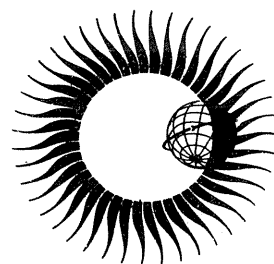


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Upper Atmosphere Geophysics



AN EXPERIMENTAL, COMPREHENSIVE FLARE INDEX AND ITS DERIVATION FOR "MAJOR" FLARES, 1955-1969



July 1971

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Upper Atmosphere Geophysics



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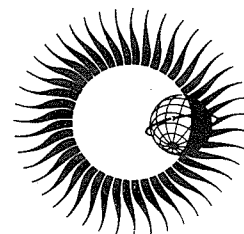
AN EXPERIMENTAL, COMPREHENSIVE FLARE INDEX AND ITS DERIVATION FOR "MAJOR" FLARES, 1955-1969

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"An Experimental, Comprehensive Flare Index and Its Derivation for 'Major' Flares, 1955-1969"

by

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The Need for a New Type of Flare Evaluation

The abundance of different types of electromagnetic phenomena that accompany certain H α flares has led over the years to a felt need for a systematic organization of this information for the respective flares. The current "importance" evaluation of a flare refers only to H α circumstances and primarily to flare area. In the absence of a more comprehensive evaluation of the flare event, the H α importance often is used to indicate the magnitude of the phenomenon. It is possible that this is a good procedure, but there is a certain uneasiness that in this practice important information may be overlooked. A number of years ago, A. D. Fokker suggested the formulation of a radio frequency importance evaluation for flares. In Boulder, at the Space Environment Services Center of the Space Environment Laboratory, practical needs have led to the use of a flare classification that reflects the magnitude of the X-ray or ionizing radiation associated with the event. The current practice in the Quarterly Bulletin of showing correlated H α flare, SID, and dynamic spectrum information in juxtaposition to the distinctive radio frequency events, further reflects the apparent need for comprehensive flare information.

The types of data that seem both appropriate and available for an overall description of a flare include evaluations of (a) the H α flare itself, (b) time-associated ionizing or X-radiation, (c) the magnitude of radio frequency radiation at both long (metric) and short (centimetric) wavelengths, and (d) the type of the dynamic spectrum at radio frequencies. Furthermore, it seems desirable to us that comprehensive information about the flare event be organized into a flare-profile in such a way that the individual components can be recognized, as well as melded into a single overall flare index.

An Experimental Comprehensive Flare Index

As a pilot venture in this field, an experimental Comprehensive Flare Index has been developed at the McMath-Hulbert Observatory. It is based on five components which, when taken sequentially, constitute a crude profile of the electromagnetic radiation of the flare. The components are listed in the profile in the order of increasing wavelength. The sum of the five components gives the Comprehensive Flare Index. The five quantities that comprise the flare profile and Comprehensive Index are described below.

1. Importance of ionizing radiation as indicated by time-associated Short Wave Fade or Sudden Ionospheric Disturbance; (Scale 1-3)
2. Importance of H α flare; (Scale 1-3)
3. Magnitude of ~ 10 cm. flux; (characteristic of log of flux in units of $10^{-22} W_m^{-2} (c/s)^{-1}$)
4. Dynamic spectrum; (Type II = 1, Continuum = 2, Type IV, with duration > 10 minutes = 3)
5. Magnitude of ~ 200 MHz flux; (characteristic of log of flux in units of $10^{-22} W_m^{-2} (c/s)^{-1}$)

We hold no brief for the special excellence or suitability of the index that we have derived. It is an index that could be developed on the basis of available tabulations of flare data for solar cycles 19 and 20, and especially since the IGY (1957-1959). We hope that the availability of this index will help to test the possible usefulness of a comprehensive flare evaluation.

The user of the index should be aware of known shortcomings of the index here presented. For item 1 in the profile, the magnitude of the Short Wave Fade (SWF) has been used as a substitute for a measure of the more significant X-radiation which generally was not known in past years. Because of changes in the Solar-Geophysical Data Bulletin, it was necessary in 1969 to replace the Short Wave Fade by the more general Sudden Ionospheric Disturbance.

In entry 2, the intensity of the H α flare is not given specific consideration.

For items 3, 4, and 5 of the index the duration of the enhanced radio frequency emission does not enter into the evaluation and this may be especially regrettable. In item 4 no distinction is made between Type IV in the various parts of the radio spectrum, nor is the intensity of the Type IV radiation reflected in the index. In some cases an intense meter- λ burst (item 5) merely reflects the occurrence of a Type II burst already noted in item 4.

Values of the Comprehensive Flare Index range from 0 for subflares without significant ionizing or radio frequency emission to 15, 16, and 17 for flares that were outstanding in all aspects of electromagnetic flare radiation. For a large number of flares in past years, needed observations were not obtained and for these events the Comprehensive Index must remain incomplete. In such cases the derived value represents only a lower limit for the Comprehensive Index.

Comprehensive Flare Indices for "Major" flares in Cycles 19 and 20 (to 1969)

The Comprehensive Flare Index described above has been derived for all flares in solar cycles 19 and 20 (to 1969) which are considered to have been well above average in either H α , ionizing, or radio frequency radiation. Specifically, the index has been determined for all flares that satisfied any one of the following criteria:

Short wave fade (or Sudden Ionospheric Disturbance) importance ≥ 3 .

H α flare, importance ≥ 3 .

10 cm flux, $\geq 500 \times 10^{-22} \text{ Wm}^{-2} (\text{c/s})^{-1}$.

Type II burst

Type IV radio emission, duration > 10 minutes.

Accordingly each flare for which the Comprehensive Index has been derived in this program can in some sense be considered as a "major" flare. The times of these "major" flares, with their respective profiles and comprehensive indices, are listed in Table I. In this table, the reported time refers to the H α flare or subflare, when known. When no H α event has been reported, a nominal time is given in parentheses and refers to the approximate time of the short wave fade or the radio frequency emission. Careful distinction has been made between "no flare reported" and "H α observations not in progress." An asterisk in the Time column of Table I identifies the latter situation.

