CRPL-F 177 PART B

FOR OFFICIAL USE

PART B

SOLAR - GEOPHYSICAL DATA

ISSUED
MAY 1959

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

CRPL-F 177
PART B

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SOLAR - GEOPHYSICAL DATA

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 and Mr. Dale B. Bucknam.

I DAILY SOLAR INDICES

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

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

Final values of R_Z appear in the IAU Quarterly Bulletin on Solar Activity, the Journal of Geophysical Research, 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 $\bar{R}$ of 3.4 was reached.

II SOLAR CENTERS OF ACTIVITY

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

The table gives the heliographic coordinates of each center (taken as the calcium plage unless two or more significantly and individually active sunspot groups are included in an extended plage) in terms of the Greenwich date of passage of the sun's central meridian (CMP) and the latitude; the serial number of the plage as assigned by McMath-Hulbert Observatory; the serial number of the center in the previous solar rotation, if it is a persisting region; particulars of the plage at CMP: area, central intensity; a summary of the development of the plage during the current transit of the disk, where b = born on disk, 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 are summarized solar coronal emission intensity indices for the green (Fe XIV at λ5303) and red (Fe X at λ6374) 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 $\lambda 5303$.

R_6 = same for $\lambda 6374$.

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

R_1 = same for $\lambda 6374$.

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

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

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

where N is the number of indices entering the summation.

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

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 Hα 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 Hα expressed in Angstroms, and maximum intensity of Hα 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 ionospheric effects, including particulars, appears in these reports after the lapse of a month (see below). All times are Universal Time (UT or GCT). Subflares (importance 1-) are listed by date, time of beginning and their heliographic coordinates. A graph presents intervals for which there were no patrols for flare observations from the observatories whose complete data are published in the table.

Ionospheric Effects -- SID, 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., and Anchorage, Alaska (CRPL Stations: PR, BE, 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 included 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); and the Royal Observatory Edinburgh (ED). All of these except the Royal Observatory Edinburgh also report solar noise bursts observed at 18 Mc. The SEA reports come from the following: Department of Terrestrial Magnetism, Carnegie Institution of Washington, Station at Derwood, Md. (DE); Dunsink Observatory, Ireland (DU); Royal Observatory Edinburgh (ED); 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); 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) and Manhattan, Kansas (A8).

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

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

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

9530 Mc and 3200 Mc Observations

Data on solar radio emission made at the Naval Research Laboratory, Washington, D.C., by the Radio Astronomy Branch of the Atmosphere and Astrophysics Division on 9530 Mc (3.15 cm) and 3200 Mc (9.4 cm) are presented. Data received by 4-ft. and 6-ft. parabolic antennas installed on a common tracking mount--4-ft. for 3.15 cm and 6-ft. for 9.4 cm. Daily values of the solar flux are listed as recorded in watts/M^2/cycle/second bandwidth (X 10^{-22}) in two polarizations. Outstanding occurrences are measured from above the daily flux level and are given in a separate table in terms of the types developed by A. E. Covington for his recordings at 2800 Mc. In the section headed 2800 Mc Observations these types are described.

2800 Mc Observations

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

Simple Burst

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

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

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

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

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

5 - Absorption following burst (negative post).

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

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

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

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

Great Burst

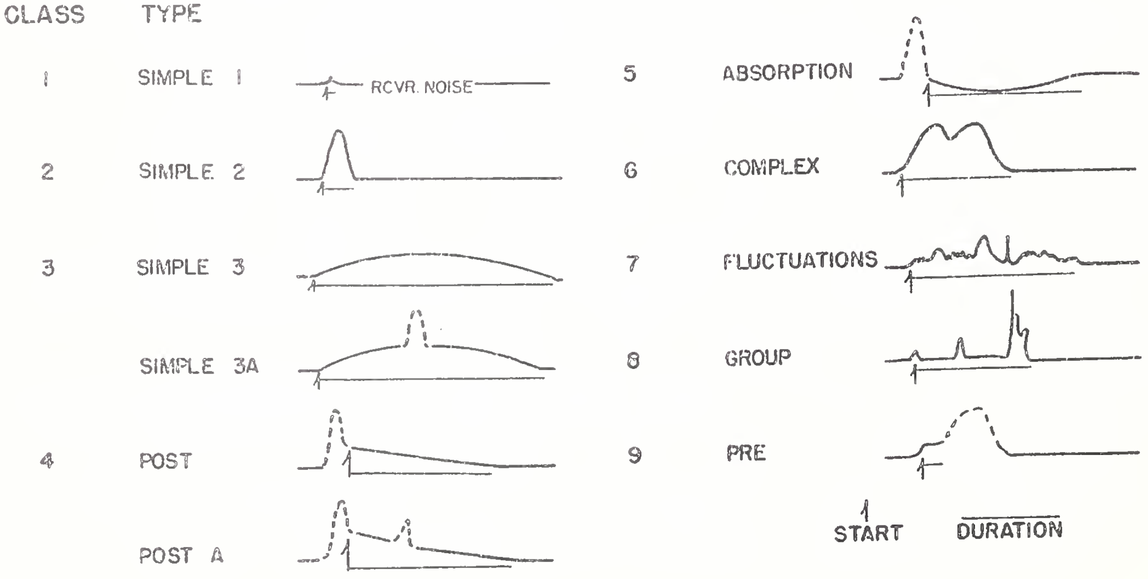
Infrequently occurring bursts of great intensity, often of complicated structure.

Letter "A"

Indicates that this event has another event superimposed upon it.

Letter "f"

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



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.

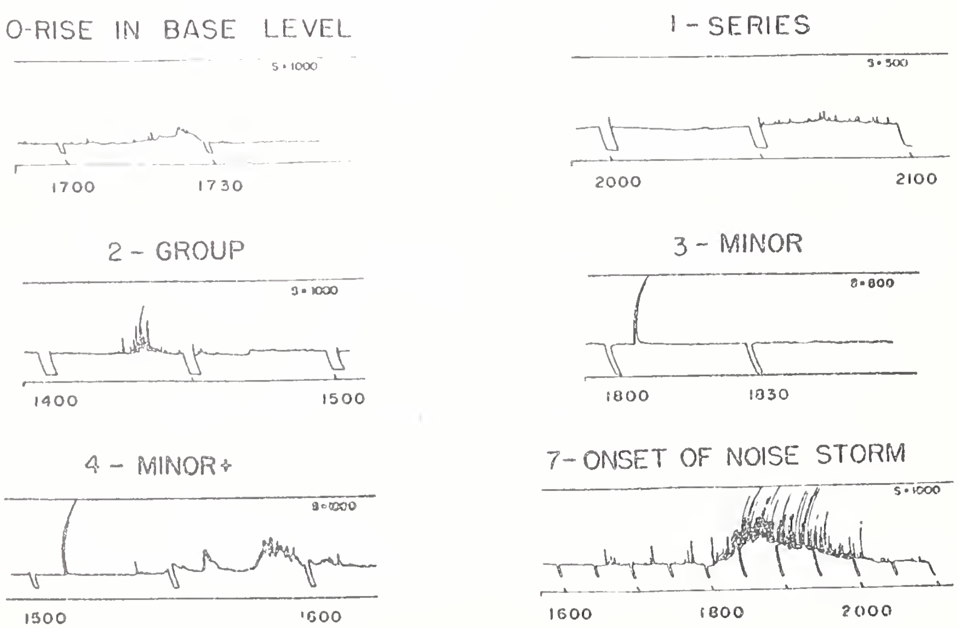
4 - Minor burst and second part -- A double rise in flux in which the early rise is a minor burst.

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.

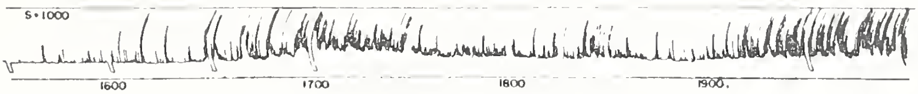
7 - Noise storm begins -- The onset of a noise storm occurs at some time during the observing period.

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.

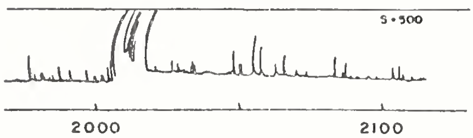
9A, 9B, or 9 -- Major burst and second part or large event without distinct first and second parts -- If there is a double rise in flux, the first part, a major burst, is listed as 9A and the second part as 9B. The second part may consist of a rise in base level, a group or series of bursts, a noise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



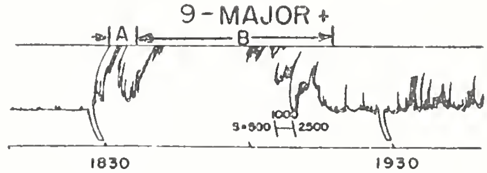
6-NOISE STORM IN PROGRESS



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.

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 compiles C and selected days. The Chairman of the Committee computes the planetary and equivalent amplitude indices. The same data are also published quarterly in the Journal of Geophysical Research along with data on sudden commencements (sc) and solar flare effects (sfe).

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

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

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

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

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

VI RADIO PROPAGATION QUALITY INDICES

One can take as the definition of a radio propagation quality index: the measure of the efficiency of a medium-powered radio circuit operated under ideal conditions in all respects, except for the variable effect of the ionosphere on the propagation of the transmittal 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.

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

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

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

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, analagous 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:

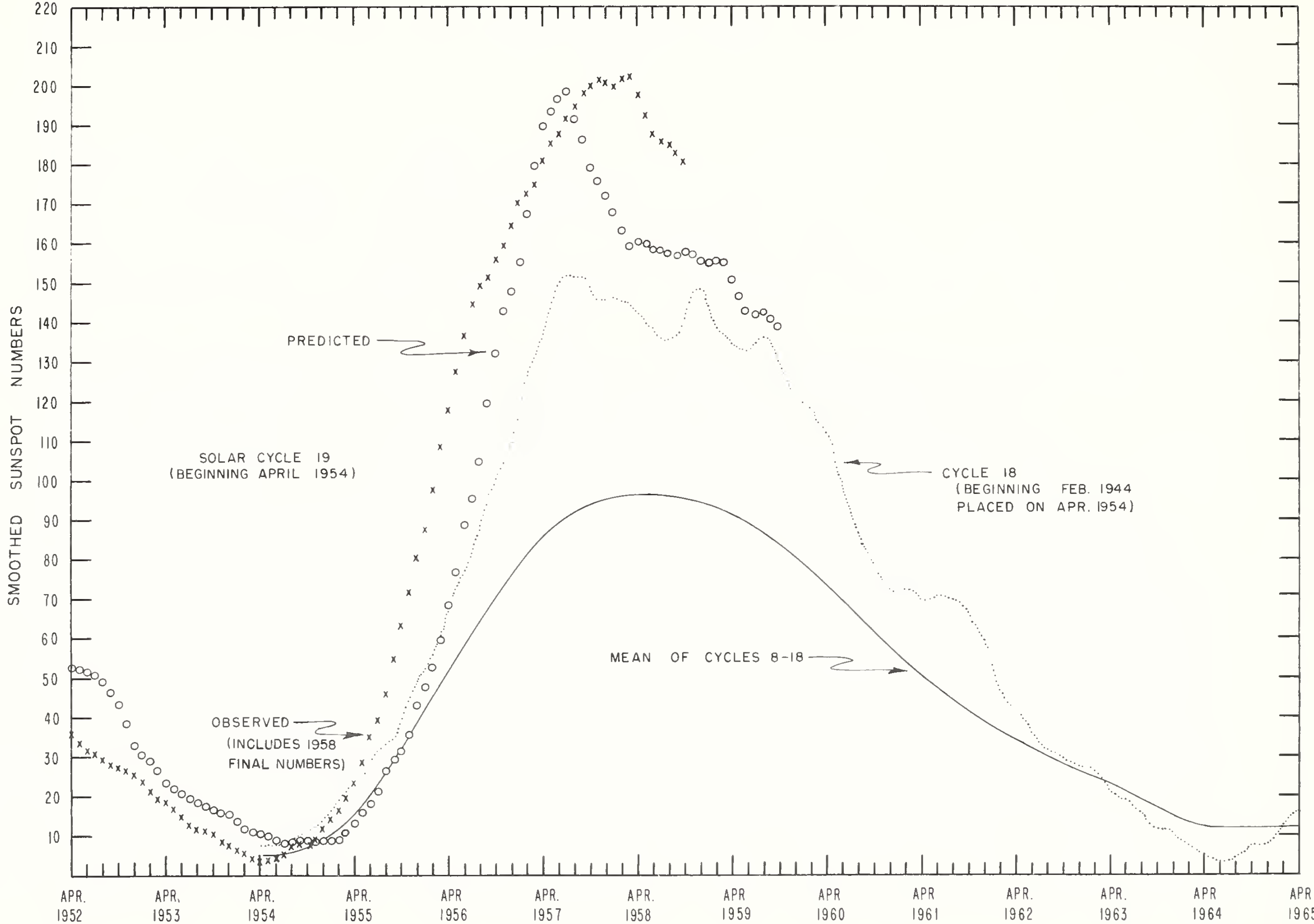
1 - Solar Flare Alert -- this warning is issued whenever a solar flare of median importance 2 plus or greater has been reported. There will be only one alert issued per flare and only one a day at most.
2 - Magnetic Storm Alert -- this warning is issued whenever a significant magnetic storm, K figure 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. 1959	American Relative Sunspot Numbers $R_{A'}$
1	143
2	106
3	143
4	150
5	104
6	120
7	127
8	142
9	150
10	134
11	114
12	140
13	158
14	150
15	176
16	175
17	177
18	194
19	171
20	195
21	182
22	170
23	144
24	140
25	158
26	164
27	169
28	175
29	233
30	207
31	195
Mean:	158.3

Apr. 1959	Zürich Provisional Relative Sunspot Numbers R_Z	Daily Values Solar Flux at 2800 Mc, Ottawa, Canada Flux
1	249	256
2	242	236
3	174	216
4	159	215
5	124	196
6	108	196
7	101	217
8	132	215
9	144	215
10	177	220
11	197	232
12	189	224
13	178	209
14	193	198
15	170	189
16	142	188
17	109	190
18	119	181
19	108	196
20	132	203
21	128	203
22	138	199
23	186	213
24	186	213
25	203	211
26	184	218
27	165	212
28	165	216
29	160	211
30	115	220
Mean:	159.2	210.3



PREDICTED AND OBSERVED SUNSPOT NUMBERS

COMMERCE - STANDARDS - BOULDER

CALCIUM PLAGE AND SUNSPOT REGIONS

APRIL 1959

CMP Apr. 1959	Lat	McMath Plage Number	Return of Region	Calcium Plage Data: CMP Values Area	Int.	History	Age	Sunspot Data: CMP Values Area	Count	History
01.2	N17	5071	5035	6000	3.5	ℓ / ℓ	5	1670	15	ℓ — ℓ
01.7	N36	5073	New	300	2	ℓ \ d	1			
01.8	S16	5072	5036	300	2	ℓ \ d	2			
02.4	S13	5075	5039	2100	3	ℓ — ℓ	2	50	1	ℓ — ℓ
04.3	N15	5076	New	1000	3	ℓ — ℓ	1	20	1	ℓ — ℓ
06.1	N13	5080	New	2000	2.5	ℓ / ℓ	1	530	10	ℓ Λ ℓ
07.1	N27	5082	5043	900	1.5	b Λ d	5			
07.5	S20	5084	5042	300	1.5	ℓ /‾ ℓ	2			
07.8	S06	5081	New	200	1.5	ℓ \ d	1			
08.2	N09	5087	5045	(300)	(2)	ℓ Λ d	2			
10.0	S22	5088	New	2200	3.4	ℓ — ℓ	1	440	17	ℓ — ℓ
10.5	N21	5085	*	4500	3	ℓ — ℓ	2			
10.6	N11	5083	5048	2900	2.5	ℓ — ℓ	6	480	26	ℓ — ℓ
12.8	S02	5092	New	1500	2.5	ℓ / ℓ	1	(210)	(3)	ℓ — ℓ
13.1	N09	5090	5052	2500	3	ℓ — ℓ	4	280	14	ℓ \ d
13.2	N25	5096	New	1300	2	b Λ d	1	20	1	b Λ d
13.5	S17	5089	5053	3700	3.5	ℓ — ℓ	8	850	13	ℓ — ℓ
15.3	N22	5093	5054	6500	3.5	ℓ — ℓ	2	630	13	ℓ \ ℓ
15.5	S18	5094	**	1700	2	ℓ — ℓ	0,4	150	2	ℓ — ℓ
16.4	S01	5099	New	500	3	b /‾ ℓ	1	70	6	b Λ d
17.2	N17	5095	***	3700	2.5	ℓ — ℓ	5	470	4	ℓ — ℓ
18.8	N21	5100	New	700	2.5	ℓ / ℓ	1	(90)	(13)	b / ℓ
19.0	N29	5097	New	700	2	ℓ \ d	1			
20.3	N19	5098	5060	700	2	ℓ / ℓ	3	(150)	(2)	b / ℓ
20.2	N07	5106	New	400	3	b / ℓ	1	150	4	b / ℓ
21.6	S13	5101	New	200	2	ℓ ‾\ d	1	(20)	(1)	ℓ \ d
23.3	S09	5103	5063	1300	2.5	ℓ — ℓ	2	330	5	b / ℓ
23.5	N26	5102	5061	5000	2.5	ℓ — ℓ	5	(210)	(6)	ℓ — ℓ
24.0	N03	5104	5077	1900	2.5	ℓ \ ℓ	2	(160)	(3)	ℓ ‾\ d
24.6	N18	5105	****	7500	3	ℓ / ℓ	2,1	340	3	ℓ — ℓ
25.8	S16	5127	New	(500)	(2)	b /‾ ℓ	1			
26.0	S04	5109	5067	500	2	ℓ \ ℓ	3			
26.2	N11	5108	5066	1300	2	ℓ — ℓ	2	200	2	ℓ — ℓ
26.4	N23	5110	5068	1000	2.5	ℓ / ℓ	4	120	14	b /‾ ℓ
27.5	N08	5111	5071	2000	3	ℓ / ℓ	6	50	1	b Λ d
27.7	S14	5114	New	300	2	ℓ ‾Λ d	1			
27.9	N21	5116	5071	1500	2	ℓ — ℓ	6	(50)	(1)	ℓ \ d
28.8	N11	5117	New	2500	2.5	ℓ — ℓ	1	310	1	ℓ — ℓ
28.8	N28	5118	New	800	2.5	b Λ d	1			
28.9	S19	5115	5072	(600)	(2)	ℓ d	3			
29.0	N28	5119	5071	800	2	ℓ V ℓ	6			
29.9	N15	5120	New	2000	3.5	ℓ — ℓ	1	590	13	ℓ — ℓ
30.1	N30	5123	New	2000	3	ℓ — ℓ	1	140	5	ℓ ‾\ d

