PART B

SOLAR - GEOPHYSICAL DATA

ISSUED
JANUARY 1957

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

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CONTENTS

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INTRODUCTION

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

I DAILY SOLAR INDICES

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

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

Final values of R_Z appear in the IAU Quarterly Bulletin on Solar Activity, the Journal of Geophysical Research 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, $\bar{R}$, 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 three times during its transit of the visible disk (first appearance, maximum development, last appearance): the date, the area, the central intensity; particulars of the associated sunspot group, if any, at analogous times: the date, the area, the spot count. 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 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 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, and Swedish Astrophysical Station on Capri. The remainder report through the URSIgram centers in Europe and Japan. 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 number of McMath region with which associated.

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

The 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.

5 - Noise storm ends -- A noise storm (see 6) which ceases at some time during the observing period.

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

S - forecast quality one grade different from observed

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

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 Company, 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 Cheltenham 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. Time is the angular coordinate and radio frequency in Mc is the radius vector. 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.

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.

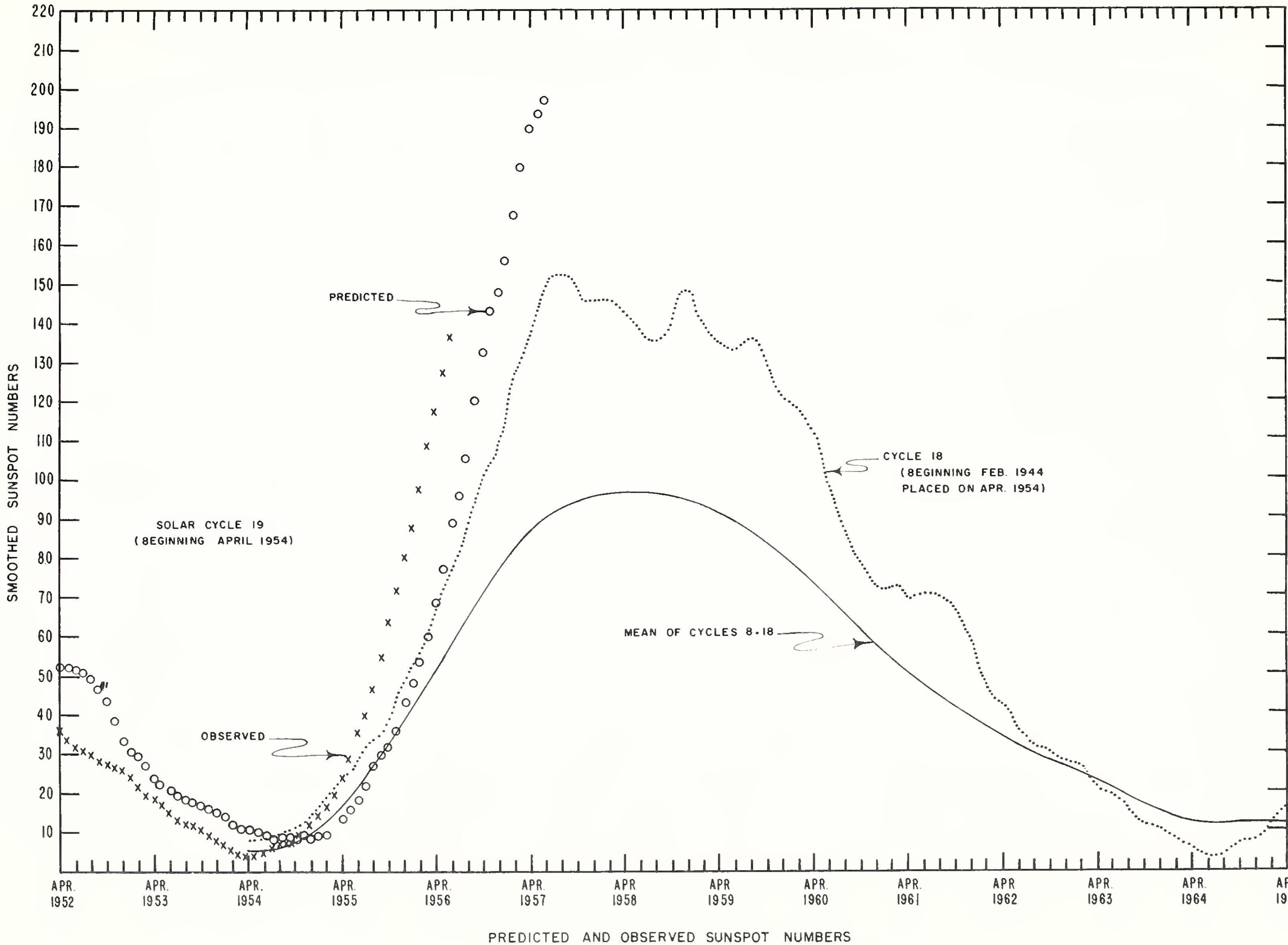
The chart compares the outcome of advance forecasts, on the same basis as the similar chart for the North Atlantic Radio Path.

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

Nov. 1956 Date	American Relative Sunspot Numbers R_A'
1	153
2	176
3	169
4	183
5	209
6	254
7	287
8	265
9	207
10	225
11	224
12	178
13	180
14	177
15	221
16	170
17	161
18	150
19	145
20	143
21	121
22	131
23	95
24	104
25	120
26	126
27	126
28	155
29	180
30	157
Mean:	173.1

Dec. 1956 Date	Zurich Provisional Relative Sunspot Numbers R_Z	Daily Values Solar Flux at 2800 MC, Ottawa, Canada Flux
1	163	225
2	145	240
3	169	250
4	194	251
5	190	261
6	175	255
7	173	251
8	157	245
9	165	257
10	204	270
11	229	272
12	200	264
13	184	249
14	218	250
15	198	254
16	186	249
17	174	254
18	156	230
19	151	236
20	130	230
21	173	242
22	193	254
23	215	258
24	219	252
25	229	---
26	216	259
27	215	272
28	202	226
29	185	234
30	168	244
31	174	---
Mean:	185.5	249.4


SMOOTHED SUNSPOT NUMBERS
220
210
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
APR. 1952
APR. 1953
APR. 1954
APR. 1955
APR. 1956
APR. 1957
APR 1958
APR 1959
APR. 1960
APR. 1961
APR. 1962
APR. 1963
APR. 1964
APR. 1965
PREDICTED
OBSERVED
SOLAR CYCLE 19
(BEGINNING APRIL 1954)
CYCLE 18
(BEGINNING FEB. 1944
PLACED ON APR. 1954)
MEAN OF CYCLES 8-18
PREDICTED AND OBSERVED SUNSPOT NUMBERS

CALCIUM PLAGE AND SUNSPOT REGIONS

DECEMBER 1956

CMP Dec. 1956	Lat.	McMath Plage Number	Return of Region	Calcium Plage Data, Date-Area-Intensity: First seen	Calcium Plage Data, Date-Area-Intensity: Maximum	Calcium Plage Data, Date-Area-Intensity: Last seen	Sunspot Data, Date-Area-Count: First seen	Sunspot Data, Date-Area-Count: Maximum	Sunspot Data, Date-Area-Count: Last seen
Nov.29.6	S23	3775 (9)	3739	23-3000-2	30-11400-2	04- 5000-2	25- 50a-XX	29- 100-2	30- 50 -2
30.2	N18	3783	New	30-1400-1	04- 1600-2.5	04- 1600-2.5	30- 20 -2	04- 170-4	04- 170 -4
Dec.01.1	S16	3776 (9)	3739	25-2800-2	30- 5700-3	06- 1300-1	25- 50a-XX	26- 170-3	06- 100 -1
01.4	N38	3778 (2)	3749	27-2500-2	----------	27- 2500-2			
01.5	N21	3777 (3)	3736	29-2500-2	30- 8000-2	06- 1900-3	27-120 -6	01- 690-17	07- 440 -1
03.3	N24	3779 (3)	3741	26-5700-1	26- 4700-1	09- 3000-2	27-100 -3	01- 340-5	10- 50a-XX
03.7	S15	3780	New	27-4000-2.5	02- 8000-3	10- 1000-2	27-240 -1	29- 390-2	04- 20 -1
05.6	S17	3781 (2)	3746	29-2000-2.5	08- 5700-2	11- 3500-2.5	30- 80 -3	04- 170-11	10- 50 -2
05.8	N20	3782	New	29-1000-2	29- 1000-2	04- 700-1			
07.8	N26	3784 (5)	3747,50	01-4000-2	11- 6000-3.5	14- 2000-2	02- 20 -XX	10- 510-8	14- 50a-XX
09.4	S20	3785 (2)	3752	02-5700-2	13-17100-3	16- 8000-2	02- 20 -XX	06-2040-22	15- 260 -XX
10.4	N22	3786 (2)	3761	03-1500-2	09- 2000-2	14- 1700-2			
13.1	S18	3788 (2)	3755,7	06-1000-1	13-22800-3	19-15000-3.5	08- 20 -XX	16-1270-14	19- 390 -1
13.2	N26	3787 (2)	3762	08-1000-1	18- 4500-3	19- 4000-3	08- 10 -XX	16- 400-8	19- 50 -1
14.7	S25	3789	New	11- 300-3	----------	13- 700-1			
15.9	N22	3796	New	16- 300-1	19- 1000-2.5	21- 1000-2	16- 50 -1	---------	18- 50 -2
17.4	S16	3790 (4)	3764	11-4000-3	13- 8000-2	22- 2000-1	12- 50 -1	16- 70-3	18- 10 -2
18.4	S20	3792 (4)	3764	14-2000-2.5	21- 3200-2	22- 3000-2	14- 50a-XX	---------	14- 50a-XX
18.7	S26	3791	New	14- 300-2.5	17- 1400-1	17- 1400-1	14- 50a-XX	---------	15- 10 -XX
18.8	N21	3793 (3)	3765	14- 800-2	19- 1200-2	19- 1200-2			
21.0	N14	3795	New	14-1000-2.5	20-11500-3	26- 5700-1	15-200 -XX	18-1360-23	26- 530 -1
21.1	S24	3794 (2)	3767	14-1200-2.5	26- 8000-2	28- 4000-1	15- 50 -XX	27-1450-11	27-1450 -11
22.4	N33	3799 (2)	3768	16- 700-1	23- 1700-3	24- 1400-3	17- 10 -XX	22- 50-XX	24- 10 -XX
22.7	S27	3797 (5)	3770,2	17-5700-1	24- 3400-2	---------*	17- 10 -XX	26- 440-7	28- XX ≥10
25.5	S16	3800 (3)	3773	18-1000-3	22- 8000-3	01- 6000-2	19-920 -2	25-1260-10	31- XX -1
26.8	N16	3801 (2)	3774	18-1000-2	27-15400-2	02- 2000-2.5	19-680 -2	25-1120-18	31- 680 -2
28.4	S20	3802 (10)	3775,6	28-2000-1	31- 2000-2	01- 1600-2	29- 50a-XX	---------	30- 10 -XX
28.9	N22	3803 (4)	3777	31-2500-2.5	02- 5000-2.5	02- 5000-2.5			
29.8	N34	3804	New	23-2800-3	27- 5700-2	03- 2800-1	23-200 -XX	31- 680-3	04- 390 -1
30.3	S14	3805 (2)	3780	28-2000-1	03- 2800-2	05- 2000-2	29- 50a-XX	03- 130-3	04- 100 -1
31.7	N25	3806	New	26-1000-1	03- 4700-1	06- 2800-2	26-140 -2	03- 580-11	06- 10 -XX