Table I

Comprehensive Flare Index "Major" Flares[†], 1955-1969

Date	Time (UT) of Flare or Event ^{††}	Position	H α Imp.	McMath Plage	Profile abcde	Index
<u>1955</u>						
Jan 16	2130-2220	N33 W41	3	3065	03222	9
Feb 24	(0104)	-	-	-	00013	4
June 9	(0001)*	-	-	-	0-012	≥ 3
June 15	(0400)*	-	-	-	0-012	≥ 3
June 18	1218-1315	S23 W25	3	3182	131-2	≥ 7
June 18	1905-1940	S22 W21	3	3182	23322	12
June 21	(2329)*	-	-	-	0-01-	≥ 1
July 5	(0215)*	-	-	-	0-012	≥ 3
July 7	(0206)*	-	-	-	0-012	≥ 3
Sept 10	(0509)*	-	-	-	0-010	≥ 1
Sept 19	(0146)*	-	-	-	0-212	≥ 5
Oct 25	1849-2033	S22 E42	2	3309	321-0	≥ 6
Nov 12	1116-1159	N27 E27	3	3326	230-3	≥ 8
Nov 15	0428-0458	N26 W09	1+	3326	21012	6
Nov 15	(1734)*	-	-	-	2-200	≥ 4
Nov 15	(2205)	-	-	-	00010	1
Nov 18	(0238)	-	-	-	10210	4
Nov 24	(0442)*	-	-	-	0-010	≥ 1
Nov 28	(2230)*	-	-	-	3-000	≥ 3
Nov 30	(0539)*	-	-	-	0-210	≥ 3
Dec 3	1058-1245	N20 E08	3	3342	330-0	≥ 6
<u>1956</u>						
Jan 16	(0031)	-	-	-	00010	1
Jan 19	(0015)*	-	-	-	2-012	≥ 5
Jan 19	0535-0710	N22 E19	3	3379	13000	4
Feb 10	2110-2143	N22 E90	3(?)	3400	332-0	≥ 8
Feb 13	1438-1558	N19 E44	2	3400	322-1	≥ 8
Feb 14	0538-0730	N12 E32	2	3400	32313	12
Feb 16	1805-2039	N20 E08	2	3400	322-2	≥ 9
Feb 17	0446-0652	S20 E25	3	3403	33200	8
Feb 17	1100-1242	N20 W04	3	3400	330-2	≥ 8
Feb 19	1430-1627	N25 W23	1+	3400	312-2	≥ 8

Comprehensive Flare Index "Major" Flares†, 1955-1969 (Continued)

Date	Time (UT) of Flare or Event ††	Position	H α Imp.	McMath Plage	Profile abcde	Index
1956 (continued)						
Feb 21	1330-1338	N40 W72	3	3401	030-0	≥ 3
Feb 23	0331- 0510	N23 W80	3	3400	333-4	≥ 13
Feb 29	2220-2335	S29 W24	3	3413	332-0	≥ 8
Mar 1	1730-1745	N20 W55	2	3412	222-1	≥ 7
Mar 2	1220-1314	N21 W64	3	3412	230-2	≥ 7
Mar 8	(0320)*	-	-	-	0-213	≥ 6
Mar 10	0515-0640	N16 E88	2	3431	322-0	≥ 7
Mar 13	1453-1529	N21 E50	2	3432	322-0	≥ 7
Mar 15	1625-1745	N22 E21	2+	3432	323-2	≥ 10
Mar 19	(2133)	-	-	-	300-0	≥ 3
Mar 20	0235-0410	S17 W04	1	3435	312-3	≥ 9
Mar 31	1350-1430	N30 W80	1	3440	312-0	≥ 6
Apr 9	0940-1101	N33 E27	3	3457	230-2	≥ 7
Apr 12	0530-0557	N19 E67	2	3464	22010	5
Apr 25	(2348)	-	-	-	00010	1
May 16	(0007)	-	-	-	00010	1
May 17	2230-2404	S24 W18	3	3497	031-0	≥ 4
May 18	1600-1610	S26 E45	S	3503	102-2	≥ 5
May 30	(0230)*	-	-	-	3-202	≥ 7
May 30	2320-2357	S20 E02	1	3513	01010	2
May 31	0752-0838	N24 E38	2+	3518	320-2	≥ 7
June 14	(0356)	-	-	-	300-0	≥ 3
June 24	1300-	N30 W90	S	3535	302-2	≥ 7
July 6	0246-0300	N20 E47	1	3565	21213	9
July 22	1624-1720	N29 W54	2	3577	222-0	≥ 6
July 25	(0310)	-	-	-	300-3	≥ 6
July 25	0535-0545	N27 W90	1+	3577	310-0	≥ 4
Aug 9	0141-0204	N21 E48	2	3607	322-0	≥ 7
Aug 19	0120-0129	S21 E67	1	3630	312-0	≥ 6
Aug 21	(0140)*	-	-	-	3-200	≥ 5
Aug 23	0215-0220	S19 W35	1	3625	312-3	≥ 9
Aug 27	0942-1018	N30 W35	1+	3629	310-0	≥ 4
Aug 29	0937-1053	N30 W69	3	3629	230-0	≥ 5
Aug 30	(0157)*	-	-	-	3-2-2	≥ 7
Aug 31	1226-1526	N15 E15	3	3643	332-4	≥ 12
Sept 5	1445-1507	S25 E77	3	3658	030-0	≥ 3
Sept 5	1645-1800	S24 E82	1+	3658	310-0	≥ 4
Sept 10	(0134)*	-	-	-	0-010	≥ 1
Sept 14	0813-0907	S22 E29	3	3666	030-3	≥ 6
Sept 17	1942-2120	S20 W17	2+	3666	322-1	≥ 8
Oct 1	0755-0855	N45 W48	3	3691	030-0	≥ 3
Oct 7	0400-0502	N24 E07	3	3694	032-2	≥ 7
Oct 11	0955-1113	N22 W58	3	3694	330-0	≥ 6
Nov 7	1119-1354	S17 E32	3+	3751	230-3	≥ 8
Nov 8	0231-0248	N14 E62	1	3753	11202	6
Nov 10	(0300)	-	-	-	30020	5
Nov 10	0840-0904	N27 W07	1	3750	310-2	≥ 6
Nov 12	(2309)	-	-	-	00010	1
Nov 13	0157-0254	N28 W58	3-	3747	23200	7
Nov 14	1037-1400	S20 W55	3	3751	23003	8
Nov 19	(0135)*	-	-	-	0-210	≥ 3
Nov 20	1002-1318	S15 W56	3	3755	330-3	≥ 9
Nov 22	1312-1415	S15 W84	2	3755	323-3	≥ 11
Dec 2	1400-1406	S15 E81	1+	3785	31201	7
Dec 6	1405-1415	S21 E41	3	3785	332-2	≥ 10
Dec 7	(0457)	-	-	-	302-0	≥ 5
Dec 15	0520-0545	S25 W30	2	3788	322-0	≥ 7
Dec 17	1535-1705	S24 W52	3	3788	33200	8
Dec 18	0830-1020	S25 W69	2	3788	320-0	≥ 5
Dec 18	2045-2313	S22 W78	2	3788	32200	7
Dec 19	0725-0810	S22 W72	2	3788	320-0	≥ 5
Dec 19	0835-0930	S15 E84	2	3800	320-2	≥ 7
Dec 20	0456-0523	S25 W90	1+	3788	31200	6
Dec 22	0955-1058	N32 E90	3	3804	030-0	≥ 3
Dec 26	0507-0626	S15 W06	2	3800	322-0	≥ 7