COMMERCE - STANDARDS - BOULDER

*5046,5047
**New and part of 5055
***5058,5059
****5070 and New

CORONAL LINE EMISSION INDICES

APRIL 1959

CMP April 1959	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	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
3	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
4	x	x	x	x	x	x	x	x	58a	70a	x	x	106a	209a	x	x
5	x	x	x	x	x	x	x	x	72	91	x	x	97	144	x	x
6	200a	265a	x	x	x	x	x	x	72	124	11	12	115	180	33	72
7	x	x	x	x	x	x	x	x	64	100	22	30	87	122	32	54
8	x	x	x	x	x	x	x	x	59	108	36	63	87	124	29	42
9	154	175	x	x	105	138	x	x	x	x	x	x	x	x	x	x
10	144	198	x	x	78	101	x	x	x	x	x	x	x	x	x	x
11	92	151	x	x	77	87	x	x	x	x	x	x	x	x	x	x
12	143	229	27	36	131	180	33	84	111	130	23	54	139	212	53	72
13	128a	187a	x	x	131a	217a	x	x	127	176	24	60	150	196	49	114
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	105	132	31	54	163	192	27	48
16	x	x	x	x	x	x	x	x	55	60	22	42	124	172	36	54
17	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
18	113a	154a	x	x	45a	51a	x	x	x	x	x	x	x	x	x	x
19	99	143	x	x	45	50	x	x	x	x	x	x	x	x	x	x
20	121	172	38	72	32	36	12	21	x	x	x	x	x	x	x	x
21	128	188	34	60	40	56	13	27	49	98	15	36	123	188	79	56
22	146	228	45	96	43	50	19	30	x	x	x	x	x	x	x	x
23	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
24	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
25	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
26	130	192	46	90	68	163	15	35	32	34	8	10	88	106	39	54
27	157	172	45	66	65	84	5	6	x	x	x	x	x	x	x	x
28	x*	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
29	200	273	41	60	101	180	9	12	x	x	x	x	x	x	x	x
30	117	144	48	78	59	88	11	15	x	x	x	x	x	x	x	x

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

SOLAR FLARES

APRIL 1959

OBSERVATORY	DATE APR 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
NIZAMIAH	01	0455 E	0503	0457	N28	W16	5068	8 D	1+	1	0457		3.07	2.00		Slow S-SWF
MITAKA	01	0502 E	0525	0511	N26	W20	5068	23 D	2	1	0506	6.43	8.17	3.13	176	
ONDREJOV	01	1147 E	1151		N23	W24	5068	4 D	1	3	1148			2.20		S-SWF
WENDEL	01	1625 E	1657 D		N18	E02	5071	32 D	1			3.00				
SAC PEAK	01	1722	1827	1737	N15	W08	5071	65	1	2			4.50		15	
MCMATH	01	1737 E	1810 D		N14	W07	5071	33 D	1	2	1737		2.40			
SAC PEAK	01	2130	2207	2142	N13	W14	5071	37	1	2			3.95		16	
MITAKA	02	0312 E	0330	0314	N27	W18	5068	18 D	1	1	0315	.50	.64	1.51	91	
MITAKA	02	0312 E	0400	0320	N19	W15	5071	48 D	1	1	0315	1.01	1.19	2.71	134	
MITAKA	02	0558	0618	0510	N11	W16	5071	20	1	1	0558	1.01	1.09	2.58	128	
CAPRI-G	02	0735 E	0742 D		N15	W19	5071	7 D	1	2	0737		2.00			
ONDREJOV	02	0742 E	0749		N12	W25	5071	7 D	1	3	0745			2.80		
CAPRI-G	02	0809 E	0827 D		N03	W23	5079	18 D	1	2			2.00			
ONDREJOV	02	0815	0823	0818	N02	W28	5079	8	1	3	0818			3.30		
CAPRI-S	02	0815 E	0827 D		N00	W25	5079	12 D	1	2	0817	2.50	2.80			
ONDREJOV	02	0848	0851	0851	N25	W28	5068	3	1	3	0851			3.00		
WENDEL	02	0915	0933	0919	N03	W27	5079	18	1			4.00				
WENDEL	02	1316 E	1342 D		N16	W23	5071	26 D	1			3.00				
WENDEL	02	1556	1620 D	1601	N13	E23	5076	24 D	1+			5.00				
CAPRI-G	03	0832 E	0852 D		N16	W36	5071	20 D	1	3	0834		3.00			
ONDREJOV	03	0834	0853	0837	N13	W39	5071	19	1	3	0837			2.60		
CAPRI-S	03	0836	0855 D		N14	W36	5071	19 D	1	3	0838	2.00	3.00			
ARCETRI	03	0954 E	1000 D		N12	E38	5080	6 D	1	3	0954	2.50	3.50			
ONDREJOV	03	1241	1319	1255	N12	W35	5071	38	1+	3	1255			2.90		
WENDEL	03	1243	1318	1249	N14	W34	5071	35	2			10.00				
STOCKHOLM	03	1244 E	1307		N16	W33	5071	23 D	1	3	1258	4.50	5.80			
CAPRI-S	03	1244 E	1316 D		N15	W31	5071	32 D	2	3	1248	6.00	6.90			
NERA	03	1245	1258		N14	W32	5071	13	2							
WENDEL	03	1246	1320		N18	W20	5071	34	1+			7.00				
CAPRI-G	03	1255 E	1300 D		N16	W29	5071	5 D	2	3	1258		8.00			
HAWAII	03	2210	2240	2216	N10	W38	5071	30	2	3	2216	4.70	6.20			S-SWF
CAPRI-G	04	0645 E	0715 D		N15	W45	5071	30 D	1	3			3.00			
CAPRI-S	04	0646	0934		N14	W44	5071	48	3	3	0806	12.00	18.60			
WENDEL	04	0739	0855 D	0800	N14	W46	5071	76 D	2+			12.00				
WENDEL	04	0739	0859 D	0754	N14	W38	5071	81 D	2			10.00				
CAPRI-G	04	0742 E	0945		N15	W45	5071	123 D	2	3	0747		9.00			Slow S-SWF
KANZELHOHE	04	0750	0825		N14	W54	5071	35	2							
ARCETRI	04	0755 E	0930 D		N14	W43	5071	95 D	3	4	0810	10.40	16.20			
ATHENS	04	0757 E	0935		N13	W44	5071	38	2							
ONDREJOV	04	0810 E	0956		N14	W44	5071	106 D	2	2	0818			3.30		
ARCETRI	04	0815 E	0914 D		N13	E90	5083	59 D	1	3						
WENDEL	04	0824	0857 D	0832	N18	W59	5068	93 D	2			11.00				
ONDREJOV	04	0828	0850		N20	W62	5068	22	1+	2	0834			3.70		
CAPRI-S	04	0828 E	0852 D		N20	W60	5068	24 D	2	3	0837	3.50	8.00			
ARCETRI	04	0828 E	0855 D		N19	W62	5068	27 D	2	4	0830	3.30	6.80			
CAPRI-G	04	0835 E	0850 D		N20	W58	5068	15 D	1	3	0836		4.00			
SCHAUINS	04	0848	0905		N18	W42	5071	17	2							
WENDEL	04	0905 E	0925 D		N11	W48	5071	25 D	1			4.00				
UCCLE	04	0917 E	1000 D		N15	W47	5071	43 D	□	4						
UCCLE	04	0917 E	1030 D		N14	E90	5083	73 D	1	4						

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↑ARCETRI	04	0953 E	1006 D		N13	E90	5083	13 D	1	3	0953	.80				
WENDEL	04	1158	1216	1205	N13	W51	5071	18	1+			6.00				
CAPRI-G	04	1158 E	1230 D		N14	W46	5071	32 D	1	3	1208		4.00			
ONDREJOV	04	1159 E	1217		N15	W50	5071	18 D	1	2	1201			4.00		
CAPRI-G	04	1258 E	1335 D		N15	W01	5076	37 D	1	3	1259		4.00			
WENDEL	04	1300	1341 D	1308	N12	W01	5076	41 D	1+			6.00				
CAPRI-S	04	1302 E	1329 D		N16	E02	5076	27 D	1	3	1305	2.50	2.60			
CAPRI-G	04	1530 E	1605 D		N12	E26	5080	35 D	1	2	1535		3.00			
HAWAII	04	2300	2324	2302	N15	E19	5080	24	1	2	2302	3.70	4.20			
CAPRI-G	05	0710 E	0715 D		N13	E14	5080	5 D	1	3	0712		3.00			
CAPRI-G	05	0838 E	0855		N12	W58	5071	17 D	1	3	0840		3.00			
WENDEL	05	0927 E	0947		N11	W55	5071	20 D	1+			5.00				
CAPRI-G	05	0935 E	1025 D		N12	W58	5071	50 D	1	3	0937		3.00			
WENDEL	05	1005 E	1026 D		N17	W62	5071	21 D	1+			6.00				
WENDEL	05	1142	1156 D		N13	W63	5071	14 D	1			4.00				
CAPRI-G	05	1145 E	1202 D		N13	W60	5071	17 D	1	3	1145		3.00			
CAPRI-S	05	1552	1614 D		N14	W58	5071	22 D	1	3	1605	1.00	2.30			
WENDEL	05	1630 E	1637 D		N15	W65	5071	7 D	1			3.00				
HAWAII	05	2316	0102	2326	N16	W69	5071	46	3+	3	2326	32.20	101.90			S-SWF
SYDNEY	05	2320 E	0045		N15	W75	5071	85 D	3							
MITAKA	06	0007 E	0047 D	0010	N15	W64	5071	40 D	3	2	0012	12.10	28.90	1.88	169	
MITAKA	06	0044	0051	0045	N20	W65	5071	7	1	2	0048	1.51	3.62	1.45	115	
ARCETRI	06	0810 E	0813 D		N12	E68	5083	3 D	1	2						
STOCKHOLM	06	1045	1107		N17	W05	5080	22	1	2	1052	2.00	2.00			
WENDEL	06	1047 E	1107 D		N18	W05	5080	20 D	1+			6.00				
WENDEL	06	1240	1310		S23	E46	5088	30	1			3.00				
WENDEL	06	1240	1315		N12	W75	5071	35	2			12.00				
MCMATH	06	1241 E	1252		N16	W80	5071	11 D	1	1	1242		4.50			
CAPRI-G	06	1255 E	1325 D		N15	W76	5071	30 D	1	2	1300		4.00			
CAPRI-G	06	1255 E	1345 D		S21	E41	5088	50 D	1	2	1300		3.00			
CAPRI-G	06	1500 E	1535 D		N12	W03	5080	35 D	1	2	1505		4.00			
NIZAMIAH	07	0404	0419	0408	N24	E49	5085	15	1	2	0408		3.20	1.70		S-SWF
CAPRI-G	07	1158 E	1205 D		N24	E47	5085	7 D	1	2	1201		3.00			
CAPRI-G	07	1445 E	1535		N10	E80	5090	50 D	2	3	1450		7.00			
CAPRI-G	07	1445 E	1547		S16	E80	5089	62 D	1	3	1448		5.00			
CAPRI-G	07	1445 E	1555		N14	E31	5083	70 D	1	3	1448		4.00			
CAPRI-G	07	1445 E	1610 D		N15	E48	5083	85 D	2	3	1450		9.00			G-SWF
UCCLE	07	1500 E	1515		N10	E27	5083	15 D	1+	4						
CAPRI-G	07	1528	1540		N23	E47	5085	12	1	3	1532		3.00			
HAWAII	07	1814	1828 D	1818	S15	E90	5089	14 D	1+	3	1818	1.10				
WENDEL	08	0705	0729 D	0713	N12	E31	5083	24 D	1			4.00				
CAPRI-G	08	0903 E	0947	0917	N25	E80	5093	44 D	2	3	0917		9.00			
ARCETRI	08	0905 E			N30	E90	5093		1	3	0905	.40				
CAPRI-G	08	0905	0907 D		N18	W32	5080	2 D	1	3	0906		2.00			
WENDEL	08	0906 E	0917 D		N17	W30	5080	11 D	1+			5.00				
WENDEL	08	0916	0959	0925	N25	E76	5093	43	3			19.00				
R O HERST	08	0927 E	0937	0927 U	N22	E90	5093	10 D	1	2						S-SWF
ARCETRI	08	0930 E	0938 D		N29	E90	5093	8 D	1+	3	0930	2.30				
CAPRI-G	08	1052 E	1110		S15	E75	5089	18 D	1	3	1102		3.00			

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WENDEL	08	1316	1331 D	1323	N11	W30	5080	15 D	1			3.00				
WENDEL	08	1422	1514 D		N09	E72	5090	52 D	1+			8.00				
CAPRI-G	08	1430 E	1502 D		N10	E75	5090	32 D	1	3	1432		5.00			S-SWF
SAC PEAK	08	1430	1517	1447	N08	E70	5090	47	1	2			3.65		18	
CAPRI-S	08	1432 E	1513 D		N08	E71	5090	46 D	2	3	1435	3.00	8.40			
CAPRI-G	08	1445	1515 D		N21	E80	5093	30 D	1	3	1450		4.00			
WENDEL	08	1447 E	1502 D		N20	E73	5093	15 D	1			4.00				
WENDEL	08	1549 E	1623 D		N25	E35	5085	34 D	1+			8.00				
CAPRI-G	08	1550 E	1600		N23	E35	5085	10 D	1	2	1550		3.00			
NIZAMIAH	09	0324	0337	0329	N16	W60	5080	13	1	2	0329		2.71	1.70		
STOCKHOLM	09	1325 E	1340		N09	E13	5083	15 D	1	2	1330	2.00	2.20			
SAC PEAK	09	1512	1552	1515	N11	E12	5083	40	1	2			2.40		14	
SAC PEAK	09	1645	1710	1650	N23	E65	5093	25	2	2			5.95		18	Slow S-SWF
UCCLE	09	1655 E			N26	E75	5093		1+	2						
SAC PEAK	09	1900	1907	1902	N12	E10	5083	2	1	2			2.15		14	
MITAKA	10	0155 E	0203 D		N16	W73	5080	8 D	1	1	0155	.60	1.92	3.82		
MITAKA	10	0244 E	0257 D		N30	E62	5093	13 D	1	1	0253	.80	2.16	1.98	159	
MITAKA	10	0325	0332 D	0327	N16	W74	5080	7 D	1+	1	0328	2.41	7.71	2.09	140	
WENDEL	10	0623 E	0711 D		N16	W72	5080	48 D	1+			6.00				
CAPRI-G	10	0710 E	0830 D		N17	W75	5080	80 D	1	3	0712		6.00			
WENDEL	10	0809 E	0853 D		N25	E56	5093	44 D	1+			6.00				
CAPRI-G	10	0813 E	0902 D		N24	E55	5093	49 D	1	3	0817		5.00			
CAPRI-G	10	1021 E	1103		N25	E54	5093	42 D	2	3	1022		8.00			
CAPRI-S	10	1037	1100 D		N26	E52	5093	23 D	2	3	1039	4.00	8.20			S-SWF
WENDEL	10	1044 E	1059 D		N26	E54	5093	15 D	1+			6.00				
UCCLE	10	1047	1102		N27	E55	5093	15	1+	4						
CAPRI-G	10	1301	1310		N25	E55	5093	9	1	3						
CAPRI-G	10	1335 E	1345 D		N17	W75	5080	10 D	2	1	1345		8.00			
CAPRI-S	11	0610	0646 D		N12	W10	5083	36 D	1	2	0623	3.00	3.20			
CAPRI-S	11	0638 E	0647 D		N08	E37	5090	9 D	1	2	0642	3.50	4.40			
CAPRI-G	11	0738 E	0820 D		N13	W11	5083	42 D	1	3	0740		5.00			
ARCETRI	11	0830 E	0851 D		N29	E44	5093	21 D	1+	2						
MOSCOW	11	0833	0839		N28	E45	5093	6	2							
CAPRI-G	11	0835 E	0905	0838	N25	E45	5093	30 D	2	3	0835					S-SWF
CAPRI-S	11	0836 E	0902 D		N28	E48	5093	26 D	2	2	0838	3.00	5.40			
UCCLE	11	0855 E	0904		N28	E47	5093	9 D	1	2						
ARCETRI	11	1011 E	1019 D		N17	W90	5080	8 D	1+	2						
WENDEL	11	1434	1453 D		N26	E42	5093	19 D	1+			7.00				
CAPRI-G	11	1442 E	1615 D	1505	N25	E42	5093	93 D	2	2	1455		8.00			Slow S-SWF
CAPRI-S	11	1451 E	1543 D		N26	E39	5093	52 D	2	3	1517	5.50	9.10			
ONDREJOV	11	1506 E	1600	1523	N25	E40	5093	54 D	2	2	1523			4.80		
SAC PEAK	11	1622	1700	1627	N11	W12	5083	38	2	3			8.30		17	
CAPRI-S	11	1624 E	1648 D		N11	W12	5083	24 D	1	3	1628	3.00	3.10			
SAC PEAK	11	1710	1747 D	1720	N12	W18	5083	37 D	1	3			2.30		15	
SAC PEAK	11	2145	2205	2150	S16	E35	5089	20	1+	3			4.90		22	
SAC PEAK	11	2325	2402 D	2334	N28	E38	5093	37 D	2	3			8.65		25	S-SWF
CAPRI-G	12	0725 E	0735 D		S15	E27	5089	10 D	1	3	0727		2.00			
CAPRI-G	12	1025 E	1140		N07	E20	5090	75 D	1	3	1026		5.00			
KANZELHOHE	12	1033 E	1051		N19	E60	5095	18 D	2							