* Combined with 3794.
a signifies area approximate.

CORONAL LINE EMISSION INDICES

DECEMBER 1956

CMP Dec. 1956	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	180*	224	36	78	159	206	36	84	117	211	55	72	109	144	41	79
2	121*	149	32	60	132	192	24	32	133	180	46	78	101	164	37	86
3	102*	124	29	48	124	148	37	56	X	X	X	X	X	X	X	X
4	83	108	32	50	190	268	30	49	182	260	70	140	78	124	38	52
5	113	157	42	78	175	240	68	106	147	198	81	154	94	160	43	60
6	88	156	40	84	168	220	35	66	104	127	28	62	67	103	52	90
7	94*	140	46	90	149	212	59	96	109*	123	60	96	95	160	68	128
8	112*	149	40	60	118	152	45	72	119	191	31	54	134	229	58	132
9	106*	160	27	40	78	92	26	40	172*	211	69	136	117	169	68	136
10	147*	245	24	38	127	152	70	102	177	198	65	120	112	135	47	96
11	128	197	48	80	136	161	53	89	195*	244	60	96	132	174	48	85
12	X	X	X	X	X	X	X	X	110*	146	X	X	116	239	X	X
13	43*	46	40	66	109	140	48	103	132	179	X	X	167	303	X	X
14	X	X	X	X	X	X	X	X	123	205	36	67	86	107	52	76
15	69	110	34	66	77	110	X	X	X	X	X	X	X	X	X	X
16	65	75	19	27	75	99	18	49	X	X	X	X	X	X	X	X
17	X	X	X	X	X	X	X	X	97	137	31	100	65	92	20	47
18	81	128	27	66	78	117	38	65	74	125	30	54	79	100	22	45
19	98	148	30	76	91	119	44	68	92*	126	62	113	102	147	37	90
20	71	98	31	50	69	90	47	80	67*	82	39	59	68	102	25	52
21	88*	136	31	56	91	108	38	48	110	140	41	63	96	146	20	57
22	64	91	9	15	86	124	10	18	149	214	50	66	129	259	25	45
23	89*	144	30	38	122	48	56	80	129	159	49	80	97	167	47	108
24	75	104	25	30	132	165	40	96	157*	166	46	114	121	192	59	168
25	86*	159	47	74	158	189	56	87	209*	272	40	48	166	250	53	147
26	100*	152	X	X	150	174	X	X	127*	187	23	64	118	173	34	62
27	108	153	X	X	121	190	X	X	X	X	X	X	X	X	X	X
28	129	189	72	115	146	209	33	62	X	X	X	X	X	X	X	X
29	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
30	X	X	X	X	X	X	X	X	113*	164	X	X	132	202	X	X
31	135	168	57	77	134	210	40	80	X	X	X	X	X	X	X	X

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

SOLAR FLARES

DECEMBER 1956

Observatory	Date Dec. 1956	Time Observed Start UT	End UT	Duration Min.	Total Area Mill.	McMath Plage Region Number	Approx. Position Lat.	Mer. Dist.	Time Max. Phase UT	Max. Int. Arb.	Rel. Area of Max. Tenths	Importance	Provis. Ionospheric Effect
S. Peak	02	1945	2035	50	115	3775	S29	W42	2010	14	2	1	
Capri-S	03	1011	1055	44	146	3776	S16	W28				1+	
Tokyo	04	0524	0544	20		3785	S25	E55				1	
Kanzel.	04	b1028	1033	>5		3785	S25	E45				2	Slow S-SWF
Capri-S	04	1117	1124	7	136	3785	S18	E67				1	
Capri-S	04	1159	1230	31	180	3785	S17	E72				1	
McMath	04	b1435				3785	S20	E65				1	
S. Peak	04	1620	1840	140	475	3780	S11	W12	1625	20	3	2	G-SWF
Tokyo	04	b2319		~20		3779	N25	W15				1	
Tokyo	05	0221	0256	35		3785	S15	E55				1	G-SWF
Tokyo	06	0230	0250	20		3785	S25	E35				1	
Arcetri	06	1402				3785	S22	E42				2	
S. Peak	06	1600	1635	35	295	3785	S16	E35	1607	30	1	2	S-SWF
Tokyo	06	b2311		~10		3785	S15	E55				1	
Capri-S	07	0830	0853	23	180	3779	N24	W62				1+	
Capri-S	07	0902	0924	22	126	3785	S12	E48				1	
Arcetri	07	b1315				3784	N25	E05				1	
Tokyo	08	0214	0224	10			S25	E75				1	
Tokyo	08	b0242		~10		3785	S15	E15				1	S-SWF
S. Peak	08	1730	1755	25	140	3785	S23	E12	1735	20	2	1	S-SWF
Capri-S	09	0839	0845	6	102	3785	S16	E07				1	
Schaus.	09	b1110	1122	>12		3784	N28	W24				1	
Capri-S	09	1452	1513	21	156	3788	S24	E47				1	
Tokyo	09	2336	2346	10		3785	S15	W15				1	
Tokyo	10	0003	0023	20		3788	S25	E45				1	
Tokyo	10	0405	0425	20		3785	S15	W05				1	G-SWF
Tokyo	10	b0648		~10		3785	S25	W25				1	Slow S-SWF
Capri-S	10	0934	1024	50	253	3785	S18	W14				2	S-SWF
Capri-S	10	1207	1304	57	136	3785	S17	W06				1+	
Capri-S	10	1413	1446	33	117	3788	S25	E37				1	
Tokyo	11	b0013		~20		3785	S15	W25				1	
Tokyo	11	b0109		~20		3788	S25	E35				1	
Capri-S	11	1015	1036	21	112	3785	S23	W33				1	
Wendel.	11	1257	1316	19		3785	S21	W10	1302			1+	
Wendel.	11	1316	1351	35		3785	S22	W12	1329			1+	
Capri-S	11	1317	1345	28		3785	S21	W09				1+	
Tokyo	12	b0103		~10		3785	S25	W15				1	
Tokyo	12	0113	0133	20		3784	N35	W55				1	
Wendel.	13	b0845	0920	>35		3788	S23	W02				2-	
S. Peak	13	1925	2015	50	210	3785	S15	W62	1950	16	5	1+	
Capri-S	15	1411	1435	24	102	3788	S22	W39				1	
Capri-S	16	1023	1047	24	102	3788	S24	W46				1	
Kanzel.	16	b1020	1035	>15		3788	S25	W45				2	
Capri-S	16	1310	1318	8	233	3785	S13	W75				1	
Tokyo	17	b0123		~20		3788	S25	W55				1	G-SWF
Tokyo	17	0221	0231	10		3787	N25	W45				1	
Tokyo	17	0453	0553	60		3795	N15	E55				2	
Capri-S	17	0838	1231	233	301	3788	S21	W61				2	
Kanzel.	17	b1015	1030	>15		3788	S25	W55				1	
Capri-S	17	1227	1304	37		3785	S12	W90				2	Slow S-SWF
Capri-S	17	1248	1318	30	209	3788	S21	W63				1+	