Comprehensive Flare Index "Major" Flares[†], 1955-1969 (Continued)

Date	Time (UT) of Flare or Event ^{††}	Position	H α Imp.	McMath Flage	Profile abcde	Index
1956 (continued)						
Dec 26	1401-1508	S17 W11	2	3800	322-0	≥ 7
Dec 29	0040-0255	N16 E59	1+	3808	313-0	≥ 7
1957						
Jan 5	0116-0200	N17 W31	2	3808	222-2	≥ 8
Jan 6	1038-1404	S21 E40	3	3813	030-1	≥ 4
Jan 6	1822	N16 W53	S	3808	30232	10
Jan 7	1830-1840	N20 W65	2+	3808	32020	7
Jan 20	1100-1417	S30 W18	3	3820	132-0	≥ 6
Jan 24	1225-1354	N16 W31	3	3823	232-2	≥ 9
Jan 24	1638-1653	S27 W80	2	3820	223-0	≥ 7
Jan 24	(2328)*	-	-	-	0-010	≥ 1
Jan 28	(2348)	-	-	-	00010	1
Jan 31	0358-0550	N24 E05	3+	3830	13210	7
Feb 8	1550-1615	S28 E38	2	3844	22211	8
Feb 12	1542-1620	N19 E80	S	3856	00010	1
Feb 21	1605-2205	N20 W33	3+	3856	03111	6
Feb 28	0005-0420	N18 W35	3	3863	13212	9
Mar 1	(0036)	-	-	-	00210	3
Mar 26	(0412)	-	-	-	00010	1
Apr 2	0255-0444	S16 W46	2	3907	322-2	≥ 9
Apr 2	1959-2120	N25 W90	1	3908	31202	8
Apr 3	0825-1026	S14 W60	3	3907	230-1	≥ 6
Apr 5	(0004)*	-	-	-	0-010	≥ 1
Apr 8	0342-0359	S22 E50	1+	3923	11212	7
Apr 9	0510-0522	N13 W70	S	3918	00010	1
Apr 11	1722-1850	S23 E05	2+	3923	32200	7
Apr 12	1850-2010	S25 W73	2	3916	32210	8
Apr 15	1410-1430	N25 E90	2	3941	32213	11
Apr 16	1040-1300	N30 E85	3	3941	333-2	≥ 11
Apr 17	1006-1118	N29 E76	3	3941	330-0	≥ 6
Apr 17	1851-	S18 E73	S	3944	20111	5
Apr 17	2000-2300	N20 E69	3+	3941	33332	14
Apr 18	1310-1353	S16 E64	2	3944	22222	10
May 9	2325-2338	S22 W90	S	3969	10110	3
May 14	0222-0230	S20 E87	1	3980	312-0	≥ 6
May 14	1840-1850	N09 W50	1	3974	11210	5
May 19	(0008)	-	-	-	00013	4
May 21	1900-1935	S12 E63	1	3990	21010	4
June 1	2329-2356	S25 W44	2-	3993	321-2	≥ 8
June 4	0029-0155	S17 W22	2	3996	32200	7
June 4	0859-0950	S17 W27	2	3996	322-2	≥ 9
June 5	1326-1433	S18 W44	2	3996	32212	10
June 6	1130-1148	S14 W27	1	3997	012-2	≥ 5
June 19	1609-1649	N20 E45	2	4024	32312	11
June 22	0236-0257	N23 E12	2	4024	22200	6
June 27	2322-2418	N20 W62	1	4024	11202	6
July 2	(0013)	-	-	-	20202	6
July 3	{ 0712-0830	N14 W40	3+	4039	332-3	≥ 11
	{ 0830-1145	N10 W42	3+	4039		
July 16	0731-0816	N31 E80	1+	4065	310-0	≥ 4
July 16	1742-2008	S33 W28	1+	4061	31212	9
July 17	0112-0148	N11 E30	1+	4065	21212	8
July 20	2358-0100	N29 E18	1	4065	31200	6
July 21	0633-0756	N30 E15	2	4065	322-2	≥ 9
July 21	1320-1442	N29 E12	2	4065	222-2	≥ 8
July 21	1405-1500	N11 E62	1	4075	11030	5
July 21	1737-1752	N22 W12	1	4065	01211	5
July 21	2215-2302	N20 W15	5	4065	00132	6
July 22	0953-1150	N15 E51	3	4075	030-2	≥ 5
July 24	{ 1712-1801	S24 W27	3	4070	33332	14
	{ 1801-2025					
Aug 1	1352-1437	S35 E04	1	4082	01130	5
Aug 2	1432-1448	N26 E32	1	4083	21121	7
Aug 3	1721-1735	N26 E17	1	4083	21121	7
Aug 5	1900-1954	N26 E08	1	4083	11112	6

Comprehensive Flare Index "Major" Flares†, 1955-1969 (Continued)

