2340	N26 E04
	HAWAII	11	0024	N25 W05
	MCMATH	11	1235 E	S08 W01
	MCMATH	11	1303	S05 W09
	MCMATH	11	1345	N10 W36
	MCMATH	11	1422	N25 W03
	LOCKHEED	11	1604 U	N25 W05
	MCMATH	11	1719	N12 W77
	MCMATH	11	1720	N16 E17
	LOCKHEED	11	1725	N16 E18
	LOCKHEED	11	1807	N24 W07
	LOCKHEED	11	1807	N24 W07
	MCMATH	11	1840	N25 W06
	LOCKHEED	11	1906	N06 E46
	MCMATH	11	1925	N25 W06
	LOCKHEED	11	1925	N24 W07
	HAWAII	11	1940 E	N23 W26
	LOCKHEED	11	1955	N16 E15
	MCMATH	11	1958	N16 E16
	SAC PEAK	11	2000	N16 E16
	MCMATH	12	1335	N05 E34
	MCMATH	12	1342	S05 W23
	MCMATH	12	1418	N21 W30
	MCMATH	12	1607	N28 W20
	SAC PEAK	12	1608	N29 W19
	SAC PEAK	12	1740	S13 E90
	MCMATH	12	1740	S13 E90
*	LOCKHEED	12	1947	S12 E90
*	MCMATH	12	1947	S13 E90
*	SAC PEAK	12	1948	S12 E90
*	MCMATH	12	2050	S07 W22
*	ARCETRI	13	0800 E	N00 W33
	ARCETRI	13	0837 E	S09 W28
	WENDEL	13	0937 E	S09 W32
	WENDEL	13	1017 E	S11 W30
	MCMATH	13	1348	N02 W36
	MCMATH	13	1355	S07 W34
	MCMATH	13	1405	S07 W34
	SAC PEAK	13	1514	S12 E80
	MCMATH	13	1630	N24 W32
	SAC PEAK	13	1632	N24 W33
	LOCKHEED	13	1732	S11 E80
	LOCKHEED	13	1810	S10 E80
	MCMATH	13	1820	S10 E80
	LOCKHEED	13	1856	S11 E80
	LOCKHEED	13	2045	S10 W37
	LOCKHEED	13	2155	S11 E78
	LOCKHEED	13	2300	S10 E76
	HAWAII	14	0012	S07 W45
	HAWAII	14	0120	N02 E85
	WENDEL	14	1232 E	S09 W48
	MCMATH	14	1340	S07 W50
	WENDEL	14	1354 E	S09 W49
*	SAC PEAK	14	1442	S09 W50
*	MCMATH	14	1500 E	N02 W50
	SAC PEAK	14	1648	S08 W52
	SAC PEAK	14	1656	S10 E72
	LOCKHEED	14	1804 E	S08 W51
	HAWAII	14	1816 E	S19 W54
	MCMATH	14	1900 E	S06 W52
	MCMATH	14	1952	S08 W52
	LOCKHEED	14	2004	N24 W46
	SAC PEAK	14	2036	S11 E70
	LOCKHEED	14	2036	S09 E69
	LOCKHEED	14	2301	N28 E35
	LOCKHEED	14	2348	S10 W55
	LOCKHEED	15	0005	N23 W58
	LOCKHEED	15	0041	S03 W59
	LOCKHEED	15	0107	S10 W50
	MCMATH	15	1222 E	S11 E53
	MCMATH	15	1340	S13 E90
	MCMATH	15	1345	S11 E53
	HUANCAYO	15	1400 E	S11 E54
*	MCMATH	15	1420	S12 E54
*	SAC PEAK	15	1420	S12 E54
	MCMATH	15	1530 E	S11 E52
	MCMATH	15	1530 E	N06 W06
	MCMATH	15	1725	S11 E52
	MCMATH	15	1836	S08 W64
	MCMATH	15	1837	S11 E52
	LOCKHEED	15	1838	S09 E47
	LOCKHEED	15	1900	S10 E50
	LOCKHEED	15	1900	S10 E50
	LOCKHEED	15	1900	S10 E50
	LOCKHEED	15	1900	S10 E50
	MCMATH	15	1904	S08 W63
	MCMATH	15	1916	S03 W72
	MCMATH	15	2030 E	S12 E51
	MCMATH	15	2045 E	S07 W65
	LOCKHEED	15	2100	S07 E60
	HAWAII	15	2352	N16 E40
	SAC PEAK	15	2352	S11 E44
	ARCETRI	16	0949 E	N06 W17
	LOCKHEED	16	2046	N05 W24
	LOCKHEED	16	2348	N14 W18
	SAC PEAK	17	1436	N05 W33
	LOCKHEED	17	1615	N13 W65
*	LOCKHEED	17	1616	N06 W34
	HAWAII	17	1844	S02 W38
*	LOCKHEED	17	1844	N05 W36
*	LOCKHEED	17	1844	N05 W36
	LOCKHEED	17	2000	N06 W36
	SAC PEAK	17	2010	N05 W37
	LOCKHEED	17	2027	N08 E51
	LOCKHEED	17	2029	N16 W68
	LOCKHEED	17	2029	N16 W68
	LOCKHEED	17	2146	N06 W38
	HAWAII	17	2152 E	S01 W40
	LOCKHEED	17	2247	N05 W39
	HAWAII	17	2254	S02 W41
	LOCKHEED	17	2355	N05 W39
	STOCKHOLM	18	0907 E	S12 E15
	SAC PEAK	18	1407	N14 E40
	ARCETRI	18	1523 E	N04 W49
	SAC PEAK	18	1524	S09 E13
	ARCETRI	18	1525 E	S09 E12
	SAC PEAK	18	1602	S09 E13
	MCMATH	18	1738 E	N06 W51
	MCMATH	18	1812	N22 W13
	SAC PEAK	18	1814	N21 W14
	MCMATH	18	1840	N06 W51
	SAC PEAK	18	1842	N06 W52
	HAWAII	18	1844 E	S03 W52
	MCMATH	18	1855	N22 W13
	MCMATH	18	1952	S10 E10
	HAWAII	18	2154	S03 W55
	SAC PEAK	18	2156	N06 W53
	MCMATH	19	1419 E	N21 W27
	SAC PEAK	19	1502	N23 E57
	MCMATH	19	1722	S10 W03
	MCMATH	19	1805 E	N23 E56
	MCMATH	19	1805 E	N21 W31
	SAC PEAK	19	1822	N23 E57
	SAC PEAK	19	1928	N23 E57
	SAC PEAK	19	2118	S08 W10
	LOCKHEED	20	0000 E	N23 E52
	WENDEL	20	1440 E	N21 W36
	LOCKHEED	20	1705 E	N22 E43
	LOCKHEED	20	1757	S15 E65
	LOCKHEED	20	1825	N22 E44
	LOCKHEED	20	1837	N24 E43
	SAC PEAK	20	1840	N22 E44
	LOCKHEED	20	2001	N21 E90
	LOCKHEED	20	2018	N08 E13
	LOCKHEED	20	2054	N23 E44
	LOCKHEED	20	2121	S08 W14
	LOCKHEED	20	2125	N22 W41
	SAC PEAK	20	2128	N22 W44
	LOCKHEED	20	2150	N22 W41
	SAC PEAK	20	2152	N22 W41
	LOCKHEED	20	2327	N23 E44
	LOCKHEED	20	2357	N10 E34
	LOCKHEED	21	0022	N23 E41
	LOCKHEED	21	0050 E	N21 E78
	WENDEL	21	1232 E	N22 E34
	ONDREJOV	21	1234	N21 E33
	STOCKHOLM	21	1237 E	N22 E32
*	SAC PEAK	21	1526	N22 E33
*	MCMATH	21	1526	N22 E32
	LOCKHEED	21	1705 E	N21 E30
	LOCKHEED	21	1705 E	N21 E30
	LOCKHEED	21	1800	N21 E30
	LOCKHEED	21	1800	N05 W56
	SAC PEAK	21	1816	N25 W56
	LOCKHEED	21	1818	N22 E31
	LOCKHEED	21	1825	N22 E80
	LOCKHEED	21	1853	N22 E31
	LOCKHEED	21	1853	N22 E31
	LOCKHEED	21	1853	N22 E31
	LOCKHEED	21	1903	N22 E80
	SAC PEAK	21	1906	N22 E83
	LOCKHEED	21	1931	N23 E32
	SAC PEAK	21	1940	N22 E31
*	LOCKHEED	21	1950	N22 E30
*	LOCKHEED	21	1950	N22 E30
	LOCKHEED	21	1950	N23 E80
	LOCKHEED	21	1950	N23 E80
	SAC PEAK	21	1958	N22 E30
	SAC PEAK	21	2018	N22 E85
*	SAC PEAK	21	2036	N22 E85
*	LOCKHEED	21	2037	N22 E80
*	LOCKHEED	21	2038	N23 E32
*	LOCKHEED	21	2038	N23 E32
	LOCKHEED	21	2120	N22 W52
	SAC PEAK	21	2120	N21 W52
	LOCKHEED	21	2147	N22 E80
	LOCKHEED	21	2150	N23 E32
	LOCKHEED	21	2150	N23 E32
	LOCKHEED	21	2227	N18 W03
	LOCKHEED	21	2248	N18 W03
	LOCKHEED	21	2250	N23 E29
	LOCKHEED	21	2250	N23 E29
	LOCKHEED	21	2256	N24 E80
*	SAC PEAK	21	2302	N22 E28
	LOCKHEED	22	0000	N06 W58
	LOCKHEED	22	0000	N06 W58
	LOCKHEED	22	0007	N24 E80
	LOCKHEED	22	0023 U	S25 E15
	LOCKHEED	22	0027	N24 E80
*	CAPRI S	22	0749 E	N21 W58
	STOCKHOLM	22	0855 E	N20 E20
*	WENDEL	22	0901 E	N21 W56
	ARCETRI	22	0934	N05 W13
	WENDEL	22	1144 E	N22 E24
	CAPRI S	22	1220 E	N22 E23
	STOCKHOLM	22	1224 E	N20 E20
	SAC PEAK	22	1536	S11 W38
	HAWAII	22	1826	N28 E11
	SAC PEAK	22	1826	N24 E18
	SAC PEAK	22	1934	N22 E64
	LOCKHEED	22	2030 E	N23 E16
	LOCKHEED	22	2040 U	S13 E51
	HAWAII	22	2204	N17 W17
	SAC PEAK	22	2208	N18 W13
	SAC PEAK	22	2300	N18 W13
	SAC PEAK	22	2358	S11 W42
	ARCETRI	23	0821 E	N25 E10
	WENDEL	23	0822 E	N24 E12
*	WENDEL	23	0909 E	S12 E43
	WENDEL	23	0922 E	S12 E43
	STOCKHOLM	23	0930 E	S13 E53
	STOCKHOLM	23	0945 E	S10 W53
	ONDREJOV	23	1014 E	S15 W57
	ONDREJOV	23	1039	S15 W57
	WENDEL	23	1055 E	N23 E11
	WENDEL	23	1208 E	S12 E40
*	MCMATH	23	1300	N20 W23
	SAC PEAK	23	1508	S10 W57
	WENDEL	24	0757 E	S24 E75

