PART B

SOLAR - GEOPHYSICAL DATA

ISSUED
APRIL 1957

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

CRPL-F152
PART B

NATIONAL BUREAU OF STANDARDS
CENTRAL RADIO PROPAGATION LABORATORY
BOULDER, COLORADO

Issued
30 Apr. 1957

SOLAR - GEOPHYSICAL DATA

CONTENTS

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 edited by Miss J. V. Lincoln of the Sun-Earth Relationships Section.

I DAILY SOLAR INDICES

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

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

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

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

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

II SOLAR CENTERS OF ACTIVITY

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

The table gives the heliographic coordinates of each center (taken as the calcium plage unless two or more significantly and individually active sunspot groups are included in an extended plage) in terms of the Greenwich date of passage of the sun's central meridian (CMP) and the latitude; the serial number of the plage as assigned by McMath-Hulbert Observatory; the serial number of the center in the previous solar rotation, if it is a persisting region; particulars of the plage at CMP: area, central intensity; a summary of the development of the plage during the current transit of the disk, where b = born on disk, 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 and the Mt. Wilson Observatory. The sunspot data are compiled from reports from the U. S. Naval Observatory, Mt. Wilson Observatory, and from reports from Europe and Japan received through the daily Ursigram messages.

Coronal Line Emission Indices -- In the table are summarized solar coronal emission intensity indices for the green (Fe XIV at 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 continum of the center of the solar disk (at the same wavelength as the line) that would contain the same energy as the observed coronal line. The indices have the following meanings:

G_6 = mean of six highest line intensities in quadrant for λ5303.

R_6 = same for λ6374.

G_1 = highest value of intensity in quadrant, for λ5303.

R_1 = same for λ6374.

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 of 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: Mt. Wilson, McMath-Hulbert, U. S. Naval, Wendelstein, Sacramento Peak, Mitaka, and Swedish Astrophysical Station on Capri. The remainder report through the URSIgram centers in Europe. Observations are in the light of the center of the H-alpha line unless noted otherwise. The reports from Sacramento Peak, New Mexico (communicated to CRPL by the High Altitude Observatory at Boulder) are from observations at the USAF Upper Air Research Observatory at Sunspot, New Mexico, by Harvard University observers, under contract AF 19(604)-146.

For each flare are listed the reporting observatory, date, times of beginning and ending of observing period (b or a preceding the number denotes true start or end of flare unknown), duration of flare (when known), total area in millionths of visible disk (Sacramento Peak uncorrected for foreshortening; Swedish Astrophysical Station corrected for foreshortening), the McMath serial number of the region with which the flare is associated, the heliographic coordinates in degrees, the time of maximum phase, maximum intensity of flare, fractional area having nearly maximum brightness, and finally the flare importance on the IAU scale of 1- to 3+. 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.

Ionospheric Effects -- SID (and GID--gradual ionospheric disturbances) may be detected in a number of ways: short wave fadeouts, enhancement of low frequency atmospherics, increases in cosmic absorption, and so forth. The table lists events that have been recognized on field strength recordings of distant high-frequency radio transmissions. Under a coordinated program, the staffs at the following ionospheric sounding stations contribute reports that are screened and synthesized at CRPL-Boulder: Puerto Rico, Ft. Belvoir, Va., and Anchorage, Alaska (CRPL Stations: PR, BE, AN); Huancayo, Peru, and College, Alaska (CRPL-Associated Laboratories: HU, CO); and White Sands, N. Mex., Adak, Alaska, and Okinawa (U. S. Signal Corps Stations: WS, AD, OK). McMath-Hulbert Observatory (MC) also contributes such reports. In addition, reports are volunteered by RCA Communications Inc., Marconi Wireless, Netherlands Postal and Telecommunications Services, Swedish Telecommunications, and others; these usually specify times of SID and the radio paths involved.

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

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

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

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

IV SOLAR RADIO WAVES

2800 Mc Observations

The data on solar radio wave events made in Ottawa, Canada by the Radio and Electrical Engineering Division of the National Research Council 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. These classifications are described by Dodson, Hedeman and Covington, Ap. J. 119, 541, 1954:

1 - Single -- Any one burst without reference to structure, but usually applied to bursts of short duration and with intensity only a few times receiver noise.

2 - Single-simple -- A single burst with only one maximum.

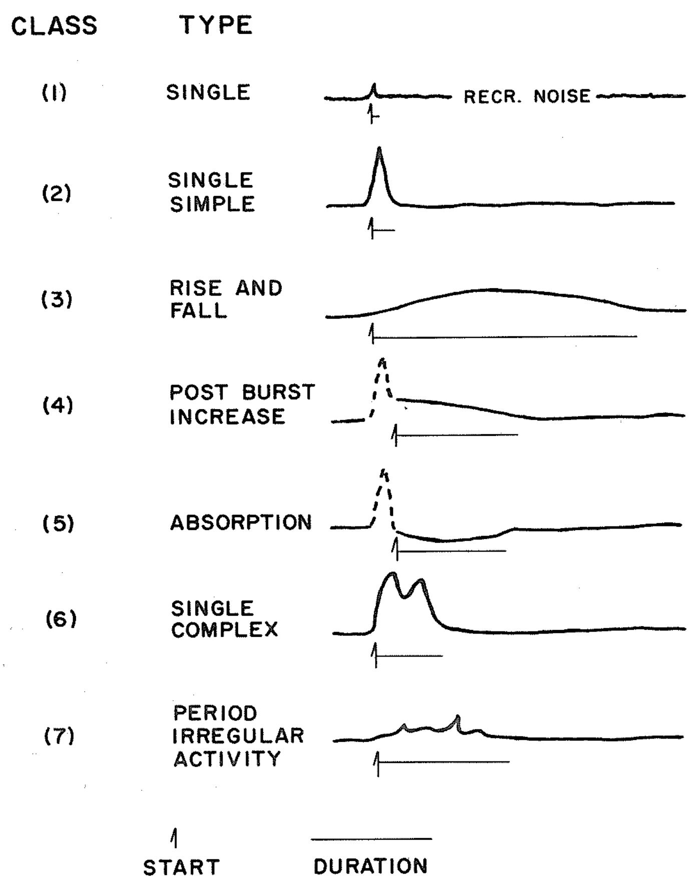
3 - Rise and fall -- A distinct, but less sudden, increase in flux than the usual burst. It may last from tens of minutes to several hours. These events range from large distinct features on the records to tiny bursts, only a few times receiver noise.

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 - Single complex -- A single burst which shows two or more comparable maxima before the activity has declined to zero.

7 - Period of irregular activity.



200 Mc Observations

Data on solar radio waves made at Cornell University, Ithaca, N.Y. on 201.5 Mc are presented. All times are in Universal Time (UT or GCT). The half width of the antenna lobe is appreciably greater than the solar disk. The flux reported is that contained in one linear component.

3-hourly Flux -- The mean of the three hourly flux measurements is given in terms of KTB where the quiet sun level equals 1.40 KTB.

The variability index is as described for 167 Mc and 460 Mc observations.

Outstanding Events -- A separate table lists the outstanding occurrences classified according to the same system as used for 167 Mc and 460 Mc observations.

167 Mc and 460 Mc Observations

Data on solar radio waves are from observations at 167 Mc and 460 Mc made at the Gunbarrel Hill (Boulder) station of the National Bureau of Standards. The half-width of the antenna lobe is appreciably greater than the solar disk. Polarization has not been determined. All times are in Universal Time (UT or GCT); when the observing period extends slightly into the next Greenwich day, the time scale is extended beyond 24 hours.

3-hourly and Daily Flux -- Flux is given in power units. These units are approximately 10^{-22} watt meter^{-2}(c/s)$^{-1}$ for both polarizations together. They will be subject to a correction factor when gain measurements of the antenna have been made. The median flux is measured for every one-hour period that contains a usable calibration and at least thirty minutes of usable record. A three-hour value of flux is obtained by averaging the available one-hour medians (at least two required). A daily value of flux is obtained by averaging all available one-hour medians (at least 4 required). A dash indicates that insufficient measurements were made to meet the above requirements or that the records were not of usable quality. Parentheses indicate that the value is somewhat doubtful because of atmospheric noise or local interference.

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

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

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

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

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

For the purpose of the variability index, an excursion whose maximum intensity is M times the median level is counted as M excursions. A dash is used to indicate that measurements were made for less than one hour during the period. Parentheses surround variability indices which are in doubt because of atmospheric noise or local interference.

Outstanding Events -- A separate table lists the occurrences that are not adequately described by the three-hourly values of median flux and variability. These are classified in general accordance with the system described and illustrated by Dodson, Hedeman, and Owren (Ap. J. 118, 169, 1953). The categories of events are identified in the table by numbers, which do not necessarily indicate the magnitude of the event:

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.

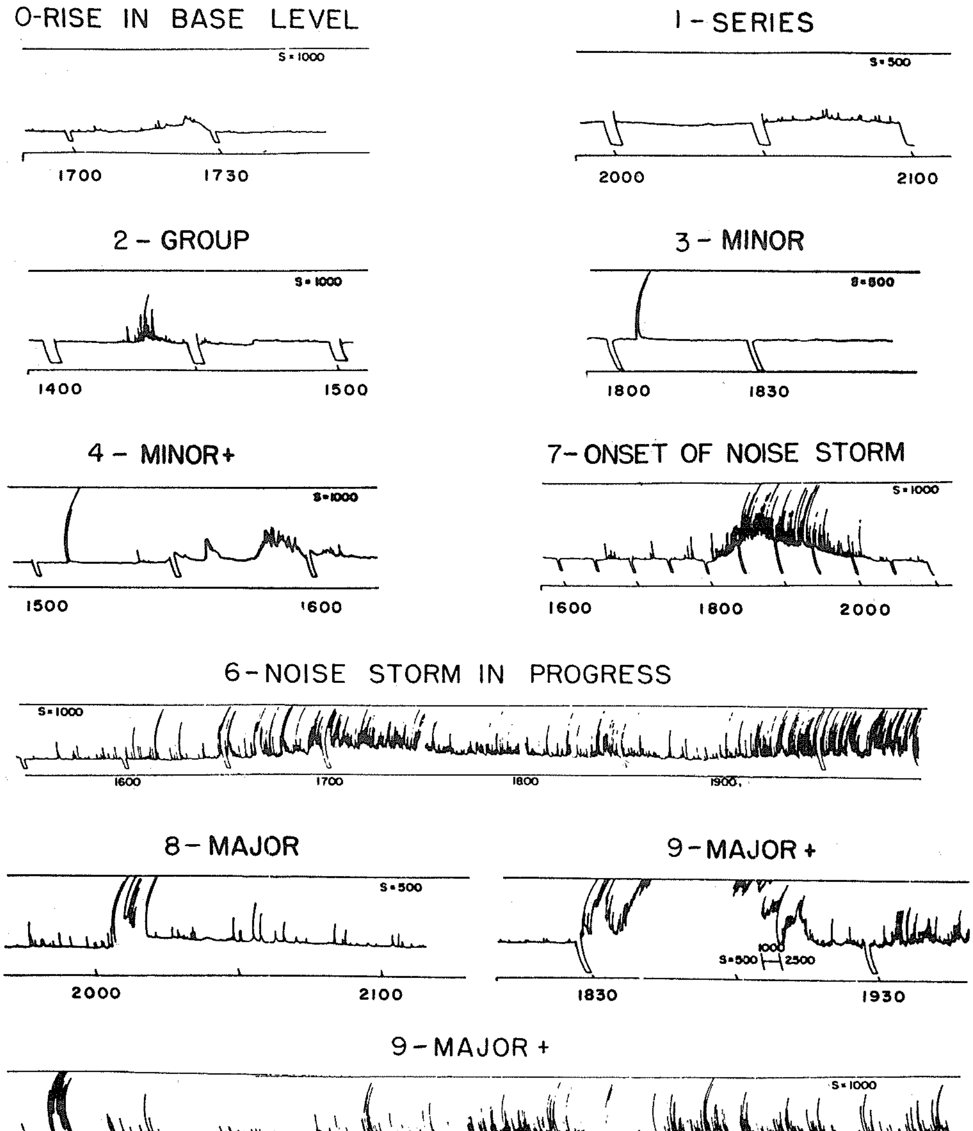
4 - Minor burst and second part -- A double rise in flux in which the early rise is a minor burst.