SOLAR FLARES

DECEMBER 1956

Observatory	Date Dec. 1956	Time Observed Start UT	End UT	Duration Min.	Total Area Mill.	McMath Plage Region Number	Approx. Position Lat. Mer. Dist.	Time Max. Phase UT	Max. Int. Arb.	Rel. Area of Max. Tenths	Importance	Provis. Ionospheric Effect
S. Peak	17	1535	1705	90	970	3788	S24 W52	1551	30	6	3	Slow S-SWF
Tokyo	18	b0010		~90		3788	S25 W55				1	
Tokyo	18	b0010		~80		3788	S25 W66				1	
Tokyo	18	0037	0107	30		3795	N15 E45				1	
Tokyo	18	0404	0424	20		3788	S25 W65				1	S-SWF
Capri-S	18	0834	1017	103	437	3788	S23 W69				2+	S-SWF
Kanzel.	18	0835	0955	80		3788	S25 W65				3	
Wendel.	18	b0836	0900	>24		3788	S24 W67				2	
Schaus.	18	b0839				3788	S24 W69				2	
Meudon	18	b0853	0943	>50		3788	S25 W65				2	
Wendel.	18	b0907	1026	>79		3788	S26 W68	0917			2	
Kanzel.	18	0915		≥100		3795	N15 E35				2*	
Schaus.	18	b0916	0926	>10		3787	N28 W58				1	
Capri-S	18	1031	1100	29		3800	S11 E90				1	
Kanzel.	18	1031	1041	10		3800	S15 E85				2	
Capri-S	18	1038	1115	37	102	3795	N16 E36				1	
Wendel.	18	b1041	1108	>27		3795	N17 E42	1051			1	
Kanzel.	18	1043		≥100		3795	N15 E35				2	
Schaus.	18	b1052	1108	>16		3795	N14 E40				1	
Neder.	18	b1100	1130	>30		3800	S35 E90				1	
Capri-S	18	1130	1249	79	262	3788	S26 W72				1+	
Capri-S	18	2045	2127	42		3788	S20 W80				2	G-SWF
Climax	18	2205				3788	S15 W90				2	
Wendel.	19	0745	0833	48		3795	N15 E23	0757			1+	
Kanzel.	19	b0805	0815	>10		3795	N15 E25				2	
Capri-S	19	0840	1143	183	92	3795	N12 E35				1+	S-SWF
Wendel.	19	0856	0930	34		3800	S15 E85				2	
Kanzel.	19	0900	1000	60		3800	S15 E75				2	
Capri-S	19	1452	1517	25	160	3795	N15 E22				1+	Slow S-SWF
McMath	19	1500	1540	40		3795	N15 E20				2+	
Tokyo	20	0001	0101	60		3795	N15 E15				1	G-SWF
Tokyo	20	0232	0402	90		3795	N15 E15				2	
Tokyo	20	0447	0457	10		3795	N15 E15				1	S-SWF
Tokyo	20	b0456		~30		3788	S25 W85				1	
Tokyo	20	b0523		~60		3795	N15 E15				1	
Capri-S	21	1037	1109	32	136	3795	N13 W05				1	
Mt.Wilson	21	b1613		~10		3801	N16 E60				1	Slow S-SWF
Mt.Wilson	21	b1646		~10		3795	N13 W10				1	
S. Peak	23	2015	2120	65	100	3800	S17 E25	2046	18	8	1	G-SWF
S. Peak	24	1555	1645	50	145	3801	N21 E36	1605	16	2	1	
Mitaka	25	0028				3801	N15 E15				1	
Mitaka	25	0053				3795	N15 W55				1	
Mitaka	25	0223				3795	N15 W55				1	
S. Peak	25	2150	a2215	>25	280	3800	S16 W02	a2215	20	4	2	
Mitaka	25	b2320				3800	S15 W05				1	
Mitaka	26	b0507				3800	S15 W05				2	S-SWF
Capri-S	26	1252	1344	52	126	3800	S17 W10				1	S-SWF
Wendel.	26	1252	1351	59		3800	S19 W09	1300			2	
Capri-S	26	1401	1508	67	262	3800	S17 W13				2	S-SWF
Wendel.	26	1404	1442	38		3800	S18 W10	1412			2	

* Capri lists as importance 1-.

SOLAR FLARES

DECEMBER 1956

Observatory	Date Dec. 1956	Time Observed Start UT	End UT	Duration Min.	Total Area Mill.	McMath Plage Region Number	Approx. Position Lat.	Mer. Dist.	Time Max. Phase UT	Max. Int. Arb.	Rel. Area of Max. Tenths	Importance	Provis. Ionospheric Effect
S. Peak	26	b1518	1615	>57	265	3800	S17	W10	b1518	20	1	2	
Mitaka	27	0104				3800	S15	W15				1	
Mitaka	27	b0226				3794	S25	W65				1	Slow S-SWF
Mitaka	27	b0455				3794	S25	W55				1	
Mitaka	27	0524				3794	S25	W55				1	
Capri-S	27	0950	1157	127	136	3807	S18	E69				1	
Wendel.	27	1227	1234	7		3794	S26	W69				1	
S. Peak	27	b1504	1540	>36	130	3801	N13	W24	1510	17	7	1*	
S. Peak	27	1600	1635	35	112	3801	N19	W17	1610	14	5	1	
S. Peak	27	1647	1805	78	270	3800	S16	W29	1710	16	1	2	
Arcetri	28	b0947				3807	S20	E59				1	
{Arcetri	28	0948				3808	N18	E66				1	
{Capri-S	28	0950	1028	38	151	3808	N17	E65				1	
Mitaka	29	0040	0230	90		3808	N25	E55				1	S-SWF
Mitaka	29	0315	0345	30		3800	S15	W45				1	S-SWF
Mitaka	29	0405	0455	50		3801	N15	W45				1	
{Capri-S	29	1458	1510	12	233	3800	S16	W51				1+}	Slow S-SWF
{S. Peak	29	b1505	1615	70	185	3800	S18	W56	b1505	≥23	2	1}	
S. Peak	29	1855	1945	50	110	3808	N20	E55	1901	21	3	1	Slow S-SWF
Mitaka	30	0102	0132	30			N35	E25				1	
Mitaka	30	0240	0310	30			N35	E25				1	
S. Peak	30	1730	1835	65	170	3800	S18	W70	1740	18	8	1	Slow S-SWF

*Capri lists as importance 1-.

Note: November flare list gave Tokyo flares of the 17th out of chronological order.
After December 25 Tokyo is designated as Mitaka.

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

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

December 01, 1855 (S27,E92)
2220 (S15,E73)
02, 1535 (N25,E16)
1645 (S24,E90)
b1450 (S17,E90)
b1915 (S20,E90)
03, 1128 (N23,W18)+
1525 (S18,E90)
1555 (S21,E90)
1625 (N15,W80)
1750 (N36,E86)
2055 (S28,E57)
2140 (S26,E53)
04, 1435 (N17,W60)++
b1458 (N34,E48)
1520 (S10,E67)
1605 (S28,E46)
1750 (S18,E57)
1825 (S15,W53)
1924 (S27,E45)
1940 (S35,E60)
2115 (S26,W67)
05, 0840 (S32,W72)+
1101 (S14,E49)+
1117 (N20,W48)+
1245 (N20,W49)+

December 06, 1800 (S19,W90)
1803 (S18,E51)
2021 (N20,W74)
08, 1250 (S17,E04)+
10, 0840 (S27,E43)+
0930 (S18,E05)+
0934 (N20,W34)+
1123 (S26,E38)+
1154 (S27,E41)+
1154 (S18,E04)+
1228 (N21,W35)+
1346 (S24,W25)+,+++
1353 (S17,W07)+
1505 (S25,E37)+
11, 1004 (S25,E25)+
1334 (S16,W18)+,+++
1555 (S17,W36)
1815 (S23,W15)
1855 (N28,W51)
1915 (S22,W15)
12, 1024 (N18,W61)+
1805 (S26,E14)
2110 (S10,W28)
2125 (N28,W67)
13, 1308 (S24,W02)+
1520 (S15,W60)

December 13, 1630 (S27,W03)
1845 (S15,W45)
2115 (S26,W05)
2150 (S15,W62)
14, 1540 (S22,W72)
1710 (S17,W67)
1743 (S26,W13)
a1820 (S30,W22)
2058 (N25,W30)
15, 1148 (S24,W29)+
1710 (S22,E78)
1740 (S23,W40)
1930 (S23,W40)
16, 1310 (S24,W40)+
1318 (N15,E64)+
1545 (S12,W36)
1700 (S12,W48)
1905 (N23,W03)
17, 0825 (S25,W57)+++
0850 (S25,W57)+++
1140 (N28,W49)+++
1147 (N13,E39)+
1240 (S25,W57)+++
1240 (N15,E53)+
1253 (S11,W90)+
1323 (N33,E63)+