SUBFLARES

Noted as follows: Date - Universal Time - Coordinates

MARCH 1960

ARCETRI	24	0816	E	N18	W30
WENDEL	24	0836	E	N22	W10
ONDREJOV	24	0836	E	N16	W32
WENDEL	24	0908	E	N16	W32
WENDEL	24	0931	E	S23	E85
WENDEL	24	0938	E	N22	W10
WENDEL	24	0954	E	S24	E73
* STOCKHOLM	24	1010	E	N19	W[illegible]
* WENDEL	24	1125	E	S24	E73
ONDREJOV	24	1150	E	N16	W34
WENDEL	24	1217	E	N20	W07
WENDEL	24	1248	E	S26	E72
WENDEL	24	1410	E	S23	E51
WENDEL	24	1423	E	N22	W13
HUANCAYO	24	1950		N22	W17
HUANCAYO	24	2050		N22	W17
* ONDREJOV	25	0853	E	N16	W48
WENDEL	25	0920	E	N21	W25
ONDREJOV	25	1040		N21	W37
STOCKHOLM	25	1149	E	N13	W01
STOCKHOLM	25	1239	E	N07	W50
MCMATH	25	1310		S10	E67
MCMATH	25	1400		N21	W23
WENDEL	25	1419	E	N18	W21
MCMATH	25	1435		N21	W27
WENDEL	25	1455	E	N12	E04
* MCMATH	25	1456		N12	E03
MCMATH	25	1501		S19	W28
* SAC PEAK	25	1504		N12	E05
WENDEL	25	1506	E	S20	W26
WENDEL	25	1541	E	N21	W25
WENDEL	25	1547	E	S20	W26
WENDEL	25	1602	E	N18	W22
MCMATH	25	1657		N23	W21
SAC PEAK	25	1700		N23	W20
SAC PEAK	25	1706		N20	W52
MCMATH	25	1707		N20	W52
HAWAII	25	1918		N20	W25
MCMATH	25	1919		N23	W22
MCMATH	25	1949		N18	W59
HAWAII	25	2120	E	N11	W05
HAWAII	25	2158		N23	W31
HAWAII	25	2248	E	N22	W17
WENDEL	26	1007	E	N11	W05
WENDEL	26	1113	E	N12	W07
WENDEL	26	1141	E	N23	W40
WENDEL	26	1200	E	N21	W34
MCMATH	26	1540		N20	W45
SAC PEAK	26	1542		N19	W45
MCMATH	26	1548		N26	E47
SAC PEAK	26	1550		N26	E46
MCMATH	26	1602		N12	W08
MCMATH	26	1617		S19	W42
SAC PEAK	26	1634		N26	E46
MCMATH	26	1635		N27	E48
MCMATH	26	1710		N20	W46
SAC PEAK	26	1712	E	N20	W46
SAC PEAK	26	1740		N24	E02
MCMATH	26	1741		N26	E03
MCMATH	26	1940		S10	W90
MCMATH	26	1957		N18	W70
MCMATH	26	2053		N20	W48
MCMATH	26	2110		N18	W70
LOCKHEED	26	2258	U	N21	W45
LOCKHEED	26	2300	U	S26	E52
HAWAII	26	2358		N14	W49
SAC PEAK	27	0006		N21	W56
WENDEL	27	0812	E	N19	W78
WENDEL	27	0912	E	N19	W79
WENDEL	27	1042	E	N21	W49
MCMATH	27	1345		N18	W85
SAC PEAK	27	1426		N22	W55
MCMATH	27	1438	E	N18	W85
SAC PEAK	27	1438		N18	W75
SAC PEAK	27	1526		S12	W14
SAC PEAK	27	1536		N20	W53
SAC PEAK	27	1616		S13	W14
MCMATH	27	1626	E	N18	W85
MCMATH	27	1626	E	S11	W14
SAC PEAK	27	1650		N18	W80
HAWAII	27	2140		S16	W17
* HAWAII	27	2232	E	N13	W62
HAWAII	28	0012	E	N12	W62
HAWAII	28	0056	E	N18	E42
WENDEL	28	0732	E	N13	E47
WENDEL	28	0743	E	N19	W81
WENDEL	28	0747	E	N20	W68
WENDEL	28	0838	E	N05	E64
WENDEL	28	0843	E	N20	W70
WENDEL	28	1002	E	N05	E63
WENDEL	28	1056	E	N22	W58
STOCKHOLM	28	1113	E	N12	E42
WENDEL	28	1202	E	N11	E43
SAC PEAK	28	1446		S15	E25
* SAC PEAK	28	1452		N12	E43
SAC PEAK	28	1614		N12	E42
SAC PEAK	28	1700		N11	E42
SAC PEAK	28	1738		N12	E42
SAC PEAK	28	1844		N11	W64
SAC PEAK	28	2006		N10	E40
HAWAII	28	2008	E	N18	E37
SAC PEAK	28	2016		N20	W68
LOCKHEED	28	2218		N11	E39
LOCKHEED	28	2233		N10	W51
LOCKHEED	28	2240		N25	W67
LOCKHEED	28	2257		N11	E39
SAC PEAK	28	2258		N10	E38
LOCKHEED	28	2339		N13	E37
HAWAII	28	2340	E	N18	E31
LOCKHEED	29	0000		S19	W90
LOCKHEED	29	0033		N23	W68
HAWAII	29	0034		N15	W75
* LOCKHEED	29	0047		N13	E36
HAWAII	29	0126	E	N17	E34
WENDEL	29	1044	E	S12	W35
WENDEL	29	1044	E	N22	W77
WENDEL	29	1103	E	N12	E31
* STOCKHOLM	29	1125	E	N10	E28
* STOCKHOLM	29	1209	E	N11	E30
SAC PEAK	29	1358	E	N12	E29
MCMATH	29	1400	E	N12	E28
SAC PEAK	29	1406		N24	W22
* WENDEL	29	1534	E	N11	E23
* SAC PEAK	29	1534		N12	E26
LOCKHEED	29	1636		N09	E20
MCMATH	29	1637	E	S17	W88
SAC PEAK	29	1638		N12	E26
WENDEL	29	1645	E	N12	E30
LOCKHEED	29	1710		N12	E28
LOCKHEED	29	1736		N13	E28
SAC PEAK	29	1738		N13	E28
MCMATH	29	1738		N13	E27
LOCKHEED	29	1745		N10	E28
LOCKHEED	29	1820		S17	W90
LOCKHEED	29	1823		N10	E30
SAC PEAK	29	1824		N10	E30
LOCKHEED	29	1833		N12	E29
LOCKHEED	29	1845		N10	E29
LOCKHEED	29	1850		N13	E28
SAC PEAK	29	1851		N12	E26
HAWAII	29	1852	E	N24	E24
LOCKHEED	29	1913		N11	E29
LOCKHEED	29	1921		N12	E27
LOCKHEED	29	1921		N12	E27
LOCKHEED	29	1925		N20	W80
LOCKHEED	29	2000		N12	E28
LOCKHEED	29	2011		N12	E28
LOCKHEED	29	2017		N10	E28
HAWAII	29	2018		N15	E24
SAC PEAK	29	2018		N11	E27
HAWAII	29	2042		N22	E11
LOCKHEED	29	2055		N09	E36
LOCKHEED	29	2055		N09	E36
LOCKHEED	29	2222		N12	E26
LOCKHEED	29	2222		N12	E26
SAC PEAK	29	2224		N11	E26
LOCKHEED	29	2241		N22	W80
LOCKHEED	29	2248		N12	E26
HAWAII	29	2300		N13	E22
SAC PEAK	29	2302		N09	E26
LOCKHEED	29	2302		N10	E26
LOCKHEED	29	2317		N11	E19
LOCKHEED	29	2325		N13	E23
LOCKHEED	29	2325		N13	E23
SAC PEAK	29	2328		N12	E22
LOCKHEED	30	0031		N12	E22
LOCKHEED	30	0058		N12	E22
LOCKHEED	30	0058		N12	E22
LOCKHEED	30	0121		N24	W90
HAWAII	30	0134		N16	E18
STOCKHOLM	30	0913	E	N08	E17
* ARCETRI	30	1343	E	N11	E15
* SAC PEAK	30	1402		N11	E13
* HUANCAYO	30	1403		N08	E12
* LOCKHEED	30	1750	E	N12	E14
* LOCKHEED	30	1750	E	N12	E14
MCMATH	30	1830		N10	W90
LOCKHEED	30	1831		N10	W90
LOCKHEED	30	1831		N10	W90
SAC PEAK	30	1848		N10	W90
* LOCKHEED	30	1849		N10	E14
* HAWAII	30	1852		N11	E10
* LOCKHEED	30	1913		N12	E10
* LOCKHEED	30	1913		N12	E10
* LOCKHEED	30	1926		N10	E14
LOCKHEED	30	2320	U	N11	E06
LOCKHEED	30	2320	U	N11	E06
HAWAII	31	0010	E	N09	E03
HAWAII	31	0054	E	N09	E02
HAWAII	31	0144	E	N10	E02
SAC PEAK	31	1538		N08	E02
LOCKHEED	31	1939		N12	W05
LOCKHEED	31	2025		N27	W21
SAC PEAK	31	2026		N26	W21
LOCKHEED	31	2030		N13	W06
* HAWAII	31	2036	E	N24	W27
* SAC PEAK	31	2040		S28	E08
* LOCKHEED	31	2050		N13	W05
* LOCKHEED	31	2050		N13	W05
* SAC PEAK	31	2056		S28	E08
* SAC PEAK	31	2056		N09	W06
SAC PEAK	31	2206		S11	E80
SAC PEAK	31	2234		N09	E75
LOCKHEED	31	2255		N11	E78
LOCKHEED	31	2255		N11	E78
SAC PEAK	31	2256		N10	W07
* LOCKHEED	31	2257		N11	W07
SAC PEAK	31	2308		S09	E44
SAC PEAK	31	2310		N09	E75
LOCKHEED	31	2338		N12	W07
SAC PEAK	31	2338		N11	W07
LOCKHEED	31	2353		N11	E78