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KANZELHOHE	12	1114 E	1220		N29	E28	5093	66 D	2&							
CAPRI-G	12	1115 E	1202 D		N26	E31	5093	47 D	2	3	1120		9.00			Slow S-SWF
CAPRI-S	12	1119 E	1222 D		N26	E29	5093	63 D	2	3	1145	6.00	7.50			
CAPRI-G	12	1210 E	1226		N13	W20	5083	16 D	1	3	1220		2.00			
MITAKA	13	0504 E	0532 D		N30	E21	5093	28 D	2	1	0504	8.04	10.90	2.21	200	
CAPRI-G	13	0718 E	0745 D		N29	E21	5093	27 D	1	3	0720		3.00			
WENDEL	13	0831	0923	0844	N27	E17	5093	52	3			19.00				
ARCETRI	13	0832 E	0852 D		N27	E18	5093	20 D	2&	2	0845	6.60	8.60			
CAPRI-S	13	0832 E	0918 D		N28	E20	5093	46 D	2	3	0841	5.50	6.80			S-SWF
CAPRI-G	13	0840 E	0922		N27	E20	5093	42 D	2&	3	0845		10.00			
ARCETRI	13	0845 E			N31	E38	5093		1	2	0845	2.80	4.80			
STOCKHOLM	13	0851 E	0920		N27	E16	5093	29 D	2	3	0853	4.00	5.20			
WENDEL	13	1056	1110		S16	E08	5089	14	1			3.00				
HAWAII	13	1800	1822	1806	N14	E46	5095	22	1	3	1806	3.30	5.00			
SAC PEAK	13	1800 U	1825 U	1805	N14	E47	5095	25 D	1	2			3.00		15	
HAWAII	13	1944	2012	1948	N28	E13	5093	28	1&	3	1948	4.50	5.70			Slow S-SWF
SAC PEAK	13	1950 E	2012 U	1950 U	N29	E14	5093	22 D	1	1			2.85		18	
HAWAII	13	2340	2354	2342	N28	E12	5093	14	1&	3	2342	3.90	4.90			S-SWF
MITAKA	13	2342 E	2358		N25	E10	5093	16 D	1	1	2342	4.02	4.78	3.40	149	
HAWAII	14	0134 E	0200 D	0136	N29	E10	5093	26 D	1&	3	0136	4.50	5.70			Slow S-SWF
MITAKA	14	0135 E	0215 D		N27	E10	5093	40 D	1	1	0143	1.51	1.89	2.00	107	
MITAKA	14	0423 E	0429		N29	E08	5093	6 D	1	1	0426	1.51	1.84	1.33	87	
MITAKA	14	0503 E	0510		N27	E07	5093	7 D	1	1	0503	3.02	3.68	3.29	137	
CAPRI-G	14	0940 E	0945 D		¤			5 D	1	1						
ONDREJOV	14	1213	1235 D		S16	W04	5089	22 D	1	1	1222			2.40		S-SWF
WENDEL	14	1219 E	1240 D		S16	W03	5089	21 D	1			3.00				
STOCKHOLM	14	1220	1241		N26	E05	5093	21	2	2	1226	6.00	7.20			
WENDEL	14	1220	1242 D	1223	N27	E05	5093	22 D	2			9.00				S-SWF
CAPRI-S	14	1222 E	1246 D		N27	E06	5093	24 D	2	3	1225	5.00	6.00			
ONDREJOV	14	1223 E	1242		N28	E05	5093	19 D	2	2	1224			4.30		
ONDREJOV	14	1255	1318		N29	E03	5093	23	1	3	1257			2.80		
WENDEL	14	1255	1320		N28	E03	5093	25	1&			6.00				
CAPRI-S	14	1258	1317 D		N25	E03	5093	19 D	1	3	1300	2.50	2.00			
WENDEL	14	1300 E	1332		S14	W01	5089	32 D	1			4.00				
ONDREJOV	14	1302 E	1319		S16	W05	5089	17 D	1	3	1304			2.30		
CAPRI-G	14	1320 E	1342 D		S17	E00	5089	22 D	1	3	1324		3.00			
CAPRI-G	14	1430 E	1452 D		S15	W04	5089	22 D	1	3	1446		4.00			
WENDEL	14	1436	1501 D		S14	W04	5089	25 D	1			4.00				
ONDREJOV	14	1446 E	1457		S15	W08	5089	11 D	1	3	1448			2.10		
CAPRI-G	14	1538 E	1605		N28	E04	5093	27 D	1	2	1542		3.00			
CAPRI-G	14	1622 E	1635 D		N14	E38	5095	13 D	1	1	1624		3.00			
MCMATH	14	1823 E	2002 D	1828	N09	W14	5090	99 D	2&	2	1828		6.25			Slow S-SWF
HAWAII	14	1824	1948 D	1832	N09	W13	5090	84 D	1&	3	1832	4.80	5.20			
MITAKA	14	2348 E	2415 D		N25	W05	5093	27 D	1	2	2348	1.51	1.75	1.62	102	
MITAKA	14	2348 E	2419		N28	W05	5093	31 D	1&	2	2348	3.02	3.65	2.15	162	
CAPRI-G	15	0810 E	0831		S16	W16	5089	21 D	1	3	0820		3.00			
SCHAUINS	15	0825 E	0835		N28	W04	5093	10 D	2							
ARCETRI	15	0832 E			N27	W06	5093		1&	3	0832	4.10	4.90			
ONDREJOV	15	0832 E	0844 D		N29	W07	5093	12 D	2	3	0835			5.20		
WENDEL	15	0833	0845	0836	N30	W06	5093	12	2			8.00				

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WENDEL	15	0835	0846		N30	E14	5093	11	1			4.00				
CAPRI-S	15	0835 E	0848 D		N29	W07	5093	13 D	2	3	0836	6.00	6.90			
CAPRI-G	15	0837 E	0858		N29	W05	5093	21 D	1	3	0843		5.00			
CAPRI-G	15	0838	0851		N34	E16	5093	13	1	3	0843		3.00			
CAPRI-G	15	0855 E	0944		S23	W30	5089	49 D	1	3	0900		3.00			
CAPRI-G	15	0927 E	0947 D		N01	W35	5092	20 D	1	3	0930		3.00			
ARCETRI	15	1057 E	1105 D		S20	W80	5088	8 D	1&	2						
CAPRI-G	15	1057 E	1130 D		S20	W77	5088	33 D	2	3	1100		8.00			
CAPRI-G	15	1057 E	1130 D		S16	W17	5089	33 D	1	3	1100		4.00			
ONDREJOV	15	1148	1155	1151	N01	W40	5092	7	1	3	1151			2.30		
SAC PEAK	15	1422	1455	1437	N27	W12	5093	33	1	2			2.50		15	
CAPRI-S	15	1424	1455 D		N23	W14	5093	31 D	1	3	1433	4.00	4.40			
ONDREJOV	15	1432 E	1448		N29	W10	5093	16 D	1	3	1435			2.30		
WENDEL	15	1432 E	1500		N27	W12	5093	28 D	2			12.00				
CAPRI-G	15	1435 E	1505 D		N29	W10	5093	30 D	1&	3	1437		6.00			
STOCKHOLM	15	1437 E	1457 D		N24	W10	5093	20 D	1	3	1440	2.50	3.00			
ARCETRI	15	1442 E			N27	W07	5093		1	3						
ONDREJOV	16	0611	0629	0614	N29	W19	5093	18	1&	3	0614			2.10		
WENDEL	16	0620 E	0638		N26	W18	5093	18 D	1&				7.00			
WENDEL	16	0649 E	0658		N28	W14	5093	9 D	1				4.00			
ONDREJOV	16	0651 E	0654		N29	W16	5093	3 D	1	3	0653			2.30		
CAPRI-G	16	0902 E	0925 D		N01	E03	5099	23 D	1	2	0905		3.00			
CAPRI-G	16	0913 E	0925 D		S11	E69	5101	12 D	1	2	0915		3.00			
CAPRI-G	16	1025 E	1127 D		S11	E69	5101	62 D	1	3			3.00			
WENDEL	16	1112	1224 D		S10	E71	5101	72 D	1				4.00			
MCMATH	16	1145	1214	1158	N27	W26	5093	29	1	1	1158		2.20			
WENDEL	16	1152 E	1218 D		N26	W27	5093	26 D	2				12.00			
ONDREJOV	16	1157	1208	1158	N27	W29	5093	11	1	3	1158			2.90		
MITAKA	17	0015	0037		N20	E81	5102	22	1&	1	0015	2.02	8.08	6.24	149	S-SWF
ATHENS	17	0756	0825		N07	W54	5090	20	2							
ONDREJOV	17	0817 E	0835		N30	W48	5093	18 D	1&	3	0818			3.60		
ARCETRI	17	0827 E			N20	E80	5102		1	3	0827	.40	2.30			
ONDREJOV	17	1115 E	1119 D		S10	W23	5094	4 D	1	3	1116			2.10		
CAPRI-G	17	1352 E	1415 D		N20	E70	5102	23 D	1	2	1355		3.00			
CAPRI-G	17	1352 E	1415 D		S08	E70	5103	23 D	1	2	1355		3.00			
CAPRI-S	17	1620 E	1700 D		N08	W55	5090	40 D	1	3	1646	2.00	3.50			
MITAKA	18	0042 E	0104 D	0053	N30	W41	5093	22 D	1	1	0052	2.02	3.60	2.39	134	
NIZAMIAH	18	0545 E	0555		S14	W56	5089	10 D	1	1	0545		2.14	1.60		
CRIMEA	18	0731	0749 D		S07	W68	5089	18 D	2							
NERA	18	0806	0812		N06	E08	5098	6	2&							
NERA	18	0806	0812		N28	W44	5093	6	2&							
CAPRI-S	18	0808 E	0841 D		N28	W45	5093	33 D	1	1	0810	2.50	4.50			
CAPRI-S	18	0917 E	0940 D		N17	E08	5100	23 D	1	1	0925	2.00	2.10			
ARCETRI	18	0946 E	0953 D		S00	W78	5092	7 D	2	3						
MCMATH	18	1856	1903	1858	N02	W82	5092	7	1	1	1858		2.10			
CAPRI-S	19	0824 E	0858 D		N26	W60	5093	34 D	2	2	0831	3.00	6.90			
CAPRI-G	19	1522 E	1602 D		N18	W08	5100	40 D	1	3	1527		3.00			
CAPRI-G	19	1645 E	1652 D		N08	E13	5106	7 D	1	3	1647		2.00			
CAPRI-G	20	1405 E	1421 D		N02	E44	5104	16 D	1	2	1408		3.00			

SOLAR FLARES

APRIL 1959

OBSERVATORY	DATE APR 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
CAPRI-G	20	1405 E	1430 D		N18	W24	5100	25 D	1	2	1408		4.00			
MCMATH	21	1449	1515 D	1459	N20	W47	5100	26 D	1	1	1459		2.30			
SAC PEAK	21	1455	1520	1457	N17	W47	5100	25	1	3			2.20		17	
HUANCAYO	21	1457	1516	1457	N18	W43	5100	19	1	2	1457	2.50	3.80	5.40		
HUANCAYO	21	1910	1923	1911	N18	E53	5110	13	1&	1	1911	4.30	7.70	2.00		
ARCETRI	22	1144 E	1157 D		N16	W17	5098	13 D	1	2						
WENDEL	23	0857 E	0917 D		S11	W06	5103	20 D	1				3.00			
CAPRI-G	23	1115 E	1145 D		N16	W68	5100	30 D	1	3	1117		3.00			
CAPRI-G	23	1250 E	1305 D		N16	W68	5100	15 D	1	3	1252		2.00			
CAPRI-G	23	1257	1320 D		N16	W52	5107	23 D	1	3			2.00			
WENDEL	23	1502 E	1522 D		S12	W09	5103	20 D	1				4.00			
CAPRI-G	23	1510 E	1522 D		S11	W07	5103	12 D	1	3	1512		2.00			
CAPRI-G	23	1520 E	1522 D		N19	E65	5117	2 D	1	3	1520		2.00			
WENDEL	23	1520 E	1532		N24	E57	5117	12 D	1&				5.00			
HUANCAYO	23	1619 E	1705	1619	N18	W65	5100	46 D	1&	2	1619	.40	1.10	3.00		
HUANCAYO	23	1619 E	1705	1646	N18	W65	5100	46 D	1&	2	1646	3.80	9.60	2.30		
CAPRI-G	24	0722 E	0750 D		S07	W09	5103	28 D	1	3	0725		3.00			
ARCETRI	24	0803 E	0915 D		N12	E90	5122	72 D	2	3						
CAPRI-G	24	1133 E	1140 D		S07	W08	5103	7 D	1	3	1135		3.00			
CAPRI-G	24	1202 E	1210 D		N17	W40	5098	8 D	1	3	1205		3.00			
CAPRI-S	24	1323	1332 D		N11	E61	5120	9 D	1	3	1325	2.00	4.00			
CAPRI-S	24	1531	1553 D		N11	E60	5120	22 D	1	2	1537	1.50	3.00			
CAPRI-G	24	1540 E	1624		N12	E56	5117	44 D	1	3	1542		3.00			
MITAKA	25	0250	0302		S06	W18	5103	12	1&	1	0250	2.01	2.09	2.04	180	
NIZAMIAH	25	0408 E	0417		N14	E72	5122	9 D	1	2	0408		2.25	1.70		
CAPRI-G	25	0737 E	0806		N17	W51	5098	29 D	1	3	0740		3.00			
WENDEL	25	0745	0807 D		N17	W54	5098	22 D	1&				6.00			
ONDREJOV	25	0748	0758	0750	N17	W53	5098	10	1&	3	0750			2.90		
CAPRI-S	25	0749 E	0804 D		N15	W53	5098	15 D	1	3	0751	2.50	4.50			
WENDEL	25	0754 E	0814		N18	W36	5098	20 D	1				4.00			
WENDEL	25	0754 E	0816 D		N18	E58	5120	22 D	1&				8.00			
CAPRI-G	25	1101 E	1110 D		S08	W20	5103	9 D	1	2	1102		2.00			
CAPRI-G	25	1225 E	1430 D		N15	W55	5098	125 D	1	2	1237		3.00			
CAPRI-G	25	1405 E	1430 D		N07	E08	5108	25 D	1	2	1408		3.00			
ONDREJOV	25	1447 E	1457		N12	E67	5122	10 D	1	3	1449			4.20		
WENDEL	25	1658 E	1717		N05	E03	5108	19 D	1				4.00			
WENDEL	25	1659	1709		N07	E04	5108	10	1&				5.00			
HAWAII	25	2005	2038	2010	N22	E03	5110	33	1	3	2010	4.50	5.00			
WENDEL	26	0632 E	0654		S07	E71	5124	22 D	1&				6.00			
WENDEL	26	0836	0850		S12	W47	5103	14	1				3.00			
CAPRI-G	26	1020 E	1025 D		N14	E43	5120	5 D	1	3	1023		3.00			
WENDEL	26	1242	1258 D		N15	E43	5120	16 D	1&				7.00			
CAPRI-G	26	1245 E	1310 D		N14	E43	5120	25 D	1	3	1247		3.00			
CAPRI-G	26	1312 E	1317 D		S13	W52	5103	5 D	1	3	1313		2.00			
HAWAII	26	1837	1846	1838	N12	E32	5117	9	1	3	1838	2.10	2.60			
CAPRI-G	27	0700 E	0722		S07	E55	5124	22 D	1	2	0703		2.00			

SOLAR FLARES

APRIL 1959

OBSERVATORY	DATE APR 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
CAPRI-S	27	0638	0746 D		S10	W49	5103	62 D	1	2	0724	2.00	3.00			
CAPRI-G	27	0700 E	0750 D		S10	W50	5103	50 D	1	2	0702		4.00			
CAPRI-G	27	0748	0750 D		S14	W61	5103	2 D	1	1	0749		3.00			
CAPRI-G	27	0825 E	0841		S07	E55	5124	16 D	1	1	0828		3.00			
CAPRI-S	27	0855	0938 D		N11	E19	5117	43 D	1	3	0911	4.00	4.20			
CAPRI-G	27	0900 E	0945 D		N12	E20	5117	45 D	2	2	0902		6.00			
MITAKA	28	0124 E	0135		S08	W60	5103	15 D	1	1	0125	2.01	3.78	2.50	96	Slow S-SWF
MITAKA	28	0214	0226	0214	S08	W60	5103	12	1&	1	0214	1.51	2.84	6.16	188	S-SWF
NIZAMIAH	28	0506 E	0513 D		S08	W62	5103	7 D	1&	1	0506		5.12	1.80		
ONDREJOV	28	0637	0646		S08	E45	5124	9	1	3	0640			3.10		
CAPRI-G	28	0731 E	0733 D		S07	E41	5124	2 D	1	3	0732		3.00			
CAPRI-S	28	0729 E	0816 D		S09	W65	5103	47 D	2	2	0731	4.00	3.80			
ATHENS	28	0731	0749 D		S07	W68	5103	18 D	2							
CAPRI-G	28	0731 E	0750 D		S09	W66	5103	19 D	1&	3	0732		4.00			
WENDEL	28	0859 E	0919 D		S07	W69	5103	20 D	1&				7.00			
CAPRI-G	28	0909 E	0920 D		N11	E18	5120	11 D	1&	3	0911		5.00			
WENDEL	28	0912 E	0922 D		S07	E45	5124	10 D	1				3.00			
CAPRI-G	28	0909 E	0945 D		S09	W66	5103	36 D	1	3	0911		4.00			
WENDEL	28	0913 E	0924 D		S06	W65	5103	11 D	1				3.00			
CAPRI-G	28	1159 E	1245 D		S08	W68	5103	46 D	1&	3	1202		5.00			
CAPRI-G	28	1317 E	1358	1348	N14	E02	5117	41 D	1	3	1348		3.00			
SAC PEAK	28	1400	1420	1410	N25	W28	5110	20	1	3			2.20		14	
SAC PEAK	28	1608	1628	1616	N12	W35	5108	20	1	3			2.55		15	
CAPRI-G	28	1609 E	1635		N12	W29	5108	26 D	2	2	1616		6.00			
SAC PEAK	28	1628	1646	1630	N13	W00	5117	18	1	3			3.60		15	
CAPRI-G	28	1635 E	1702 D		N11	E05	5117	27 D	2	1	1645		6.00			
UCCLE	28	1716	1722		N13	E04	5117	6	1	4						
HAWAII	28	1942	1958	1948	N15	W11	5117	16	1	3	1948	2.60	2.80			
CAPRI-S	29	0800	0820		N06	W43	5108	20	1	3	0805	1.50	2.20			
WENDEL	29	0802	0822		N07	W45	5108	20	1&				6.00			
CAPRI-G	29	0807 E	0825 D		N07	W44	5108	18 D	1	3	0810		3.00			
CAPRI-G	29	0917 E	0935		S05	E28	5124	18 D	1	3	0920		3.00			
ONDREJOV	29	0926	0939		N10	W04	5117	13	1	2	0932			2.20		
WENDEL	29	0927	0944		N10	W07	5117	17	1				4.00			
CAPRI-G	29	0935 E	0945		N09	W06	5117	10 D	1	2	0940		3.00			
WENDEL	29	0951	1000		S07	E26	5124	9	1				3.00			
CAPRI-G	29	1015 E	1042		N16	E35	5122	27 D	1	2	1018		4.00			
CAPRI-G	29	1028 E	1122		N11	E07	5120	54 D	1	2	1030		3.00			
MCMATH	29	1255 E	1511		S04	W85	5103	136 D	1	1						
CAPRI-G	29	1315 E	1322 D		S08	W77	5103	7 D	1	2	1317		3.00			
SAC PEAK	29	2004	2110	2034	N15	W19	5116	66	1&	2			5.00		16	
SAC PEAK	30	1538	1612 D	1556	N10	E05	5122	34 D	1	2			3.53		16	
HUANCAYO	30	1546	1619	1551	N10	E03	5122	33	1	2	1551	5.00	5.10	2.10		
SAC PEAK	30	1900	1916	1906	N15	W30	5117	16	1	2			2.55		17	
HAWAII	30	1902	1920	1902	N16	W28	5117	18	1	3	1902	3.20	4.00			