SOLAR FLARES

DECEMBER 1956

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

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

Date	Time	Coordinates
December 17,	a1517	(S23,W61)
18,	1100	(S19,E36)+
	1133	(N12,E35)+
	1200	(S26,W69)+++
19,	1236	(N15,E23)+
	2205	(S21,W90)
21,	0824	(N11,W11)+
	1555	(N17,E66)
	1638	(N13,W17)
	1735	(S27,W09)
	1740	(N15,W10)
	1810	(N15,W10)
	1845	(N14,W10)
	2045	(N14,W11)
	2120	(N15,W10)
	2155	(N10,W17)
23,	1520	(N16,W43)
	2105	(N16,E17)
	2120	(N17,W46)
	1630	(N22,E45)
24,	1655	(S27,W39)
	1745	(N13,W56)
	1840	(N13,E17)
	1520	(N16,E25)
	2000	(N14,W54)
25,	1610	(S25,W50)
December 25,	1620	(S42,W35)
	1755	(S28,W48)
	1815	(S16,W01)
	2050	(S23,W35)
	2155	(N16,E10)
26,	b1518	(S29,W62)
	1545	(N19,E90)
	1754	(N18,W04)
	2005	(S23,W53)
	2155	(N14,W17)
	2205	(S23,W54)
27,	1040	(S23,W58)+
	1120	(S20,E72)+++
	1335	(S20,E71)+++
	1620	(S20,E69)
	1700	(S23,W63)
	1705	(S17,E07)
	1820	(S20,E66)
	1855	(S20,E66)
	1900	(S28,W80)
	2130	(S16,W22)
28,	1610	(S19,W43)
	1645	(N18,W42)
	1705	(N18,W37)
	1710	(S22,W38)
	1810	(S21,W40)
December 28,	1940	(S20,E56)
	1950	(N22,E68)
	2005	(N15,E37)
	2050	(N18,W35)
	2110	(N19,W44)
	2115	(N19,E60)
	2150	(S20,E54)
29,	b1505	(N28,E28)
	1635	(N18,W54)
	1705	(N17,W51)
	1740	(N20,E57)
	2125	(N18,W58)
	2150	(N20,E55)
30,	b1507	(N31,E17)
	b1507	(S37,E47)
	1525	(S18,W70)
	1625	(N22,E45)
	1630	(N35,W07)
	1630	(N21,E46)
	1650	(N32,E19)
	1720	(N20,E39)
	1945	(N31,E16)
31,	1555	(N35,W16)
	1605	(N20,E30)
	1820	(N31,E00)
	1920	(N31,E00)
	1940	(N18,E20)

IONOSPHERIC EFFECTS OF SOLAR FLARES

(SHORT-WAVE RADIO FADEOUTS)

NOVEMBER 1956

Nov. 1956	Start UT	End UT	Type	Wide-spread Index	Impor-tance	Observation stations
2	0032	0058	Slow S-SWF	1	1-	OK
3	1945	2010	Slow S-SWF	5	1	BE, HU, MC, PR
	2334	2347	Slow S-SWF	3	1-	AN, OK
4	0254	0315	S-SWF	1	1-	OK
	0628	0653	S-SWF	5	1	AN, OK, NE*
	1420	1455	Slow S-SWF	4	1	BE, MC, PR, NE*
	1600	1630	Slow S-SWF	5	2-	BE, HU, MC, PR, WS, NE*
5	0200	0210	S-SWF	1	1-	OK
	0210	0220	S-SWF	1	1-	OK
	0440	0504	S-SWF	1	1-	OK
	1733	1750	Slow S-SWF	5	2	BE, HU, MC, PR, WS
	1835	1850	G-SWF	4	1	BE, HU, MC, PR
6	0100	0130	G-SWF	4	1-	AN, OK
	0134	0220	Slow S-SWF	1	1	OK
	0320	0420	G-SWF	1	1+	OK
	1118	1145	Slow S-SWF	1	2	NE*
	1145	1216	Slow S-SWF	1	2	NE*
	1552	1620	Slow S-SWF	3	1	HU, MC, PR
	1712	1730	S-SWF	5	2-	AN, BE, HU, MC, PR, WS, NE*
	2238	0023	Slow S-SWF	3	2	OK, WS
7	0836	0901	S-SWF	1	2	NE*
	1106	1127	S-SWF	2	2	NE*, DA**
	1127	1400	Slow S-SWF	5	3-	BE,HU,PR,NE*,SW+,RCA*
8	0106	0137	Slow S-SWF	1	1	OK
	0243	0300	S-SWF	1	1	AN, OK
	0405	0502	S-SWF	1	1-	OK
	0540	0618	S-SWF	1	1	OK
	1315	1338	Slow S-SWF	4	1+	HU, MC, PR, NE*, DA**
	1440	1455	G-SWF	1	1-	MC
	1832	1900	Slow S-SWF	5	2-	AN, BE, HU, MC, PR, WS
9	0100	0115	S-SWF	4	1+	OK, TO+
	0547	0602	Slow S-SWF	1	1	OK
	0750	0823	G-SWF	3	2-	AN, NE*
	0949	1005	S-SWF	1	2	NE*
	1005	1050	G-SWF	4	1	PR, NE*
	1520	1535	Slow S-SWF	4	1	HU, MC, PR, NE*
	1840	1855	S-SWF	5	1	BE, HU, MC, PR, WS
10	0330	0500	Slow S-SWF	4	3	OK, CW+
	0840	0922	S-SWF	1	3	NE*
	0931	1000	S-SWF	1	2	NE*
	1818	1850	G-SWF	4	1	AN, MC, PR, WS
	1845	1930	G-SWF	4	1-	AN, MC, TO+
11	1532	1615	Slow S-SWF	5	2-	BE, HU, MC, PR
	1652	1720	G-SWF	2	1-	MC, PR
	1858	1955	Slow S-SWF	4	1+	HU, MC, PR
	2130	2210	G-SWF	3	1	BE, MC, WS
	2342	0025	S-SWF	4	1	AN, OK
12	0510	0536	Slow S-SWF	1	1	OK
	1506	1522	S-SWF	3	1	HU, PR
	1630	1655	Slow S-SWF	3	1	HU, MC, PR, WS
	1831	2055	Slow S-SWF	5	2+	BE, HU, MC, PR, WS
13	0158	0300	S-SWF	4	2+	AN, OK
	0325	0512	Slow S-SWF	4	2+	AN, OK
	1430	1630	Slow S-SWF	5	2+	BE, HU, MC, PR, WS, NE*
14	0453	0522	S-SWF	5	2+	AN, OK, CW+

IONOSPHERIC EFFECTS OF SOLAR FLARES

(SHORT-WAVE RADIO FADEOUTS)

NOVEMBER 1956

Nov. 1956	Start UT	End UT	Type	Wide-spread Index	Impor-tance	Observation stations
14	1037	1155	Slow S-SWF	4	2+	NE*, DA**, RCA*
	1832	1915	Slow S-SWF	5	2	BE, HU, MC, PR, WS
15	0132	0203	Slow S-SWF	1	1+	OK
	0212	0242	S-SWF	1	1+	OK
	0808	0828	S-SWF	4	2	NE*, RCA*
	1940	1958	S-SWF	3	1	HU, PR
	2152	2217	S-SWF	3	1+	HU, WS
16	1330	1345	S-SWF	3	1-	HU, PR
	1438	1502	Slow S-SWF	4	1+	BE, MC, PR, NE*
	1625	1700	Slow S-SWF	5	1	AN, BE, HU, MC, PR, WS
	1825	1900	G-SWF	3	1-	MC, PR
17	0058	0112	S-SWF	1	1-	OK
	0140	0223	S-SWF	1	1+	OK
	0248	0322	G-SWF	1	1-	OK
	0410	0542	Slow S-SWF	1	2+	OK
	1212	1220	Slow S-SWF	4	1-	MC, PR, NE*, DA**
	1630	1705	G-SWF	3	1	AN, MC, WS
	1845	1930	G-SWF	4	1	AN, HU, MC, PR
18	0022	0042	Slow S-SWF	1	1-	OK
	0150	0233	Slow S-SWF	1	1	OK
	0430	0500	Slow S-SWF	1	1	OK
	0830	0850	Slow S-SWF	4	2	NE*, DA**, RCA*
19	0820	0955	S-SWF	1		RCA*
20	0123	0215	Slow S-SWF	4	2-	AN, OK, PR
	0437	0510	G-SWF	1	1-	OK
	0543	0608	S-SWF	1	1-	OK
20	0823	0846	Slow S-SWF	1	1	NE*
	1007	1106	S-SWF	5	3-	AN, NE*, DA**, SW+, RCA*
	1835	1955	G-SWF	4	1	BE, MC, PR
21	1520	1535	G-SWF	3	1+	HU, MC, PR
	1540	1620	G-SWF	2	1	MC, PR
22	0320	0343	S-SWF	1	1-	OK
	0920	1005	S-SWF	1		RCA*
	1258	1321	Slow S-SWF	4	1+	HU, MC, PR, NE*
	1330	1435	S-SWF	5	3	BE,MC,PR,NE*,SW+,RCA**,CW*
24	1637	1650	S-SWF	4	1-	HU, MC, PR
25	0213	0259	Slow S-SWF	1	1+	OK
	1718	1735	Slow S-SWF	4	1-	AN, HU, PR
26	1805	1832	Slow S-SWF	3	1	HU, PR
	2225	2232	Slow S-SWF	4	1-	OK, PR, WS
28	1610	1630	Slow S-SWF	3	1-	BE, MC, PR
	1820	1945	Slow S-SWF	5	1+	BE, HU, MC, PR, WS
29	0440	0520	S-SWF	1	2-	OK
30	0720	0750	G-SWF	1	1	OK
	2040	2055	S-SWF	2	1-	HU, PR

NE* Nederhorst den Berg, Netherlands.
DA** Darmstadt, Germany.
SW+ Enköping, Sweden.
RCA* RCA Communications Inc. Brentwood, N. J. and Somerton, England.
RCA** RCA Communications Inc. Riverhead, N. Y.
CW* Cable & Wireless, Barbadoes.
CW+ Cable & Wireless, Singapore or Hong Kong.