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.

9 - Major burst and second part -- A double rise in flux, the first part of which is a major burst. The second part may consist of a rise in base level, a group or series of bursts, or the onset of a noise storm.



Starting times and durations are enclosed in parentheses when they are limited by the period of observation. The maximum instantaneous flux (Inst. Flux) is measured from the sky level as are the hourly medians. The maximum smoothed flux (Smd. Flux) is that obtained by taking the difference of the maximum value of a smooth curve drawn through the outstanding occurrence with a smoothing period of 20 percent to 50 percent of the total duration, and the value of the interpolated hourly median at that same time had the event not occurred, both measured from the sky level.

V GEOMAGNETIC ACTIVITY INDICES

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

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

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

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

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

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

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 transmitted signal. The indices given here are derived from monitoring and circuit performance reports, and are the nearest practical approximation to the ideal index of propagation quality.

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

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

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

P - forecast quality equal to observed

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

S - forecast quality one grade different from observed

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

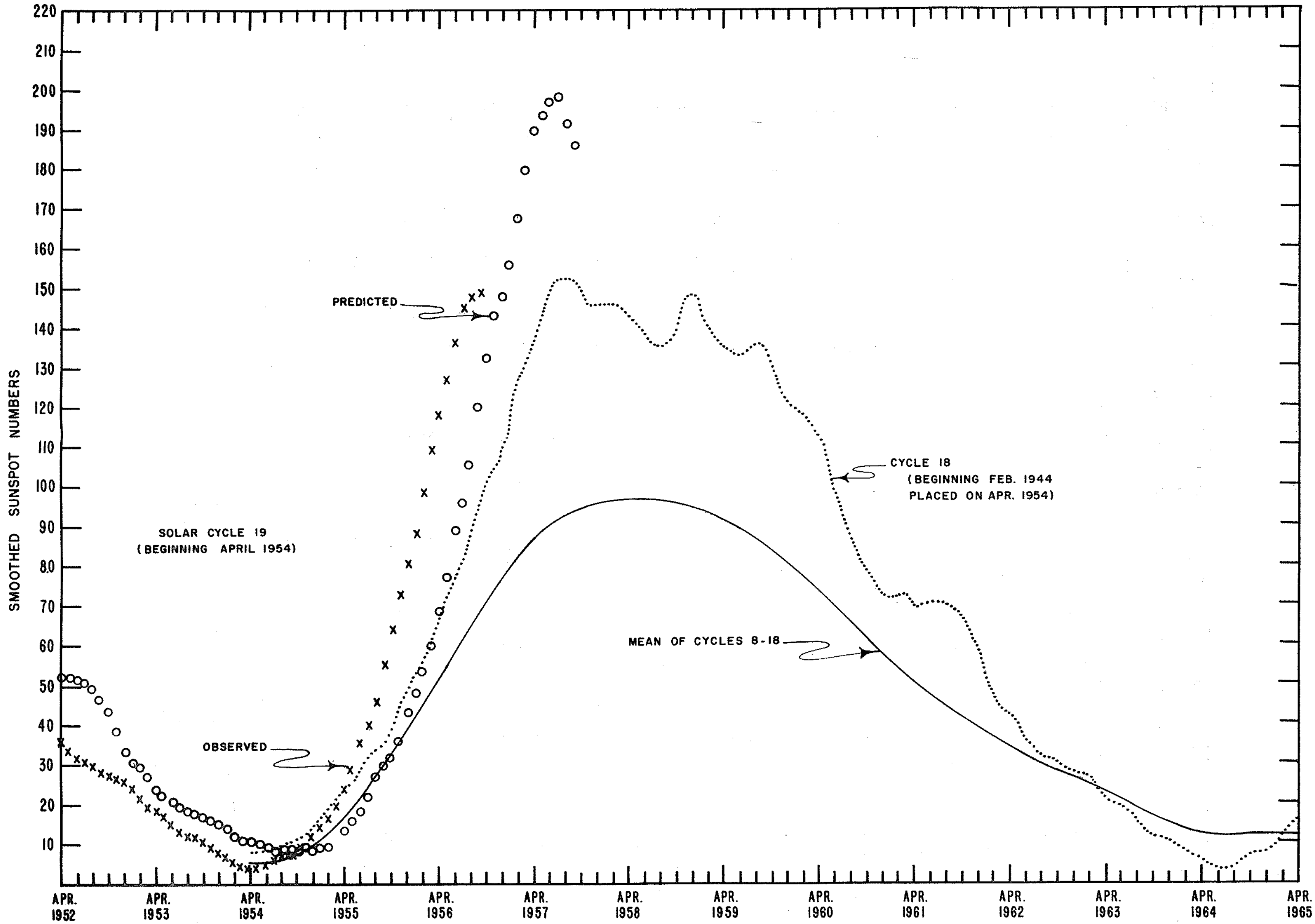
The chart compares the outcome of advance forecasts, on the same basis as the similar chart for the North Atlantic Radio Path.

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

DAILY SOLAR INDICES

Feb. 1957 Date	American Relative Sunspot Numbers R_A'
1	68
2	58
3	70
4	106
5	84
6	102
7	104
8	126
9	150
10	119
11	98
12	108
13	103
14	114
15	143
16	136
17	121
18	121
19	99
20	92
21	97
22	123
23	98
24	116
25	116
26	102
27	106
28	121
Mean:	107.2

Mar. 1957 Date	Zürich Provisional Relative Sunspot Numbers R_Z	Daily Values Solar Flux at 2800 MC, Ottawa, Canada Flux
1	153	186
2	164	182
3	137	179
4	127	177
5	125	180
6	146	180
7	146	195
8	143	198
9	180	197
10	186	199
11	210	216
12	224	209
13	228	214
14	164	200
15	161	198
16	146	201
17	155	200
18	148	197
19	150	193
20	110	195
21	128	198
22	137	202
23	152	203
24	145	196
25	160	198
26	171	193
27	154	215
28	146	198
29	154	209
30	172	195
31	145	201
Mean:	157.0	196.9



PREDICTED AND OBSERVED SUNSPOT NUMBERS

CALCIUM PLAGE AND SUNSPOT REGIONS

MARCH 1957

CMP Mar. 1957	Lat.	McMath Plage Number	Return of Region	Calcium Plage Data: CMP Area	Values Int.	History	Age	Sunspot Data: CMP Area	Values Count	History
01.1	S15	3868	New	600	3	b ⌐ ℓ	1	190	9	b ∧ ℓ
02.2	S08	3870	New	300	1.5	ℓ \ d	1			
02.5	S32	3869	New	2200	2	ℓ − ℓ	1			
02.5	N22	3874	New	1000	3	b ⌐ ℓ	1	490	9	b ¬ ℓ
03.4	S19	3872	3838	6700	2.5	ℓ − ℓ	5	20	5	ℓ − ℓ
05.6	S12	3873	New	3000	2.5	ℓ └ ℓ	1	60	1	ℓ − d
06.1	N32	3875	3845	2400	3	ℓ − ℓ	2	290	4	ℓ ¬ d
06.5	N14	3877	New	400	2	ℓ \ d	1			
07.1	S22	3876	3843	5000	3	ℓ − ℓ	2	240	2	ℓ − ℓ
10.0	S26	3879	3844	1800	2.5	ℓ − ℓ	2	70	2	
11.6	N31	3880	New	1000	2	ℓ ¬ d	1			
11.6	S08	3882	3860	1200	2	ℓ − ℓ	2	(50a)	-	ℓ − d
12.0	S23	3881	3847	6000	3	ℓ − ℓ	2	390	23	ℓ \ d
12.7	N16	3883	3848	2600	3	ℓ − ℓ	4	120	10	ℓ \ d
13.6	S20	3884	3849	7000	3	ℓ − ℓ	5	170	16	ℓ └ d
14.9	N15	3885	3857	300	2.5	ℓ ∨ ℓ	2	(20)	(1)	b − ℓ
15.3	S07	3887	New	(500)	(2)	ℓ \ d	1			
16.1	S37	3886	New	1900	3	ℓ − ℓ	1	130	4	ℓ ¬ d
16.3	S22	3888*	3853	4100	3	ℓ / ℓ	6	1010	20	ℓ ⌐ ℓ 5.5 / 16
16.6	N16	3889	3854	1800	3	ℓ − ℓ	5	110	7	ℓ − d
18.0	N13	3891*	3856	2500	3	ℓ − ℓ	5	60	1	ℓ ∨ ℓ
18.8	S22	3892	3855	3200	3	ℓ − ℓ	2	450	11	ℓ ∧ ℓ
20.0	N27	3893	3858	1500	2	ℓ − ℓ	5			
20.7	S25	3894	3859	800	1.5	ℓ − d	3			
21.7	N33	3895	New	1400	2	ℓ − ℓ	1	160	1	ℓ \ d
21.9	N18	3903	New	300	2	b − d	1			
22.1	S37	3896	New	700	1.5	ℓ − d	1			
23.7	S15	3897	3861	5000	3.5	ℓ − ℓ	2	730	21	ℓ ¬ ℓ
24.3	N18	3898	3863	1000	2.5	ℓ − ℓ	2			
25.4	N27	3900	3865	1800	3	ℓ − ℓ	2	40	4	b − d
25.6	N39	3904	New	1000	3	b − ℓ	1	150	1	b ¬ d
26.1	S14	3899	New	5500	3.5	ℓ − ℓ	1	1620	17	ℓ − ℓ 5 -20.5 -9.5
26.7	N28	3908	New	300	1	b / ℓ	1	(290)	(11)	b / ℓ
27.9	S18	3901	3868	1300	2	ℓ − ℓ	2	(30)	(2)	ℓ − d
28.6	N33	3905	3866	900	3	ℓ − ℓ	2	60	4	ℓ ¬ d
28.6	N11	3906	New	1500	2	ℓ ∨ ℓ	1	90	2	ℓ \ d
30.1	N20	3909	3874	3700	3	ℓ / ℓ	2	540	9	b ⌐ ℓ
30.2	S19	3907	3872	3700	3	ℓ − ℓ	6	40	6	b _/ ℓ**

* Resurgence of activity.
( ) Values extrapolated several days to CMP.
** Spot region showed sudden growth; 31 March, area = 70, Count = 2; 01 April, area = 630, count = 7.