COMMERCE - STANDARDS - BOULDER

*Rated as flare of importance ≥1 by other observatories (See CRPL-F 188 Part B).

SOLAR FLARES

JANUARY 1960

OBSERVATORY	DATE JAN 1960	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
UCCLE	03	1024 E			S02	E75	5526			2						
MITAKA	04	0256 E	0320		N13	W47	5511	24 D	1+	1	0256	3.93	5.90	2.58	115	
GOOD HOPE	05	0954	1008	0957	S13	E62	5525	14	1		0957	1.10	2.30			
GOOD HOPE	05	1015	1030	1019	S13	E62	5525	15	1		1019	1.00	2.10			
GOOD HOPE	06	0718	0732	0721	N08	W58	5512	14	1		0721	1.20	2.30			
GOOD HOPE	06	0956	1028	1006	N09	W59	5512	32	1		1006	1.10	2.10			
GOOD HOPE	06	1133	1158	1137	N09	W62	5512	25	1		1137	1.60	3.40			
MITAKA	07	0019 E	0033 D	0024	N05	W65	5512	14 D	1	1	0019	1.97		2.11	100	S-SWF
MITAKA	07	0420	0435	0424	N05	W67	5512	15	1+	1	0420	3.90	9.83	3.27	140	S-SWF
GOOD HOPE	07	0637 E	0650		N08	W74	5512	13 D	1		0638	.90				
GOOD HOPE	07	0758	0826		S18	E42	5525	28	1		0805	1.70	2.40			
GOOD HOPE	07	0816	0836	0820	N08	W74	5512	20	1		0820	1.10				
GOOD HOPE	07	0946	1019	0949	N08	W75	5512	33	1		0949	.80				
GOOD HOPE	07	1142	1204	1145	N07	W78	5512	22	1		1145	1.50				
GOOD HOPE	07	1245	1318	1253	N08	W77	5512	33	1		1253	1.50				
HUANCAYO	07	1522	1555	1528	N09	W71	5512	33	2	2	1528	2.20	6.20	3.10		Slow S-SWF
GOOD HOPE	08	0841	0900	0846	N07	W88	5512	19	1		0846	.80				
GOOD HOPE	09	0908	0940 D	0920	N09	W79	5512	32 D	1		0920	1.10				
GOOD HOPE	10	0748 E	0815		S21	E02	5525	27 D	1		0748	1.70	1.80			
GOOD HOPE	10	1133	1214	1143	N09	W90	5516	41	2		1143	1.00				
GOOD HOPE	10	1223	1244	1226	N09	W90	5516	21	1		1226	.50				
GOOD HOPE	10	1244	1258	1247	S12	W75	5514	14	1		1247	1.20				
GOOD HOPE	12	1255	1312	1257	N20	W05	5527	17	1		1257	2.70	2.90			
GOOD HOPE	13	1201	1240	1203	S17	W48	5525	39	1		1203	1.30	2.00			
UCCLE	15	1352 E			S18	W67	5525		3	3	1352	9.00	20.00			Slow S-SWF
GOOD HOPE	16	1009	1022	1013	N28	E75	5539	13	1		1013	1.00				
MITAKA	17	0035 E	0048	0037	N08	E61	5540	13 D	1+	1	0036	3.42	7.28	3.17	152	
GOOD HOPE	18	1320	1333	1322	N17	E60	5545	13	1		1322	1.40	3.00			
GOOD HOPE	19	0809	0839	0811	N16	E50	5545	30	1		0811	1.20	2.00			
GOOD HOPE	23	0739	0753	0742	N09	W59	5538	14	1		0742	1.30	2.60			
ATHENS	23	0856 E	0916 D		N05	W50	5538	20 D	1+	2		2.30	3.80			
GOOD HOPE	23	0941	0952	0942	N09	W59	5538	11	1		0942	1.30	2.60			
GOOD HOPE	23	1204	1230	1209	N10	W60	5538	26	1		1209	1.10	2.30			
GOOD HOPE	23	1249	1304	1251	N10	W61	5538	15	1		1251	1.00	2.10			
GOOD HOPE	24	0656	0709	0701	N08	E42	5549	13	1		0701	1.80	2.50			
GOOD HOPE	24	0754	0816	0801	N11	W74	5538	22	1		0801	1.10				
GOOD HOPE	24	0855	0903	0858	N08	E58	5550	8	1		0858	1.30	2.60			

SOLAR FLARES

JANUARY 1960

OBSERVATORY	DATE JAN 1960	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
GOOD HOPE	25	1129	1158	1134	N11	W90	5538	29	1		1134	.50				
GOOD HOPE	25	1240	1305	1244	N07	E55	5550	25	1		1244	1.50	2.80			
HUANCAYO	25	1549	1600	1552	N06	E54	5550	11	1	2	1552	1.80	3.00	2.90		
MITAKA	27	0323 E	0327 D	0324	S15	E62	5551	4 D	1	1	0324	1.28	2.28	4.61	134	
NIZAMIAH	27	0457 E	0505		N08	E18	5550	8 D	1	2	0457	2.43	2.56	1.50		
{ GOOD HOPE	27	0836	0900	0840	N08	W02	5549	24	1		0840	3.30	3.40			
{ ATHENS	27	0838	0857		N06	W02	5549	19	1	3		2.70	2.70			
HUANCAYO	27	1448	1500	1449	N03	E16	5550	12	1	2	1449	1.80	1.90	4.20		
HUANCAYO	27	1520	1540	1524	N03	E16	5550	20	1	2	1524	4.90	5.10	2.90		
GOOD HOPE	28	0705 E	0740		N05	E12	5550	35 D	1		0707	2.20	2.30			
GOOD HOPE	28	0826 E	0859 D		N05	E12	5550	33 D	1		0834	4.50	4.70			
HUANCAYO	28	1417	1444	1424	N07	E10	5550	27	1	2	1424	2.80	2.90	2.80		
MITAKA	29	0546	0559	0553	S15	E30	5551	13	1	1	0551	2.76	3.28	3.06	120	
ATHENS	29	0841	0850		S17	E34	5551	9	1+	2		2.30	3.70			
MITAKA	30	0023 E	0029		N03	W21	5550	6 D	1	1	0029	.98	1.07	1.38	100	
MITAKA	30	0107	0113		N09	W12	5550	6	1	1	0109	3.93	4.17	3.29	100	
MITAKA	30	0217 E	0233		S14	E20	5551	16 D	1	1	0217	2.95	3.16	2.16	125	
GOOD HOPE	30	1306	1337	1311	N05	W27	5550	31	1		1311	2.50	2.80			
MITAKA	31	0158	0236	0158	S16	E03	5551	38	1+	1	0158	7.86	8.02	1.68	102	
GOOD HOPE	31	1229	1244 D	1232	N23	W50	5548	15 D	1		1232	2.70	4.80			

COMMERCE - STANDARDS - BOULDER

These flare reports are addenda to the January 1960 flares published in CRPL-F 186 Part B, February 1960.