COMMERCE - STANDARDS - BOULDER

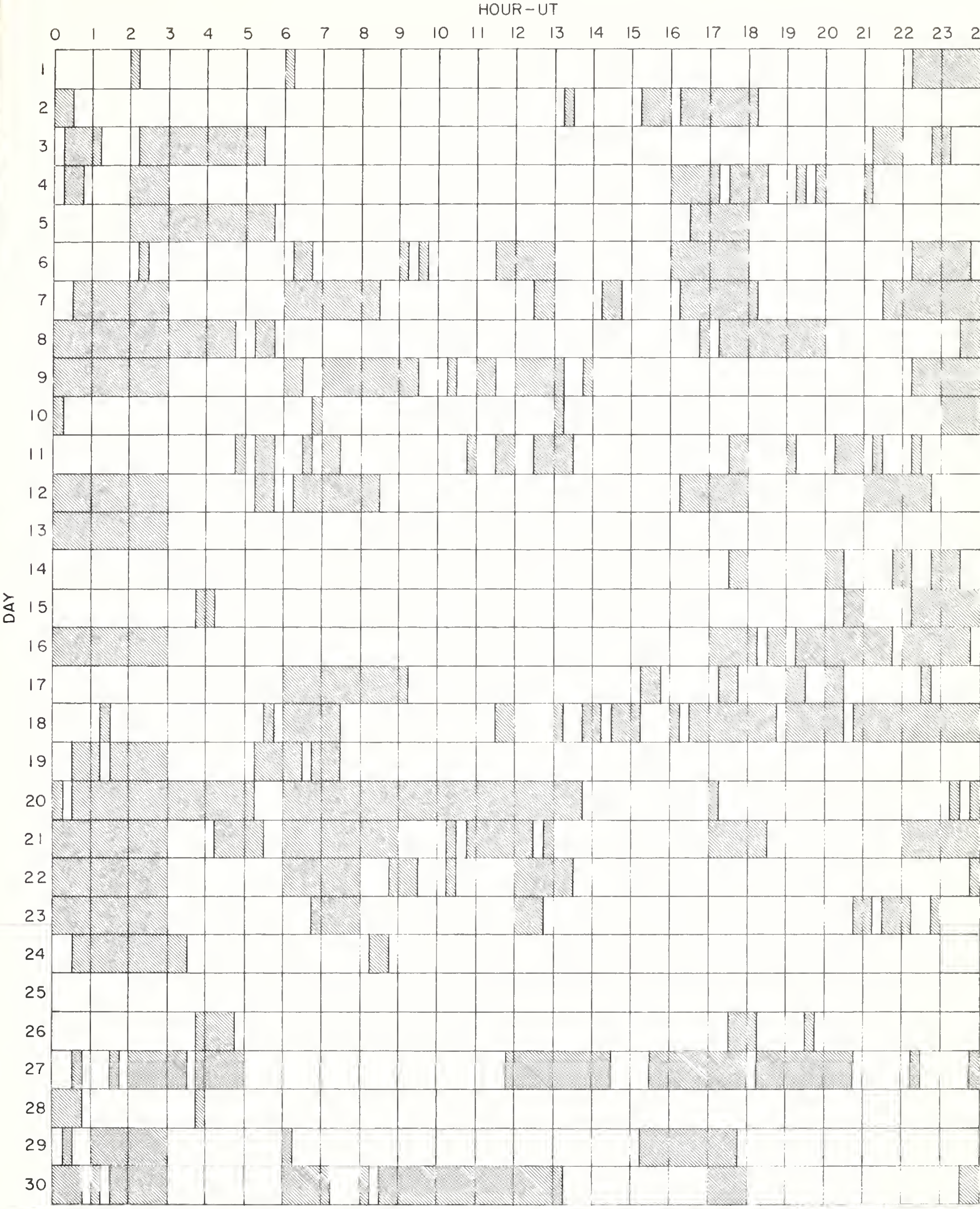
CAPRI G — ANACAPRI - GERMAN
CAPRI S — ANACAPRI - SWEDISH
GOOD HOPE — ROYAL OBSERVATORY, CAPE OF GOOD HOPE
KIEV* — KIEV UNIVERSITY
KODAIKNAL — KODAIKANAL
KRASNYA — KRASNAYA PAKHRA
MOSCOW — NIZMIR
MOSCOW-G — MOSCOW - GAISH
R O EDIN — ROYAL OBSERVATORY, EDINBURGH
R O HERST — GREENWICH ROYAL OBSERVATORY, 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
D - GREATER THAN
U - APPROXIMATE
& - PLUS
- - MINUS
☐ - NOT REPORTED

INTERVALS OF NO FLARE PATROL OBSERVATIONS

APRIL 1959



COMMERCE - STANDARDS - BOULDER

Stations Include:

Anacapri (Swedish)
Arcetri
Hawaii
Huancayo
Mitaka
Nizamiah
Ondrejov
Royal Greenwich Observatory
Herstmonceux
Sacramento Peak
Uccle

SUBFLARES

Noted as follows: Date - Universal Time - Coordinates

MARCH 1959

* WENDEL	01	1015 E	N21 W36
* WENDEL	01	1016 E	N23 W35
WENDEL	01	1109 E	N28 W34
WENDEL	01	1251 E	N18 W36
CAPRI-G	01	1258 E	N07 W12
MCMATH	01	1359 E	N17 W38
* MCMATH	01	1614	N25 W42
MCMATH	01	1701	N24 W38
MCMATH	01	1726	S19 E45
MCMATH	01	1743	N23 W43
SAC PEAK	01	1823	N22 W43
SAC PEAK	01	1912	N22 W42
SAC PEAK	01	2012	N12 E42
CLIMAX	01	2018	N13 E42
CLIMAX	01	2116	N27 E63
SAC PEAK	01	2140	N27 E60
* CLIMAX	01	2258	N13 E40
HAWAII	02	0018	N17 E38
HAWAII	02	0030	N31 E57
HAWAII	02	0132	N23 W45
* WENDEL	02	0732 E	N22 W42
* WENDEL	02	0832 E	N21 W46
WENDEL	02	1006 E	N26 W45
* UCCLE	02	1030	S17 E37
WENDEL	02	1224 E	N18 E35
WENDEL	02	1300 E	N07 E58
SAC PEAK	02	1438 E	N21 W90
ARCETRI	02	1502 E	S10 E66
* MCMATH	02	1520	N27 W51
* CAPRI-G	02	1522 E	N27 W51
* MCMATH	02	1550	S19 E34
MCMATH	02	1558	S11 E66
MCMATH	02	1618	N27 W51
SAC PEAK	02	1620	N26 W52
MCMATH	02	1818	N26 W55
SAC PEAK	02	1832	S19 E34
MCMATH	02	1832	S19 E33
HAWAII	02	1836 E	S16 E34
MCMATH	02	1842	N10 W33
MCMATH	02	1846	S12 E64
SAC PEAK	02	1850	S10 E62
* SAC PEAK	02	1855	N23 W55
SAC PEAK	02	1925	N23 W55
SAC PEAK	02	1957	N23 W55
HAWAII	02	2000 E	N20 W56
SAC PEAK	02	2040	N25 E46
SAC PEAK	02	2045	N09 W36
SAC PEAK	02	2245	N10 E25
WENDEL	03	1102 E	N23 W60
WENDEL	03	1136 E	N26 E58
* CLIMAX	03	1544	S11 E53
* MCMATH	03	1545	S11 E52
SAC PEAK	03	1555	N13 E22
MCMATH	03	1555	N12 E22
SAC PEAK	03	1555	N19 E90
SAC PEAK	03	1705	N20 E90
SAC PEAK	03	1712	S19 E21
MCMATH	03	1713 E	S19 E21
SAC PEAK	03	1840	S01 E10
MCMATH	03	1842	S01 E10
SAC PEAK	03	1932	N27 W68
SAC PEAK	03	2007	S19 E20
HAWAII	03	2108	S18 E21
SAC PEAK	03	2145	N25 W76
SAC PEAK	03	2210	S09 W29
SAC PEAK	03	2245	N23 W72
HAWAII	03	2314	N23 W70
HAWAII	04	0024	S08 E22
HAWAII	04	0025	S25 E46
HAWAII	04	0034	N21 W75
CAPRI-S	04	0748 E	S16 E08
MCMATH	04	1334	N12 E12
MCMATH	04	1405	N26 W90
MCMATH	04	1602	N20 W90
SAC PEAK	04	1620	N30 W90
MCMATH	04	1732	N23 W90
MCMATH	04	1811 E	S11 E38
MCMATH	04	1830 E	S11 E36
MCMATH	04	1942	S11 E35
SAC PEAK	04	2035	S11 E34
HAWAII	05	0104	S09 E33
CAPRI-G	05	1147 E	S16 E03
CAPRI-G	05	1157 E	S17 E90
CAPRI-G	05	1215 E	N08 E29
CAPRI-G	05	1338 E	S16 E03
SAC PEAK	05	2200	S10 E21
SAC PEAK	06	1430	S17 W15
SAC PEAK	06	2200	S09 E07
SAC PEAK	06	2237	N15 E80
MCMATH	07	1317 E	N25 W35
MCMATH	07	1341	N25 W35
SAC PEAK	07	1520	N23 E90
MCMATH	07	1530 E	N25 W35
SAC PEAK	07	1550	N23 E90
MCMATH	07	1622 E	N25 W36
* SAC PEAK	07	1702	N01 E90
SAC PEAK	07	1705	N23 E90
* SAC PEAK	07	1726 U	N13 E90
MCMATH	07	1912 E	N10 W62
SAC PEAK	07	2032	N24 E90
SAC PEAK	07	2147	N24 E90
HAWAII	07	2326	S20 W37
HAWAII	08	0010	S19 W36
LOCARNO	08	0817	S17 W33
CAPRI-G	08	0823 E	S18 W36
CAPRI-G	08	0915 E	N12 W42
SAC PEAK	08	1527	N22 W48
SAC PEAK	08	1555	N22 W48
SAC PEAK	08	1625	N22 W48
* HAWAII	08	2116	N15 E90
SAC PEAK	08	2225	N26 W57
SAC PEAK	08	2255	N25 W53
WENDEL	09	0815 E	N17 W45
* WENDEL	09	0830 E	N15 W45
* WENDEL	09	0902 E	N15 W45
* WENDEL	09	0917 E	N15 W45
WENDEL	09	0923 E	N16 W42
WENDEL	09	1000 E	N15 W45
WENDEL	09	1045 E	N15 W46
CAPRI-G	09	1135 E	N25 W55
WENDEL	09	1150 E	N12 W57
SAC PEAK	09	1657	N04 E35
SAC PEAK	09	1702	N15 W68
SAC PEAK	09	1910	S18 W54
SAC PEAK	09	1932	N10 W73
SAC PEAK	09	2010	N27 W65
NIZAMIAH	10	0401	N09 W54
WENDEL	10	1102 E	N17 W53
MCMATH	10	1255 E	S09 W46
MCMATH	10	1303	N10 W59
MCMATH	10	1320	S14 W66
MCMATH	10	1345	S14 W65
MCMATH	10	1406	S14 W66
* MCMATH	10	1447	S10 W49
* MCMATH	10	1515	N26 E05
MCMATH	10	1550 E	N05 E22
SAC PEAK	10	1620	N05 E20
SAC PEAK	10	1637	N12 W76
MCMATH	10	1638	N13 W77
SAC PEAK	10	1642	N10 E61
SAC PEAK	10	1735	N11 E60
* MCMATH	10	1800	S09 W51
SAC PEAK	10	1802	N09 E56
MCMATH	10	2031	N10 E59
MCMATH	10	2044 E	N15 W28
MCMATH	10	2117	S15 W70
MCMATH	10	2121	S09 W53
SAC PEAK	10	2124 E	S11 W52
SAC PEAK	10	2124 E	N16 W64
SAC PEAK	10	2127	N07 E53
SAC PEAK	10	2140	N18 E29
SAC PEAK	10	2157	N09 E59
SAC PEAK	10	2207	S11 W54
MCMATH	11	1314	S10 W60
MCMATH	11	1332	S09 W62
* SAC PEAK	11	1429 E	N23 E90
CAPRI-G	11	1450 E	S16 W77
SAC PEAK	11	1450	S14 W78
MCMATH	11	1502	S10 W60
SAC PEAK	11	1512	S17 E12
MCMATH	11	1514	S16 E13
SAC PEAK	11	1600	S14 W80
SAC PEAK	11	1605	S12 W56
MCMATH	11	1720	N10 E85
SAC PEAK	11	1720	N10 E80
SAC PEAK	11	1830	N14 W90
SAC PEAK	11	2002	N10 E79
NIZAMIAH	12	0337	N10 E70
NIZAMIAH	12	0532	N10 E70
MCMATH	12	1347	N11 E74
SAC PEAK	12	1422 E	N10 E80
SAC PEAK	12	1457	N10 E80
SAC PEAK	12	1515	N26 E85
SAC PEAK	12	1612	N10 E80
SAC PEAK	12	1647	N11 E62
CLIMAX	12	1654	N12 E64
SAC PEAK	12	1725	N10 E80
SAC PEAK	12	1850	N10 E80
SAC PEAK	12	1935	N10 E80
SAC PEAK	12	2005	N15 W53
SAC PEAK	12	2230	N10 E75
SAC PEAK	12	2325	N12 E66
LOCARNO	13	1145	N11 E58
MCMATH	13	1244	N28 E75
MCMATH	13	1316	N25 E67
MCMATH	13	1502	N17 E60
* MCMATH	13	1505	N24 E68
* SAC PEAK	13	1600	N13 E54
MCMATH	13	1642	N25 E65
MCMATH	13	1756	N10 E50
SAC PEAK	13	1757	N12 E49
MCMATH	13	1827	N10 E50
MCMATH	13	1901	N12 E57
CAPRI-G	14	1333 E	N11 E66
SAC PEAK	14	1535	N23 E46
SAC PEAK	14	1722	N11 E36
SAC PEAK	14	1735	N12 E43
SAC PEAK	14	1840	S07 E12
SAC PEAK	14	2022	N08 E37
SAC PEAK	14	2035	S07 E12
HAWAII	14	2036	S06 E12
SAC PEAK	14	2155	N23 E43
SAC PEAK	14	2317	N11 E36
WENDEL	15	0735 E	N13 E30
WENDEL	15	0745 E	N09 E32
CAPRI-S	15	0913	N11 E02
* WENDEL	15	1139 E	N28 E35
WENDEL	15	1322 E	N27 E33
SAC PEAK	15	1450 E	N30 E45
SAC PEAK	15	1457	N19 E66
SAC PEAK	15	1635	S14 E40
SAC PEAK	15	1642	N27 E31
MCMATH	15	1650 E	N27 E32
SAC PEAK	15	1712	S14 W07
SAC PEAK	15	1800	N37 E12
* SAC PEAK	15	1900	N10 E24
SAC PEAK	15	1905	N19 E64
SAC PEAK	15	1942	N10 E23
SAC PEAK	15	1947	N27 E29
SAC PEAK	15	2307	N10 E20
HAWAII	15	2308 E	N11 E20
CAPRI-S	16	0821 E	N27 E23
* MCMATH	16	1231 E	N11 E54
* MCMATH	16	1255	N28 E19
MCMATH	16	1354	N30 E32
SAC PEAK	16	1505	N20 E63
MCMATH	16	1559	N28 E27
UCCLE	16	1610 E	N29 E28
* SAC PEAK	16	1622	N28 E26
SAC PEAK	16	1642	N27 E27
* SAC PEAK	16	1702	N10 E13
* MCMATH	16	1704	N11 E13
MCMATH	16	1739	N26 E18
SAC PEAK	16	1740	N26 E18
MCMATH	16	1832	N21 E51
MCMATH	16	1845	N27 E17
HAWAII	16	1848	N28 E14
SAC PEAK	16	1852 E	N27 E16
MCMATH	16	1958	N12 E10
SAC PEAK	16	2142 U	N27 E15
MCMATH	16	2144	N27 E15
CLIMAX	16	2301	N27 E16
HAWAII	16	2302	N28 E12
STOCKHOLM	17	0854	N28 E18
WENDEL	17	0910 E	N28 E18
* STOCKHOLM	17	0943	N23 E12
* ARCETRI	17	0946 E	N24 E12
UCCLE	17	1044	S32 E44
STOCKHOLM	17	1055	N09 E03
WENDEL	17	1112 E	N13 E02
WENDEL	17	1146 E	N13 E08
WENDEL	17	1201 E	N15 E43
WENDEL	17	1223 E	N16 E51
WENDEL	17	1325 E	N17 E03
STOCKHOLM	17	1327	N09 E00
WENDEL	17	1422 E	N11 W01
WENDEL	17	1424 E	N26 E06
* SAC PEAK	17	1432	N11 W02
* SAC PEAK	17	1445	N25 E11
* CAPRI-S	17	1452 E	N10 E00
* WENDEL	17	1510 E	N18 E49
* CAPRI-S	17	1513 E	N15 E47
* WENDEL	17	1520 E	N13 W02
SAC PEAK	17	1521 E	N28 E17
* WENDEL	17	1535 E	N26 E10
SAC PEAK	17	1707	N25 E10
CLIMAX	17	1710	N26 E09
SAC PEAK	17	1710	N20 E32
SAC PEAK	17	1755	N25 W37
SAC PEAK	17	1910	N25 E08
CLIMAX	17	2306	N26 E06
HAWAII	17	2308	N26 E06
CLIMAX	18	0024	N27 E11
HAWAII	18	0024	N28 E08
WENDEL	18	0707 E	N13 W03
WENDEL	18	0751 E	N14 W08
STOCKHOLM	18	1200	N27 E08
MCMATH	18	1207 E	N26 E06
STOCKHOLM	18	1216	N19 E27
MCMATH	18	1305	N18 E02
MCMATH	18	1334	N27 E04
STOCKHOLM	18	1344	N27 E03
SAC PEAK	18	1357 E	N30 E07
SAC PEAK	18	1407	N21 E26
MCMATH	18	1409	N22 E26
MCMATH	18	1459	N26 E02
MCMATH	18	1506	N11 W12
MCMATH	18	1624	N19 E21
MCMATH	18	1713	N12 W09
SAC PEAK	18	1722	N12 W09
MCMATH	18	2007	N10 W17
MCMATH	18	2050	N17 W21
* SAC PEAK	18	2055	N07 W04
SAC PEAK	18	2055 E	N16 E21
MCMATH	18	2110	N20 E68
SAC PEAK	18	2112	N18 E67
SAC PEAK	18	2117	N12 W07
* MCMATH	18	2124	N26 W01
* HAWAII	18	2134 E	N26 W03
SAC PEAK	18	2145	N28 E01
SAC PEAK	18	2155	N15 E20
SAC PEAK	18	2247	N14 E76
SAC PEAK	18	2310	N27 W00
SAC PEAK	18	2315	N12 W09
HAWAII	19	0046	N29 E00
WENDEL	19	0902 E	N24 W14
WENDEL	19	0907 E	N27 W08
* CAPRI-S	19	0915 E	N12 W17
WENDEL	19	0917 E	N21 E16
* UCCLE	19	0926 E	N31 W05
* UCCLE	19	0926 E	N14 W20
WENDEL	19	0959 E	N27 W16
* UCCLE	19	1014	N29 W16
* WENDEL	19	1108 E	N27 W09
MCMATH	19	1307 E	N12 W21
MCMATH	19	1409	N27 W17
* MCMATH	19	1426	N28 W17
* MCMATH	19	1448	N26 W16
MCMATH	19	1515	S10 W27
MCMATH	19	1530	N26 W15
MCMATH	19	1627	N13 W22
MCMATH	19	1706	N15 E22
MCMATH	19	1717	N29 W09
MCMATH	19	1735	N30 W22
SAC PEAK	19	1737	N27 W22
MCMATH	19	1756	N26 W18
SAC PEAK	19	1815	N26 W07
MCMATH	19	1816	N25 W06
MCMATH	19	1824	N12 W24
SAC PEAK	19	1837	N25 W18
MCMATH	19	1838	N26 W17
MCMATH	19	1858	N29 W11
SAC PEAK	19	1902	N30 W10
MCMATH	19	1920	N30 W24
MCMATH	19	1928	N29 W24
SAC PEAK	19	1950	N19 E60
SAC PEAK	19	1950	N28 W20
MCMATH	19	1951	N29 W20
MCMATH	19	2015	N09 W17
SAC PEAK	19	2030	N27 W21
MCMATH	19	2031	N29 W20
SAC PEAK	19	2050	N28 W24
HAWAII	19	2052	N27 W25
SAC PEAK	19	2202	N17 E54
HAWAII	19	2218	N19 E55
SAC PEAK	19	2300	N14 W26
HAWAII	19	2302	N13 W28
SAC PEAK	19	2307	N27 W22
WENDEL	20	0845 E	N29 W26
LOCARNO	20	0900 E	N15 E19
WENDEL	20	1020 E	N09 E13
UCCLE	20	1032	N27 W35
WENDEL	20	1033 E	N27 W34
UCCLE	20	1127	N24 W37
CAPRI-G	20	1332 E	N28 W31
* SAC PEAK	20	1415 E	N15 W03
SAC PEAK	20	1440	N10 E10
SAC PEAK	20	1445	N16 E09
* SAC PEAK	20	1500	N10 W38
SAC PEAK	20	1520	N07 W29
SAC PEAK	20	1615	N11 W41
SAC PEAK	20	1640	N27 W34
SAC PEAK	20	1730	N22 W34
SAC PEAK	20	1812	N27 W24
HAWAII	20	1830	N27 W26
SAC PEAK	20	2100	N10 W39
HAWAII	20	2104	N07 W39
HAWAII	21	0000 E	N29 W36
* HAWAII	21	0158 E	N12 W38
* WENDEL	21	0725 E	N11 W43
WENDEL	21	0735 E	N27 W44
WENDEL	21	1101 E	N28 W39
CAPRI-G	21	1104 E	N27 W38
MCMATH	21	1213 E	N16 W41
MCMATH	21	1230	N29 W46
MCMATH	21	1241	N29 W37
CAPRI-G	21	1313	N11 W49
SAC PEAK	21	1412	N26 W44
WENDEL	21	1437 E	N28 W39
WENDEL	21	1437 E	N27 W45
SAC PEAK	21	1640	N17 W14
MCMATH	21	1720 E	N10 W47
MCMATH	21	1800 E	N10 W47