CORONAL LINE EMISSION INDICES

MARCH 1957

CMP Mar. 1957	North East Quadrant (observed 7 days earlier)				South East Quadrant (observed 7 days earlier)				South West Quadrant (observed 7 days later)				North West Quadrant (observed 7 days later)			
	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	83	98	22	40	101	129	14	20
2	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
3	57	83	X	X	163	230	X	X	X	X	X	X	X	X	X	X
4	46	73	30	60	96	132	51	116	94	102	39	116	78	106	27	51
5	40	52	28	58	105	148	48	70	94[a]	116[a]	46[a]	76[a]	62[a]	114[a]	42[a]	64[a]
6	65	88	30	41	179	188	82	103	149	220	32	82	70	160	20	24
7	23	32	21	30	90	128	28	48	173	225	48	66	38	52	28	36
8	43	64	24	28	83	120	48	60	126	179	29	40	34	38	22	27
9	39	48	10	32	174	236	49	98	X	X	X	X	X	X	X	X
10	X	X	X	X	X	X	X	X	101	118	60	95	63	80	22	52
11	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
12	X	X	X	X	X	X	X	X	276*	340	36	101	157	262	38	99
13	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
14	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
15	69	96	12	18	105	120	16	25	X	X	X	X	X	X	X	X
16	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
17	X	X	X	X	X	X	X	X	121	136	47	82	95	140	17	35
18	153	172	16	30	125	184	39	88	110	126	X	X	78	110	X	X
19	85[a]	94[a]	23[a]	36[a]	107[a]	144[a]	44[a]	59[a]	108	160	32	80	81	110	16	25
20	89	104	8	12	90	104	12	14	87	163	34	69	78	116	19	28
21	62	104	11	22	59	80	23	46	X	X	X	X	X	X	X	X
22	147	190	16	25	104	130	26	48	X	X	X	X	X	X	X	X
23	X	X	X	X	X	X	X	X	108	172	34	80	73	94	26	44
24	90	174	35	55	104	170	63	84	100	150	38	70	69	122	30	68
25	82[a]	106[a]	34[a]	68[a]	99[a]	140[a]	50[a]	83[a]	X	X	X	X	X	X	X	X
26	173	204	35	63	161	265	61	89	X	X	X	X	X	X	X	X
27	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
28	93	140	30	48	109	172	53	96	X	X	X	X	X	X	X	X
29	X	X	X	X	X	X	X	X	126*	230	30	50	135	200	59	100
30	X	X	X	X	X	X	X	X	79	158	27	52	106*	155	54	98
31	77	102	40	71	124	184	73	145	X	X	X	X	X	X	X	X

a = index computed from low weight data.
* = yellow line observed.

SOLAR FLARES

MARCH 1957

Observatory	Date Mar. 1957	Time Observed Start UT	Time Observed End UT	Duration Min.	Total Area Mill.	McMath Plage Region Number	Approx. Position Lat.	Approx. Position Mer. Dist.	Time Max. Phase UT	Max. Int. Arb.	Rel. Area of Max. Tenths	Importance	Provis. Ionospheric Effect
Mitaka	02	0522	0532	10		3875	N35	E55				1	
McMath	04	1415	1435	20		3876	S22	E40				1+	
Capri-S	06	1215	1346	91	165	3868	S13	W71				1	
S.Peak	08	1940	2012	32	140	3881	S23	E38	1945	17	3	1	
Mitaka	09	b0002	0012	>10		3884	S15	E65				1	G-SWF
Mitaka	09	0414	0424	10		3884	S15	E65				1	
Capri-S	10	0903	0925	22	131	3884	S17	E39				1	
Capri-S	10	1413	1453	40	165	3888	S18	E74				1	
S.Peak	12	1710	1745	35	130	3881	S21	W08	1725	15	9	1	
McMath	12	1710	1800	50		3881	S28	W08				1+	
S.Peak	12	1825	1838	13	36	3888	S21	E39	1830	20	9	1-	
McMath	12	1827	1840	13		3888	S20	E45				1	
S.Peak	12	2155	2220	25	105	3879	S26	W24	2202	15	8	1	
Mitaka	13	b0232	0248	>16		3888	S23	E37				1	
Capri-S	13	1106	1233	90	267	3891	N05	E68				1+	
S.Peak	13	1420	1620	120	228	3888	S20	E40	1435	20	1	2-	
Capri-S	13	1425	1635	130	360	3888	S19	E37				2	
Neder.	13	1428	1523	55		3888	S21	E42				2	
Meudon	13	b1444	1555	>71		3888	S16	E44				2	
McMath	13	2030	2055	25		3881	S26	W20				1+	G-SWF
Capri-S	14	1513	1521	8	125	3892	S23	E57				1	
S.Peak	15	1452	1518	26	100	3892	S26	E41	1458	15	4	1	
Capri-S	18	1029	1040	11	100	3892	S25	E05				1	
Capri-S	20	1127	1141	14	117	3899	S12	E73				1	
Mt.Wilson	20	b2312	2322	>10		3899	S15	E75				1	
Mitaka	24	0221	0231	10		3899	S15	E25				1	
S.Peak	24	1848	1910	22	290	3897	S14	W21	1850	23	6	2	S-SWF
Mitaka	25	b0630	0650	>20		3901	S05	E25				1	
Mitaka	27	b0258	0318	>20		3909	N15	E45				1	
Mitaka	27	0415	0545	90		3909	N15	E25				2	G-SWF
Mitaka	27	b0548	0618	>30		3899	S05	W15				1	Slow S-SWF
Capri-S	27	1109	1136	27	100	3897	S12	W57				1	
S.Peak	27	1500	1530	30	87	3907	S22	E40	1510	14	9	1-	
Capri-S	27	1503	1528	25	233	3907	S16	E31				1	
S.Peak	27	2110	2128	18	165	3905	N36	E14	2115	15	2	1	
Mitaka	28	b0010	0030	>20		3898	N25	W65				1	
Capri-S	28	0725	0747	22	180	3899	S11	W21				1+	
Capri-S	28	1013	1116	63	194	3899	S15	W26				1+	S-SWF
S.Peak	28	1455	1520	25	128	3905	N36	E05	1500	20	6	1	
Capri-S	28	1456	1532	36	165	3905	N34	E08				1+	
Capri-S	28	1548	1607	19	112	3899	S17	W28				1	
S.Peak	28	1548	1608	20	74	3899	S20	W32	1555	18	8	1-	
S.Peak	28	b2307	a2357	>50	370	3907	S16	E18	2330	18	3	2	
Mitaka	29	0548	0558	10		3908	N25	W25				1	
Mitaka	29	b0643	0713	>30		3905	N45	W05				1	
Capri-S	29	0730	0744	14	272	3913	S15	E71				1+	
Capri-S	29	0808	----	--	97	3911	N18	E59				1	
Capri-S	29	1116	1304	108	476	3899	S17	W40				2+	
McMath	29	1744	1753	9		3899	S16	W48				2	
McMath	30	1810	----	--		3900	N25	W70				1	
Capri-S	31	0643	0708	25	112	3899	S08	W62				1+	
McMath	31	1335	----	--		3907	S20	W10				1	

Subflares noted as follows (Date, time (UT), coordinates):

S. Peak: unmarked   Wendel: +++
Capri-S: +   Mitaka: *
McMath : ++

March 01, 1950 (S16,W80)	March 07, 1742 (N18,E65)	March 08, 1210 (S21,E47)+	March 08, b1700 (S13,E46)
2020 (N15,W65)	1855 (S13,W62)	b1510 (S26,E25)	1830 (S22,E79)
2105 (N33,E57)	2107 (N20,W67)	1600 (S16,W76)	2147 (N18,E59)
02, 0706 (N30,W27)+++	08, 0945 (N11,E53)+	1635 (S26,E31)	2250 (N18,E59)

SOLAR FLARES

MARCH 1957

Subflares noted as follows (Date, time (UT), coordinates):

S. Peak: unmarked   Wendel: +++
Capri-S: +   Mitaka: *
McMath : ++

March 09, 0951 (S15,W81)+
1835 (N12,W16)
10, 0708 (S25,W81)+
11, 1442 (N19,E10)
1528 (S24,E90)
1545 (S24,E60)
1600 (S12,W49)
1608 (S18,E22)
2020 (S23,E90)
2148 (S21,E04)
12, 1558 (S38,E43)
2020 (S22,E38)
2152 (S23,E80)
13, 0808 (N16,E39)+
0908 (S19,W04)+
1127 (S23,E37)+
1137 (S35,E36)+
1442 (N15,E36)
1449 (N15,E37)+
1550 (N15,E36)
1628 (S24,E70)
1648 (S24,E70)
1918 (S23,W03)
1920 (S20,E00)++
1940 (N16,E35)

March 14, 1238 (N15,E24)+
1512 (S23,E58)
1635 (N16,E22)
1858 (S24,E57)
1905 (S22,E50)++
15, 1228 (S23,E09)+
1454 (S25,E42)+
1542 (N22,W80)
1550 (S23,E41)
1604 (S25,E41)+
1912 (N32,E80)
16, 0745 (S13,W43)+
0825 (S18,W60)+
1151 (S18,W62)+
1502 (N14,W59)
1545 (S24,E26)
1546 (S26,E28)+
1655 (S17,W69)
17, 0824 (S16,E87)+
1025 (N33,E67)+
1129 (N34,E54)+
1204 (N34,E56)+
1332 (S16,E84)+
1442 (S17,E80)
1555 (S16,E80)

March 17, 1558 (S16,E83)+
1615 (S19,W75)
1715 (S16,E78)
1852 (S24,E05)
2210 (N34,E45)
2320 (N35,E63)
18, 1548 (S25,E02)+
20, 1138 (S16,E52)+
21, 1304 (S15,E27)+
1810 (N14,W54)
1838 (N15,W55)
1940 (N10,W57)
b2032 (S18,W80)
2038 (N10,E90)
2215 (S17,E30)
22, 1336 (N08,E80)+
23, 1221 (S23,W71)+
24, 1830 (S14,E73)
2050 (S12,E15)
2255 (S20,E22)
25, 1434 (S14,E13)
1638 (S14,W37)
26, 1625 (S18,W42)
1920 (N08,E23)
27, 0915 (N12,E16)+