CAPRI G ANACAPRI - GERMAN
CAPRI S ANACAPRI - SWEDISH
GOOD HOPE ROYAL OBSERVATORY, CAPE OF GOOD HOPE
KIEV* KIEV UNIVERSITY
KODAIKNAL KODAIKANAL
KRASNYA KRASNAYA PAKHRA
LOCKHEED LOS ANGELES

MOSCOW-G MOSCOW - GAISH
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

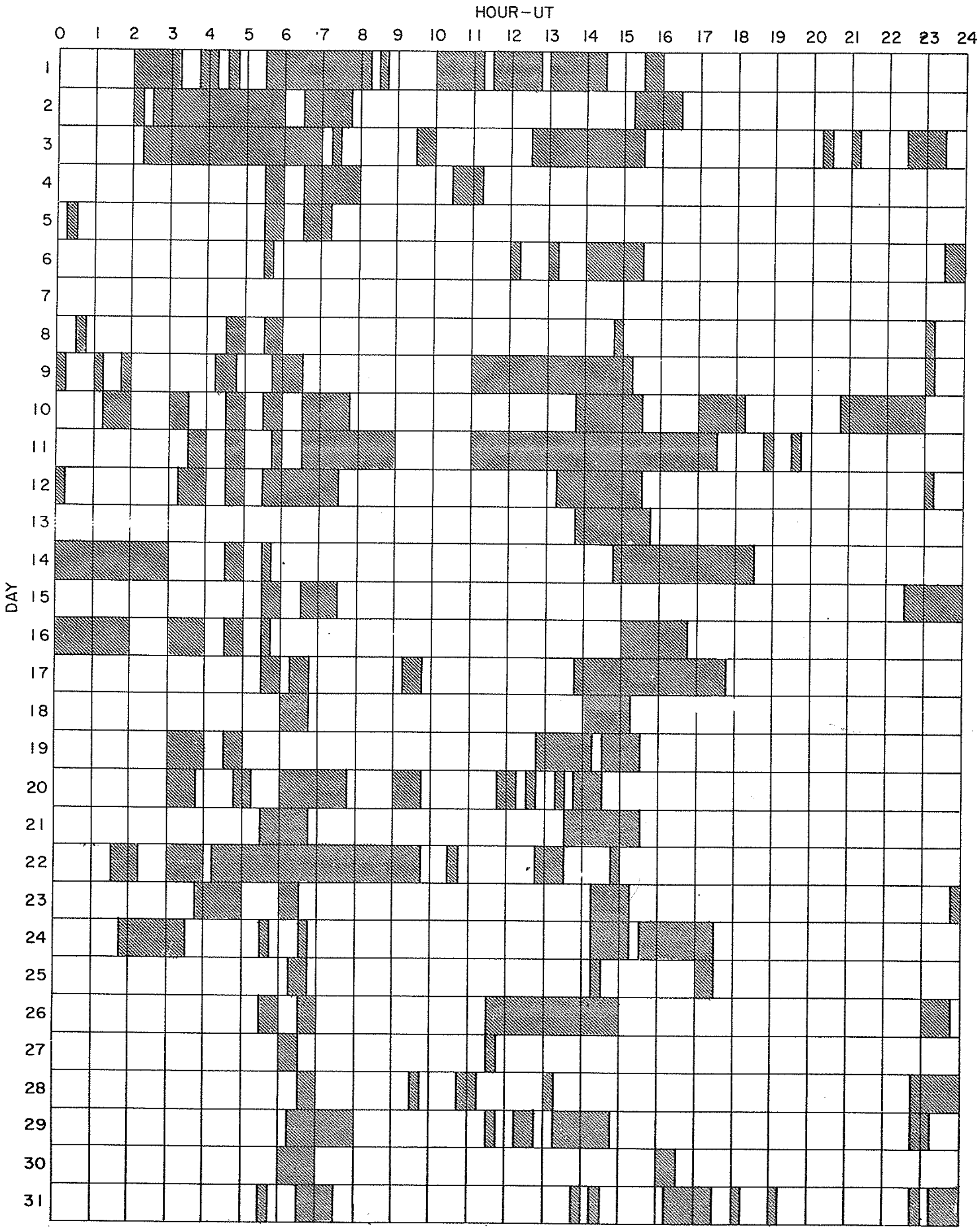
SAC PEAK: ALL VALUES IN MAX. INT. COLUMN ARE ARBITRARY UNITS (0-40), NOT PERCENT OF CONTINUOUS SPECTRUM.

E - LESS THAN   & - PLUS
D - GREATER THAN   - - MINUS
U - APPROXIMATE   □ - NOT REPORTED

LOCKHEED OBSERVATIONS: ALL VALUES IN THE MAXIMUM INTENSITY COLUMN ARE ARBITRARY UNITS ON A SCALE OF 10 TO 40 - NOT PERCENT OF THE CONTINUOUS SPECTRUM.

INTERVALS OF NO FLARE PATROL OBSERVATIONS

JANUARY 1960



Stations Include:

COMMERCE - STANDARDS - BOULDER

Anacapri (Swedish)
Arcetri
Athens
Climax
Dunsink

Good Hope
Hawaii
Huancayo
Kodaikanal
Lockheed

McMath
Meudon
Mitaka
Nizamiah
Ondrejov

Royal Greenwich Observatory
  Herstmonceux
Sacramento Peak
Uccle

ERRATA TO SOLAR FLARES

DECEMBER 1959

OBSERVATORY	DATE DEC 1959	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
CLIMAX	01	1522 E	1616		N09	W07	5476	54 D	2		1531	5.50				Slow S-SWF
CLIMAX	01	1641	2035	1709	N09	W04	5476	234	1+		1709	5.00				S-SWF
CLIMAX	03	1757	1803 D		N08	W35	5476	6 D	2		1802	6.90				S-SWF
CLIMAX	06	1905	1919	1910	N11	W19	5478	14	1		1910	2.40				
CLIMAX	07	1636			N12	W37	5478		1		1645	4.90				
CLIMAX	07	1902	2002	1912	N09	W37	5478	60	1		1912	3.50				
CLIMAX	07	2135	2240 D		N06	W39	5478	65 D	2		2143	5.50				
CLIMAX	08	1532 E	1549	1540 U	N06	W50	5478	17 D	1		1540	2.40				
CLIMAX	19	2146	2203 D	2158	N23	E47	5502	17 D	1		2158	2.30				
CLIMAX	20	1605			N04	W46	5493		1		1615	2.60				
CLIMAX	29	1746	1806	1751	N09	W50	5505	20	1		1751	2.60				

The Climax flares listed above should replace those published in CRPL-F 188 Part B on pages III g-i. The measured areas have been corrected. Because of this in some instances the importance has also changed.

IONOSPHERIC EFFECTS OF SOLAR FLARES

(SHORT-WAVE RADIO FADEOUTS)

MARCH 1960

Mar. 1960	Start UT	End UT	Type	Wide Spread Index	Importance	Observation Stations	Known Flare, UT CRPL-F 188B
1	1240	1300	Slow S-SWF	5	1+	BE, DA, HU, NE, PR	1240E
1	1800	1830	S-SWF	5	1+	AN, BE, FM, HU, MC, PR	1750
1	1918	1944	S-SWF	5	2	AD, BE, FM, HU, LA, MC, NE, PR, WS	1915
2	1105	1120	S-SWF	5	1	KU, NE, PR, PU	1111E
7	1817	1857	Slow S-SWF	4	1	BE, MC, PR	1810
10	1719	1740	S-SWF	5	2-	BE, FM, HU, LA, MC, NE, PR, PU, WS	1716
11	1100	1118	S-SWF	5	1	BE, PR, PU	*
14	0110	0220	S-SWF	5	2	AD, OK	
17	1618	1635	S-SWF	5	1-	FM, HU, MC, PR, WS	1616
17	2010	2028	S-SWF	5	1-	AD, AN, FM, HU, MC, PR, WS	
21	1532	1545	S-SWF	5	1	BE, FM, HU, MC, PR, WS	1527
27	0144	0230	Slow S-SWF	5	2	AD, OK, TO	0150E
27	0530	0600	S-SWF	1	1-	OK	*
27	0600	0617	S-SWF	1	1-	OK	*
27	0638	0657	Slow S-SWF	1	1-	OK	0634E
27	0745	0800	Slow S-SWF	1	1-	OK	0736E
28	0120	0200	S-SWF	5	1+	AD, OK	
28	1738	1800	Slow S-SWF	5	1	FM, MC, PR, WS	
28	2050	2140	S-SWF	5	2+	AD, BE, BO, FM, HU, MC, PR, TO, WS, **	2042
29	0652	0853	S-SWF	5	3+	BR, JU, KU, NE, OK, SW, TO, CW++, CW***	0705E
29	2040	2145	S-SWF	5	2+	AD, BE, BO, FM, HU, MC, PR, TO, WS	2038
30	0220	0249	S-SWF	4	1	AD, OK	*
30	0718	0740	S-SWF	5	1	OK, NE, PU *	*
30	1520	1800	Slow S-SWF	5	3	BE, BO, BR, FM, HU, MC, NE, PR, SW, WS, CW** CW***	1455
30	2010	2030	S-SWF	5	1	BO, HU, PR, WS	1947
31	1640	1745	Slow S-SWF	5	2	BE, BO, FM, HU, LA, MC, PR, WS	1620

* = No known flare patrol
BO = Boulder, Colorado
BR = Breisach, G.F.R.
DA = Darmstadt, G.F.R.
JU = Juhlesruh, G.D.R.
KU = Kuhlungsborn, G.D.R.
LA = Los Angeles, Calif.
NE = Nederhorst den Berg, Netherlands
PU = Prague, Czechoslovakia
TO = Hiraiso Radio Wave Observatory, Japan
CW+ = Cable and Wireless, Hong Kong
CW++ = Cable and Wireless, Singapore
CW* = Cable and Wireless, Barbadoes
CW** = Cable and Wireless, Somerton, England
CW*** = Cable and Wireless, Brentwood, England

IONOSPHERIC EFFECTS OF SOLAR FLARES

(Sudden Cosmic Noise Absorption / Sudden Enhancements Of Atmospherics / Solar Noise Bursts At 18 Mc.)