Noted as follows: Date - Universal Time - Coordinates

MARCH 1959

MCMATH	21	1802	E	N30 W35
*MCMATH	21	1820		N27 W46
*SAC PEAK	21	1822		N28 W47
SAC PEAK	21	2117		N25 W50
SAC PEAK	21	2152		N28 W47
SAC PEAK	21	2252		N28 W47
SAC PEAK	21	2355		N17 E39
HAWAII	22	0152		N16 E32
NIZAMIAH	22	0330		N22 E27
NIZAMIAH	22	0517		N22 E27
WENOEL	22	0756	E	N23 W56
WENDEL	22	0804	E	N18 W24
WENOEL	22	0814	E	N18 E27
WENDEL	22	0818	E	N27 W46
WENOEL	22	0835	E	N27 W55
LOCARNO	22	1025		N21 W50
MCMATH	22	1323		N17 W26
MCMATH	22	1412		N16 W14
SAC PEAK	22	1450	E	N17 E22
SAC PEAK	22	1525		N20 E52
MCMATH	22	1526		N20 E53
*SAC PEAK	22	1557		N24 W27
MCMATH	22	1634		N17 W16
MCMATH	22	1708	E	N17 W28
MCMATH	22	1731		N27 W61
SAC PEAK	22	1807		N15 W28
SAC PEAK	22	1822		N12 W59
HAWAII	22	1826		N13 W26
HAWAII	22	1900		N18 E10
SAC PEAK	22	1902		N16 E12
SAC PEAK	22	1945		N27 W64
SAC PEAK	22	2012		N15 W29
HAWAII	22	2014		N15 W30
SAC PEAK	22	2045		N12 W17
SAC PEAK	22	2130		N26 W64
SAC PEAK	22	2302		N26 W65
SAC PEAK	22	2305		N17 W30
CAPRI-G	23	0952	E	N17 E12
LOCARNO	23	1045		N27 W62
*MCMATH	23	1226	E	N24 E23
LOCARNO	23	1250		N15 W38
MCMATH	23	1252		N17 W39
MCMATH	23	1300		N27 W72
LOCARNO	23	1302		N10 W75
MCMATH	23	1303		N12 W88
LOCARNO	23	1310		N26 W68
*SAC PEAK	23	1420	E	N30 W60
*UCCLE	23	1448	E	N25 W87
LOCARNO	23	1508		N23 E13
MCMATH	23	1511		N17 W31
*MCMATH	23	1525		N20 E03
*SAC PEAK	23	1527		N19 E02
SAC PEAK	23	1605		N26 W77
CAPRI-S	23	1606	E	N23 W70
MCMATH	23	1708		N18 W42
MCMATH	23	1716		N17 E09
MCMATH	23	1753		N26 W74
SAC PEAK	23	1755		N25 W70
MCMATH	23	1815		N17 W43
SAC PEAK	23	1815		N15 W42
HAWAII	23	1816		N15 W43
MCMATH	23	1838		N29 W73
MCMATH	23	1850		N29 W75
SAC PEAK	23	1855		N28 W70
MCMATH	23	1941		N16 E10
SAC PEAK	23	2055		N28 W70
SAC PEAK	23	2217		N29 W70
SAC PEAK	23	2225		N12 W88
SAC PEAK	23	2355		N09 E75
HAWAII	24	0018		N24 W43
*WENOEL	24	0728	E	S09 E41
*WENDEL	24	0810	E	S09 E40
*WENOEL	24	0850	E	S08 E42
*SAC PEAK	24	1420		S10 E37
*SAC PEAK	24	1450		S08 E38
*MCMATH	24	1452		S09 E38
MCMATH	24	1624	E	S09 E39
MCMATH	24	1624	E	N17 W47
SAC PEAK	24	1627		N16 W47
SAC PEAK	24	1722		N27 W78
SAC PEAK	24	1820		N24 W90
SAC PEAK	24	2002		S09 E32
MCMATH	24	2007		S09 E33
MCMATH	24	2050		N22 W06
SAC PEAK	24	2137		N26 E88
NIZAMIAH	25	0345		N30 E68
NIZAMIAH	25	0540		N30 E68
STOCKHOLM	25	0937		N22 E17
*CAPRI-S	25	0942	E	N16 W12
*STOCKHOLM	25	0944		N17 W06
STOCKHOLM	25	1309		N23 E12
*MCMATH	25	1410		S08 E23
MCMATH	25	1427		N16 W16
MCMATH	25	1450		N18 W57
MCMATH	25	1552		N15 W59
MCMATH	25	1644		N16 W16
MCMATH	25	1700		S08 E20
MCMATH	25	1714		N24 E12
MCMATH	25	1722		N10 E57
MCMATH	25	1800		N17 W60
MCMATH	25	1818		S08 E19
HAWAII	25	1926		S08 E21
MCMATH	25	1927	E	S08 E19
HAWAII	25	2142		N27 E09
NIZAMIAH	26	0250	E	N25 E62
NIZAMIAH	26	0410	E	N25 E62
NIZAMIAH	26	0441	E	N25 E62
STOCKHOLM	26	0848		S10 E14
STOCKHOLM	26	0928		N23 E06
*STOCKHOLM	26	1120		N19 W03
LOCARNO	26	1200		N24 E59
*STOCKHOLM	26	1255		N26 E13
*CAPRI-S	26	1305	E	N29 E10
CAPRI-G	26	1315	E	N12 E75
UCCLE	26	1332	E	N30 E15
UCCLE	26	1332	E	S08 E11
*SAC PEAK	26	1515		N24 E59
SAC PEAK	26	1622		N24 E60
SAC PEAK	26	1705		N11 W85
SAC PEAK	26	1727		N24 E54
SAC PEAK	26	1750		N32 E90
SAC PEAK	26	1937		N17 W72
SAC PEAK	26	2000		S34 W08
SAC PEAK	26	2000		N20 E21
HAWAII	26	2002		N22 E19
SAC PEAK	26	2007		N05 E35
HAWAII	26	2008		N07 E37
NIZAMIAH	27	0520		N23 W08
LOCARNO	27	1020		N13 W90
LOCARNO	27	1040		S09 W01
LOCARNO	27	1250		N25 E60
MCMATH	27	1558		N23 E38
MCMATH	27	1605		N23 W12
MCMATH	27	1654		N23 W12
MCMATH	27	1724		N24 W13
MCMATH	27	1824		N26 W13
MCMATH	27	1900		N23 W13
MCMATH	27	1941		N23 W13
MCMATH	27	1945		N09 E29
MCMATH	27	2151		N25 E46
MCMATH	28	1208		N23 W23
MCMATH	28	1347		N25 W25
MCMATH	28	1415		N26 E36
SAC PEAK	28	1442		N22 W25
MCMATH	28	1443		N23 W25
*SAC PEAK	28	1507		N12 E42
*MCMATH	28	1512		N12 E44
CAPRI-G	28	1527		N26 E29
MCMATH	28	1536		N18 W00
*SAC PEAK	28	1547		N25 E35
MCMATH	28	1624		N12 E44
SAC PEAK	28	1632		N12 E42
SAC PEAK	28	1920		N12 E42
MCMATH	28	1922		N13 E41
HAWAII	28	1922		N14 E43
SAC PEAK	28	1922		S08 W13
MCMATH	28	1927		S07 W12
HAWAII	28	1930		S08 W13
*SAC PEAK	28	1945		N23 W31
*HAWAII	28	1948		N23 W29
MCMATH	28	2020		S30 W34
HAWAII	28	2020		S33 W34
MCMATH	28	2021		N08 E15
HAWAII	28	2022		N09 E15
LOCARNO	29	1050	E	S09 W28
LOCARNO	29	1120		N14 E32
*UCCLE	29	1121	E	N31 E30
LOCARNO	29	1304		N19 W64
SAC PEAK	29	1405		N12 E32
SAC PEAK	29	1422		N20 E15
SAC PEAK	29	1432		N20 W68
SAC PEAK	29	1447		N19 W17
SAC PEAK	29	1452		N13 E31
*SAC PEAK	29	1532		N08 E35
HAWAII	29	1911	E	N23 E10
SAC PEAK	29	1925	E	N21 E12
SAC PEAK	29	1945		N20 W70
SAC PEAK	29	2102		N12 E27
SAC PEAK	29	2120		N28 E26
SAC PEAK	29	2135		N20 E11
SAC PEAK	29	2302		N20 E10
HAWAII	30	0036	E	N26 E08
NIZAMIAH	30	0333		N24 W41
NIZAMIAH	30	0359		N22 E06
NIZAMIAH	30	0433	E	S30 E24
SAC PEAK	30	1357		N28 E10
SAC PEAK	30	1405		N08 E22
SAC PEAK	30	1425		N29 E15
SAC PEAK	30	1452		N21 W00
SAC PEAK	30	1502		N28 E09
SAC PEAK	30	1522		N08 E22
SAC PEAK	30	1522		N24 E08
SAC PEAK	30	1547		N14 E17
SAC PEAK	30	1555		N25 W55
SAC PEAK	30	1627		N28 E07
SAC PEAK	30	1657		N28 E15
SAC PEAK	30	1717		N13 E18
SAC PEAK	30	1730		N28 E07
SAC PEAK	30	1732		N18 W31
SAC PEAK	30	1805		N15 E65
SAC PEAK	30	1807		N29 E07
HAWAII	30	1812	E	N29 E05
SAC PEAK	30	1830		N28 E13
SAC PEAK	30	1910		N28 E13
SAC PEAK	30	2005		N26 W02
SAC PEAK	30	2020		N29 E05
SAC PEAK	30	2042		N22 W00
SAC PEAK	30	2135		N19 W32
NIZAMIAH	31	0454	E	N02 W01
SAC PEAK	31	1657		N30 W03
SAC PEAK	31	1707		N14 E04
SAC PEAK	31	2 32	E	N20 W46
SAC PEAK	31	2105		N21 W42
HAWAII	31	2148		N16 E48

*Rated as flare of importance ≥ 1 by other observatories (see CRPL-F 176 Part B).