March 27, 0951 (N33,E19)+
1522 (S12,W12)
1523 (S12,W12)+
2010 (S12,W62)
2102 (S17,W21)
2142 (N31,W16)
2220 (S12,W28)
28, 1430 (S24,E75)
1740 (S14,W69)
1822 (N20,E68)
1848 (S21,E90)
2110 (S17,W40)
2332 (S15,W33)
30, b1525 (N12,W05)
1632 (N12,W06)
1702 (N12,W04)
1740 (N12,W05)
1800 (N30,W70)
31, 1440 (N20,E34)
1450 (S18,W68)
1520 (S21,W71)
1550 (N15,W19)
1642 (N30,W65)
1648 (S16,W26)
1742 (S16,W26)
1752 (S19,E24)
1900 (N30,W90)
b2157 (S21,E60)

IONOSPHERIC EFFECTS OF SOLAR FLARES

(SHORT-WAVE RADIO FADEOUTS)

FEBRUARY 1957

Feb. 1957	Start UT	End UT	Type	Wide-spread Index	Importance	Observation stations	Known Flare, UT CRPL-F 151B
1	1530	1740	Slow S-SWF	2	1 32W	BE, MC	1525
2	0612	0630	S-SWF	1	1-	OK	
	1720	2020	G-SWF	3	1	AN, MC, PR	
4	2007	2045	G-SWF	2	1+	AN, MC	
6	1731	1805	Slow S-SWF	5	1+	BE, HU, MC, PR, WS	{1600 1755
8	1552	1602	S-SWF	5	2 35E	BE, HU, MC, PR, WS, NE*	1550
10	0815	0828	S-SWF	1	2 72W	NE*	b0819
11	1625	1720	G-SWF	4	1+	AN, BE, MC, PR, WS	
13	1539	1557	Slow S-SWF	4	1 60E	HU, MC, PR, WS	b1537
18	1528	1612	G-SWF	3	1	HU, PR	
19	1655	1713	Slow S-SWF	2	1- 90W	HU, PR, WS	b1650
	1930	2030	S-SWF	2	1	AN, PR	
23	1822	1930	G-SWF	2	1	AN, MC, WS	
24	1602	1650	Slow S-SWF	5	1- 46E	AN, HU, MC, PR, WS	1600
26	1355	1407	S-SWF	5	2 71W	BE, HU, MC, PR, NE*, SW**	1355
	1922	1955	Slow S-SWF	5	1+ 74W	AN, BE, HU, MC, PR, WS	1920
	2100	2120	S-SWF	3	1	AN, WS	
27	0115	0204	Slow S-SWF	1	2-	OK	
28	0020	0210	G-SWF	4	1+ 35W	OK, TO+	0005

NE* Nederhorst den Berg, Netherlands.
SW** Enköping, Sweden.
TO+ Hiraiso Radio Wave Observatory, Japan.

SOLAR RADIO WAVES (OTTAWA)--2800 MC

OUTSTANDING EVENTS

MARCH 1957

Mar. 1957	Type*	Start UT Hrs:Mins	Duration Hrs:Mins	Maximum Time UT Hrs:Mins	Maximum Peak Flux	Remarks
5	1	17 24	1.5	17 24.5	3	
8	1	19 41	1.5	19 41.5	7	
11	1	15 28	2	15 28.8	25	
18	1	13 21	2	13 21.5	4	
19	1	18 03	3	18 03.7	4	
20	2	16 02	2	16 03	15	
20	2	17 34	4	17 35	8	
20	2	18 12.5	2	18 14	18	
21	1	22 18.5	1.5	22 19	5	
24	6	18 47	5	18 50	212	
	4		16		9	
29	2	17 37.3	3.3	17 38	27	
30	1	15 04	2	15 05	3	
30	1	15 24	5	15 25	3	
30	Group (2)	19 02.7	6.5			
	1	19 02.7	3	19 03	3	
	1	19 05.7	3.5	19 07.2	3	
31	1	14 49	7	14 50.5	4	
31	2	15 52.3	1	15 53	7	
31	6	17 42.8	3	17 43.3	13	
31	2	18 34	2	18 35	9	
31	2	20 00.6	1	20 00.9	14	

* See page 6.

SOLAR RADIO WAVES (CORNELL)--200 MC

OUTSTANDING EVENTS

MARCH 1957

Mar. 1957	Type	Start UT	Duration Minutes	Maximum Inst. Flux	Maximum Smd. Flux	Remarks
2	3	1414	<1/2	>10.2	>10.2	
	3	1802	1/2	>10.2	>10.2	
3	3	1458	2 1/2	7.40	5.00	
	3	1542	1/2	>10.2	>10.2	
	3	1718	1	>10.2	>10.2	
	3	1722	<1/2	>10.2	>10.2	
9	1	1805 1/2	34			
13	3	1632	1 1/2	>10.2	>10.2	
17	7	1632 1/2	141 1/2			
18	7	1804	175			
20	2	1357	73			
	2	1551	56			
	2	1710	26			
	3	1811	4	>10.2	>10.2	
23	3	1805	1	10.2	9.30	
24	2	1410	30			
	2	1520	9			
	2	1556 1/2	2 1/2			
	1	1636	40			
	8	1846 1/2	9	>10.2	>10.2	off-scale-1847-50 1/2 UT
27	2	1438 1/2	31 1/2			
28	1	1402 1/2	104			

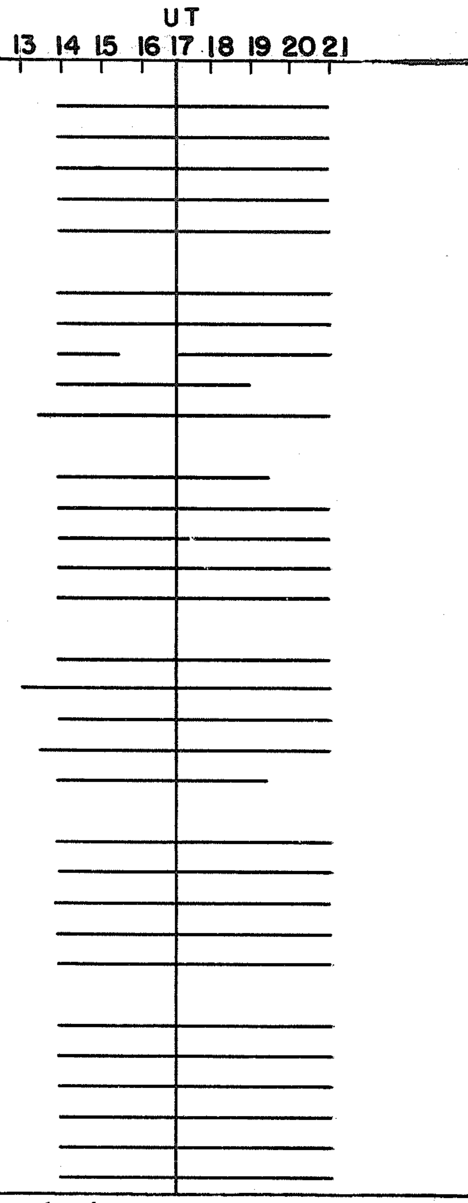
SOLAR RADIO WAVES (CORNELL)--200 MC

3-HOURLY FLUX

MARCH 1957

Mar. 1957	Flux Hours UT 12-15	Flux Hours UT 15-18	Flux Hours UT 18-21	Variability Hours UT 12-15	Variability Hours UT 15-18	Variability Hours UT 18-21
1	[[1.40	1.75	1.65	[[1	1	1
2	[[1.40	1.45	1.50	[[1	0	1
3	[[1.40	1.45	1.50	[[1	1	1
4	[[1.40	1.80	1.45	[[1	1	0
5	[[1.40	1.40	1.40	[[0	0	0
6	[[1.40	1.45	1.45	[[1	1	0
7	[[1.40	1.40	1.40	[[0	0	0
8	[[1.40	1.40⊔	1.40	[[0	0⊔	0
9	[[1.40	1.45	1.70]]	[[0	0	1]]
10	[[1.40	1.40	1.40	[[0	0	0
11	[[1.40	1.40	1.40]	[[0	0	0]
12	[[4.05	4.20	3.95	[[2	2	2
13	[[3.65	2.65	2.25	[[2	2	1
14	[[1.40	1.40	1.40	[[0	0	0
15	[[1.50	1.45	1.45	[[1	0	1
16	[[2.90	3.25	2.25	[[1	1	1
17	[[1.70	2.00	1.95	[[1	2	1
18	[[1.60	1.75	2.80	[[1	1	2
19	[[1.60	1.50	1.60	[[0	0	1
20	[[2.35	2.00	1.50]	[[2	2	1]
21		1.75	1.70		1	1
22	[[1.40	1.45	1.65	[[0	0	1
23	[[1.75	1.70	1.75	[[1	1	1
24	[[2.55	2.70	3.50	[[2	1	1
25	[[5.15	4.65	3.40	[[1	1	1
26	[[4.10	3.30	3.30	[[1	1	1
27	[[2.40	1.95	1.65	[[2	1	1
28	[[2.40	1.95	1.80	[[2	1	1
29	[[1.40	1.40	1.60	[[0	1	1
30	[[1.40	1.40	1.45	[[0	1	0
31	[[2.10	2.15	2.85	[[2	1	2

Observing Periods*



[[= first two hours missing.
⊔= second hour missing.
]]= last two hours missing.
]= last hour missing.
Flux in terms of KTB.
Quiet sun = 1.45 KTB.

*Note: Times given are the first and last half-hourly time marks on the record. Actual "on sun" times may exceed the times shown by 29 minutes at each end, but typically exceed it by no more than 10 minutes at each end.