FEBRUARY 1960

FEB. 1960	CLASS SCNA	CLASS SEA	CLASS Burst	WIDE SPREAD INDEX	TIME (UNIVERSAL TIME) BEGIN	MAX.	END	PERCENT ABSORPTION SCNA	OBSERVATION STATIONS
1		1		3	1347	1356	1422		DU, NE
2		1		5	1556	1600	1629		A1, DU
3		2+		3	0820		0907		JU, NE
3		1		1	0950		1023		NE
3		2		5	1230		1320		A3, NE, PA
{3		2+		5	1709	1724			A1, A5, BO, PA, SP
{3	2			3	1710	1719	1745	50	BO, SP
{3		2+		5	2020	2035	2150		A3, A5, BO, PA, SP
{3	2			5	2021	2029	2050	50	BO, HA, SP
3		1		1	0745		0809		NE
4		1+		5	0845		0930		DU, JU, NE
4		2-		5	1312		1349		DU, JU, NE, PA
4			1	3	1927		1930		BO, SP
{4	2			5	2040	2043	2055	50	BO, HA, SP
{4		1+		5	2040	2045	2105		A3, A5, A6, HA, PA, SP
{4	1			5	2141	2147	2200	25	BO, HA
{4		2		5	2141	2148	2217		A1, A3, A5, HA, SP
5		3		5	1346	1401	1455		A1, A3, A5, DU, NE, PA
{5	1			5	2117	2122	2135	15	BO, HA
{5		1+		5	2117		2200		A1, A5, HA
6		2		5	1224	1231	1251		A3, DU, NE, PA, PU
6		1+		5	1345		1435		A1, A3, A5, DU, NE, PA
8		2		1	0843		0859		JU
{13		2		1	2005	2018	2045		BO
{13	1			1	2007	2009	2035	10	BO
19				1	1255	1300	1437		DU
22		2		5	1220	1230	1245D		A3, A5, A10
22		2+		5	1357	1406	1557		A1, A3, A5, A10, DU, NE, PA
25		1		5	1825	1830	1855		A1, A10

IONOSPHERIC EFFECTS OF SOLAR FLARES

(Sudden Cosmic Noise Absorption / Sudden Enhancements Of Atmospherics / Solar Noise Bursts At 18 Mc.)

MARCH 1960

Mar. 1960	CLASS SCNA	CLASS SEA	CLASS Burst	WIDE SPREAD INDEX	TIME (UNIVERSAL TIME) BEGIN	MAX.	END	PERCENT ABSORPTION SCNA	OBSERVATION STATIONS
1	1			1	0226	0229	0246	20	HA
1		1		5	1243		1318		A1, KU, NE, PA
{1	1			4	1756	1809	1830	25	BO, MC
1}		1+		5	1801	1814	1900D		A1, A5, BO
{1	2			5	1921	1924	1945	55	BO, HA, MC
1}		3		5	1921	1930	2015		A1, A2, A3, A5, BO, MC, PA
2		1+		5	1100		1138		DU, KU, NE, PA
2			1	5	2206		2210		BO, HA, MC
8			1	5	2003		2006		BO, HA
8			1	5	2015		2018		BO, HA
10		2		5	1608	1616	1640		A1, A3, A5, A10
10		1		3	1646	1651	1700D		A1, A3, A5
10		2		5	1719	1725	1755		A1, A5, A7, A9, A10, PA, RE
11		1		1	1100		1124		PU
16		2+		4	1429	1445	1533		A1, A5, A6
16		2		4	1546	1557	1655		A5, A6
16		1		3	2040	2045	2105		A3, A5
17		2		5	1618	1629	1659		A2, A3, A5, A6, A9, NE
{17		1		5	2011	2015	2040		A2, A3, A5, A6, RE
17}	1			4	2012	2014	2025	25	BO, RE
21		1		4	1530		1603		DU, NE
24			2	4	1840		1845		BO, MC
24			2	5	1950		1954		BO, HA, MC
24			2	5	2056		2058		BO, HA
24			2	1	2200		2207		HA
27	1			1	0151	0155	0215	10	HA
27		1		1	0753				NE
27				1	1308	1320	1401		DU
27			1	5	2333		2338		BO, HA
28				1	1003	1008	1056		DU
28		2		4	2045	2050	2140		A1, A3, A5, RE
{28			1	5	2046		2048		BO, MC, HA
28	3			5	2048	2102		60	BO, HA, MC, RE
28}			3	5	2100		2110		BO, HA, MC, RE
28			3	1	220C		2345		HA (Very strong continuum)
28		3		1	2212	2236	2305		A9
29		3		5	0700		0815		NE, TA
{29		2		5	2040	2056	2225D		A1, A3, A5, A6, A9, RE
29}	2			5	2042	2103	2200	40	BO, HA, MC, RE
30		2		1	0720				NE
{30		2+		5	1522		1722		A2, A3, A5, A6, A10, DU, NE, TA
30}	3			4	1522	1537		60	BO, MC
30			3	5	1653		0045D		BO, HA, MC (Noise storm, strong continuum)
{31		2		5	1644	1712	1750		A1, A3, A5, A9, A10, BO
31	1			1	1655	1705	1730	15	BO
31}			1	1	1751		1756		BO
{31		2		5	1833	1900	1945		A1, A5, A10
31}			1	1	1834		1840		BO

SOLAR RADIO EMISSION
OUTSTANDING OCCURRENCES

APRIL 1960

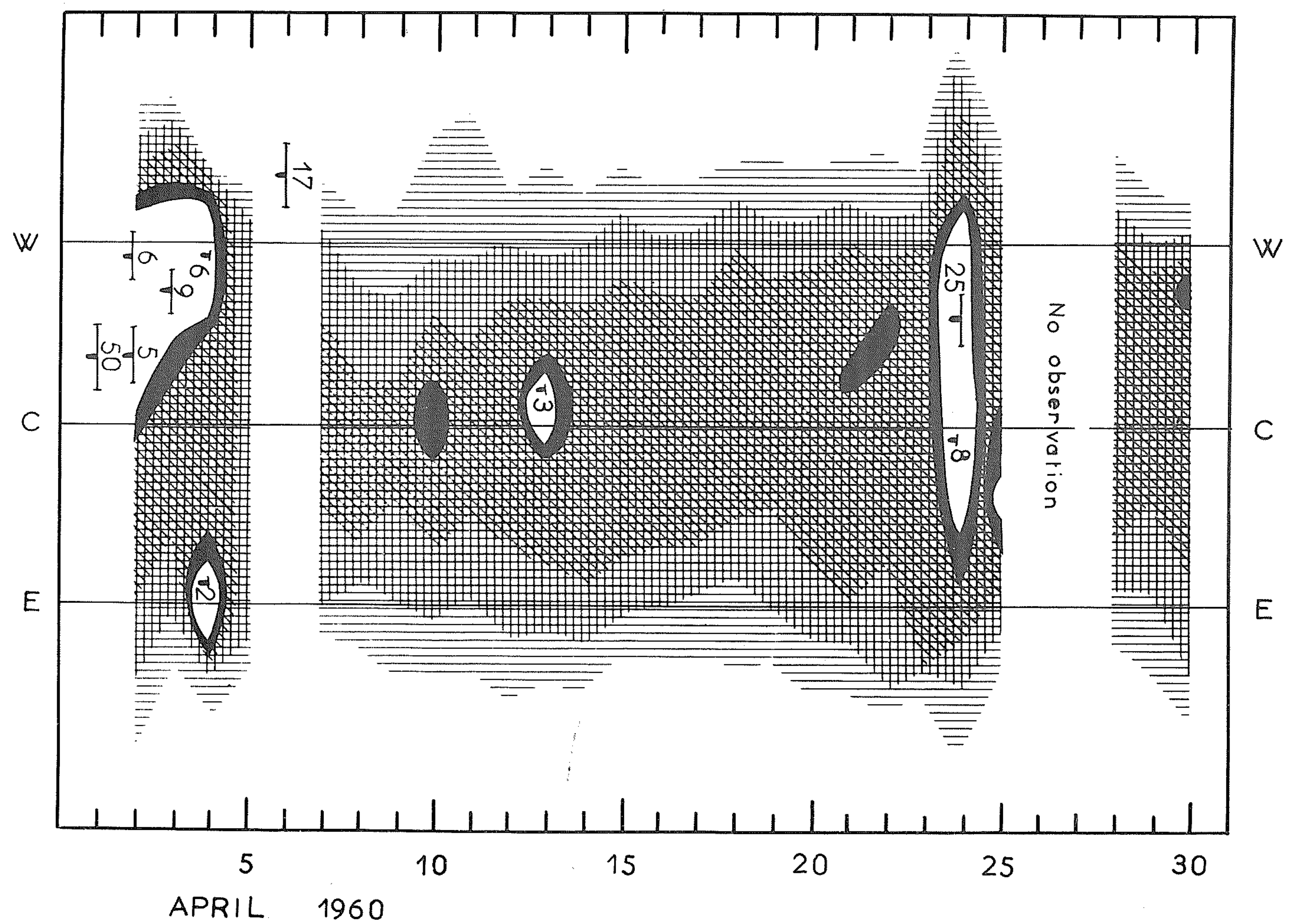
Ottawa **2800 Mc**

Apr. 1960	Type*	Start UT	Duration Hrs:Mins	Maximum Time UT	Maximum Peak Flux	Remarks
2	6 Complex f	1240	8	1244	32	
2	1 Simple 1	1620	4	1622	3	
2	2 Simple 2 f	2035	5	2037	8	
3	2 Simple 2	1155	5	1156.5	35	In sunrise osc.
	4 Post Increase		15		10	
3	3 Simple 3 A	1745	>5 15	2145	40	
	6 Complex f	2119	23	2122	35	
4	2 Simple 2	2132	10	2133	43	
5	2 Simple 2	1600	4	1601.3	48	
	4 Post Increase A		1 05		13	
	1 Simple 1	1609	1	1609.3	7	
	2 Simple 2	1622.5	6	1623.7	10	
5	6 Complex	1936	7	1940	17	
5	3 Simple 3	2205	20	2209	5	
8	1 Simple 1	1655	2	1656	7	
9	2 Simple 2	1217	3	1218	8	
9	2 Simple 2	1518.5	2.5	1519	18	
9	2 Simple 2	1645	2	1646	8	
12	1 Simple 1	2121	2	2121.3	7	
12	3 Simple 3	2238	30	2241	7	
16	2 Simple 2 f	1526.5	2	1526.8	48	
16	8 Group (3)	1858	41			
	2 Simple 2	1858	12	1900	12	
	2 Simple 2	1925	8	1927	12	
	1 Simple 1	1933	6	1935.5	4	
21	2 Simple 2	1808.7	1	1809	11	
22	3 Simple 3	1717	40	1719.5	5	
22	3 Simple 3 f	1845	1 05	1855	10	
23	3 Simple 3	1232	30	1233.5	6	
23	3 Simple 3 f A	1910	4 00	2053	12	
	2 Simple 2	2137	1.5	2137.7	9	
27	2 Simple 2	2006	6	2007.5	57	
30	1 Simple 1	1418	1	1418.6	6	