IONOSPHERIC EFFECTS OF SOLAR FLARES

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

SEPTEMBER 1958

DATE	CLASS SCNA	CLASS SEA	CLASS Burst	WIDESPREAD INDEX	TIME (UNIVERSAL TIME) BEGIN	MAX.	END	PERCENT ABSORPTION SCNA	OBSERVATION STATIONS
1		1-		1	1350		1410		KU
1			1	5	2056	2057	2058		BO, SP, RE
1		2		5	2058	2108	2125		A2, A3, A5, A7, BO
1	1			3	2059	2103	2123	30	BO, SP
2		1		1	0128		0212		HO
2		1		5	1046		1108		A1, A2, A5, KU, NE
2		1-		5	1244		1319		KU, NU, PA
2		1		4	1701	1709	1734		A2, BO
2	1			4	1703	1709	1723	16	BO, RE
2			1	4	1821	1824	1826		BO, RE
2		2+		5	2102	2110	2150		A1, A2, A5, A6, A7, BO, MC PA
2	2			5	2103	2107	2137	45	BO, MC, SP, RE
3		1		5	1759	1805	1820		A1, A2, A5, A7, BO
3	1			4	1800	1806	1823	17	BO, RE
3	1			1	1902	1938	2015	13	BO
3		1		3	1931	1950	2009		A7, BO
5			1	4	1845	1848	1850		RE, SP
5			1	4	1920	1923	1925		RE, SP
5		1-		3	2020	2022	2035		A7, BO
5	1-			1	2021	2030	2040	4	BO
5			1-	1	2021	2022	2023		SP
6		2		1	1317		1344		NE
6		1		1	1633		1651		PA
7		1		1	0929		1100		NE
7		1		5	1444	1457	1545		A2, BO, DU, ED, KU, NE, NU, PU
7	1+			5	1448	1454	1510U	35	BO, RE, SP
7	2			5	1657	1707	1740		BO, MC, RE, SP
7		1+		5	1657	1717	1738		BO, MC, PU
7			1-	3	1722	1723	1724		BO, SP
7			1	4	1759	1801	1811		BO, RE
7	1			3	2138	2147	2218	11	BO, SP
7		2+		4	2141	2141	2149		A2, A3, BO
8		1-		1	0954		1014		KU
9		1		1	0050		0113		HO
9		1-		1	1045		1055		NU
9			1	1	1825	1830	1834		SP
9	1-			1	1826	1838	1901	8	BO
9		2		5	1831	1839	1904		A1, A2, A5, A6, A7, BO
10		1		5	1325		1437		A2, DU, ED, KU, NE, NU, PA, PU
10	1		1	1	1325	1332	1350U	30	RE
11		2		4	1114		1144		KU, NE, NU
11		1+		5	1215		1251		NE, NU, PA
11			2+	3	1556	1600	1604		MC, RE
11			1	4	1734	1736	1738		BO, RE
11	1			4	1800	1817	1852	16	BO, RE
11			1	4	1804	1806	1807		BO, RE
11		1-		1	1805	1821	1845		BO
12		1		3	0701		0737		NE, PU
12		1		5	0914	0923	0955		ED, KU, NU, PU
12		1		1	1041		1135		PU
12	1			4	1615	1622	1638	20	BO, RE
12		1		5	1616	1635	1658		A2, BO, ED, NE, NU
12	1			1	1712	1722	1739	11	BO
12		1		4	1718	1724	1749		A2, BO
13		2		1	0012		0055		A7, HO
13		1		1	1005		1119		PU
13	1			1	1410	1458	1530D	15	BO
13		1		5	1432	1438	1514		A2, BO, PA
13			1+	4	1932	1938	1940		BO, RE

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

SEPTEMBER 1958

DATE	CLASS			WIDESPREAD	TIME (UNIVERSAL TIME)			PERCENT ABSORPTION	OBSERVATION STATIONS
	SCNA	SEA	Burst	INDEX	BEGIN	MAX.	END	SCNA	
{13		1+		3	2229	2236	2313		A7, BO
{13	1-			1	2229	2239	2325	5	BO
14		1-		5	0830		0845		ED, KU, NE, NU, PU
14		1-		5	0854		0930		ED, KU, NE, NU
14		1		1	1008		1033		PU
{14	1-			1	2322	2334	2355	6	BO
{14		1		1	2331	2354	2442		BO
15		3		1	0939		1110		PU
{15	1			4	1437	1445	1500	35	BO, RE
{15		1		5	1438	1445	1503		A1,A2,A5,A8,BO,DE,DU,ED,PA
{15		2		5	1659	1712	1829		A1,A2,A5,A7,A8,BO,DU,KU,MC,PA
{15	2			5	1701	1711	1817	25	BO, MC, RE, SP
{15		2		5	2010	2020	2033		A2, A5, A6, A7, DE, SP
{15	2			5	2011	2017	2032	45	BO, RE, SP
15			1	4	2200		2202		BO, RE
16		1		1	0745		0812		PU
16		1		5	1108	1115	1130		A5, KU
{16		1		5	1500	1510	1545		A5, BO, KU, NE, NU, PA
{16	1			20	1501	1520	1600U		BO, RE
{16			1	4	1523		1526		BO, RE
16		□		3	1900	1904	1941		DU, ED
17		1-		3	1538	1550	1645		DU, NU
18		2		3	0823	0832	0929		DU, NE
21		1-		3	1341		1401		KU, NU
22		1-		1	1013		1027		NU
23		1		1	1021		1051		NU
26		1		3	1207	1215	1238		ED, NE
27		1-		1	1026		1051		KU
{28	1			1	1525	1538	1548	25	RE
{28		1		5	1534	1540	1604		A1, A8, ED, KU, NE, NU
{28	1-			4	2046	2049	2115	8	BO, RE
{28		2-		5	2046	2051	2130		A1, A5, A8, BO
29		2		1	1155		1245		PA

IONOSPHERIC EFFECTS OF SOLAR FLARES

(SHORT-WAVE RADIO FADEOUTS)

MARCH 1959

Mar. 1959	Start UT	End UT	Type	Wide Spread Index	Impor-tance	Observation Stations	Known Flare, UT CRPL-F 176B
2	1645	1700	Slow S-SWF	4	1	BE, HU, MC, PR	1637
2	2320	2359	S-SWF	5	2	AD, LA, OK, PR, WS	2317
3	0905	0923	S-SWF	1	1	PU	0902
4	0348	0414	S-SWF	1	1	OK	0345
4	1600	1620	S-SWF	3	1	BE, HU, PR	
5	0520	0700	S-SWF	4	3	NE, OK	
5	1527	1600	S-SWF	5	2	BE, FM, HU, MC, NE, PR, SW, WS, CW***	1525
6	0033	0115	Slow S-SWF	4	1+	AD, OK, TO	
7	1725	1920	Slow S-SWF	5	3	BE, FM, HU, LA, MC, NE, PR, WS, CW*	1723U
9	1722	1800	Slow S-SWF	4	2	BE, FM, MC, PR, WS	1715
10	0513	0708	Slow S-SWF	5	3	NE, OK, TO, CW†++	
10	0708	0828	Slow S-SWF	1	3-	OK	*
11	1140	1151	S-SWF	3	2	NE, SW	1130
11	1807	1857	S-SWF	5	2+	AN, BE, FM, HU, LA, MC, PR, SW, TO, WS, CW*	1810
12	0854	0953	C-SWF	1	3	JU	0913E
13	0015	0040	Slow S-SWF	3	1+	AD, OK	0021E
14	0026	0113	Slow S-SWF	5	2+	AD, CA, OK, TO	0018E
15	1224	1240	Slow S-SWF	1	3	JU	1223
16	0050	0140	S-SWF	5	1+	AD, AN, OK, TO, RCA+	0050
16	0357	0430	Slow S-SWF	5	2	CA, OK, TO, CW†++	0353
16	0638	0715	S-SWF	5	1+	OK, PU, CW++**	*
16	0915	0939	S-SWF	3	2	NE, CW***	0841
16	1356	1430	Slow S-SWF	4	1+	FM, PR, PU	*
16	1626	1655	S-SWF	5	2	AN, BE, FM, HU, MC, NE, PR, WS	1625
17	0134	0150	S-SWF	1	1	OK	0132
17	0646	0717	Slow S-SWF	5	1+	NE, OK, PU	0657E
18	0637	0700	S-SWF	5	1	NE, OK	0628E
18	1347	1410	S-SWF	4	1+	BE, JU, MC, PR	1340E
19	1058	1125	S-SWF	4	2	JU, NE, SW, CW***	1027E
19	1430	1440	S-SWF	5	1	BE, HU, JU, MC, NE, PR, WS	1427
20	2238	2255	S-SWF	4	1	AD, AN, LA, WS	2237
21	0200	0240	S-SWF	4	3	AD, CA, CW+	0155
21	0912	0949	S-SWF	5	3	NE, PU, SW, CW***	0900E
21	1325	1358	Slow S-SWF	3	1	BE, MC	1300E
21	1655	1720	Slow S-SWF	5	1+	BE, FM, HU, MC, PR, WS	1645
21	1823	1925	Slow S-SWF	5	2+	BE, FM, HU, LA, PR, WS	1821
22	0430	0610	G-SWF	1	3	OK	0403
22	1341	1505	S-SWF	5	3	BE, DA, FM, JU, MC, NE, PR, SW, WS, CW**	1339
23	1333	1430	Slow S-SWF	5	2+	BE, FM, HU, MC, NE, PR, SW, WS, CW***	1325E
23	1546	1615	S-SWF	4	2	HU, PR, WS	1540
23	1903	1940	S-SWF	4	2	AD, FM, HU, PR, WS	
24	0738	0819	Slow S-SWF	1	3	JU	0701
24	1002	1149	S-SWF	5	3	BE, DA, NE, SW, CW†***	0958E
24	1720	1750	S-SWF	5	1	BE, FM, HU, PR	
24	2100	2130	Slow S-SWF	5	1+	AD, BE, HU, LA, OK, PR, WS	
25	0558	0638	S-SWF	5	2	CA, JU, NE, TO, CW†**	0600
25	1626	1718	G-SWF	4	2-	AN, LA, PR, WS	*
25	2015	2112	S-SWF	5	2+	AD, AN, BE, FM, HU, LA, PR, WS	*
26	0730	0825	Slow S-SWF	4	2	LI, OK	0731E
26	1052	1126	S-SWF	1	2	PU	1120E
26	1242	1310	Slow S-SWF	4	1	BE, LI, PR	1249
26	1518	1540	S-SWF	5	2	BE, FM, HU, LA, LI, NE, PR, PU, SW, CW*	1530E
26	2102	2130	S-SWF	5	2	AD, AN, BE, FM, HU, LA, MC, PR, WS	2100
07	0140	0210	Slow S-SWF	5	1	AD, CA, OK	0148E
28	1738	1808	S-SWF	4	1	LA, MC, PR, WS	1725
28	2121	2145	S-SWF	5	1+	AD, BE, LA, MC, PR, WS	2113
29	0750	0830	S-SWF	5	3	LI, NE, OK, PU, SW, CW†++ ***	0801E
29	1540	1600	S-SWF	5	1	HU, PA, PU, WS	1515
30	1550	1612	Slow S-SWF	4	1	BE, FM, HU, PR, WS	

SOLAR RADIO EMISSION
DAILY DATA

APRIL 1959

Washington,D.C. — 9530 Mc.

Day	Flux	Day	Flux	Day	Flux
1	260	11		21	258
2	288	12		22	244
3	258	13	236	23	256
4		14	230	24	234
5		15	225	25	
6	256	16	229	26	
7	259	17	223	27	238
8	250	18		28	250
9	243	19		29	236
10	240	20	243	30	

OUTSTANDING OCCURRENCES

Apr. 1959	Type	Start UT	Duration Hrs.Mins	Maximum Time UT	Peak Flux	Observing Period UT	Remarks
1	Simple 1	1720.8	Indeter.	1723.9	8	1215-2015	Strong Radar Interference all day
2						1215-2030	Strong Radar Interference all day
3						1210-2125	Strong Radar Interference all day
6	Simple 2f	1732.0	Indeter.	Indeter.	>8	1215-2150	Strong Radar Interference all day
7	Simple 2	1235.0	1.1	1235.3	11	1210-2155	Strong Radar Interference all day
	Sinple 3	1350.0	I 55	I451	28		
	Complex	2048.9	4.3	2050.0	47		Strong Radar Interference all day
				2050.3	53		
8	Simple 2f	1311.6	6.0	1313.7	13	1215-2020	Strong Radar Interference all day
	Complex	1427.0	50.0	1435.0	366		
	Simple 2	1520.0	0.5	1520.3	130		Strong Radar Interference all day
	Simple 2	1520.6	0.7	1520.8	116		
		~1745					Burst in Interference
9	Complex	1645.5	19.0	1649.4	205	1210-2130	Radar Interference all day
	Simple 2	1925.2	1.6	1925.6	12		
10	Simple 2	1223.2	4.0	1224.4	34	1215-2005	Radar Interference all day
	Simple 2	1258.2	2.5	1258.9	85		
	Post Inc.	1300.7	19.0		13		
	Complex	1604.9	6.6	1608.2	93		
				1608.5	111		
				1609.2	110		
	Post Inc.	1611.5	17.0		17		
13	Simple 2	1943.6	12.3	1948.0	99	1230-2145	Radar Interference all day
14	Complex	1220.3	14.0	1221.5	230	1220-2130	Radar Interference all day
15						1220-2150	Radar Interference all day
16						1215-2145	Radar Interference all day
17	Complex	1743.0	2.2	1744.2	31	1215-2145	Radar Interference all day
20	Simple 2	1934.8	2.3	1936.2	77	1215-2150	Radar Interference all day
	Post Inc.	1937.1	28.0		19		Radar Interference all day
21						1215-2145	Radar Interference most of day
22						1215-2150	Radar Interference most of day
23						1215-2145	Radar Interference most of day
24						1215-2030	Radar Interference most of day
27						1245-2045	Radar Interference most of day
28						1120-2045	Radar Interference most of day
29						1120-2055	Radar Interference most of day

SOLAR RADIO EMISSION
DAILY DATA

APRIL 1959

Washington,D.C. 3200 Mc.

Day	Flux	Day	Flux	Day	Flux
1	214	11		21	151
2	206	12		22	149
3	176	13	173	23	161
4		14	165	24	163
5		15	150	25	
6	171	16	149	26	
7	170	17	143	27	167
8	172	18		28	156
9	175	19		29	165
10	180	20	158	30	

OUTSTANDING OCCURRENCES

Apr. 1959	Type	Start UT	Duration Hrs Min	Maximum Time UT	Peak Flux	Observing Period UT	Remarks
1	Indeter.	1721.1	Indeter.	1725.2	30	1215-2015	Strong Radar Interference all day
2						1215-2030	Strong Radar Interference all day
3						1210-2125	Strong Radar Interference all day
6	Complex f	1732.0	28.0	1733.6	83	1215-2150	Strong Radar Interference all day
7	Simple 3A	1350.0	1 55	1444.3	33	1210-2155	Strong Radar Interference all day
	Simple 2f	1356.8	11.8	1401.3	26		
	Complex	1446.1	25.0	1451.0	61		
	Simple 2	2049.6	0.7	2050.0	9		
8	Simple 2f	1312.0	6.2	1313.7	18	1215-2020	Strong Radar Interference all day
	Complex	1427.0	50.0	1434.2	79		
		1745					
9	Complex	1645.5	19.0	1649.3	123	1210-2130	Radar Interference
	Simple 2	1925.0	2.0	1925.6	18		
10	Simple 1	1223.5	3.0	1224.7	6	1215-2005	Radar Interference all day
	Simple 2	1258.2	2.5	1258.9	15		
	Post Inc.	1300.7	10.0		5		
	Simple 2	1605.9	4.6	1608.3	29		
	Post Inc.	1610.5	10.0		6		
13	Complex	1303.1	0.8	1303.15	55	1230-2145	Radar Interference all day
	Simple 2	1943.6	6.4	1947.9	60		
14	Complex	1220.3	12.0	1221.6	82	1220-2130	Radar Interference all day
15						1220-2150	Radar Interference all day
16						1220-2145	Radar Interference all day
17						1215-2145	Radar Interference all day
20	Simple 2	1934.8	2.3	1936.2	38	1215-2150	Radar Interference all day
	Post Inc.	1937.1	25.0		11		
21						1215-2145	Radar Interference most of the day
22						1215-2150	Radar Interference most of the day
23						1215-2145	Radar Interference most of the day
24						1215-2030	Radar Interference most of the day
27						1245-2045	Radar Interference most of the day
28						1120-2045	Radar Interference most of the day
29						1120-2055	Radar Interference most of the day