SOLAR RADIO WAVES (BOULDER) -- 167 MC

3-HOURLY AND DAILY FLUX

JANUARY 1957

Jan. 1957	Flux Hours UT 12-15	15-18	18-21	21-24	Flux Daily	Variability Hours UT 12-15	15-18	18-21	21-24	Variability Daily	Observed Periods Hours UT
1	--	67	66	101	75	--	3	3	3	3	1454-2330
2	--	20	27	14	21	--	2	2	3	3	1442-2330
3	--	13	15	18	15	--	1	1	1	1	1440-2330
4	--	19	20	15	19	--	2	2	1	2	1425-2330
5	--	33	40	38	37	--	3	3	3	3	1425-2330
6	--	70	40	15	45	--	3	2	3	3	1425-2335
7	--	15	16	12	15	--	3	1	1	3	1425-2335
8	--	13	13	12	13	--	1	1	3	3	1430-2335
9	--	12	12	12	12	--	1	2	1	2	1425-2335
10	--	--	13	12	13	--	-	0	0	0	1820-2335
11	--	13	13	13	13	--	3	1	(0)	1	1425-2340
12	--	14	14	--	14	--	0	1	(1)	(1)	1425-2128; 2203-2340
13	--	--	13	12	13	--	-	(0)	(1)	(1)	1755-2340
14	--	--	12	12	12	--	-	1	0	1	1734-2340
15	--	13	13	12	13	--	1	1	2	2	1425-2340
16	--	--	12	11	12	--	1	2	1	2	1425-2345
17	--	13	13	13	13	--	0	(0)	2	2	1425-2345
18	--	14	14	14	14	--	1	0	1	1	1420-2345
19	--	135	69	71	94	--	2	3	2	3	1510-2345
20	--	36	163	81	95	--	2	2	3	3	1425-2350
21	--	27	19	19	22	--	3	2	2	3	1420-2350
22	--	24	35	74	41	--	2	3	3	3	1420-2350
23	--	20	17	16	18	--	3	3	3	3	1420-2355
24	--	18	--	14	16	--	(2)	-	3	3	1420-1808; 2048-2355
25	--	12	10	--	11	--	3	2	2	3	1420-2355
26	--	20	13	--	17	--	3	2	2	3	1420-2150; 2243-2400
27	--	--	13	--	13	--	0	0	(0)	(0)	1545-2400
28	--	14	13	13	13	--	1	1	2	2	1448-2400
29	--	13	13	14	13	--	(0)	(0)	(0)	(0)	1415-2400
30	--	--	16	--	--	--	(1)	(1)	(1)	(1)	1415-1530; 1618-2105/1
31	--	--	--	--	--		(0)	(0)	-	(0)	1415-2055

1. Additional observed period: Jan. 30, 2207-2400.

SOLAR RADIO WAVES (BOULDER) -- 167 MC

3-HOURLY AND DAILY FLUX

FEBRUARY 1957

Feb. 1957	Flux Hours UT 12-15	15-18	18-21	21-24	Flux Daily	Variability Hours UT 12-15	15-18	18-21	21-24	Variability Daily	Observed Periods Hours UT
1	--	--	--	--	--	--	2	(2)	-	(2)	1415-2026; 2320-2400
2	--	--	--	--	--	--	0	-	-	-	1415-1733
3	--	14	14	12	13	--	(0)	0	0	(0)	1410-2405
4	--	--	--	--	--	--	-	-	2	2	1447-1557; 2300-2405
5	--	14	--	--	--	--	(0)	-	(0)	0	1435-1637; 2150-2405
6	--	--	13	12	12	--	1	2	2	2	1515-2410
7	--	--	19	15	17	--	(1)	(1)	1	(1)	1405-2410
8	--	20	15	13	17	--	3	3	2	3	1405-2410
9	--	14	13	15	14	--	2	3	1	3	1405-2410
10	--	18	16	15	16	--	2	2	2	2	1405-2410
11	--	13	13	13	13	--	1	1	1	1	1405-2410
12	--	15	15	14	14	--	2	2	0	2	1400-1738; 1833-2415
13	--	--	16	16	16	--	(1)	3	2	3	1400-2415
14	--	14	14	15	14	--	2	2	2	2	1355-2415
15	--	14	13	14	14	--	0	1	(0)	1	1355-2415
16	--	16	14	15	15	--	2	1	(1)	2	1355-2420
17	--	15	15	16	15	--	0	1	2	2	1355-2420
18	--	19	18	19	18	--	2	1	(1)	2	1350-2420
19	--	15	13	14	14	--	2	2	(0)	2	1350-2420
20	--	16	14	14	15	--	2	2	1	2	1350-2425
21	--	15	23	18	18	--	1	2	3	3	1350-2425
22	--	19	21	25	22	--	0	1	2	2	1345-2425
23	--	20	19	18	19	--	1	2	1	2	1445-2425
24	--	29	22	22	24	--	2	1	2	2	1345-2425
25	--	22	23	19	21	--	1	1	1	1	1345-2430
26	--	68	73	--	73	--	3	3	3	3	1340-2430
27	--	16	14	14	15	--	(1)	(1)	3	3	1340-2430
28	--	14	13	14	13	--	1	(1)	2	2	1440-2430

SOLAR RADIO WAVES (BOULDER) -- 460 MC
3-HOURLY AND DAILY FLUX
JANUARY 1957

Jan. 1957	Flux Hours UT 12-15	Flux Hours UT 15-18	Flux Hours UT 18-21	Flux Hours UT 21-24	Flux Daily	Variability Hours UT 12-15	Variability Hours UT 15-18	Variability Hours UT 18-21	Variability Hours UT 21-24	Variability Daily	Observed Periods Hours UT
1	--	87	82	82	84	--	2	2	2	2	1454-2330
2	--	85	88	84	86	--	(0)	(0)	(1)	(1)	1442-2330
3	--	83	82	83	83	--	(0)	(0)	(0)	(0)	1440-2330
4	--	85	84	83	84	--	(0)	(0)	(0)	(0)	1425-2330
5	--	88	87	86	87	--	(1)	(2)	2	(2)	1425-2330
6	--	100	431	81	220	--	3	2	0	3	1425-2335
7	--	79	79	77	78	--	3	(0)	(0)	3	1425-2335
8	--	78	79	77	78	--	(0)	(0)	(0)	(0)	1430-2335
9	--	75	75	75	75	--	(0)	(0)	(1)	(1)	1430-2335
10	--	71	70	73	71	--	(0)	(0)	(0)	(0)	1430-2335
11	--	71	75	73	73	--	(1)	(0)	(0)	(1)	1425-2340
12	--	74	73	73	73	--	(0)	0	(0)	(0)	1425-2340
13	--	75	78	75	76	--	(0)	0	0	(0)	1425-2340
14	--	69	75	75	73	--	(1)	(2)	(0)	(2)	1517-2340
15	--	77	76	75	76	--	(0)	(0)	(0)	(0)	1425-2340
16	--	75	75	75	75	--	(0)	(0)	(0)	(0)	1425-2345
17	--	75	74	75	75	--	(0)	(0)	(0)	(0)	1425-2345
18	--	77	76	80	77	--	(0)	(0)	(0)	(0)	1425-2345
19	--	130	97	92	108	--	0	(0)	(0)	(0)	1425-2345
20	--	77	144	102	108	--	0	1	0	1	1425-2350
21	--	81	82	81	81	--	2	(0)	(0)	2	1420-2350
22	--	83	90	91	88	--	(1)	(1)	(0)	(1)	1420-2350
23	--	85	103	84	91	--	2	2	(1)	2	1420-2355
24	--	87	83	87	85	--	2	(0)	2	2	1420-2355
25	--	80	81	81	80	--	2	(1)	(0)	2	1420-2355
26	--	82	80	80	81	--	0	(0)	(0)	(0)	1420-2400
27	--	74	76	76	75	--	0	0	0	0	1420-2400
28	--	74	74	74	74	--	(0)	(0)	(0)	(0)	1420-2400
29	--	79	79	77	78	--	(0)	(0)	(0)	(0)	1415-2400
30	--	--	77	79	78	--	(0)	(0)	(0)	(0)	1415-2400
31	--	75	76	--	75	--	(0)	(0)	(0)	(0)	1415-2130; 2316-2405

SOLAR RADIO WAVES (BOULDER) -- 460 MC

3-HOURLY AND DAILY FLUX

FEBRUARY 1957

Feb. 1957	Flux: Hours UT 12-15	15-18	18-21	21-24	Daily	Variability: Hours UT 12-15	15-18	18-21	21-24	Daily	Observed Periods: Hours UT
1	--	73	71	72	72	--	(1)	(1)	(0)	(1)	1415-2400
2	--	66	70	71	69	--	(0)	(0)	(0)	(0)	1415-2405
3	--	74	72	72	73	--	0	0	0	0	1410-2405
4	--	69	--	--	--	--	(0)	(0)	(0)	(0)	1447-1700; 2205-2405
5	--	69	71	--	70	--	(0)	(0)	(0)	(0)	1410-2223; 2325-2405
6	--	71	73	--	72	--	(0)	(0)	(0)	(0)	1410-2112; 2230-2410
7	--	71	74	72	72	--	(0)	(0)	(0)	(0)	1405-2410
8	--	75	74	74	74	--	2	(0)	(0)	2	1405-2410
9	--	74	72	74	73	--	(0)	(0)	(0)	(0)	1405-2410
10	--	73	76	75	75	--	0	0	1	1	1405-2410
11	--	71	74	74	73	--	(0)	(0)	(0)	(0)	1405-2410
12	--	74	74	73	74	--	(0)	(0)	(0)	(0)	1400-2415
13	--	79	80	74	78	--	(0)	(0)	(0)	(0)	1400-2415
14	--	76	72	83	76	--	(0)	(0)	(0)	(0)	1355-2415
15	--	71	72	69	71	--	(0)	(0)	(0)	(0)	1355-2415
16	--	67	66	65	66	--	1	(0)	(1)	(1)	1355-2420
17	--	65	71	75	70	--	0	1	0	1	1355-2420
18	--	77	75	76	76	--	(0)	0	(0)	(0)	1350-2420
19	--	72	71	70	71	--	(0)	(0)	(0)	(0)	1350-2420
20	--	72	73	71	72	--	(0)	2	(0)	2	1350-2425
21	--	83	89	85	86	--	(0)	(0)	(0)	(0)	1350-1530; 1645-1930 /1
22	--	--	--	--	--	--	--	--	--	--	---------
23	--	--	--	--	--	--	--	--	--	--	---------
24	--	80	80	86	82	--	1	0	0	1	1345-2425
25	--	76	74	74	75	--	(0)	0	(0)	(0)	1345-2430
26	--	85	81	78	82	--	(0)	(0)	(0)	(0)	1340-1633; 1705-2430
27	--	72	72	70	71	--	(0)	0	2	2	1340-2430
28	--	--	--	65	69	--	(0)	(0)	(0)	(0)	1445-2430

1. Additional observed period: Feb. 21, 2008-2425.

SOLAR RADIO WAVES (BOULDER) -- 167 MC

OUTSTANDING EVENTS

JANUARY 1957

Jan 1957	Type	Start UT	Duration Hrs:Mins	Maximum Time UT	Maximum Inst. Flux	Maximum Smd. Flux	Remarks
1	6	(1454)	(08:36)	~2130	1400	69	
1	3	1628.7	00:01.3	1629.1	3100	920	
1	8	1943.8	00:03.7	1947.1	>5600	920	
1	8	2022.4	00:04.6	2022.5	3900	190	
2	6	1442	(08:48)	1854	470	17	
2	8	2326.1	00:01.5	2327.1	~3000	~500	Off Scale
3	1	1440	08:50	2210.3	120	--	
4	6	(1425)	(09:05)	1616.5	800	8	
4	3	1550.4	00:00.6	1550.6	1600	--	
5	6	(1425)	(09:05)	2053	590	28	
5	3	1611.3	00:00.6	1611.7	2700	--	
5	2	1856.3	00:04.3	1857.7	1900	130	
5	3	(1933)	(00:01.4)	1933.3	1300	600	
5	8	2139.9	00:01.1	2140.7	>6400	--	Off Scale
6	6	(1425)	(09:10)	~1500	--	26	Note 2
6	9	1705.5	01:50	Note 3	>6300	260	Off Scale
6	2	2110.2	00:12.0	2110.8	2100	44	
7	1	(1425)	(09:10)	1518.3	760	--	
7	9	1734.0	01:32	~1736	>5600	120	Off Scale
8	1	(1430)	(08:37)	1542.2	83	--	
8	9	2307.0	(00:28)	2327.5	2200	140	
9	1	(1425)	(09:10)	1512	82	--	
9	3	1922.8	00:01.2	1923.5	1300	--	
11	1	(1425)	(04:45)	1646.1	110	--	
11	2	1614.5	00:07.0	1625.1	1700	110	
12	2	1924.9	00:10	1933.1	140	--	
13	3	2227.3	00:00.4	2227.4	120	--	
14	2	1940.2	00:11	1946.4	150	--	
15	1	(1425)	(09:15)	2221.9	280	--	Note 4
16	3	1918.4	00:00.7	1918.6	440	--	

Notes: 1. Interference may sometimes obscure or be mistaken for solar events.
2. January 6: Type "9" event, 1705-1855, not included in type "6."
3. January 6: Maximum occurred off scale between 1706 and 1709.
4. January 15: Other large bursts occurred at 1459.2 and 2220.3.