Date	Time (UT) of Flare or Event††	Position	H α Imp.	McMath Plage	Profile abcde	Index
1957 (continued)						
Aug 6	(0229)	-	-	-	00210	3
Aug 6	0423-0433	N25 W22	S	4083	00012	3
Aug 9	1330-1442	S33 W77	1	4082	31100	5
Aug 10	0125-0142	N26 W71	1	4083	31320	9
Aug 28	0913-1404	S31 E33	3	4125	33332	14
Aug 28	2010-2048	S28 E30	2+	4125	22212	9
Aug 30	(2210)*	-	-	-	2-233	≥ 10
Aug 31	1257-1455	N25 W02	3	4124	33333	15
Sept 1	0204-0224	N13 W08	1	4124	310-3	≥ 7
Sept 1	0946-1030	N12 W09	2	4124	222-3	≥ 9
Sept 2	0409-0445	N14 W25	1	4124	11210	5
Sept 2	1257-1346	N10 W26	1	4124		
	or				22202	8
	1313-1410	S34 W36	2+	4125		
Sept 3	0037-0116	N24 W24	1	4124	21222	9
Sept 3	1018-1103	N15 W40	2	4124	222-0	≥ 6
Sept 3	1412-1656	N23 W30	3	4124	33320	11
Sept 7	0810-0845	N15 W88	1+	4124	313-2	≥ 9
Sept 8	1627-1634	S13 E25	S	4138	00022	4
Sept 10	0223-0300	N14 E16	3	4134	23200	7
Sept 11	0140-0200	N15 E90	S	4148	?0210	≥ 3
Sept 11	0236-0722	N13 W02	3	4134	33333	15
Sept 12	(0220)*	-	-	-	20200	4
Sept 12	0703-0740	N09 W15	2	4134	32213	11
Sept 12	1510-1638	N11 W18	2	4134	22232	11
Sept 12	2145-2222	S17 W76	1	4136	21212	8
Sept 13	0602-0707	S16 W24	1	4141	11202	6
Sept 13	1410-1508	N09 W32	1+	4134	31232	11
Sept 14	0226-0303	N11 W39	2	4134	322-0	≥ 7
Sept 15	0333-0418	N07 E69	2	4152	322-0	≥ 7
Sept 15	2030-2110	N11 W64	1+	4134	21212	8
Sept 16	2242-2310	N11 W77	1	4134	21212	8
Sept 18	1303-	N23 E10	3			
	1425-1600	N20 E04	3	4151	33120	9
Sept 18	1722-	N23 E08	3+			
	1815-2110	N20 E03	3+	4151	33232	13
Sept 19	0350-0555	N23 E02	3	4151	33333	15
Sept 20	0529-0552	N23 W13	1	4151	11200	4
Sept 20	2117-2222	N07 W14	2	4152	12222	9
Sept 21	0415-0456	N23 W23	2	4151	322-1	≥ 8
Sept 21	1330-1510	N10 W06	3	4152	33230	11
Sept 24	0224-0307	N15 E90	S	4162	20010	3
Sept 24	0507-0522	N15 E90	1+	4162	01010	2
Sept 26	1907-2202	N22 E15	3	4159	23132	11
Sept 30	1657-1750	N25 W37	3	4159	33200	8
Oct 8	0231-0258	N17 W05	2	4172	22203	9
Oct 9	0340-0438	S38 W14	2	4173	12210	6
Oct 10	1630-1731	N25 E38	1+	4183	31200	6
Oct 13	0534-0641	N12 E40	2+	4186	122-0	≥ 5
Oct 15	(2150)*	-	-	-	1-300	≥ 4
Oct 16	0144-0155	N22 W56	1	4179	212-0	≥ 5
Oct 16	0152-0202	S25 E21	3	4189	230-0	≥ 5
Oct 18	0816-1022	S24 W04	1	4189	312-0	≥ 6
Oct 19	0406-0415	S28 W20	1	4189	11202	≥ 6
Oct 20	(0239)*	-	-	-	2-3-3	≥ 8
Oct 20	0838-1120	S25 W32	2	4189	320-2	≥ 7
Oct 20	1637-1644	S26 W45	3+	4189	33332	14
	1644-1804	S26 W35				
Oct 20	(2145)*	-	-	-	1-210	≥ 4
Oct 21	1301-1314	S28 W50	1	4189	01211	5
Oct 23	2222-2236	S18 W79	1	4189	01022	5
Oct 24	2314-2326	N15 W42	S	4195	10012	4
Oct 24	2329-2406	N27 W44	S	4194	00010	1
Oct 26	(0135)*	-	-	-	2-2-0	≥ 4
Oct 30	(0037)*	-	-	-	0-200	≥ 2

Comprehensive Flare Index "Major" Flares†, 1955-1969 (Continued)

Date	Time (UT) of Flare or Event††	Position	H α Imp.	McMath Plage	Profile abcde	Index
1957 (continued)						
Oct 31	(2119)*	-	-	-	0-012	≥ 3
Nov 4	(2240)	-	-	-	00010	1
Nov 5	1205-1257	S24 W54	2	4207	222-4	≥ 10
Nov 6	(0420)	-	-	-	00210	3
Nov 6	0834-0900	S28 W67	2	4207	322-2	≥ 9
Nov 13	0457-0511	S25 E27	1	4237	11212	7
Nov 15	0517-0636	N18 W45	1+	4230	012-0	≥ 3
Nov 18	(0321)	-	-	-	002-0	≥ 2
Nov 20	(0040)	-	-	-	20213	8
Nov 22	0404-0446	N31 W28	2	4246	32213	11
Nov 23	0750-0925	N26 W54	2	4246	222-2	≥ 8
Nov 24	0848-1100	S14 E37	3	4263	332-4	≥ 12
	1100-1202	S12 E35	3			
	1817-1939	S12 E12	S			
Nov 24	or 1825-1950	S16 E24	S	4263	00131	5
Nov 25	0457-0509	N29 W71	1+	4246	11012	5
Nov 29	0045-0600	N41 E63	3+	4282	03010	4
Dec 6	0347-0443	N15 E45	2	4295	22210	7
Dec 6	(2346)	-	-	-	102-0	≥ 3
Dec 7	0000-0030	S22 W25	1+	4288	012-0	≥ 3
Dec 12	1750-1859	N15 W41	2+	4295	12111	6
Dec 13	0227-0346	N15 E90	1	4314	31302	9
Dec 14	1245-1450	N18 E78	2+	4314	323-3	≥ 11
Dec 19	0757-1015	N20 E13	2+	4314	32223	12
Dec 20	0543-0606	N16 E00	1	4314	21213	9
	2334-2400	S15 E60	S	4323		
Dec 21	or 2334-2402	N25 E27	S	4321	002-0	≥ 2
	or 2349-2425	N17 W27	S	4314		
Dec 22	0237-0301	S27 E30	1	4319	012-0	≥ 3
	0437-0505	N18 W26	S	4314		
Dec 22	or 0438-0443	S21 E16	S	4319	002-0	≥ 2
	or 0438-0445	S20 W35	S	4313		
	or 0439-0504	S26 E41	S	4322		
	1022-1101	N19 W28	1+	4314	312-2	≥ 8
Dec 22	(1543)	-	-	-	00030	3
Dec 23	0025-0040	N18 W38	1	4314	11200	4
Dec 23	0038-0052	N26 E40	2	4321	12200	5
Dec 23	1436-1523	N18 W45	1+	4314	21230	8
Dec 24	(0018)	-	-	-	00200	2
Dec 24	(0103)	-	-	-	00200	2
Dec 24	(0127)	-	-	-	00200	2
Dec 24	0221-0234	N21 E01	1	4321	01200	3
Dec 25	0435-0437	S07 W59	1	4315	212-0	≥ 5
Dec 25	(0529)	-	-	-	002-2	≥ 4
Dec 25	1632-1655	N21 W72	S	4314	30222	9
Dec 25	1812-1900	S07 W70	1+	4315	31222	10
Dec 26	(0245)*	-	-	-	2-3-3	≥ 8
Dec 26	(0435)*	-	-	-	1-2-0	≥ 3
Dec 28	2229-2331	N25 W50	2	4321	22033	10
1958						
Jan 7	1820-1939	S18 E39	2	4355	12131	8
Jan 15	(0335)	-	-	-	00010	1
Jan 15	1640-1757	S13 W58	2+	4355	32320	10
Jan 16	1414-1447	N18 E23	1+	4370	31100	5
Jan 16	2255-2347	S15 E47	2	4377	02010	3
Jan 18	2253-2335	S11 W32	1	4368	01012	4
Jan 25	0915-1107	S23 W70	3	4372	332-2	≥ 10
Feb 9	1330-1501	S20 W02	1+	4400	311-2	≥ 7