COMMERCE - STANDARDS - BOULDER

OUTSTANDING OCCURENCES

APRIL 1959

Ottawa **2800 Mc.**

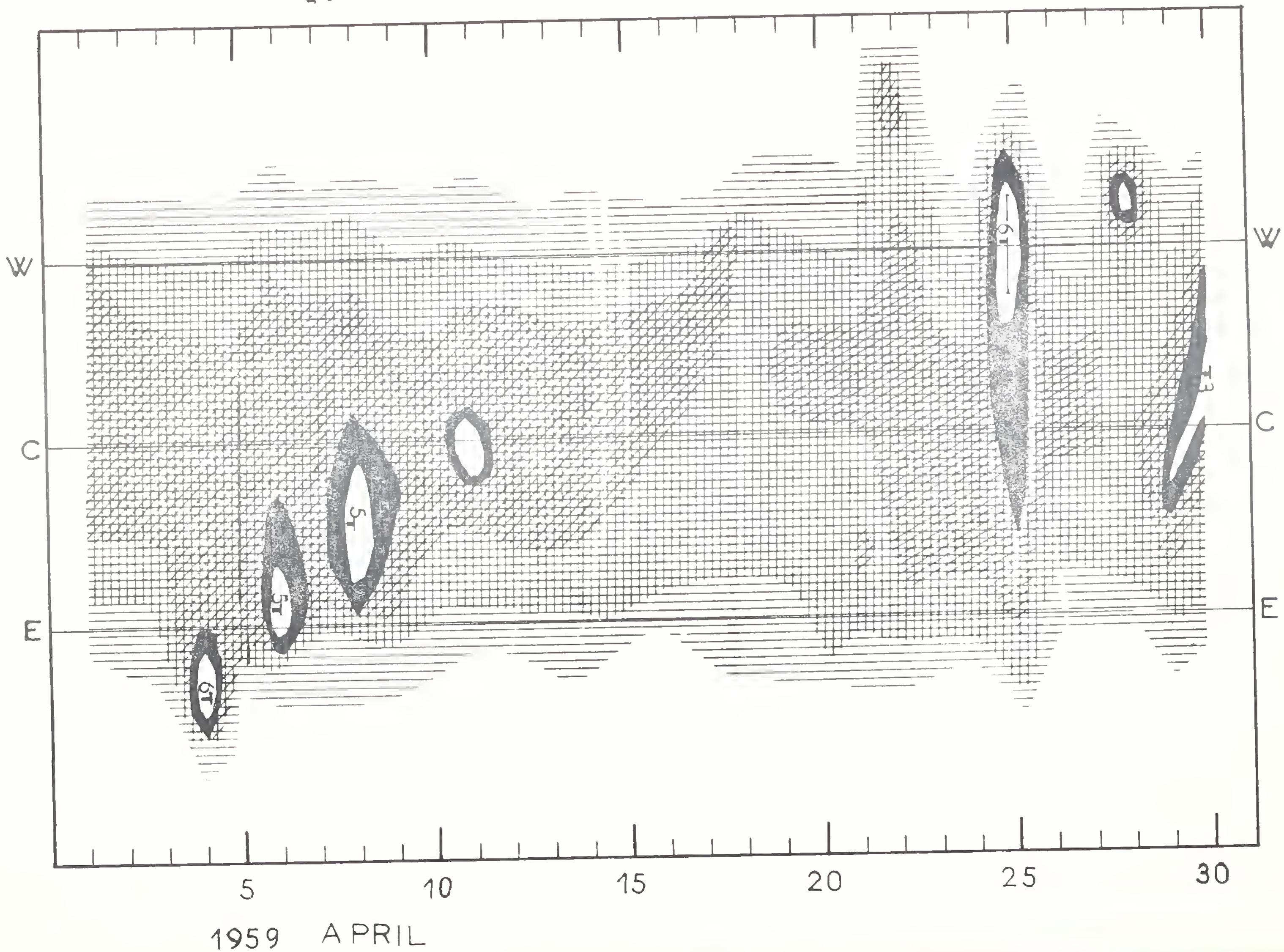
Apr. 1959	Type*	Start UT	Duration Hrs:Mins	Maximum Time UT	Peak Flux	Remarks
1	6 Complex	1725	40	1739.5	22	
1	6 Complex	2130	7	2133.3	15	
1	2 Simple 2	2233	2.5	2234	20	
2	1 Simple 1	2121.5	2.5	2122.5	7	
3	2 Simple 2	1239	8	1243.5	35	
	4 Post Increase		50		13	
3	2 Simple 2	2212.5	2.5	2213.2	25	
4	2 Simple 2 f	1905.5	5	1907.5	15	
4	2 Simple 2	1938	2	1938.8	25	
5	2 Simple 2	1641	3	1642.2	16	
6	6 Complex f	1725	17	1733.3	80	
	4 Post Increase		20		15	
6	2 Simple 2	1931.5	4	1932.7	65	
7	3 Simple 3 A	1350	3 30	1430	36	
	2 Simple 2 f	1357	11	1401.5	40	
	2 Simple 2	1450.3	3.5	1451	32	
8	2 Simple 2	1312.5	4	1313.7	13	
8	3 Simple 3 A	1420	2 40	indet.	8	
	6 Complex f	1432	14	1435	70	
8	1 Simple 1	2045	8	2049	7	
9	6 Complex f	1646	7	1649.2	130	
	4 Post Increase		10		6	
9	2 Simple 2	1716.5	1.5	1717	18	
10	1 Simple 1	1224	1	1224.5	7	
10	2 Simple 2	1258.7	2	1259	16	
10	2 Simple 2	1608	4	1608.5	25	
10	2 Simple 2	1647.3	3	1648.8	18	
11	3 Simple 3 A	1452	1 20	1517	17	
	1 Simple 1	1453	4	1454	6	
	6 Complex	1502	10.5	1506.9	90	
	2 Simple 2	1520	3.5	1521.2	38	
	1 Simple 1	1542	6	1545	7	
	2 Simple 2	1607.8	3	1608.3	35	
11	2 Simple 2 f	1623.5	5.5	1626.5	35	
	4 Post Increase		25		7	
11	2 Simple 2 f	1808	6	1809.5	20	
11	2 Simple 2 f	2146.5	4	2147.4	35	
13	2 Simple 2	1946	3	1947	32	
14	2 Simple 2	1221	12	1222.3	80	
14	1 Simple 1	1443.5	1.5	1444	5	
14	3 Simple 3 f	1823.5	30	1841	15	
17	2 Simple 2	1959	3	2000	10	
20	2 Simple 2	1935.5	4	1936.3	55	
21	2 Simple 2	1457	1	1457.5	30	
24	3 Simple 3	1400	3	indet.	15	
25	3 Simple 3	1310	2 35	1320	15	
25	2 Simple 2	1901	1.5	1901.5	18	
26	3 Simple 3 A	1738	3 10	indet.	8	
	2 Simple 2 f	1743	7	1746	9	
30	2 Simple 2	1901	3	1902	40	In interference
30	2 Simple 2 f	2133.5	9	2138	30	In interference

SOLAR RADIO EMISSION
INTERFEROMETRIC OBSERVATIONS

APRIL 1959

Nançay

169 Mc



SOLAR RADIO EMISSION
OUTSTANDING OCCURRENCES
FEBRUARY 1959

BOULDER 167 MC

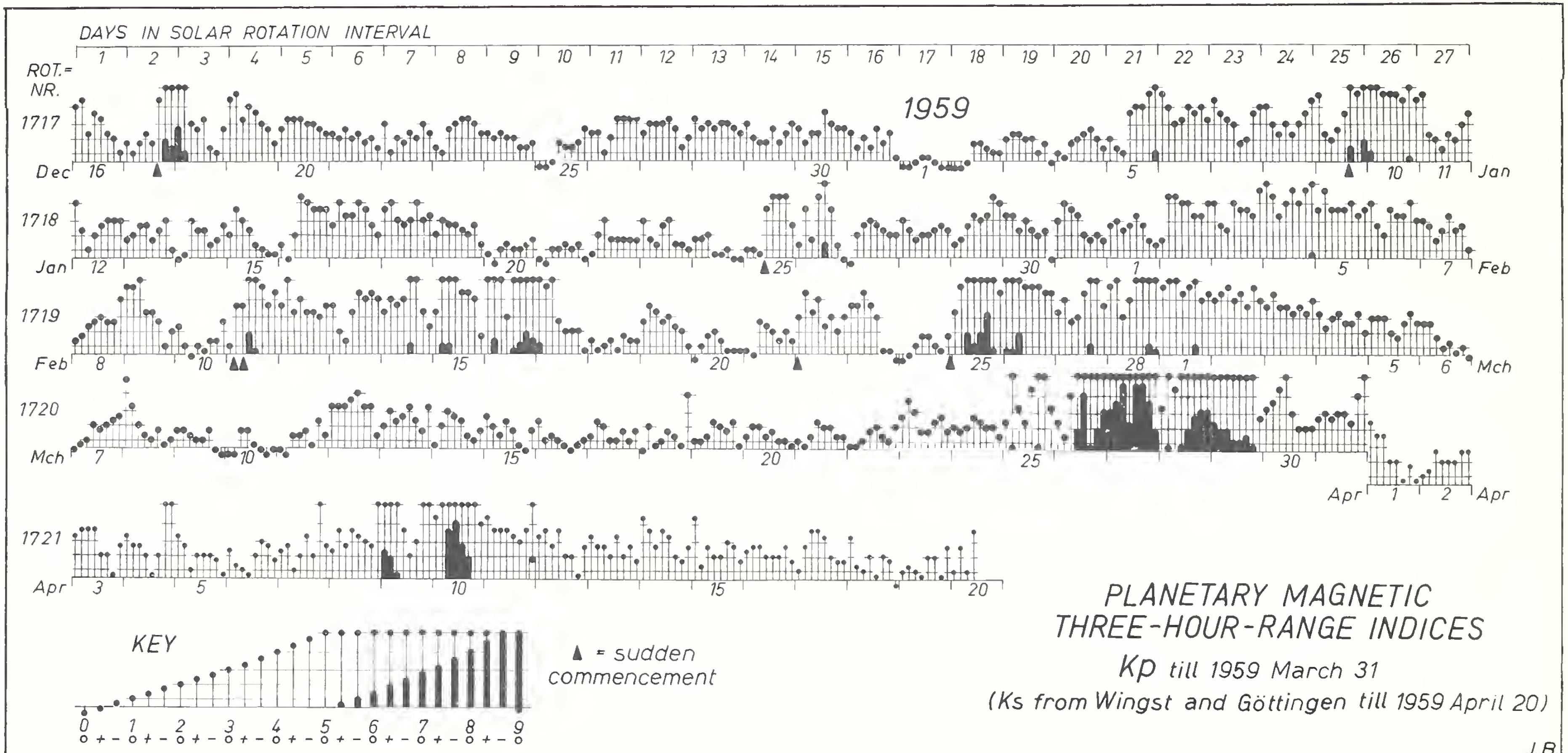
Feb. 1959	Type	Start UT	Time of Maximum UT	Duration Minutes	Intensity
2	3	1854	1855	2	3
2	3	1858	1858	.2	2
2	3	1902	1902	.2	2
2	3	1903	1903	.2	1
2	2	1906	1907	3	2
2	2	1909.5	1910	2	2
2	2	1930.5	1931	5.5	1
2	8	2014	2014.5	8	1
3	2	2353	2355.5	4	3
4	3	2025.5	2025.5	.5	2
5	3	1900.5	1901	.5	1
5	2	1910	1910.5	1	1
5	3	1921.5	1922	.5	1
5	2	1958	1958.7	1	1
5	3	2002	2002	.5	1
5	3	2133.5	2133	.5	1
6	6	1530		522 D	1
6	3	1903.5	1903.5	.5	1
6	2	2006.5	2007	.5	1
6	3	2153	2153	.2	2
6	2	2357.5	2358.5	3.5	2
6	8	2403	2405.5	5	3
7	2	1406	1411	15	2
7	2	1523	1523.5	2	1
7	9A	1615	1620	7.5	3
/	9B	1622.5		37.5	1
7	6	1746		231	1
7	2	1854	1856.5	3	1
7	3	2120	2120	.2	1
7	9	2333.5	2339	8.5	2
8	6	2045		209 D	2
9	6	1402E		615 D	2
9	8	1640	1648	42	3
9	2	1943	1944	5	2
9	3	2032	2032	.5	2
9	3	2102	2102	.5	2
9	3	2344.8	2344.8	.2	2
9	3	2359.5	2359.5	.5	2
9	2	2407	2409	8	2
10	6	1403E		613 D	2
10	3	1404	1404	.2	2
10	3	1410	1412	.2	2
10	3	1413.5	1413.5	.2	2
10	3	1415	1415	.2	2
10	3	1938	1938	.2	2
10	2	2132	2132.5	1.5	2
10	3	2359.8	2359.8	.2	2
10	3	2412	2412	.2	2
11	6	1403B		614 D	2
11	3	1412	1412	.2	2
11	2	1443	1443.5	1	2
11	3	1536	1536	1	2
11	2	1608	1609	2	3
11	2	1614	1616.2	4	2
11	2	1631	1633	3	2
11	3	1754.8	1754.8	.5	2
11	3	1937	1937.5	.8	2
11	3	2413	2413	.2	2
12	6	1400E		618 D	1
12	8	2310	2320	40	3
13	6	1401E		619 D	1
13	2	1509.5	1510.2	1.5	1
13	2	1720	1737	59	2
14	6	1357E		623 D	2
14	3	1401	1401	.5	2
14	3	1406.5	1406.5	.2	2
14	2	1947	1947.5	2	2
14	3	1957.5	1957.5	.2	2
14	3	2203	2203	.2	2
14	2	2222	2224	3	2
15	6	1356E		630 D	2
15	3	1619	1619	.2	2
15	2	2202.5	2202.5	1.5	2
16	6	1355E		628 D	1
16	3	1634	1634.6	1	2
16	2	2301	2301.5	1	2
17	6	1352E		632 D	1
17	2	1602.5	1606.5	8.5	1
17	2	1804.6	1805	2.4	2
17	2	1910.5	1911	2.5	1
17	3	2228.5	2225.5	1	1
17	8	*2418.5	2420.5	4.5	2
18	3	1803.5	1803.8	1	1
18	3	2343	2343	2	2
19	6	2030		123	1
19	2	2059	2059	1	2
20	9A	1750.5	1752.5	3	2
20	9B	1753.5	1817	144.5	1
20	3	2022	2022.5	1	2
20	3	2313	2313.4	1	3
21	3	2006	2006	1	2
21	3	2314	2314	1	3
22	3	1850.3	1850.3	.2	1
22	3	2014.5	2014.5	.5	1
22	3	2143	2143	1	2
23	3	1824	1824	1	2
24	2	1442	1443	2	2
24	2	1850	1851	1.5	2
25	2	1423	1425	2.5	2
25	2	1442	1442.5	1	2
25	2	1445	1446	3	2
25	3	1639	1639	.5	2
25	3	2016.8	2016.8	.2	2
26	3	1453	1453.5	1	1
26	2	2314	2315.5	2	2
28	2	**1338.6E	1345	11.4 D	2
28	3	1406.5	1407	1	2

*On sunset pattern
**On sunrise pattern

GEOMAGNETIC ACTIVITY INDICES

MARCH 1959

Mar. 1959	C	Values Kp Three hour Gr. interval 1	2	3	4	5	6	7	8	Sum	Ap	Final Selected Days
1	1.4	5-	5o	5o	4+	5-	6-	4o	4+	38-	42	Five
2	1.2	4o	4+	5-	4o	4+	4-	5-	4o	34-	31	Quiet
3	1.1	4-	4+	4-	4-	3+	4-	3+	4o	30-	23	
4	0.9	3+	2+	3o	3+	3-	3-	3+	2o	23-	14	9
5	0.8	3o	3o	3o	2o	2-	3-	3+	3-	21+	12	10
												11
6	0.1	3-	3-	2-	1o	1+	1-	1o	0+	11+	6	16
7	0.4	0+	1-	1o	2o	2-	2o	2+	3-	13-	6	22
8	0.6	5-	3+	2o	1+	1o	2-	1-	1o	16-	11	
9	0.1	2-	2-	1+	1o	1o	2-	0+	0o	9-	4	
10	0.1	0o	0o	2-	2-	1-	0+	0o	0+	5-	2	
11	0.2	0+	0o	1+	1+	2-	1-	2+	1+	9o	4	Five
12	1.0	3+	3+	3+	4-	4o	3+	3+	1+	26-	18	Disturbed
13	0.7	2o	3o	2+	3-	3+	2+	2-	3+	21-	12	
14	0.4	1-	2o	3o	3-	2+	1+	1o	2-	15-	8	1
15	0.2	3-	2o	1+	2+	2-	1-	0+	2-	13-	6	26
												27
16	0.1	2+	1o	1+	1o	1-	0+	1-	1o	8+	4	28
17	0.2	1+	2+	2o	1o	1o	2-	1o	2-	12o	6	29
18	0.4	0+	2o	1-	1o	2-	1+	1-	4o	12-	7	
19	0.2	1o	1o	1+	2+	2o	2-	2+	1-	12+	6	
20	0.1	1+	2o	2o	1+	2-	1o	1o	1-	11o	5	
21	0.2	1o	1-	1+	2+	2o	2o	1+	1+	12o	6	Ten
22	0.2	1-	1-	1o	2-	2o	1+	1o	2o	10+	5	Quiet
23	0.7	3-	4-	3o	2-	2-	2+	3-	2-	19+	11	
24	0.5	2o	2-	2o	3-	2+	2o	2o	1+	16o	8	6
25	1.3	2+	5+	3+	2+	4+	5+	5o	3+	31+	31	9
												10
26	1.8	2+	1+	4o	6+	8o	5+	6+	7+	41o	81	11
27	1.9	7+	8-	8+	7-	8+	8+	8-	6+	61-	178	16
28	1.8	3+	5+	4+	5+	6+	7o	7+	7+	46+	87	17
29	1.6	7-	6+	6+	6-	6-	6o	5+	3-	45-	73	19
30	1.1	3+	4-	4+	5o	3o	2o	2o	2o	25+	20	20
31	1.0	3-	3o	3-	3o	3o	2+	4o	5o	26-	19	21
												22
Mean:	0.72									Mean:	24	


DAYS IN SOLAR ROTATION INTERVAL
ROT.= NR.
1717
1718
1719
1720
1721
1959
KEY
▲ = sudden commencement
PLANETARY MAGNETIC
THREE-HOUR-RANGE INDICES
Kp till 1959 March 31
(Ks from Wingst and Göttingen till 1959 April 20)
J.B.