SOLAR RADIO WAVES (BOULDER) -- 167 MC

OUTSTANDING EVENTS

JANUARY 1957

Jan. 1957	Type	Start UT	Duration Hrs:Mins	Maximum			Remarks
				Time UT	Inst. Flux	Smd. Flux	
16	2	1942.3	00:10	1944.6	120	9	
16	3	2216.4	00:00.6	2216.5	110	--	
17	1	2139	02:00	2212	72	--	
19	6	(1420)	(09:25)	~1645	570	120	Note 5
19	8	2006.9	00:01.0	2007.2	1800	--	
20	6	(1420)	(09:30)	~2015	690	160	
20	3	2234.9	00:01.0	2235.8	540	--	
20	8	2344.9	00:02.0	2345.6	~1000	~300	
21	6	(1420)	(09:30)	~1700	280	16	
21	8	1510.2	00:10	1513.5	>2400	830	Off Scale
21	8	(1533)	(00:07)	1534	>2400	1200	Off Scale
22	1	(1420)	05:45	1656	340	--	
22	6	(1425)	(09:30)	2044	1200	61	
23	6	(1420)	(09:35)	~1930	510	9	
23	8	1709.6	00:00.8	1709.8	>2000	--	Off Scale
23	8	1833.3	00:01.9	1834	>1900	>1900	Off Scale
23	9	2313.0	(00:42)	2313.4	>2100	140	Off Scale
24	8	1451.5	00:01.1	1451.8	640	310	
24	8	2316.9	00:02.4	2318.6	980	160	
25	1	1441	(09:14)	2026.8	440	--	
25	8	1645.8	00:07	1650.8	>2000	290	Off Scale
26	6	(1415)	(09:45)	~1420	--	10	
26	3	1604.9	00:00.5	1605.0	920	--	
26	3	1754.2	00:00.5	1754.3	400	--	
26	3	2248.0	00:00.8	2248.6	200	--	
28	1	2024	(03:36)	2243	200	--	
28	3	2202.3	00:00.6	2202.4	850	--	
30	1	(1415)	(09:45)	1827.3	450	--	

Notes: 1. Interference may sometimes obscure or be mistaken for solar events.
5. January 19: Other large bursts occurred at 2037, 2146.5 and 2202.7.

SOLAR RADIO WAVES (BOULDER) -- 167 MC

OUTSTANDING EVENTS

FEBRUARY 1957

Feb. 1957	Type	Start UT	Duration Hrs:Mins	Maximum Time UT	Maximum Inst. Flux	Maximum Smd. Flux	Remarks
1	6	(1415)	02:15	1611.2	96	10	
4	3	2324.6	00:02.0	2325.0	~160	--	
4	3	2351.0	00:00.6	2351.3	~880	--	
6	3	1927.4	00:02.1	1928.8	660	62	
6	3	2056.1	00:01.4	2056.2	100	21	
6	3	2120.8	00:00.5	2121.1	420	--	
7	8	1514.4	00:04.0	1515.9	~3000	~1000	
7	1	1717	05:53	1922	210	--	
8	6	(1405)	(05:25)	2110.5	690	10	
8	8	1552.0	00:01.7	1552.7	>4400	1900	Off scale
8	3	2053.8	00:00.9	2053.8	>4400	--	
8	1	2109	(03:01)	2110.5	690	--	
9	1	(1405)	(10:05)	1909.8	290	--	
9	3	2050.6	00:00.6	2050.7	1800	--	
10	6	(1405)	(10:05)	~1530	190	6	
10	8	2242	00:27	2245.4	320	62	
12	3	1539.4	00:02.2	1540.4	240	64	
12	3	1545.9	00:01:9	1546.9	510	64	
12	3	1834.8	00:00.6	1834.8	340	--	
12	8	2039.8	00:03.0	2040.0	1700	180	
13	1	1535	(08:40)	1536.7	74	--	
13	3	1915.4	00:00.4	1915.6	1900	--	
13	8	1957.8	00:01.7	1958.0	1800	720	
14	1	1401.8	(10:13.2)	2105.7	640	--	Note 2
15	2	1950.4	00:01.7	1951.3	210	31	

Note 1. Interference may sometimes obscure or be mistaken for solar events.

2. February 14, other large burst at 1956.2.

SOLAR RADIO WAVES (BOULDER) -- 167 MC

OUTSTANDING EVENTS

FEBRUARY 1957

Feb. 1957	Type	Start UT	Duration Hrs:Mins	Maximum Time UT	Maximum Inst. Flux	Maximum Smd. Flux	Remarks
16	6	1605	01:00	1619.3	280	7	
16	1	1705	05:35	2136	85	--	
17	1	1752	(06:28)	1908	45	--	
17	2	2134.8	00:11.7	2146	310	29	
18	6	(1350)	(10:30)	~1700	140	6	
19	3	1558.7	00:00.6	1558.8	36	--	
19	3	2038.8	00:02.2	2039.3	520	76	
20	1	(1350)	(07:30)	1803.0	220	--	
20	2	1636.2	00:03.5	1636.7	490	170	
21	6	1827	04:17	~2100	460	15	
21	3	2037.0	00:00.1	2037.0	1400	--	
21	3	2146.4	00:00.2	2146.5	1700	--	
22	6	(1345)	(10:40)	2233.3	180	12	
23	6	(1445)	(09:40)	2154.6	290	7	
23	3	1819.5	00:00.8	1819.8	990	--	
24	6	(1345)	(10:40)	~1430	570	16	
25	6	(1345)	(10:45)	1905.5	140	11	
26	6	(1340)	(10:50)	~1700	2800	60	
27	1	(1340)	(10:50)	1621.1	100	--	
27	8	2121.2	00:00.8	2121.4	>6600	--	
27	9	2401	(00:29)	2404.5	640	6	
28	1	(1440)	(09:50)	1516.7	190	--	
28	2	2058.9	00:02	2059.3	~740	23	
28	3	2302.8	00:00.8	2303.5	420	--	

Note 1. Interference may sometimes obscure or be mistaken for solar events.

IVk

SOLAR RADIO WAVES (BOULDER) -- 460 MC

OUTSTANDING EVENTS

JANUARY 1957

Jan. 1957	Type	Start UT	Duration Hrs:Mins	Maximum Time UT	Maximum Inst. Flux	Maximum Smd. Flux	Remarks
1	6	(1454)	(08:36)	~1600	--	16	Note 2
1	8	1517	00:05	1520.8	400	180	
1	8	2022.4	00:02.9	2025.6	>1000	190	Off scale
2	6	1630	(07:00)	~1850	160	24	
3	6	(1440)	(08:50)	~1800	--	13	
4	6	(1425)	(09:05)	~1600	--	14	
5	6	(1425)	(09:05)	~1600	--	17	
5	1	1611	05:30	(1933.0)	830	--	Note 3
6	9	1703	03:01	Note 4	>1300	1000	Off scale
7	3	1518.0	00:00.6	1518.2	>1300	--	Off scale
7	3	1635.7	00:00.8	1635.8	>1300	--	Off scale
7	9	1733	01:23	1738	>1300	68	Off scale
11	0	1615	00:07	1615.3	110	17	
11	2	1656.9	00:00.3	1657.0	150	--	
14	3	1942.9	00:01.3	1943.4	1200	--	
14	3	1956.5	00:01.1	1956.7	800	--	
18	6	2210	(01:35)	~2230	--	23	
19	6	(1425)	(09:20)	~1500	260	56	
20	6	1815	(05:35)	~1900	470	90	
21	8	1510	00:15	1512.4	480	45	
22	6	(1420)	(09:30)	~1800	190	16	
23	9	1709.3	01:21	1709.6	>1400	81	Off scale
23	9	1832.9	(05:22)	1833.4	>1400	34	Off scale/5.
24	6	(1420)	(07:00)	~1630	--	14	
24	3	1526.8	00:01.5	1527.4	980	230	
24	9	2120	(02:35)	2121	600	16	
25	2	1646	00:08	1647.0	830	10	
25	3	1825.9	00:00.3	1826.0	470	--	

Notes:
1. Unusually severe interference has probably obscured some solar events.
2. January 1, off scale bursts at 1628.7; 2148.7; smaller bursts at 1821.3; 1943.1; 2121.
3. January 5, large burst at 2140.7.
4. January 6, off scale maximum occurred between 1703 and 1706 or 1804 and 1834.
5. January 23, other large bursts at 1808 and 2047.