Comprehensive Flare Index "Major" Flares†, 1955-1969 (Continued)

Date	Time (UT) of Flare or Event††	Position	H α Imp.	McMath Plage	Profile abcde	Index
1958 (continued)						
Feb 9	<u>2108-2302</u>	S12 W14	2+	4400	12133	10
Feb 10	<u>1320-1411</u>	S13 W64	2+	4400	32222	11
Feb 10	<u>1900-2030</u>	S14 W64	1+	4400	31212	9
Feb 26	<u>0527-0632</u>	S18 W61	2	4426	22310	8
Mar 1	(0340)	-	-	-	302-0	≥ 5
Mar 1	<u>0905-1007</u>	S11 W45	3	4436	232-2	≥ 9
Mar 1	(2041)	-	-	-	00030	3
Mar 2	(0009)	-	-	-	00010	1
Mar 2	(1134)	-	-	-	102-2	≥ 5
Mar 3	<u>1005-1411</u>	S16 E60	3	4445	33334	16
Mar 5	<u>0500-0632</u>	S12 E46	3	4445	03000	3
Mar 9	<u>1540-1740</u>	N34 W32	2	4444	32100	6
Mar 11	<u>0030-0042</u>	N11 E12	1	4449	31210	7
Mar 11	(1510)	-	-	-	30100	4
Mar 12	<u>0024-0233</u>	N08 E02	2+	4449	32210	8
Mar 14	<u>1454-1541</u>	S21 W85	2	4445	32201	8
Mar 23	<u>0947-1445</u>	S14 E78	3+	4476	33332	14
Mar 24	<u>1607-1643</u>	S15 E57	1	4476	21212	8
Mar 25	(2320)	-	-	-	00-12	≥ 3
Mar 26	<u>0036-0040</u>	N21 W50	1	4465	01022	5
Mar 27	<u>1534-1710</u>	S16 E23	2+	4476	32200	7
Mar 28	<u>1030-1152</u>	S24 E26	2	4478	322-0	≥ 7
Mar 28	<u>1703-1904</u>	S15 E09	2+	4476	32200	7
Mar 28	<u>1833-1922</u>	N20 W85	2	4465	22212	9
Mar 28	<u>2042-2131</u>	S24 E21	2	4478	22200	6
Mar 29	<u>1339-1410</u>	N35 E78	2	4484	32222	11
Mar 29	<u>1447-1507</u>	N26 W70	1	4469	21110	5
Mar 29	<u>1630-1637</u>	N20 W90	S	4465	30012	6
Mar 29	<u>1819-1915</u>	S24 E08	2	4478	32300	8
Mar 30	<u>0045-0123</u>	N35 E74	2	4484	22203	9
Mar 30	<u>0944-1421</u>	S16 W20	2+	4476	322-2	≥ 9
Mar 31	<u>0005-0036</u>	S17 W22	2	4476	22202	8
Mar 31	<u>0038-0130</u>	S08 W23	2	4476	32202	9
Apr 2	<u>1951-2025</u>	S15 E23	1+	4483	21224	11
Apr 6	<u>1929-2025</u>	S15 W27	1	4483	01132	7
Apr 7	<u>1010-1215</u>	N14 E32	3	4493	232-0	≥ 7
Apr 8	<u>0301-0408</u>	S17 W44	1	4483	11213	8
Apr 11	(1333)	-	-	-	30121	7
Apr 30	<u>1930-2005</u>	S17 E27	1+	4530	11110	4
	or					
May 1	<u>1932-2015</u>	N10 W50	1+	4519	13200	6
	<u>2115-2241</u>	S18 E15	3	4530		
May 5	<u>0356-0457</u>	S18 W29	3	4530	333-0	≥ 9
May 5	<u>2025-2115</u>	N24 W50	1+	4529	21200	5
	or					
May 19	<u>2032-2115</u>	S15 W39	1+	4530	00012	3
	(1826)	-	-	-		
June 4	<u>2147-2356</u>	N14 W58	2	4578	22233	12
June 5	<u>0835-0956</u>	N15 W65	2+	4578	222-2	≥ 8
June 5	<u>1615-1656</u>	S18 E69	2+	4598	32201	8
June 6	<u>0436-0614</u>	N16 W78	2	4578	22032	9
June 14	<u>2112-2146</u>	N14 E38	1	4607	11110	4
June 19	<u>0940-1210</u>	N14 W21	3	4607	232-2	≥ 9
June 26	<u>0245-0517</u>	N10 E49	2+	4623	22210	7
June 27	<u>0254-0405</u>	N10 E37	1+	4623	21200	5
July 3	<u>0041-0114</u>	N30 E37	1+	4630	01200	3
July 4	<u>0513-0534</u>	N29 E26	1+	4630	11200	4
July 4	<u>1712-1722</u>	S23 E32	S	4636	30000	3
	and					
July 7	<u>1747-1753</u>	S23 E32	S	4638	33333	15
	<u>0020-0414</u>	N25 W08	3+	4634		
July 12	<u>2317-2330</u>	N20 W78	1	4634	11010	3
July 19	<u>1905-2030</u>	N23 E13	2+	4651	32223	12
July 20	(0251)	-	-	-	10213	7
July 25	<u>0000-0128</u>	N10 E85	2+	4665	22222	10