SOLAR RADIO EMISSION
INTERFEROMETRIC OBSERVATIONS

APRIL 1960

Nançay 169 Mc



SOLAR RADIO EMISSION

OUTSTANDING OCCURRENCES

APRIL 1960

BOULDER

167 MC

Apr. 1960	Type	Start UT	Time of Maximum UT	Duration Minutes	Intensity
1	6	1242 E		747 D	3
1	3	1704.0	1704.5	1.1	3
1	3	1839.8	1839.8	1.0	3
1	3	2114.3	2115.0	0.7	3
2	3	0016.0	0017.4	1.8	3
2	6	1241 E		750 D	3
2	8	1457.6	1459.2	14	3
2	8	1629.0	1636.0	8	3
2	8	2031.0	2032.1	7	3
2	8	2356.1	2357.8	7	3
3	6	1240 E		752 D	2
3	8	1558.0	1559.0	2.0	3
4	6	1240 E		205 D	2
4	2	1803	1803.8	2	2
4	3	1857.0	1857.0	0.3	2
4	3	1900.5	1900.5	0.5	2
4	3	1916.0	1916.2	1.0	2
4	3	1956.5	1956.5	0.2	2
4	3	2115.9	2115.9	0.1	2
4	8	0015.0	0017.9	4.0	3**
4	3	0055.4	0055.4	0.2	2**
5	3	1922.9	1922.9	0.1	2
5	3	1959.0	1959.0	0.9	2
5	3	2129.9	2129.9	0.3	2
5	3	2138.0	2138.0	0.5	2
6	3	1651.0	1651.0	0.1	2
6	3	1829.0	1829.0	0.1	1
6	3	1847.5	1847.5	0.2	1
6	3	1855.0	1855.0	0.3	1
6	8	1956.5	1958.3	5	1
6	3	2155.6	2155.6	0.1	1
7	3	1251.2	1251.2	0.2	2*
7	3	1755.8	1756.1	2.0	3
7	3	2102.0	2102.0	0.2	2
7	3	2152.5	2152.5	0.2	1
8	3	1248.5	1248.8	0.8	2*
8	3	1249.9	1249.9	0.1	3*
8	3	1809.2	1809.2	0.1	1
8	3	1837.9	1837.9	0.2	1
8	3	1844.0	1844.0	0.1	1
8	3	2005.0	2005.0	0.3	1
8	7	2018	2037	47	1
8	3	2130.0	2130.0	0.2	1
9	3	1351.0	1351.0	0.3	1
9	3	1451.3	1451.3	0.2	2
9	3	1518.5	1519.0	1.5	3
9	3	1844.5	1844.5	0.5	3
9	3	1850.5	1851.0	1.7	3
10	3	2022.6	2022.6	0.3	1
10	3	2024.8	2025.0	1.2	2
10	3	2158.9	2158.9	1.1	1
10	3	2204.3	2204.3	0.1	2
10	3	2211.9	2211.9	0.2	2
10	3	2216.0	2217.0	1.5	2
10	8	2323.0	2326.5	9	2
11	3	0000.5	0000.5	0.8	3
11	8	1336.5	1338.8	3.5	2
11	3	1349.3	1349.3	0.1	2
11	2	1430.0	1431.5	3.0	2
11	3	1836.0	1836.0	2.0	2
11	3	1854.5	1854.5	1.5	3
11	8	2022.0	2023.4	3.0	2
12	3	0110.6	0110.6	0.1	1*
13	3	1839.5	1839.5	0.1	1
15	3	1235.0	1235.0	0.2	1*
16	3	1938.2	1938.2	0.3	2
16	3	2355.6	2355.6	0.4	2
17	3	0006.6	0006.6	0.6	3
17	3	0008.0	0008.5	1.0	2
17	3	1613.2	1613.2	0.1	1
17	3	1622.0	1622.0	0.1	1
18	3	1237.0	1237.0	0.2	1*
18	3	1242.9	1242.9	0.1	2*
18	3	1349.5	1349.5	0.1	1
18	3	1447.8	1447.8	0.1	1
18	3	1546.0	1546.0	0.3	1
18	3	1652.2	1652.2	0.2	2
18	3	2012.3	2012.3	0.4	2
20	2	1303.2	1303.2	1.6	2*
20	3	1316.1	1316.8	1.0	2*
20	3	1616.5	1617.0	1.2	2
20	2	1900.0	1900.0	2.0	2
21	3	0033.5	0033.5	0.2	2**
21	3	0034.6	0034.6	0.1	1**
21	3	0040.5	0040.5	0.3	1**
21	6	1213 E		797 D	1
22	3	2017.0	2017.0	0.3	1
22	3	2141.6	2141.8	1.0	1
23	3	0025.0	0025.0	1.0	1
23	3	0033.5	0033.5	0.3	2**
23	3	0128.2	0128.2	0.2	2**
23	3	1402.3	1403.1	1.8	3
23	3	1448.5	1448.5	0.3	2
23	3	1524.2	1524.2	0.6	2
23	3	1637.0	1637.0	0.1	2
23	7	1758		454 D	2
23	3	2009.0	2009.0	1.0	3
24	6	1208	2327	805 D	3
25	3	1350.6	1350.6	0.1	2
25	3	1456.8	1456.8	0.1	1
25	3	1637.0	1637.0	0.3	2
25	2	1734	1735	7	2
25	3	1804.0	1805.0	1.5	2
26	3	1231.2	1231.2	0.1	2*
26	3	1236.8	1237.0	0.7	2*
26	3	1326.0	1326.0	0.2	1
26	3	1343.0	1343.0	0.3	1
26	3	1607.5	1608.2	1.4	1
26	3	1718.6	1718.6	0.2	1
26	3	1742.0	1742.0	0.1	2
27	3	0058.8	0058.8	0.5	2**
27	3	0121.6	0121.6	0.1	2**
27	3	1357.5	1357.5	0.2	1
27	3	1423.5	1423.5	0.2	1
27	3	1538.5	1538.5	0.3	2
27	3	1623.5	1623.5	0.4	2
27	3	1625.5	1625.5	0.2	2
27	3	1659.3	1659.3	0.3	2
27	3	1706.9	1706.9	0.4	2
27	3	1731.6	1731.9	0.5	2
27	3	1759.2	1759.2	0.1	2
27	3	1830.0	1830.0	0.1	2
28	9A	0115.9	0117.1	1.9	2**
28	9B	0117.8	0123.5	17	2**
28	3	2323.1	2323.1	0.2	2
28	3	2334.5	2334.5	0.3	3
28	3	2347.9	2347.9	0.2	2
29	3	1425.8	1425.8	0.1	2
29	3	1503.5	1503.5	0.2	1
29	3	1655.0	1655.0	0.1	1
29	3	1759.0	1759.0	0.2	2
29	7	2136		244 D	2
29	3	2151.0	2151.0	0.2	3
30	6	1241 E	1330	779 D	3

* On sunrise pattern
** On sunset pattern

Errata: In CRPL-F 188 Part B in the March 1960 table for Boulder 167 Mc outstanding events the event listed March 22 at 0047.4 should be March 23 at 0047.4 and the event listed March 26 at 0025.4 should be March 27 at 0025.4.