SOLAR RADIO WAVES (BOULDER) -- 460 MC

OUTSTANDING EVENTS

FEBRUARY 1957

Feb. 1957	Type	Start UT	Duration Hrs:Mins	Maximum Time UT	Maximum Inst. Flux	Maximum Smd. Flux	Remarks
1	3	1535.7	00:00.6	1536.2	230	--	
1	2	1812	00:04	1813	250	48	
8	8	1551	00:03	1552	>1400	>1400	Off scale
10	8	2243	00:21	~2253	~220	72	
16	3	1430.7	00:00.3	1430.8	180	--	
16	3	2226.0	00:01.2	2226.1	240	--	
17	1	1908	02:37	1908.1	180	--	
20	2	1802	00:16	1803	1100	--	
21	6	(2008)	(01:52)	~2100	--	24	
24	6	(1345)	(10:10)	2223	180	20	
24	3	1657.7	00:00.8	1657.9	360	--	
26	6	(1420)	(09:40)	~1600	--	19	
27	9	2401	(00:33)	Note 2	>900	>900	Off scale

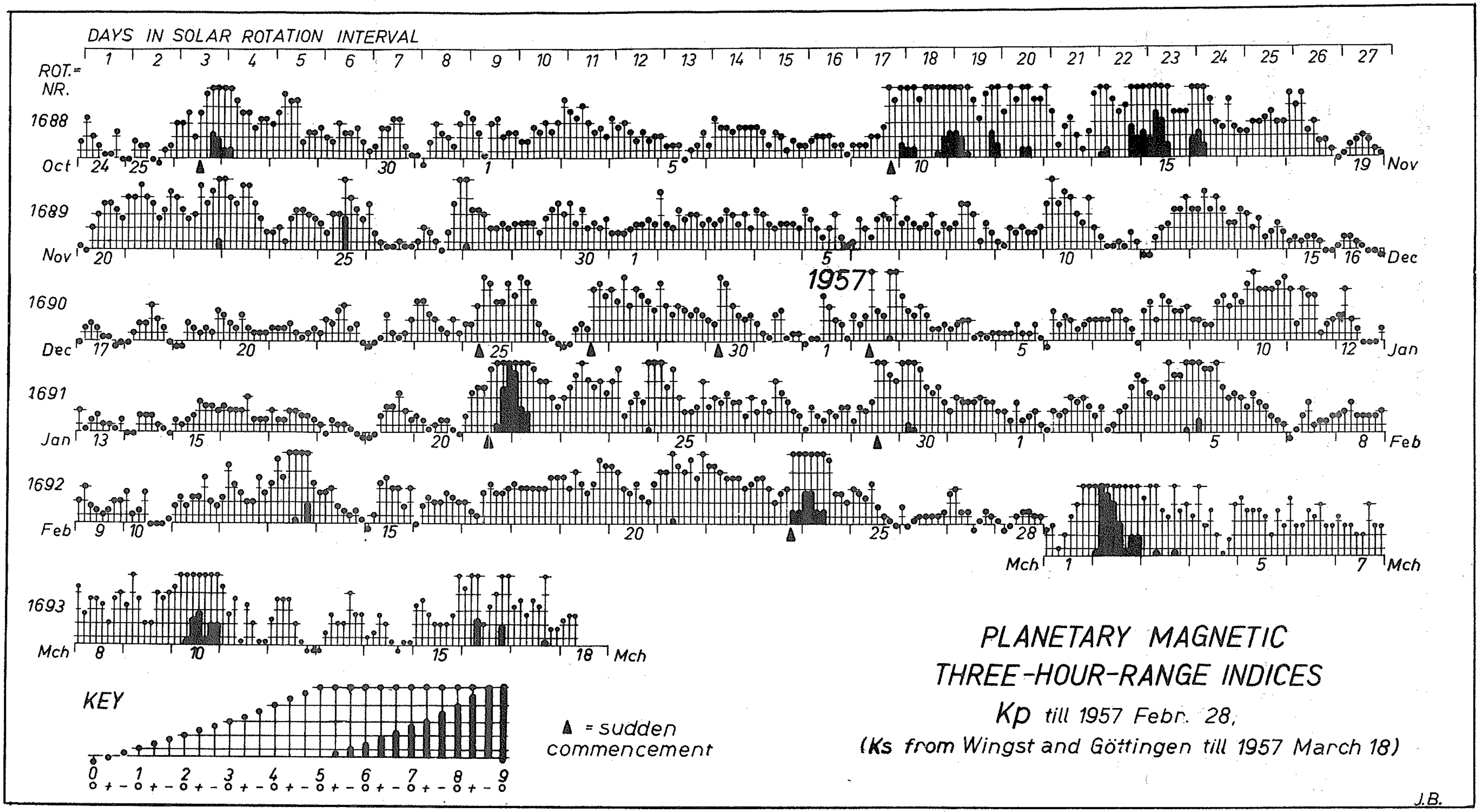
Notes: 1. Unusually severe interference has probably obscured some solar events.

2. Off scale from 2417 thru sunset.

GEOMAGNETIC ACTIVITY INDICES

FEBRUARY 1957

Feb. 1957	C	Values Kp Three hour Gr. interval 1	2	3	4	5	6	7	8	Sum	Ap	Final Selected Days
1	0.3	2o	2o	1+	3-	1+	2-	2o	1o	14o	7	Five
2	0.5	1-	2o	2-	2o	3o	3-	3o	2+	17+	9	Quiet
3	0.9	2-	2+	1-	1o	2o	2+	4-	4+	18o	12	
4	1.4	4o	3+	3o	4-	5o	4+	4+	5+	33o	31	7
5	1.3	5o	6o	5-	5-	5o	4-	3o	3+	35+	39	10
												26
6	0.4	3o	2+	3+	3-	2+	2-	1+	1o	18-	10	27
7	0.2	0o	1-	2-	3-	1o	1+	1+	2-	10+	5	28
8	0.2	2-	2o	3-	2-	2-	2-	2-	2o	15o	7	
9	0.2	2o	3o	2-	1+	1o	1+	2o	2o	14+	7	
10	0.2	3-	1o	1+	3-	0+	0+	0+	1-	9+	5	
11	0.7	2-	2+	2-	2+	2+	4-	2o	2-	18-	9	Five
12	0.9	2+	4+	3+	3-	2o	2o	4-	3-	23o	15	Disturbed
13	1.6	3+	5-	4-	5o	5+	5o	6+	3+	37-	43	
14	0.4	3-	3-	3o	2-	1+	1o	1+	1-	14+	8	4
15	0.6	0o	1o	3+	4-	3o	3o	2-	3o	19-	12	5
												13
16	0.3	0+	2-	2+	2o	2o	3-	2+	2o	15+	7	21
17	0.7	2o	1+	1o	3-	3+	3-	3-	3o	19-	11	24
18	1.0	3+	3o	3o	3o	3o	3o	4-	4-	26-	17	
19	1.2	4-	3o	4o	3+	3-	3+	5-	4+	29o	23	
20	0.9	4+	4o	3o	3-	3+	2+	2o	3+	25o	17	
21	1.3	4o	4o	5+	4+	4o	5-	4-	5o	35o	35	Ten
22	1.0	4+	4+	4o	4-	4-	4-	3o	3+	30o	24	Quiet
23	1.4	4-	4-	3o	2o	3-	3o	6o	6o	30o	32	
24	1.5	7o	7o	6o	6o	5-	3-	3-	2o	38o	62	1
25	0.3	3o	3-	2+	3+	2-	1o	1-	0+	15o	9	7
												8
26	0.0	2-	0+	1-	1o	1o	1o	1o	1+	8o	4	9
27	0.1	3-	3o	1+	1+	0o	1-	1+	1o	11+	6	10
28	0.1	1-	0o	0+	1o	1+	1+	1o	1o	7-	3	14
												16
												26
												27
Mean:	0.70									Mean:	17	28



PLANETARY MAGNETIC
THREE-HOUR-RANGE INDICES
Kp till 1957 Febr. 28,
(Ks from Wingst and Göttingen till 1957 March 18)

CRPL RADIO PROPAGATION QUALITY FIGURES AND FORECASTS

NORTH ATLANTIC

FEBRUARY 1957

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

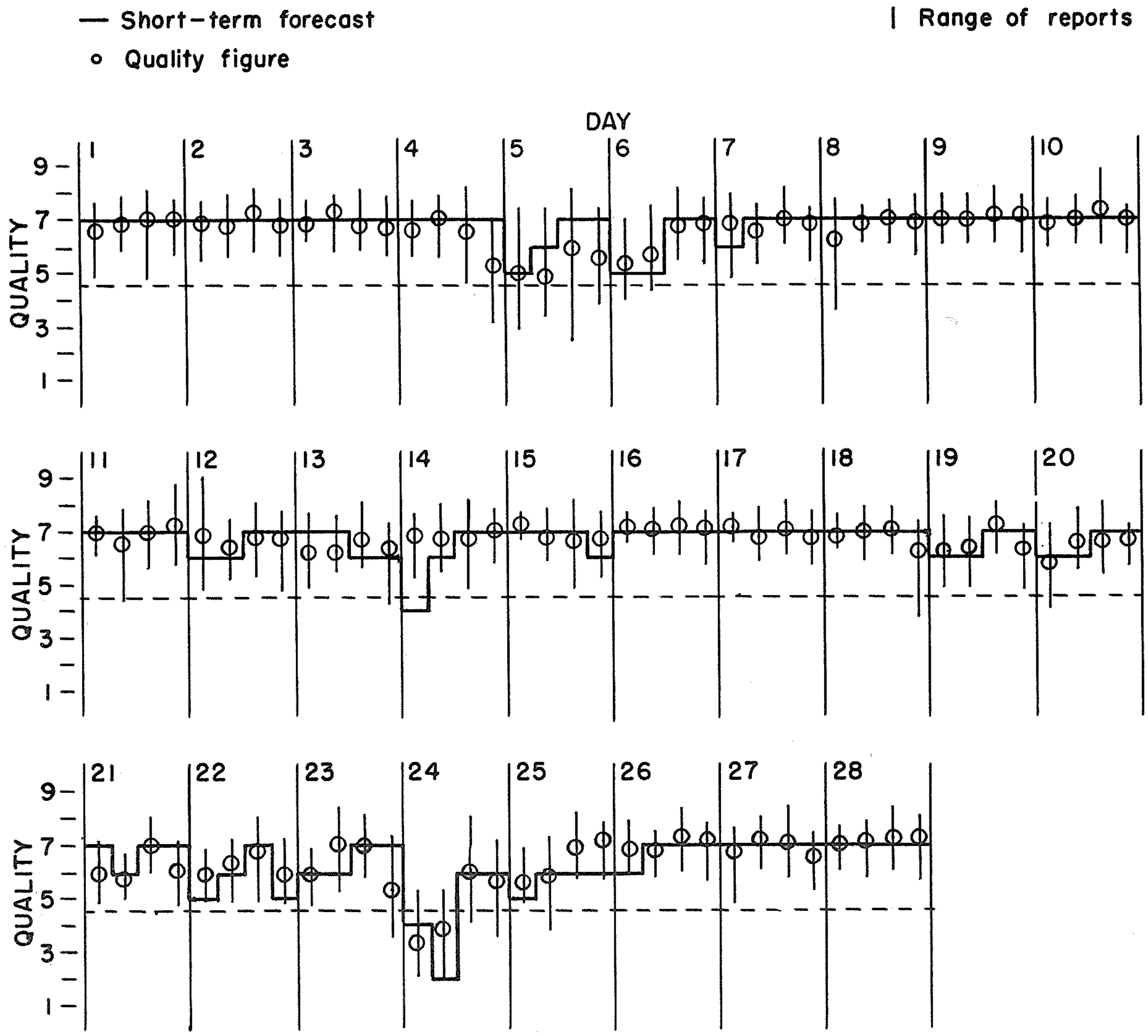
Score:		00	06	12	18	1-4 days	4-7 days
Quiet Periods	P	18	21	25	19	19	18
	S	8	6	3	7	7	8
	U	0	0	0	2	1	1
	F	1	0	0	0	0	0
Disturbed Periods	P	0	0	0	0	0	0
	S	1	0	0	0	1	0
	U	0	1	0	0	0	0
	F	0	0	0	0	0	1

( ) represent disturbed values.