Comprehensive Flare Index "Major" Flares†, 1955-1969 (Continued)

Date	Time (UT) of Flare or Event††	Position	H α Imp.	McMath Plage	Profile abcde	Index
1958 (continued)						
July 29	0259-0408	S14 W44	3	4659	33332	14
July 29	0458-0526	S14 W38	1	4659	01202	5
July 30	1523-1637	S13 W64	2	4659	32200	7
July 31	1058-1150	S13 W72	1+	4659	31201	7
Aug 2	1840-1851	S14 W90	S	4659	30312	9
Aug 4	0409-0610	N30 W31	3	4667	33210	9
Aug 4	2112-2129	S07 W10	1	4670	01122	6
Aug 7	1457-1700	S16 E71	3	4686	33200	8
Aug 14	2137-2225	S14 W36	1+	4686	21112	7
Aug 16	0433-0831	S14 W50	3+	4686	33334	16
Aug 19	2118-2411	N18 E26	2	4708	22231	10
Aug 20	0042-0128	N16 E18	3+	4708	23312	11
Aug 22	1428-1717	N18 W10	3	4708	33333	15
Aug 26	0005-0124	N20 W54	3	4708	33333	15
Sept 2	2102-2141	S08 E84	1+	4741	12-13	≥ 7
Sept 7	1639-1726	S32 E18	2	4739	32200	7
Sept 14	0822-1030	S10 W30	2+	4741	323-2	≥ 10
Sept 18	0728-0938	S11 W53	3	4750	032-1	≥ 6
Sept 22	0738-0910	S19 W42	2	4765	222-1	≥ 7
Sept 28	2046-2108	N32 W66	S	4777	10112	5
Oct 2	2143-2201	S06 W38	1	4781	01223	8
Oct 8	1510-1528	N12 E25	S	4806	00012	3
Oct 10	(0200)	-	-	-	302-0	≥ 5
Oct 21	2318-0127	S04 W32	2+	4826	32333	14
Oct 23	1655-1803	S32 E50	1	4838	11123	8
Oct 24	(0520)	-	-	-	00010	1
Oct 24	1432-1801	S05-W57	2+	4826	32232	12
Nov 14	0036-0207	S19 E51	3	4877	330--	≥ 6
Nov 24	1607-1907	S11 W08	3	4883	33232	13
Nov 27	1857-1904	N18 W12	1	4884	11122	7
Nov 27	2354-0020	N19 W19	1	4884	01-12	≥ 4
Nov 30	2240-2308	N13 E22	S	4898	0001-	≥ 1
Dec 9	1642-1735	N10 W90	1	4898	21113	8
Dec 10	0219-0306	N01 E20	2	4913	12223	10
Dec 10	1312-1514	S03 E18	1	4913	01233	9
Dec 11	1545-1612	S02 E00	S	4913	20233	10
Dec 11	1640-1707	S02 E10	S	4913	00030	3
Dec 11	1740-1755	S07 W88	S	4905	00030	3
Dec 11	1802-1842	S02 E00	2	4913	22333	13
Dec 11	1850-1910	S02 W02	S	4913	10132	7
Dec 11	1930-2012	S02 E02	2	4913	22233	12
Dec 12	1229-1547	S03 W08	2+	4913	22332	12
Dec 15	1535-1550	S04 W49	S	4913	00031	4
Dec 17	1040-1115	S04 W82	1	4913	012-2	≥ 5
Dec 17	1855-1927	N07 W35	1+	4919	11212	7
Dec 18	(0438)	-	-	-	00011	2
Dec 19	(0527)	-	-	-	00011	2
Dec 23	0545-0730	S15 E66	2+	4934	32302	10
Dec 31	1656-1741	S18 W54	3	4934	23232	12
1959						
Jan 3	1600-1702	S12 W90	1+	4934	31210	7
Jan 7	0215-0404	S10 W10	2	4947	22033	10
Jan 14	2140-2152	N21 E11	S	4962	00300	3
Jan 21	1700-1750	N10 E48	3	4976	23212	10
Jan 22	2050-2145	N08 W08	1+	4973	21222	9
Jan 26	0842-1000	N16 W61	3	4969	232-0	≥ 7
Jan 26	1027-1315	N16 W61	3	4969	033-1	≥ 7
Feb 1	0352-0458	N12 E82	3	4997	33--3	≥ 9
Feb 2	1017-1225	N22 W30	3	4983	130-0	≥ 4
Feb 2	1816-2055	N09 E60	3	4997	33222	12
Feb 3	0040-0107	N12 E08	2	4992	12-10	≥ 4
Feb 7	1557-1620	N14 W60	1+	4992	01012	4
Feb 7	2318-2324	N17 W58	S	4992	00012	3
Feb 8	1343-1350	N10 E90	1	5009	21212	8
Feb 9	0058-0246	N10 E90	2	5009	32233	13

Comprehensive Flare Index "Major" Flares†, 1955-1969 (Continued)