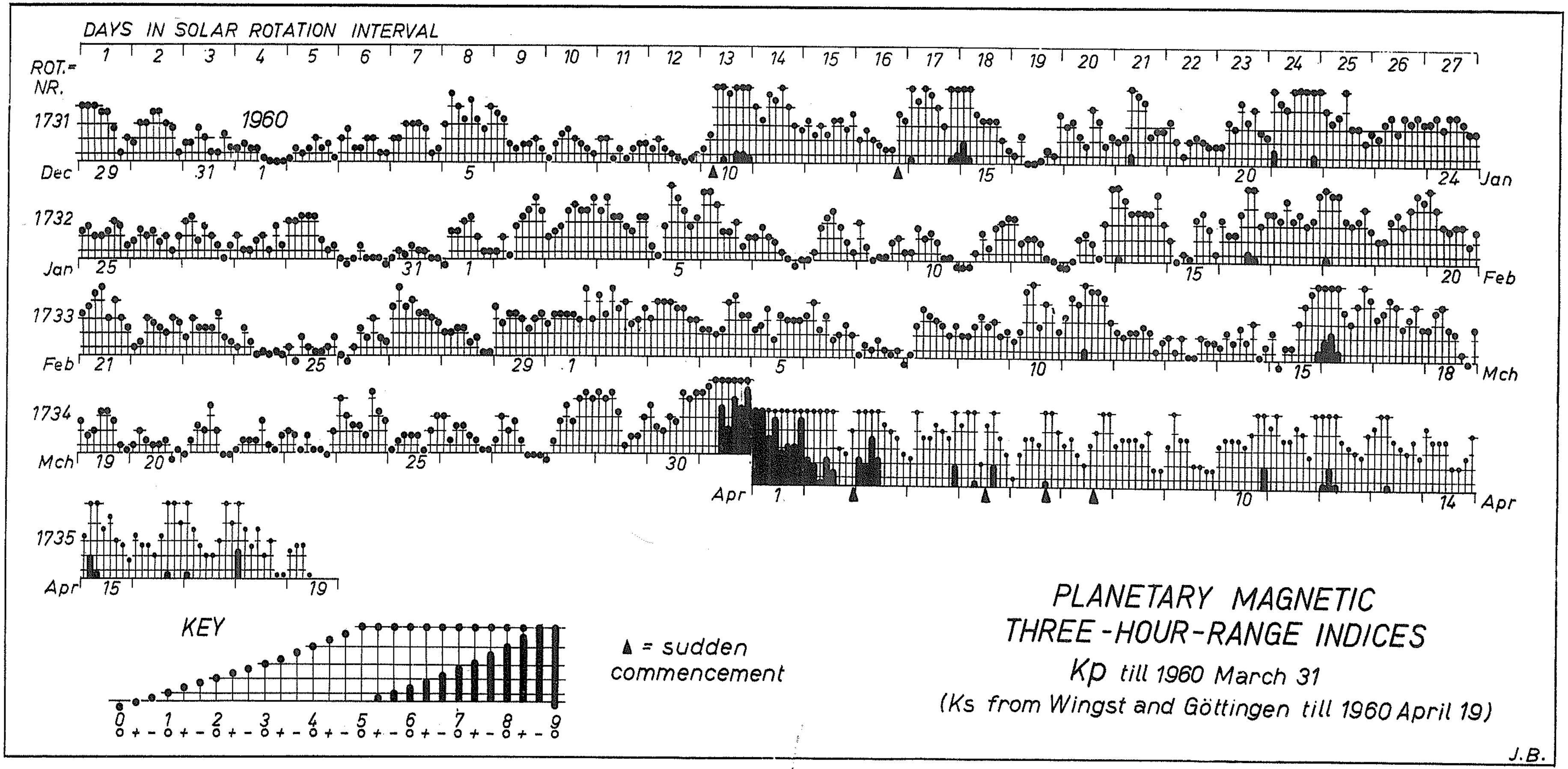
TIMES OF OBSERVATION

Apr. 1960	U.T.	Apr. 1960	U.T.
1	1242-0109	17	1218-0126
2	1241-1933	18	1217-0127
	1942-0111	19	1215-0127
3	1240-0112	20	1215-0130
4	1240-0113	21	1213-0130
5	1239-0115	22	1213-0130
6	1236-0115	23	1211-0132
7	1235-0115	24	1208-0133
8	1233-0117	25	1207-0134
9	1231-0118	26	1206-0135
10	1230-0119	27	1204-0139
11	1227-0120	28	1203-0139
12	1228-0121		I 1730-1925
	I 1742-0030	29	1203-1527
13	1225-0123		1535-1629
14	1223-1702		1635-1827
	1739-0123		1929-0140
15	1222-0124	30	1241-0140
16	1221-0125		

GEOMAGNETIC ACTIVITY INDICES

MARCH 1960

Mar. 1960	C	Values Kp Three hour Gr. interval 1 2 3 4	5 6 7 8	Sum	Ap	Final Selected Days
1	1.1	3- 3+ 3+ 3+	3+ 3o 5- 3o	27-	19	Five
2	1.1	4+ 3+ 5- 4-	4o 3- 3o 4-	29+	23	Quiet
3	1.1	3o 4o 4o 4o	4- 4- 3o 3o	28+	21	
4	1.1	2+ 2+ 2o 2+	4o 4+ 3+ 3+	24o	16	7
5	0.9	2+ 3- 4- 2-	3+ 3o 3o 3o	23-	14	13
						20
6	0.8	3+ 4o 2+ 3+	2- 2o 3- 2o	21+	13	22
7	0.1	1- 1+ 1o 2-	1o 1- 1o 0o	7+	4	23
8	0.8	1- 3- 4- 3+	3o 3- 2o 3-	21-	13	
9	0.7	2o 2o 3- 3+	3- 3o 2o 2+	20o	11	
10	1.1	2- 2+ 5- 5o	3- 4o 4- 2+	26+	22	
11	1.3	3+ 4+ 4o 6-	5- 5- 4+ 3o	34o	34	Five
12	0.3	2+ 2o 2+ 2+	3- 2+ 1o 2-	17-	8	Disturbed
13	0.1	2o 1o 2o 1-	1- 2o 2- 2-	12-	5	
14	0.4	1+ 2+ 2- 3-	2- 3o 1- 1+	15-	8	2
15	1.2	2+ 0o 1+ 1+	3o 4o 5- 6-	22+	21	3
						11
16	1.6	6+ 7- 6- 4-	3o 4o 5o 4+	39-	52	16
17	1.1	3+ 4- 4+ 4o	3- 3+ 4o 3-	28o	21	31
18	0.6	3- 4- 4o 3-	2+ 1o 0+ 3-	19+	12	
19	0.5	3- 2- 2o 3+	3+ 3- 1o 1-	17+	10	
20	0.0	1o 2o 1+ 1o	1o 1+ 0o 1-	8+	4	
21	0.4	0+ 1+ 2+ 2o	4- 2o 0+ 0+	12+	7	Ten
22	0.2	1- 1+ 1+ 1+	3- 1o 1- 2-	11-	5	Quiet
23	0.2	2o 2- 1- 2-	1- 1- 0+ 2o	10-	5	
24	0.9	4o 3o 2+ 2+	2- 4+ 3+ 3-	24-	16	7
25	0.3	1- 1+ 2- 2-	2- 1- 2o 3o	13-	6	13
						14
26	0.3	3o 1+ 2+ 2+	2- 1+ 1- 1-	13+	7	20
27	0.2	1+ 3o 2o 3-	1+ 0+ 0+ 0+	11+	6	21
28	1.0	0o 1+ 3- 4-	3- 4o 4+ 4o	23-	17	22
29	1.0	4+ 4o 4+ 3+	1o 2- 2- 3o	23+	18	23
30	1.1	4- 2+ 2o 3o	3- 4+ 4o 4+	26+	20	25
31	2.0	4+ 5- 5o 8-	7- 8o 8- 8+	52+	129	26
						27
Mean:	0.76			Mean:	18	



PLANETARY MAGNETIC
THREE-HOUR-RANGE INDICES
Kp till 1960 March 31
(Ks from Wingst and Göttingen till 1960 April 19)