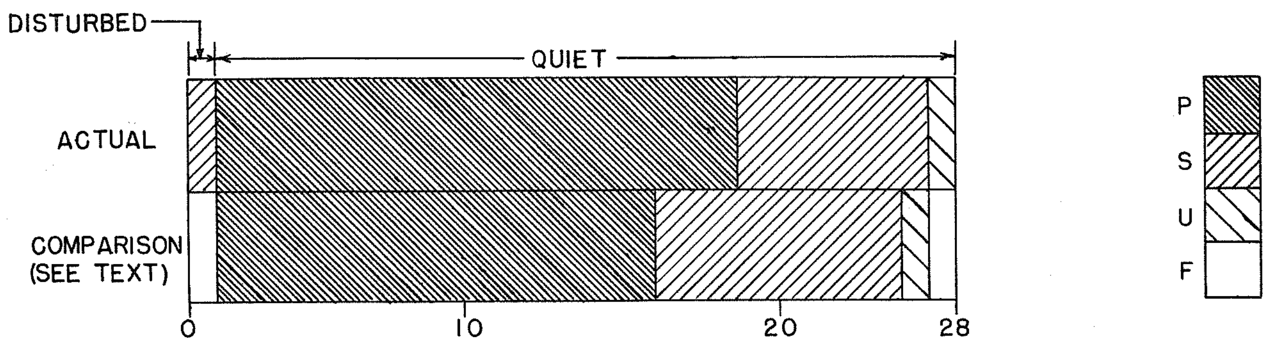
CRPL RADIO PROPAGATION QUALITY FIGURES AND FORECASTS

NORTH ATLANTIC

FEBRUARY 1957

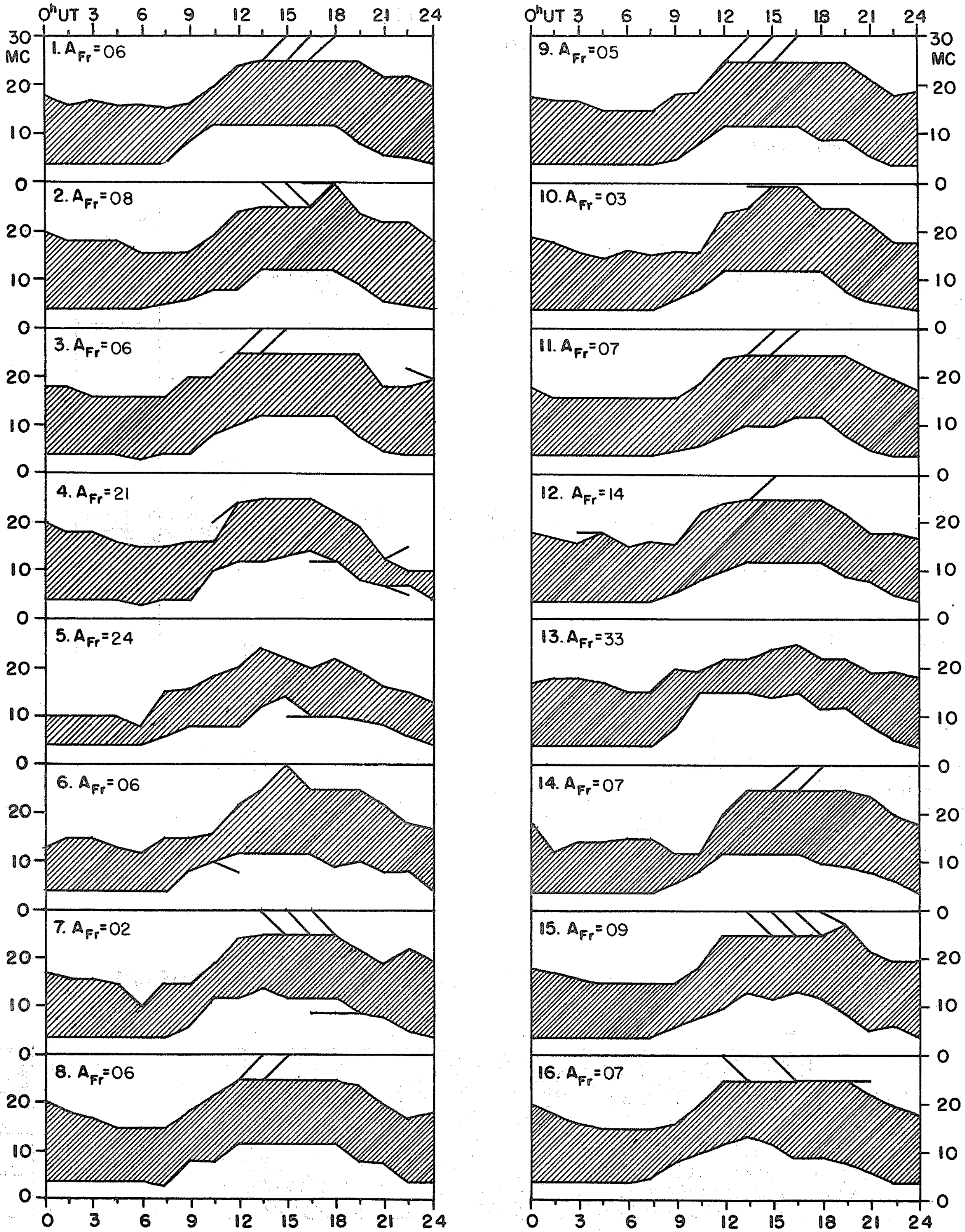


OUTCOME OF ADVANCE FORECASTS (1 TO 4 DAYS AHEAD)

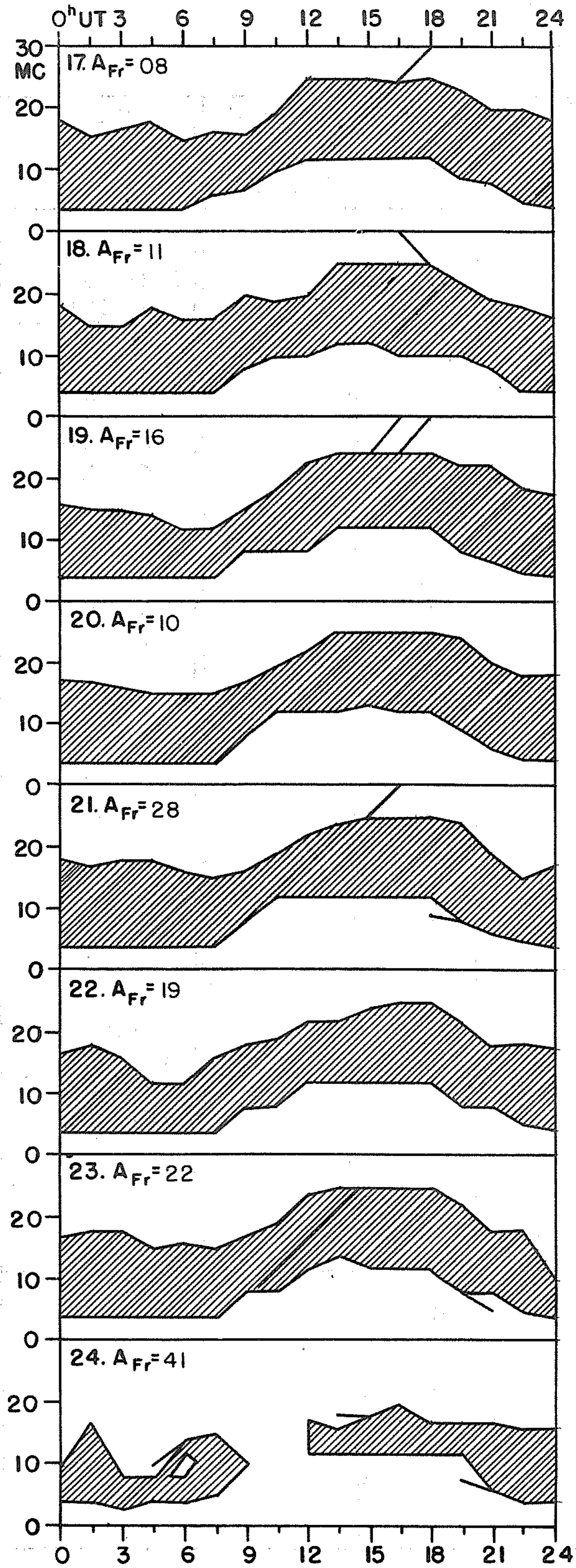


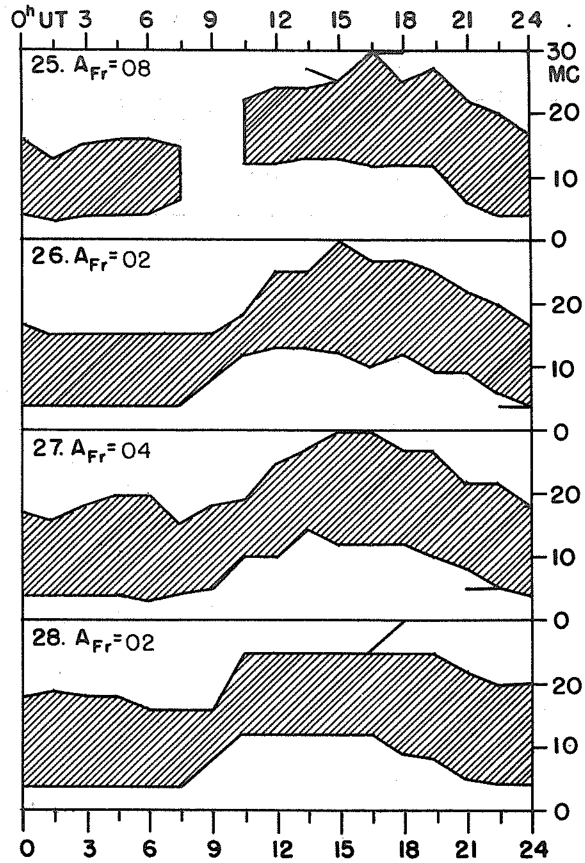
USEFUL FREQUENCY RANGES -- NORTH ATLANTIC PATH

FEBRUARY 1957



FEBRUARY 1957





Adapted from Observations by Deutsches Bundespost

CRPL RADIO PROPAGATION QUALITY FIGURES AND FORECASTS

NORTH PACIFIC

FEBRUARY 1957

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

( ) represent disturbed values.

CRPL RADIO PROPAGATION QUALITY FIGURES AND FORECASTS

NORTH PACIFIC

FEBRUARY 1957