Date	Time (UT) of Flare or Event††	Position	H α Imp.	McMath Plage	Profile abcde	Index
1959 (continued)						
Feb 9	0943-1019	N09 E88	2 ⁺	5009	322-2	≥ 9
Feb 9	1641-1720	N06 E80	1	5009	21132	9
Feb 12	2301-2515	N13 E48	3	5009	23-32	≥ 10
Feb 18	(0508)*	-	-	-	2-212	≥ 7
Feb 18	(2241)*	-	-	-	2-010	≥ 3
Feb 19	2032-2244	N11 W10	3	5016	13200	6
Feb 20	1735-1905	N23 E06	1	5018	1121-	≥ 5
Mar 7	1723-1750	N01 E90	2	5048	32100	6
Mar 9	1715-1757	N14 W67	2	5035	22110	6
Mar 10	0614-0644	N12 E66	S	5048	30000	3
Mar 13	(0441)	-	-	-	00011	2
Mar 21	0158-0259	N12 W37	2	5052	322-0	≥ 7
Mar 21	0903-1043	N15 W42	2	5052	322-1	≥ 8
Mar 21	1309-1344	N28 W46	1 ⁺	5054	11200	4
Mar 22	1338-1545	N29 W50	1 ⁺	5054	31200	6
Mar 24	0958-1325	N29 W77	3	5054	333-0	≥ 9
Mar 28	2113-2315	N24 W33	3	5061	13200	6
Mar 29	0747-0930	N17 E37	2	5071	322-0	≥ 7
Apr 5	2316-2519	N16 W67	3 ⁺	5071	33-02	≥ 8
Apr 8	0905-1010	N27 E85	3	5093	233-5	≥ 13
Apr 9	1645-1710	N25 E70	2	5093	12222	9
Apr 11	2145-2205	S16 E35	1 ⁺	5089	01112	5
Apr 13	0830-0935	N27 E19	3	5093	232-0	≥ 7
Apr 14	1824-2002	N08 W14	2	5090	22100	5
Apr 22	1130-1300	N17 W18	S	5098	302-2	≥ 7
May 2	2355-2514	N15 W48	1	5120	11013	6
May 8	2252-2346	N21 E83	2 ⁺	5148	22323	12
May 9	0123-0212	N20 E78	3	5148	030-3	≥ 6
May 10	2102-2610	N18 E47	3 ⁺	5148	33233	14
May 11	2006-2150	N10 E41	3	5148	33233	14
May 13	0509-0553	N22 E26	2 ⁺	5148	22033	10
May 13	1416-1438	N11 E14	S	5148		
	or				01010	2
	1416-1435	S08 E84	1	5156		
May 13	2339-2418	S07 E87	1 ⁺	5156	11210	5
May 17	0104-0204	N20 W26	S	5148	30200	5
May 17	0700-0722	N21 W30	1	5148	213-2	≥ 8
May 18	(0407)*	-	-	-	2-212	7
May 19	1332-1401	N21 W57	2	5148	12214	10
May 23	0029-0113	N14 E43	1	5165	01010	2
June 5	0545-0554	S14 E12	S	5179	00012	3
June 9	1707-1900	N17 E90	2	5204	32331	12
June 10	(0247)	-	-	-	00014	5
June 16	0618-0810	N16 E15	3	5204	23--0	≥ 5
June 18	1130-1310	N16 W12	3 ⁺	5204	23300	8
June 22	(0503)	-	-	-	00010	1
July 5	2330-2353	N09 W23	S	5244	10012	4
July 7	0037-0340	N19 E90	S	5265	00-12	≥ 3
July 9	1930-2320	N19 E60	2	5265	12233	11
July 10	0206-1000	N20 E60	3 ⁺	5265	33312	12
July 13	0255-0605	N15 E18	3	5265	23200	7
July 14	0325-0901	N17 E04	3 ⁺	5265	33334	16
July 14	1400-1730	S25 E37	3	5273	23120	8
July 16	1552-1645	N14 W27	3	5265	23212	10
July 16	2114-2430	N16 W31	3 ⁺	5265	33333	15
July 17	0520-0656	N16 W40	1 ⁺	5265	01010	2
July 27	1224-1258	N14 E50	2	5294	22322	11
July 27	2050-2250	N27 E26	3	5291	13122	9
July 29	1202-1408	N11 E26	2	5294	22201	7
July 29	2117-2243	N15 E22	2 ⁺	5294	22222	10
Aug 1	1746-1754	N15 W37	S	5298	00120	3
Aug 11	1203-1232	N20 W24	2	5315	02212	7
Aug 14	0040-0326	N11 E26	3	5323	33-02	≥ 8
Aug 17	0328-0348	N14 W15	1	5323	21213	9
Aug 17	1218-1248	N15 W20	1 ⁺	5323	212-2	≥ 7

Comprehensive Flare Index "Major" Flares†, 1955-1969 (Continued)

Date	Time (UT) of Flare or Event††	Position	Ho Imp.	McMath Plage	Profile abcde	Index
1959 (continued)						
Aug 17	<u>2046-2113</u>	N14 W27	2	5323	22122	9
Aug 18	<u>1014-1350</u>	N12 W23	3	5323	33232	13
Aug 28	<u>0027-0128</u>	N11 E71	1	5344	21332	11
Aug 31	<u>1850-2054</u>	N10 E11	1+	5344	21232	10
Sept 1	<u>1923-2216</u>	N12 E60	2+	5354	22130	8
Sept 2	<u>0720-0954</u>	N10 W10	2+	5344	222-2	≥8
Sept 2	<u>1602-1645</u>	N25 W77	2	5339	22213	10
Sept 3	<u>0421-0439</u>	N25 W86	1	5339	31313	11
Sept 5	<u>1556-1614</u>	N13 W52	1	5344	11222	8
Sept 11	<u>2157-2211</u>	N14 E01	S	5360	10110	3
Sept 15	<u>2110-2150</u>	S13 W63	S	5367	00010	1
Oct 17	(0150)	-	-	-	002-0	≥2
Oct 20	(0012)	-	-	-	00202	4
Nov 11	(0657)*	-	-	-	0-020	≥2
Nov 18	(0043)	-	-	-	20010	3
Nov 21	<u>1734-1940</u>	N20 W30	1+	5461	11010	3
Nov 26	<u>0923-1110</u>	S15 W17	2+	5476	122-2	≥7
Nov 28	<u>2006-2130</u>	N12 E31	3	5476	23230	10
Nov 29	<u>1816-2012</u>	N09 E18	2+	5476	22210	7
Nov 30	<u>0247-0356</u>	N08 E16	2+	5476	32333	14
Nov 30	<u>1720-1906</u>	N07 W06	3	5476	33230	11
Dec 1	<u>1456-1622</u>	N09 W06	2	5476	22130	8
Dec 1	<u>1638-2035</u>	N09 W05	2+	5476	32010	6
Dec 2	<u>1219-1412</u>	N07 W16	2+	5476	22233	12
Dec 5	<u>1215-1250</u>	N11 W07	2	5478	222-3	≥9
Dec 8	<u>0116-0204</u>	N13 W39	1+	5478	11213	8
Dec 8	<u>0747-0839</u>	N12 W44	2	5478	212-2	≥7
Dec 10	<u>0512-0537</u>	N15 W70	2+	5478	12213	9
Dec 11	(0412)	-	-	-	10212	6
Dec 18	<u>0636-0700</u>	S07 W53	1	5440	11-32	≥7
Dec 21	<u>0043-0350</u>	S04 W53	2	5494	32232	12
1960						
Jan 11	<u>2040-2355</u>	N22 E02	3	5527	2323-	≥10
Jan 12	<u>1646-1710</u>	S10 W37	1	5525	01132	7
Jan 15	<u>1334-1455</u>	S20 W68	2	5525	122-2	≥7
Jan 16	<u>2239-2335</u>	N12 E76	1+	5541	21014	8
Feb 3	<u>2015-2155</u>	N14 W30	2	5552	22112	8
Feb 4	<u>1306-1423</u>	S15 W49	2	5551	12132	9
Feb 4	{ <u>2032-2100</u> <u>2136-2220</u>	S14 W56	S	5551	10232	8
Feb 5	<u>1350-1400</u>	N11 W50	1	5552	21-20	≥5
Feb 5	<u>1943-2007</u>	N10 W56	1	5552	01010	2
Feb 7	<u>1604-1636</u>	N12 W87	S	5552	00010	1
Feb 13	<u>2002-2050</u>	N11 E45	1	5574	11110	4
Feb 18	<u>0122-0327</u>	S21 E90	S	5580	30220	7
Feb 20	<u>0235-0331</u>	S20 E63	2	5580	322-0	≥7
Feb 22	<u>1352-1520</u>	N08 E41	3	5581	33232	13
Feb 29	<u>0140-0200</u>	S32 W56	2	5580	02010	3
Mar 1	<u>1915-2050</u>	N22 W14	1+	5586	21222	9
Mar 10	<u>1716-1810</u>	N24 E07	1	5592	21212	8
Mar 28	<u>2042-2150</u>	N14 E37	2	5615	22232	11
Mar 29	<u>0650-1220</u>	N12 E30	2+	5615	323-4	≥12
Mar 30	(0215)	-	-	-	30230	8
Mar 30	{ <u>1455-</u> <u>1520-2034</u>	N12 E11	2	5615	32333	14
Apr 1	<u>0843-1320</u>	N12 E11	3	5615	333-3	≥12
Apr 3	<u>0542-0700</u>	N11 W36	2	5615	322-0	≥7
Apr 5	<u>0215-0530</u>	N12 W63	2	5615	32332	13
Apr 24	<u>2332-2430</u>	N15 E35	1	5642	11030	5
Apr 28	<u>0130-0145</u>	S05 E34	3	5645	33230	11
Apr 29	<u>0107-0908</u>	N14 W21	2+	5642	22232	11
May 4	<u>1000-1200</u>	N13 W90	3	5642	333--	≥9
May 6	(0312)	-	-	-	10010	2
May 6	<u>1404-2020</u>	S08 E07	3+	5653	3323-	≥11