CRPL RADIO PROPAGATION QUALITY FIGURES AND FORECASTS
NORTH ATLANTIC

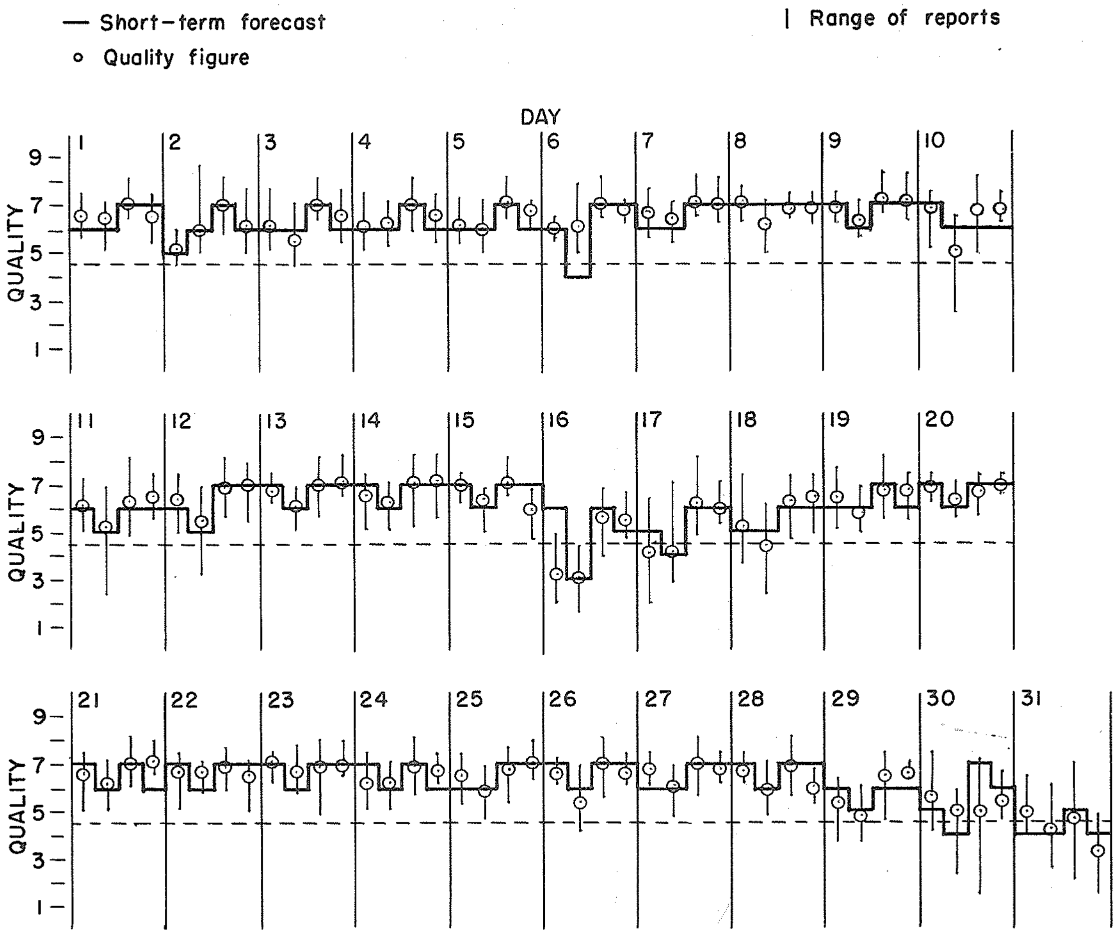
MARCH 1960

Mar. 1960	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		1-7 days Final	1-7 days Js	1-7 days SDW	1-7 days J	Half Day (1)	(2)
1	7-	6+	7o	7-	6	6	7	7	7-	7	7		7	3	3
2	5+	6o	7o	6+	5	6	7	6	6o	7	7		7	3	3
3	6+	6-	7o	7-	6	6	7	6	6+	6			6	(4)	3
4	6+	6+	7o	7-	6	6	7	6	7-	6			6	2	3
5	6+	6o	7o	7-	6	6	7	6	7-	7			7	3	3
6	6o	6+	7o	7-	6	4	7	7	7-	7			7	3	2
7	7-	6+	7o	7o	6	6	7	7	7-	7			7	1	1
8	7o	6+	7-	7o	7	7	7	7	7-	7			7	3	2
9	7-	6+	7+	7o	7	6	7	7	7-	7			7	2	3
10	7-	5o	7-	7-	7	6	6	6	6+	7			7	3	3
11	6o	5+	6+	7-	6	5	6	6	6o	7			7	3	(4)
12	6+	6-	7o	7o	6	5	7	7	6+	6			6	2	2
13	7-	6+	7o	7+	7	6	7	7	7-	6			6	1	1
14	7-	6+	7o	7+	7	6	7	7	7-	6			6	2	2
15	7o	6+	7o	6o	7	6	7	7	7-	5			5	1	3
16	3+	3o	6-	6-	6	3	6	5	(4o)	5			5	(5)	3
17	4o	4+	6+	6o	5	4	6	6	5-	5			5	(4)	3
18	5+	4+	6+	7-	5	5	6	6	5+	6			6	3	1
19	7-	6-	7-	7-	6	6	7	6	7-	6			6	2	2
20	7o	6+	7-	7o	7	6	7	7	7-	6			6	1	1
21	7-	6+	7o	7o	7	6	7	6	7-	7			7	1	2
22	7-	7-	7o	7-	7	6	7	7	7-	7			7	2	2
23	7o	7-	7o	7o	7	6	7	7	7o	7			7	2	1
24	6+	6+	7o	7-	7	6	7	6	7-	7			7	3	3
25	7-	6o	7-	7o	6	6	7	7	7-	7			7	1	2
26	7-	5+	7o	7-	7	6	7	7	6+	7			7	2	1
27	7-	6o	7o	7-	6	6	7	7	7-	7			7	2	1
28	7-	6o	7o	6o	7	6	7	7	7-	6			6	2	3
29	5+	5-	7-	7-	6	5	6	6	6-	6			6	(4)	2
30	6-	5o	5o	5+	5	4	7	6	5+	4		4	6	2	3
31	5o	4+	5-	3+	4	4	5	4	(4o)	4		4	4	(5)	(7)
Score: Quiet Periods				P	20	19	28	16		15			15		
				S	9	7	2	14		13			13		
				U	0	0	1	0		1			1		
				F	0	1	0	0		0			0		
Disturbed Periods				P	0	3	0	0		1			1		
				S	1	1	0	1		1			0		
				U	0	0	0	0		0			0		
				F	1	0	0	0		0			1		

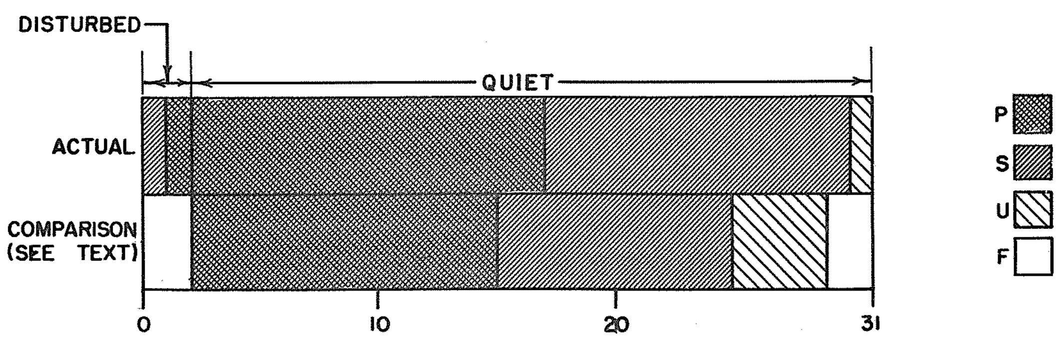
( ) represent disturbed values.

NORTH ATLANTIC

MARCH, 1960



OUTCOME OF ADVANCED FORECASTS FINAL ESTIMATE



CRPL RADIO PROPAGATION QUALITY FIGURES AND FORECASTS

NORTH PACIFIC

MARCH 1960

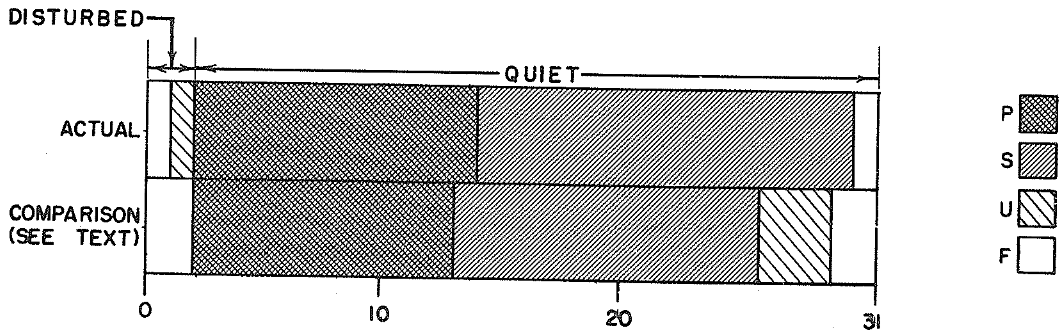
Mar. 1960	North Pacific 8-hourly quality figures		Short-term forecasts issued at		Whole day index	Advance forecasts (Jp reports) for whole day; issued in advance by:				Geomagnetic K_{Si}	
	0700 to 1900	1900 to 0700	0600	1800		1-7 days Final	1-7 days Jps	1-7 days SDW	1-7 days Jp	Half (1)	Day (2)
1	6	7	7	7	7	6			6	3	3
2	6	6	6	7	6	6			6	(4)	3
3	6	7	6	7	6	6			6	(4)	3
4	5	6	8	7	5	6			6	2	(4)
5	6	6	7	7	6	7			7	3	2
6	6	6	6	7	6	7			7	3	2
7	6	5	7	8	6	7			7	0	1
8	6	5	7	6	6	7			7	3	3
9	7	5	7	6	6	7			7	2	2
10	6	5	6	5	5	6			6	3	3
11	5	6	5	4	5	6			6	(4)	(4)
12	6	5	6	6	6	7			7	2	2
13	5	5	6	6	6	7			7	1	1
14	6	6	6	6	6	6			6	2	1
15	7	5	7	5	6	6			6	1	3
16	4	5	5	5	(4)	6			6	(7)	(4)
17	6	6	6	6	5	5			5	(4)	3
18	7	6	6	6	6	5			5	(4)	1
19	5	6	6	6	6	6			6	2	3
20	5	5	6	6	6	6			6	1	1
21	6	6	6	6	6	6			6	1	2
22	6	7	6	6	6	7			7	1	2
23	6	5	6	6	7	7			7	2	1
24	6	6	7	6	6	7			7	2	2
25	7	7	6	7	7	7			7	1	2
26	6	7	7	7	7	6			6	2	1
27	6	7	7	7	7	6			6	2	0
28	6	6	7	6	6	6			6	2	3
29	6	6	6	6	6	6			6	(4)	2
30	8	6	6	6	7	4		4	6	2	2
31	2	2	4	3	(2)	4	4	4	4	(6)	(8)
Score:	Quiet Periods		P 14	17		12					
			S 13	11		16					
			U 1	0		0					
			F 1	2		1					
	Disturbed Periods		P 0	0		0					
			S 1	1		0					
			U 1	0		1					
			F 0	0		1					

( ) represent disturbed values.

NORTH PACIFIC

MARCH 1960

OUTCOME OF ADVANCED FORECASTS FINAL ESTIMATE



ALERT PERIODS AND SPECIAL WORLD INTERVALS

INTERNATIONAL WORLD DAY SERVICE

APRIL 1960

Issued Day/Time UT Apr. 1960	Advance Geophysical Alert	No.	Worldwide Geophysical Alert	Special World Interval
1/1600		54	Magnetic Storm Aurora Probable 31/08XXZ	Continue Special World Interval
2/1600		55		Continue Special World Interval
3/1600		56		Finish Special World Interval
12/1600		57	Magnetic Storm 10/22XXZ	
24/0600	Ft. Belvoir Magnetic Storm Aurora Probable 23/21XXZ			
24/1600		58	Magnetic Storm 23/21XXZ	
27/2040	Ft. Belvoir Magnetic Storm 27/2000Z			
28/1600		59	Magnetic Storm Aurora Probable 27/2000Z	Start Special World Interval
29/1600		60		Continue Special World Interval
30/1600		61		Continue Special World Interval

COMMERCE - STANDARDS - BOULDER