CRPL RADIO PROPAGATION QUALITY FIGURES AND FORECASTS

NORTH ATLANTIC

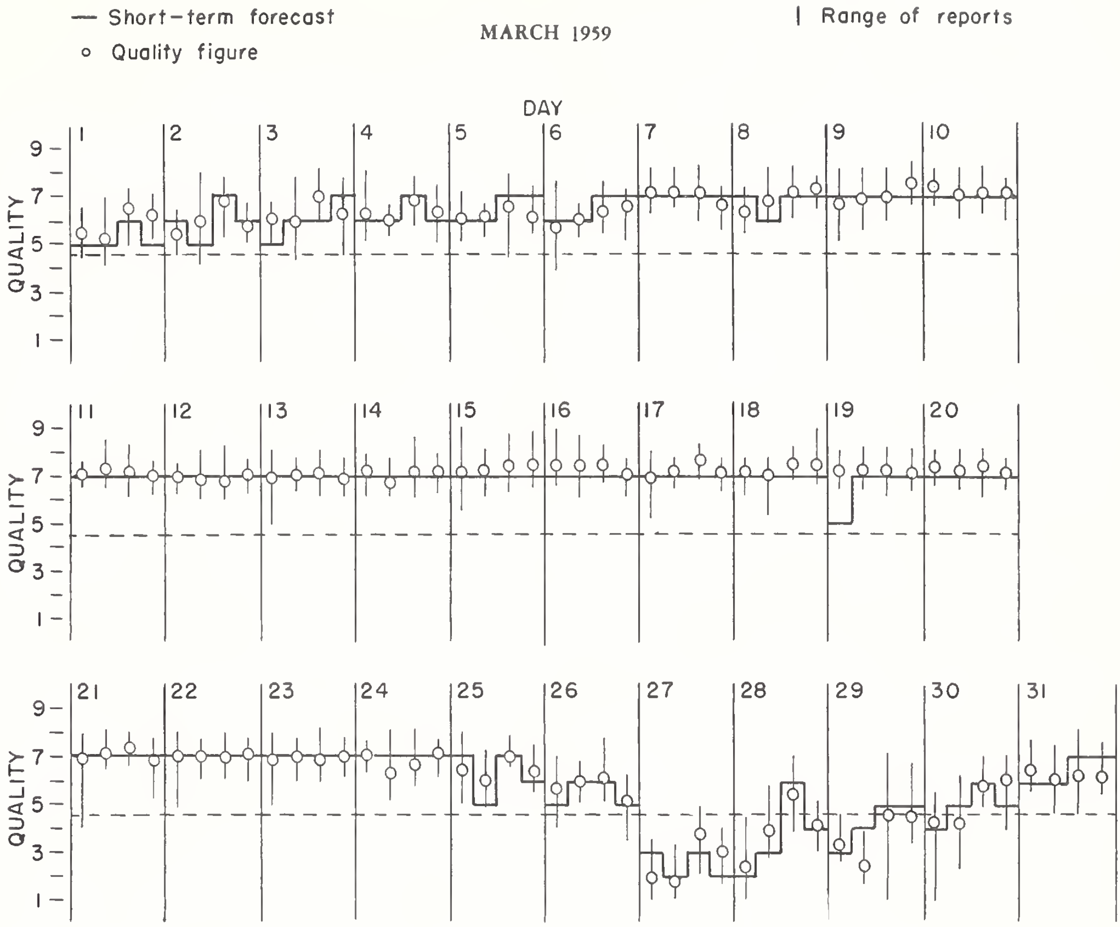
MARCH 1959

Mar. 1959	North Atlantic 6-hourly quality figures				Short-term forecasts issued about one hour in advance of:				Whole day quality 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 (1)	Day (2)
1	5+	5o	6+	6+	5	5	6	5	6-	7			7	(4)	(4)
2	5+	6o	7o	6o	6	5	7	6	6o	7			7	(4)	3
3	6o	6o	7o	6+	5	6	6	7	6+	7			7	(4)	3
4	6+	6o	7-	6+	6	6	7	6	6+	7			7	2	2
5	6o	6+	7-	7-	6	6	7	7	6+	6			6	3	2
6	6+	7-	7o	7o	6	6	7	7	7-	7			7	2	0
7	7o	7+	7o	7-	7	7	7	7	7o	7			7	1	1
8	6+	7o	7+	7+	7	6	7	7	7o	7			7	2	1
9	7-	7o	7o	8-	7	7	7	7	7o	7			7	1	0
10	7+	7o	7+	7+	7	7	7	7	7+	7			7	0	0
11	7+	7+	7+	7o	7	7	7	7	7+	7			7	0	2
12	7o	7o	7o	7o	7	7	7	7	7o	7			7	3	3
13	7o	7o	7+	7o	7	7	7	7	7o	7			7	2	3
14	7+	7-	7+	7+	7	7	7	7	7+	7			7	2	2
15	7+	7+	8-	8-	7	7	7	7	7+	7			7	2	1
16	8-	7+	8-	7+	7	7	7	7	7+	7			7	1	1
17	7o	7+	8-	7+	7	7	7	7	7+	7			7	2	1
18	7+	7o	8-	8-	7	7	7	7	7+	7			7	1	2
19	7+	7+	7+	7+	5	7	7	7	7+	7			7	1	2
20	7+	7+	7+	7+	7	7	7	7	7+	7			7	1	1
21	7o	7+	7+	7o	7	7	7	7	7+	7			7	1	2
22	7o	7o	7o	7+	7	7	7	7	7o	7			7	1	2
23	7o	7o	7o	7o	7	7	7	7	7o	7			7	3	2
24	7o	6+	7-	7+	7	7	7	7	7o	7			7	2	2
25	7-	6+	7o	7-	7	5	7	6	7-	7			7	3	(5)
26	6-	6o	6+	5+	5	6	6	5	6-	6			6	3	(6)
27	2o	2-	4-	3o	3	2	3	2	(3-)	3	3		6	(7)	(6)
28	2+	4o	6-	4+	2	3	6	4	(4-)	5	5		7	(4)	(6)
29	3+	3-	5-	5-	3	4	5	5	(3+)	7	7		7	(5)	(4)
30	4+	4+	6o	6+	4	5	6	5	5o	7	7		7	(4)	2
31	7-	6o	6+	6+	6	6	7	7	6+	7	7		7	3	3
Score: Quiet Periods				P	20	22	24	21		22					
				S	6	5	6	8		5					
				U	1	0	0	0		1					
				F	0	0	0	0		0					
Disturbed Periods				P	3	1	0	1		1					
				S	1	3	1	1		1					
				U	0	0	0	0		0					
				F	0	0	0	0		1					

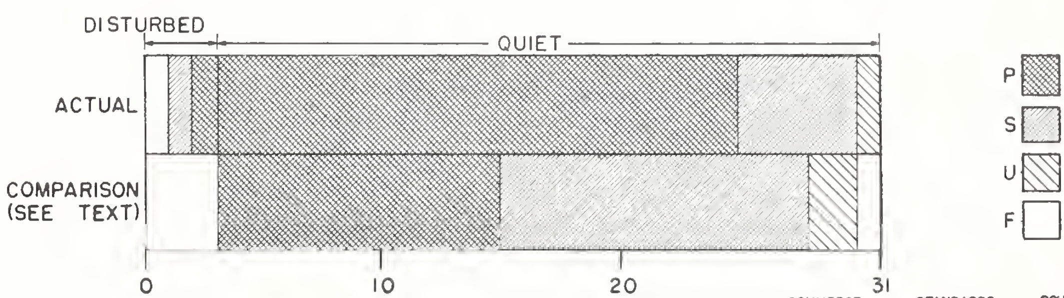
( ) represent disturbed values.

NORTH ATLANTIC

MARCH 1959



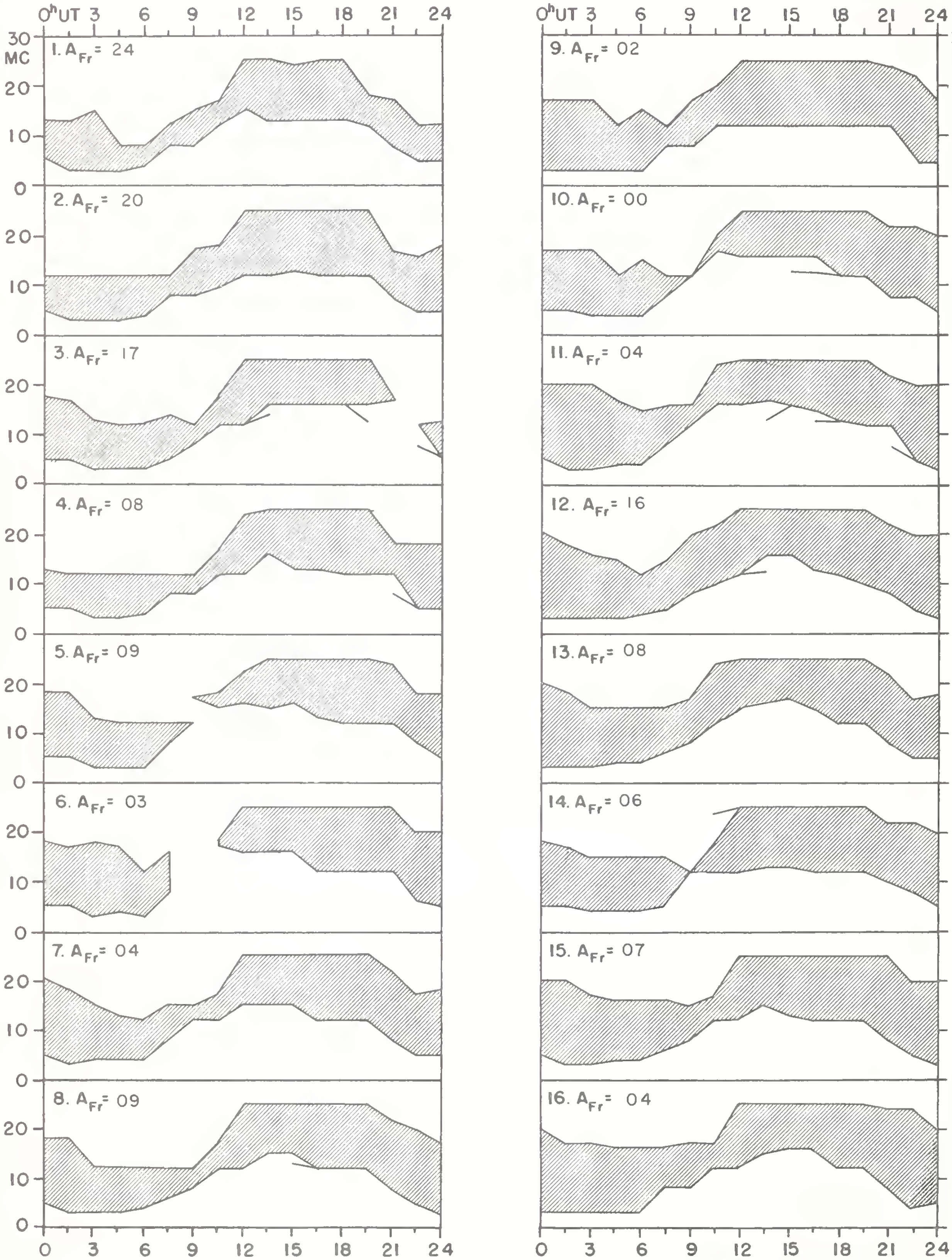
OUTCOME OF ADVANCED FORECASTS FINAL ESTIMATE



COMMERCE - STANDARDS - BOULDER

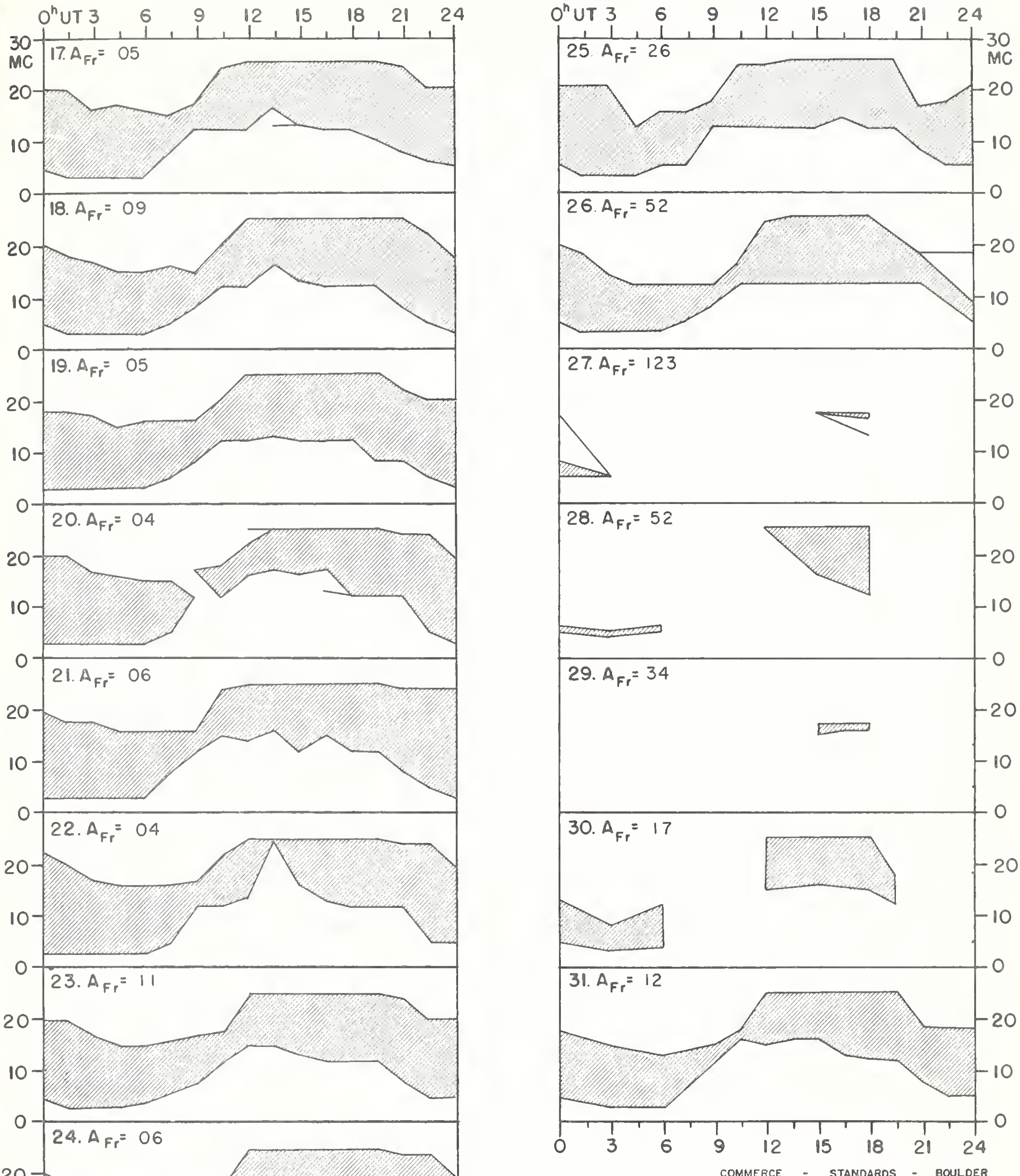
USEFUL FREQUENCY RANGES -- NORTH ATLANTIC PATH

MARCH 1959



COMMERCE - STANDARDS - BOULDER

MARCH 1959



Adapted from Observations by Deutsches Bundespost

NORTH PACIFIC

MARCH 1959

Mar. 1959	North Pacific 8-hourly quality figures			Short-term forecasts issued at			Whole day index	Advance forecasts (Jp reports) for whole day; issued in advance by:				Geomagnetic K_{Si}	
	03 to 11	11 to 19	19 to 03	02	10	18		1-7 days Final	1-7 days Jps	1-7 days SDW	1-7 days Jp	Half (1)	Day (2)
1	5	3	6	5	4	4	(4)	6			6	(5)	(5)
2	6	4	5	5	4	6	5	6			6	(4)	(4)
3	6	6	6	6	5	5	6	6			6	(4)	(4)
4	7	6	7	6	6	5	7	6			6	3	3
5	6	6	7	6	6	6	7	6			6	2	2
6	6	6	7	6	6	6	7	6			6	1	0
7	5	6	7	6	6	6	6	6			6	1	2
8	6	6	7	6	6	6	7	6			6	2	1
9	7	6	6	6	6	6	7	6			6	1	1
10	7	6	6	6	7	7	7	5			5	0	0
11	6	6	7	7	7	7	7	5			5	1	2
12	7	6	6	6	7	6	6	6			6	3	3
13	6	6	6	6	6	7	6	6			6	2	2
14	6	6	6	6	6	7	6	6			6	2	2

Mar. 1959	0700 to 1900	1900 to 0700	0600	1800	Whole day index	1-7 days Final	1-7 days Jps	1-7 days SDW	1-7 days Jp	Half (1)	Day (2)
15	6	7	6	7	6	6			6	2	1
16	6	6	6	6	7	6			6	1	0
17	6	7	7	6	7	6			6	1	1
18	6	7	6	6	6	6			6	1	2
19	6	7	7	7	7	5			5	1	2
20	6	7	7	7	7	5			5	1	1
21	7	7	7	7	7	6			6	1	1
22	7	8	7	7	7	6			6	0	1
23	6	7	7	6	7	6			6	2	2
24	6	7	6	7	6	6			6	2	2
25	6	6	6	6	6	6			6	3	(4)
26	5	4	6	5	5	5			5	3	(6)
27	2	2	3	3	(2)	5			5	(8)	(7)
28	3	4	3	4	(4)	6			6	(5)	(7)
29	3	6	3	3	(4)	6			6	(6)	(5)
30	5	6	5	6	6	6			6	(4)	2
31	6	5	6	5	6	6			6	3	3

Score:		March 1-14 0200	1000	1800	Final	March 15-31 0600	1800	Final
Quiet Periods	P	7	8	3	6	9	9	7
	S	7	4	9	5	5	4	5
	U	0	0	1	2	0	0	2
	F	0	0	1	0	0	1	0
Disturbed Periods	P	0	1	0	0	2	1	0
	S	0	1	0	0	1	2	0
	U	0	0	0	0	0	0	0
	F	0	0	0	1	0	0	3

COMMERCE - STANDARDS - BOULDER

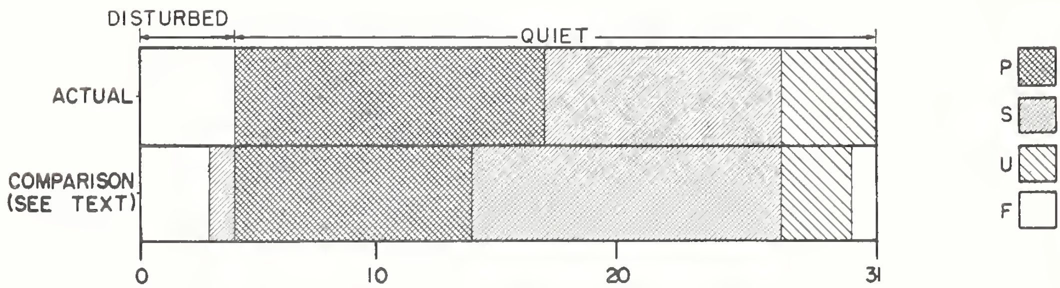
Note: The short-term forecast schedule was changed March 15, the forecast now being issued daily at 0600 and 1800 UT rather than at 0200, 1000, and 1800 UT.

( ) Represent disturbed values.

NORTH PACIFIC

FEBRUARY 1959

OUTCOME OF ADVANCED FORECASTS FINAL ESTIMATE



ALERT PERIODS AND SPECIAL WORLD INTERVALS

INTERNATIONAL GEOPHYSICAL COOPERATION 1959

Issued Day/Time UT Apr. 1959	Advance Geophysical Alert	No.	Worldwide Geophysical Alert	Special World Interval
6/0230	Climax Solar Flare 06/0015Z			
9/2130	Ft. Belvoir Magnetic Storm 09/1827Z			
10/1600		8	Magnetic Storm 09/1827Z	Start Special World Interval
11/1600		9		Finish Special World Interval
23/1700	Ft. Belvoir Magnetic Storm 23/1036Z			