SOLAR RADIO WAVES (BOULDER) -- 167 MC

3-HOURLY AND DAILY FLUX

DECEMBER 1956

Dec. 1956	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	--	13	12	13	13	--	2	3	3	3	1403-2320
2	--	26	32	22	27	--	2	2	2	2	1404-2319
3	--	14	13	13	13	--	1	1	2	2	1518-2319
4	--	14	12	11	12	--	0	0	1	1	1428-2319
5	--	12	13	11	12	--	1	1	0	1	1434-2319
6	--	12	13	11	12	--	2	1	1	2	1407-2319
7	--	17	21	21	19	--	2	2	2	2	1408-2319
8	--	36	33	26	32	--	2	2	2	2	1409-2319
9	--	14	13	12	13	--	1	3	2	3	1410-2319
10	--	11	12	9	11	--	0	(0)	0	(0)	1411-2319
11	--	10	12	10	11	--	0	1	0	1	1412-2319
12	--	11	11	9	10	--	0	0	1	1	1413-2319
13	--	11	19	--	19	--	(0)	2	3	3	1413-2319
14	--	10	11	9	10	--	0	(0)	2	2	1636-2319
15	--	10	11	10	10	--	1	(0)	1	1	1415-2245
16	--	--	--	11	--	--	--	1	(0)	1	2003-2320
17	--	--	12	10	11	--	--	2	(1)	2	1802-2320
18	--	10	11	10	11	--	2	(2)	(2)	(2)	1417-2321
19	--	26	29	19	26	--	3	3	2	3	1417-2321
20	--	66	72	95	76	--	3	3	3	3	1418-2322
21	--	85	95	65	84	--	2	2	2	2	1438-2322
22	--	--	--	171	--	--	--	--	2	2	2052-2323
23	--	119	106	217	142	--	3	3	3	3	1614-2323
24	--	24	25	26	25	--	3	2	3	3	1520-2324
25	--	20	15	94	37	--	1	1	3	3	1522-2324
26	--	18	20	18	19	--	2	2	2	2	1521-2325
27	--	41	59	47	49	--	3	2	2	3	1432-2326
28	--	24	30	11	23	--	2	2	3	3	1430-2326
29	--	14	12	12	13	--	2	(1)	2	2	1442-2328
30	--	13	13	11	12	--	(1)	3	1	3	1604-2328
31	--	13	14	11	13	--	2	2	(1)	2	1536-2329

SOLAR RADIO WAVES (BOULDER) -- 460 MC

3-HOURLY AND DAILY FLUX

DECEMBER 1956

Dec. 1956	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	--	79	79	80	79	--	(1)	(1)	(1)	(1)	1403-2320
2	--	83	84	79	82	--	(0)	0	(0)	(0)	1404-2319
3	--	76	79	76	77	--	(0)	(0)	(0)	(0)	1518-2319
4	--	80	80	--	80	--	(0)	(0)	(0)	(0)	1438-2319
5	--	80	80	78	80	--	(0)	(0)	(0)	(0)	1445-2319
6	--	80	79	79	79	--	(0)	(0)	(0)	(0)	1407-2319
7	--	84	83	83	83	--	(0)	(1)	(0)	(1)	1408-2319
8	--	79	76	76	77	--	0	0	0	0	1409-2319
9	--	82	81	80	81	--	0	0	0	0	1410-2319
10	--	81	77	78	79	--	0	(1)	(0)	(1)	1411-2319
11	--	82	83	79	82	--	(0)	(0)	(0)	(0)	1412-2319
12	--	87	82	79	83	--	(1)	(0)	(0)	(1)	1413-2319
13	--	83	81	80	82	--	(0)	(1)	(1)	(1)	1413-2319
14	--	82	78	78	80	--	(0)	(0)	(0)	(0)	1414-2319
15	--	82	80	78	80	--	(0)	(0)	(0)	(0)	1415-2320
16	--	--	--	82	--	--	--	--	(0)	(0)	2004-2320
17	--	90	88	87	88	--	(0)	(0)	(1)	(1)	1454-2320
18	--	88	86	84	86	--	(0)	(0)	(1)	(1)	1417-2321
19	--	97	97	98	97	--	(0)	(0)	(0)	(0)	1417-2321
20	--	118	108	112	113	--	(0)	(0)	(0)	(0)	1418-2322
21	--	108	105	105	106	--	(0)	(0)	(2)	(2)	1436-2322
22	--	--	--	108	--	--	--	--	1	1	2055-2323
23	--	112	111	136	118	--	1	1	1	1	1614-2323
24	--	102	97	96	99	--	2	(0)	0	2	1522-2324
25	--	98	98	933	202	--	0	0	2	2	1522-2324
26	--	114	105	109	110	--	(0)	1	(0)	1	1521-2325
27	--	118	109	111	113	--	(1)	(0)	(0)	(1)	1435-2326
28	--	108	100	102	104	--	(0)	(0)	(1)	(1)	1430-2326
29	--	100	97	93	97	--	0	0	0	0	1441-2328
30	--	96	98	100	98	--	1	1	1	1	1607-2328
31	--	94	--	--	--	--	0	--	--	0	1536-1700

SOLAR RADIO WAVES (BOULDER) -- 167 MC

OUTSTANDING EVENTS

DECEMBER 1956

Dec. 1956	Type	Start UT	Duration Hrs:Mins	Maximum Time UT	Maximum Inst. Flux	Maximum Smd. Flux	Remarks
1	1	(1436)	(04:37)	1834.4	1700	--	
1	8	2112.8	00:29	2131.2	>5100	160	Off Scale
2	6	(1404)	(09:15)	~1900	--	23	
2	8	1425.7	00:01.5	1426.3	~2400	340	
3	2	2310.4	(00:08)	2312.0	~330	43	
6	2	1740.3	00:03.6	1740.1	310	76	
6	3	1802.3	00:00.8	1802.6	120	--	
7-9	6	(1408)	3 days	Dec.8	--	22	
7	8	1449.1	00:02.0	1450.0	1300	220	
8	3	1808.7	00:00.4	1808.8	540	--	
8	3	1822.7	00:00.5	1822.8	1100	--	
9	8	1815.2	00:07	1816.6	3000	1400	
9	8	2239.6	00:02.4	2240.3	990	320	
11	8	(1412)	(00:18)	1421.8	~120	42	
11	1	1909.7	01:55	2009.6	58	--	
13	1	1817	01:45	1817.8	80	--	
13	6	2002	(03:17)	2207.3	~320	22	
14	2	2240.6	00:07	2241.7	~440	52	
17	2	2044.9	00:16	2059.5	220	19	
18	1	(1417)	(09:04)	2313.7	~250	--	
19-30	6	(1417)	12 days	Dec.23	--	90	
19	8	2005.3	00:01.4	2005.7	2700	830	
21	3	1543.6	00:00.3	1543.7	1400	--	
25	9	2218	(01:06)	2237	>4600	850	
26	--	Note 2	--	--	--	--	
26	2	2234.2	00:01.1	2235.0	590	--	
27	3	1443.1	00:00.9	1443.4	2800	--	
28	3	2243.2	00:01.5	2243.5	2100	400	
29	3	1642.8	00:00.7	1644.1	270	--	
29	3	2130.5	00:01.5	2130.9	780	110	
30	8	2001.4	00:06	2006.7	1500	58	
31	1	1704	04:05	1928.2	260	--	

Notes: 1. Occasional interference may sometimes obscure or be mistaken for solar events. Relatively small events are not reported.

2. Probable type 9 event in progress at beginning of observing period, 1521 UT and ending at 1530 UT.

SOLAR RADIO WAVES (BOULDER) -- 460 MC

OUTSTANDING EVENTS

DECEMBER 1956

Dec. 1956	Type	Start UT	Duration Hrs:Mins	Maximum Time UT	Maximum Inst. Flux	Maximum Smd. Flux	Remarks
1	2	1625.6	00:30	1629.4	210	45	
1	2	1925.6	00:02.6	1926.0	450	79	
1	2	2114	00:21	2114.2	470	58	
7	2	1449.2	00:02.1	1450.2	>1400	320	
7	3	1835.8	00:00.1	1835.8	180	--	
10	3	1856.7	00:00.2	1856.8	250	--	
12	6	(1413)	(06:47)	~1600	--	10	
12	3	1511.4	00:00.6	1511.7	170	--	
13	3	2054.4	00:00.5	2054.5	180	--	
13	3	2223.2	00:00.2	2223.3	340	--	
17-31	6	(1454)	15 days	Dec.27	--	33	
17	3	2204.3	00:00.3	2204.5	200	--	
18	3	2120.1	00:00.8	2120.2	250	--	
21	8	2251.0	00:02.7	2252.7	>1000	~300	Off Scale
22	3	2256.0	00:00.9	2256.2	190	--	
23	9	2035.8	(02:47)	2036.5	~700	42	
24	8	1727.9	00:26	1740.1	>1100	23	Off Scale
25	9	2217.3	00:54	Note 2	>1000	>800	Off Scale

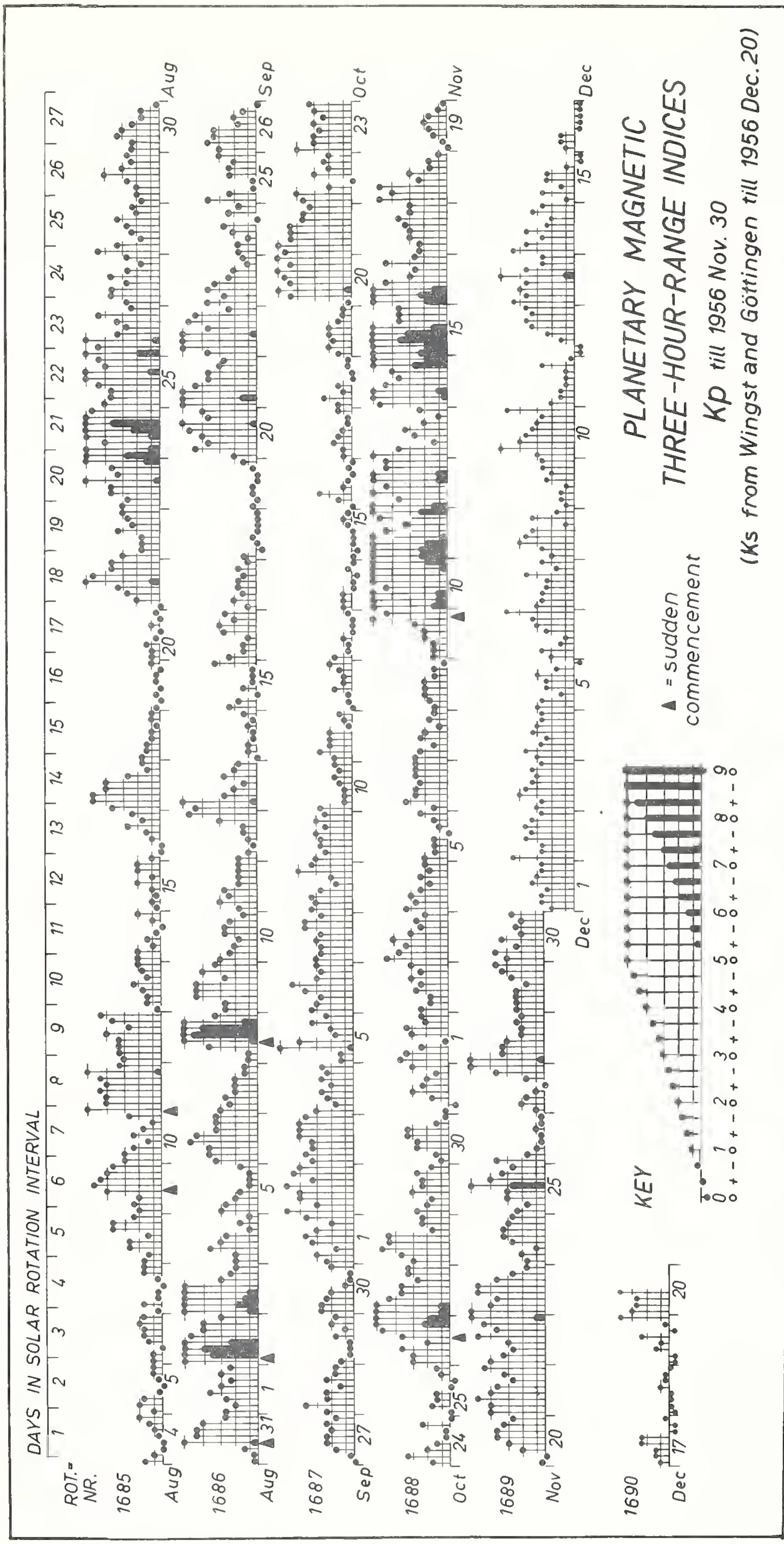
Notes: 1. Unusually severe interference has probably obscured some solar events.

2. Off scale from 2230 thru 2304 UT.

GEOMAGNETIC ACTIVITY INDICES

NOVEMBER 1956

Nov. 1956	C	Values Kp Three hour Gr. interval 1 2 3 4	5 6 7 8	Sum	Ap	Final Selected Days
1	0.8	4- 3+ 2+ 1-	3o 3+ 2o 2+	21-	13	Five
2	0.6	2+ 2- 2- 3-	2+ 3o 2+ 3o	19o	10	Quiet
3	1.0	4+ 4- 3+ 4o	3o 2+ 3- 2o	25+	18	
4	0.4	3+ 3- 3o 2+	2- 2+ 2- 2o	19o	10	5
5	0.2	2o 1+ 1+ 1+	0+ 1o 1+ 2+	11o	5	7
						8
6	0.7	1+ 3+ 3- 3-	2+ 3- 3- 3-	20+	12	19
7	0.2	3- 2+ 1+ 2+	2o 1o 2- 1+	15-	7	26
8	0.1	1+ 2- 2o 2o	2o 1+ 1+ 1-	12+	6	
9	0.9	1+ 1+ 1+ 2o	2o 3- 5o 4+	20o	15	
10	1.8	6o 6- 6- 4+	5o 5o 5+ 6+	43+	62	
11	1.8	7- 7- 6+ 5+	4+ 3+ 5- 7-	44o	72	Five
12	1.6	6o 4- 5o 4+	6- 6- 4+ 4+	39o	48	Disturbed
13	0.8	5o 4- 1+ 3-	3+ 2o 1o 2+	21+	16	
14	1.6	5- 5+ 6- 4+	4- 4o 7o 6+	41o	59	10
15	1.8	7- 6+ 8- 7+	6o 4- 4- 4-	45o	86	11
						14
16	1.5	6+ 7- 6o 4+	3o 3- 4+ 3-	36o	48	15
17	1.0	2+ 2+ 3o 3o	3+ 4- 3o 3o	24-	15	16
18	0.8	5- 4o 5- 2+	3o 2- 2- 1o	23o	18	
19	0.1	0+ 1- 1+ 2-	2o 2- 1o 1-	9+	4	
20	0.8	1- 0+ 2o 3o	4- 4- 3+ 3-	19+	13	
21	1.2	4o 4o 5- 4o	4- 3- 3+ 4+	31-	26	Ten
22	1.4	4o 3+ 3- 3o	5- 4- 4+ 6-	31+	29	Quiet
23	1.1	5o 4o 4- 5-	5- 4- 3- 2-	30o	27	
24	0.8	2- 2o 1o 3-	3+ 3+ 3o 3-	20-	12	2
25	1.4	2+ 2- 3o 3o	7o 4o 3+ 3-	27o	29	4
						5
26	0.2	4- 2- 1o 1-	1- 1o 1- 1-	10o	6	6
27	0.7	1o 2o 2- 1o	0+ 2- 4- 5o	16+	12	7
28	1.0	5+ 3+ 3+ 3o	2o 2o 2+ 2o	23+	17	8
29	0.7	2+ 2+ 2+ 2+	2- 3- 3+ 4-	21-	12	19
30	0.6	3o 4- 2+ 3+	2o 2+ 2o 3-	21+	12	24
Mean:	0.92			Mean:	24	26
						27


DAYS IN SOLAR ROTATION INTERVAL
ROT.-NR.
1685
1686
1687
1688
1689
1690
KEY
▲ = sudden commencement
PLANETARY MAGNETIC
THREE-HOUR-RANGE INDICES
Kp till 1956 Nov. 30
(Ks from Wingst and Göttingen till 1956 Dec. 20)

CRPL RADIO PROPAGATION QUALITY FIGURES AND FORECASTS

NORTH ATLANTIC

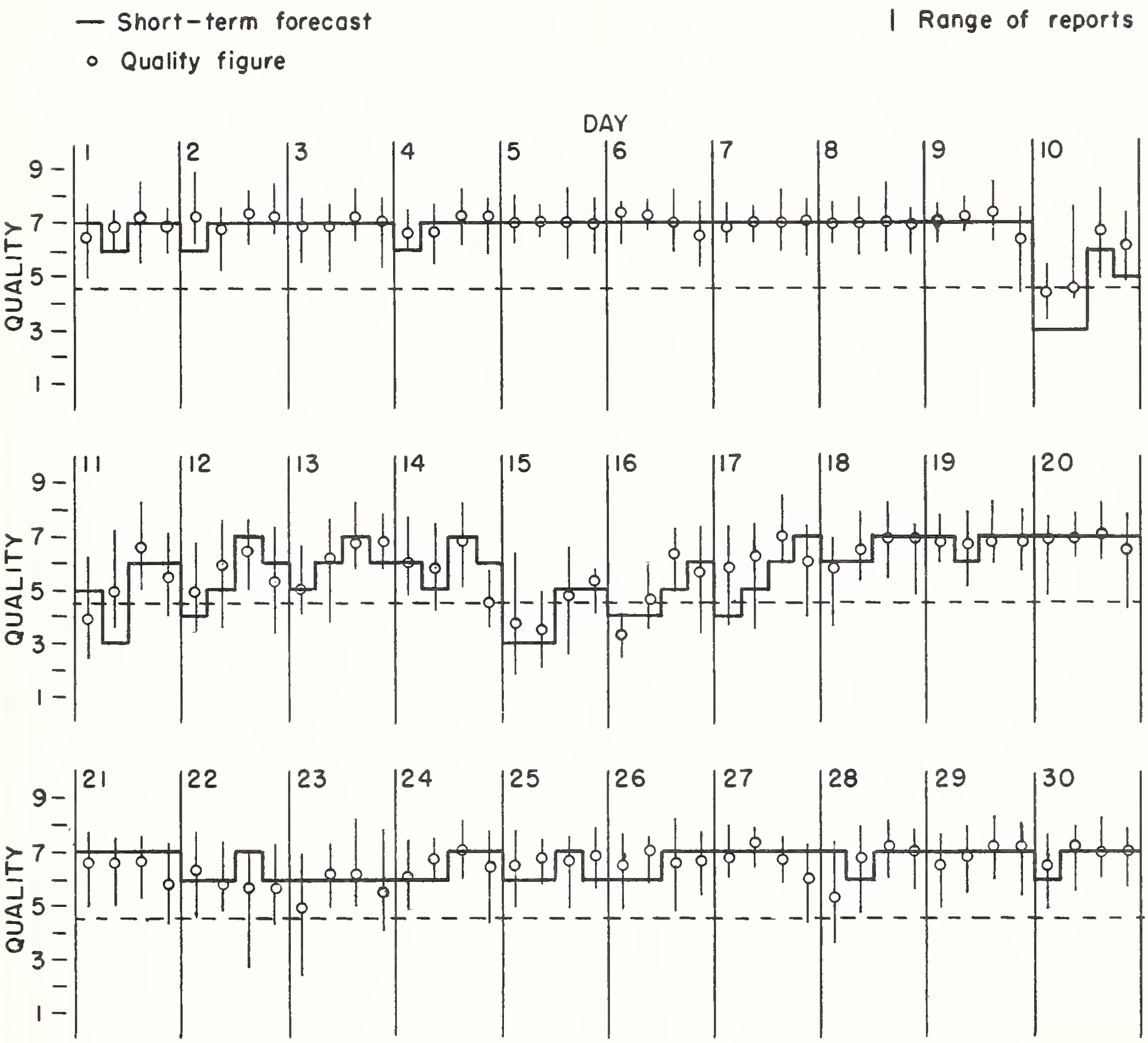
NOVEMBER 1956

Nov. 1956	North Atlantic 6-hourly quality figures				Short-term forecasts issued about one hour in advance of:				Whole day index	Advance forecasts (J-reports) for whole day; issued in advance by:			Geomagnetic K_{Fr}	
	00 to 06	06 to 12	12 to 18	18 to 24	00	06	12	18		1-4 days	4-7 days	8-25 days	Half (1)	Day (2)
1	6+	7-	7o	7-	7	6	7	7	7-	7	7		2	2
2	7+	7-	7+	7o	6	7	7	7	7o	7	7		2	3
3	7o	7-	7o	7o	7	7	7	7	7o	5	7		3	3
4	7-	7-	7+	7o	6	7	7	7	7o	5	7		3	2
5	7o	7o	7o	7o	7	7	7	7	7o	6	7		1	1
6	7o	7+	7o	7-	7	7	7	7	7o	7	7		2	3
7	7-	7o	7o	7o	7	7	7	7	7o	7	7		2	1
8	7o	7o	7o	7o	7	7	7	7	7o	7	7		2	1
9	7o	7o	7+	6+	7	7	7	7	7o	5	7		1	3
10	4+	5o	7-	6o	3	3	6	5	6-	3	7		(5)	(5)
11	4o	5o	7-	5+	5	3	6	6	5+	3	7		(6)	(4)
12	5o	6o	6+	5+	4	5	7	6	6-	5	6		(4)	(4)
13	5o	6o	7-	7-	5	6	7	6	6+	6	6		2	2
14	6o	6-	7-	4+	6	5	7	6	6-	6	6		(4)	(4)
15	4-	3+	5-	5+	3	3	5	5	(4o)	7	6		(6)	(4)
16	3+	5-	6+	6-	4	4	5	6	5-	4	7		(5)	3
17	6-	6+	7o	6o	4	5	6	7	6+	5	7		2	2
18	6-	6+	7-	7-	6	6	7	7	7-	6	7		3	2
19	7-	7-	7o	7-	7	6	7	7	7-	6	7		0	2
20	7o	7o	7o	6+	7	7	7	7	7-	7	7		2	3
21	7-	7-	7-	6-	7	7	7	7	6+	7	7		(4)	3
22	6+	6o	6-	6-	6	6	7	6	6-	7	7		3	(4)
23	5o	6+	6+	6-	6	5	6	6	6-	6	7		(4)	2
24	6o	7-	7o	6+	6	6	7	7	7-	4	6		1	2
25	7-	7-	7-	7-	6	6	7	6	7-	4	6		2	(4)
26	7-	7o	7-	7-	6	6	7	7	7-	5	6		1	1
27	7-	7+	7-	6o	7	7	7	7	7-	7	6		2	2
28	5+	7-	7o	7o	7	6	7	7	7-	7	7		3	2
29	7-	7-	7o	7o	7	7	7	7	7o	7	7		2	3
30	7-	7o	7o	7o	6	7	7	7	7o	7	7		3	2
Score: Quiet Periods				P	16	16	24	18		13	18			
				S	8	11	6	11		8	9			
				U	1	2	0	0		5	2			
				F	1	0	0	0		3	0			
Disturbed Periods				P	0	1	0	0		0	0			
				S	4	0	0	0		0	0			
				U	0	0	0	0		0	0			
				F	0	0	0	1		1	1			

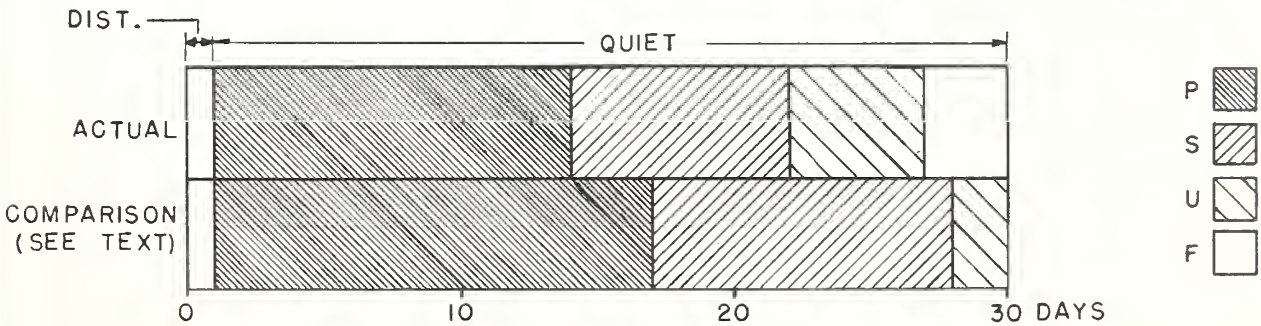
( ) represent disturbed values.

CRPL RADIO PROPAGATION QUALITY FIGURES AND FORECASTS
NORTH ATLANTIC

NOVEMBER 1956

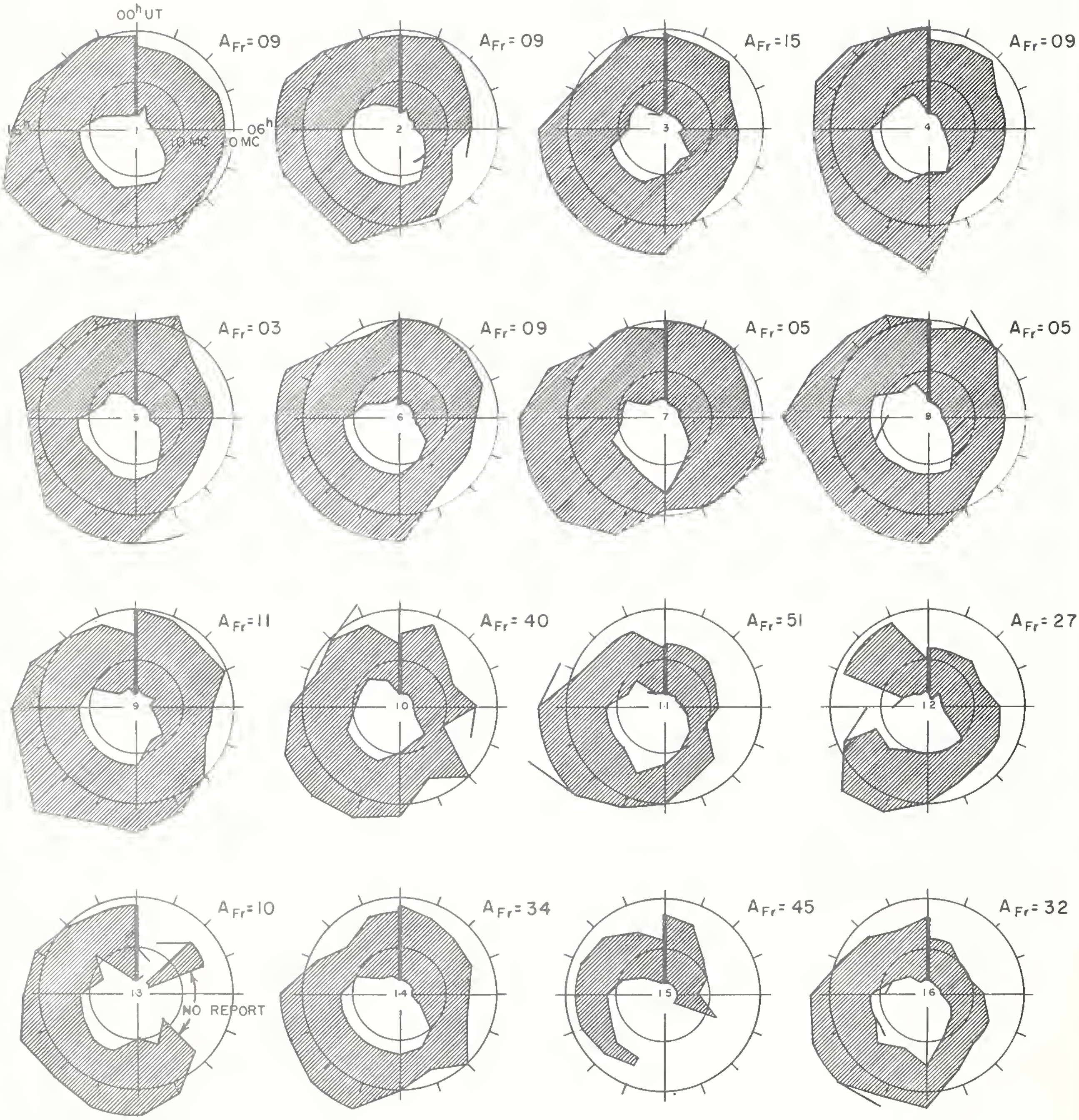


OUTCOME OF ADVANCE FORECASTS (1 TO 4 DAYS AHEAD)

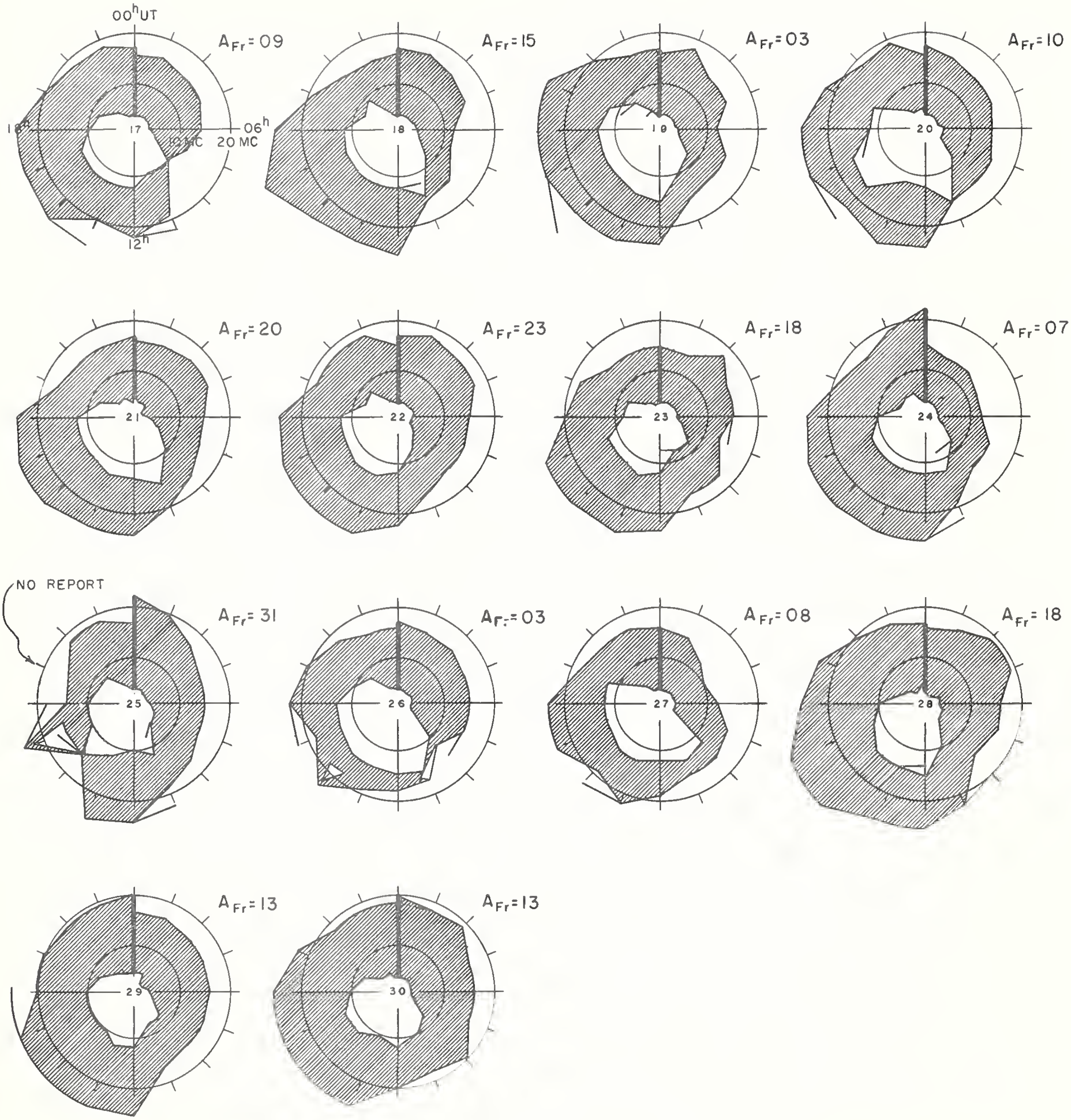


USEFUL FREQUENCY RANGES -- NORTH ATLANTIC PATH

NOVEMBER 1956



NOVEMBER 1956



Adapted from Observations by Deutschen Bundespost

CRPL RADIO PROPAGATION QUALITY FIGURES AND FORECASTS

NORTH PACIFIC

NOVEMBER 1956

Nov. 1956	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	6	6	6	6	6	5	6	6	6		2	3
2	6	6	7	6	6	6	6	6	6		0	3
3	6	6	6	6	4	6	6	5	5		3	3
4	6	6	6	6	5	6	6	5	5		2	1
5	6	5	7	6	6	7	6	6	6		1	1
6	6	6	5	6	6	6	6	6	6		2	2
7	6	6	6	6	6	7	6	6	6		1	1
8	6	6	6	6	6	6	6	6	4		1	1
9	6	6	6	6	6	6	6	6	3		1	3
10	5	3	4	5	4	3	(4)	4	3		(7)	(6)
11	4	3	5	4	2	4	(4)	5	3		(7)	(6)
12	5	3	6	5	4	5	5	6	4		(4)	(5)
13	5	5	7	5	5	6	6	6	5		3	2
14	6	5	4	6	4	4	5	5	6		(5)	(5)
15	3	3	5	3	2	5	(3)	6	6		(8)	(5)
16	5	6	6	4	4	6	5	6	5		(6)	3
17	5	5	5	5	6	5	5	4	4		2	3
18	6	6	5	5	5	6	6	4	5		(4)	3
19	5	5	5	6	6	5	5	5	5		1	1
20	5	5	5	6	5	6	5	6	6		1	(4)
21	6	5	6	6	4	5	6	6	6		(4)	(4)
22	6	5	5	6	5	5	5	6	4		3	(5)
23	6	4	6	5	5	4	5	6	4		(5)	(4)
24	5	5	5	5	5	6	5	5	5		1	3
25	5	5	5	6	5	6	6	6	5		2	(5)
26	5	5	5	6	5	6	5	6	5		1	0
27	5	5	6	6	5	6	6	6	5		1	2
28	6	6	6	6	6	6	6	6	6		(4)	2
29	5	6	5	6	6	6	5	6	6		1	2
30	6	5	6	5	5	6	5	6	6		2	2
Score: Quiet Periods			P	18	16	13		15	11			
			S	10	7	14		11	14			
			U	0	0	0		0	0			
			F	0	2	1		1	2			
Disturbed Periods			P	2	0	1		1	0			
			S	0	5	1		1	2			
			U	0	0	0		0	0			
			F	0	0	0		1	1			

( ) represent disturbed values.

CRPL RADIO PROPAGATION QUALITY FIGURES AND FORECASTS

NORTH PACIFIC

NOVEMBER 1956