Comprehensive Flare Index "Major" Flares†, 1955-1969 (Continued)

Date	Time (UT) of Flare or Event††	Position	H α Imp.	McMath Plage	Profile abcde	Index
1960 (continued)						
May 9	0704-1021	S11 E52	3	5657	231-0	≥ 6
May 12	1342-1546	N30 W59	1+	5654	31232	11
May 13	0519-0733	N30 W67	3	5654	33333	15
May 15	(0312)*	-	-	-	3-0-0	≥ 3
May 17	(1743)	-	-	-	00031	4
May 26	0850-1050	N14 W15	2+	5669	223-3	≥ 10
May 27	1500-1555	N13 E69	1	5678	01130	5
June 1	0823-1340	N29 E46	3+	5680	333-3	≥ 12
June 1	2020-2150	N18 W90	1	5669	21032	8
June 5	2217-2346	N26 W24	1+	5680	11110	4
June 10	0506-0737	N31 W62	2	5680	12210	6
June 12	0436-0720	S14 E53	2	5695	320-0	≥ 5
June 14	0001-0045	N17 W36	1	5693	11210	5
June 15	0243-0349	N18 W13	1	5694	11222	8
June 20	0126-0205	S13 W59	2	5695	12212	8
June 23	0329-0344	N12 W23	S	5706	00012	3
June 25	1026-1046	N19 E03	1+	5713	21232	10
June 25	1136-1530	N21 E06	3	5713	2323-	≥ 10
June 25	1659-1740	N19 W01	1	5713	11231	8
June 25	2039-2140	N18 W04	2+	5713	22232	11
June 26	0728-0525	N20 W08	3	5713	132-2	≥ 8
June 26	2358-2600	S08 E34	3	5719	23133	12
June 27	0418-0615	N20 W19	1+	5713	11232	9
June 27	2140-2345	N22 W27	3	5713	23232	12
June 29	0125-0247	N20 W50	1	5713	21333	12
June 29	1042-1102	N29 E39	1	5724	01110	3
July 8	2328-2410	N07 W33	2+	5732	02010	3
July 26	0320-0502	N09 W31	1	5765	11112	6
Aug 3	1616-1629	N06 W55	S	5775	00012	3
Aug 4	(1623)	-	-	-	10012	4
Aug 5	1123-1131	N18 E88	1		310-0	≥ 4
Aug 6	1618-1650	N20 E78	1+	5794	21132	9
Aug 11	0233-0356	N21 E35	2	5794	22233	12
Aug 11	1916-2055	N22 E26	2+	5794	22332	12
Aug 11	2254-2309	S24 W58	S	5788	00030	3
Aug 14	0511-0655	N22 W06	2+	5794	323-3	≥ 11
Aug 14	1306-1414	N20 E36	2	5799	32200	7
Aug 19	1233-1320	N16 W85	1+	5794	21112	7
Aug 21	1546-1630	N27 W02	1+	5806	3111-	≥ 6
Aug 26	1354-1442	N07 E17	S	5814	20010	3
Sept 1	2038-2100	S18 W49	1	5825	01023	6
Sept 2	0243-0321	S17 W57	1+	5825	21213	9
Sept 2	0538-0655	N18 W80	1	5816	21110	5
Sept 3	0037-0154	N18 E88	2+	5837	32333	14
Sept 3	2348-0048	N17 W90	S	5816	30232	10
Sept 5	1924-2100	N04 E66	1	5840	01010	2
Sept 8	1816-1824	N18 E90	S	5848	00112	4
Sept 14	1721-1814	S17 E90	S	5858	30100	4
Sept 16	1706-1855	S22 E67	1	5858	31332	12
Sept 26	0525-0616	S22 W64	1+	5858	31332	12
Oct 10	0713-0836	S17 W23	1+	5880	012-2	≥ 5
Oct 11	0517-0755	S17 W36	2	5880	32232	12
Oct 12	1742-1859	N11 W24	1	5884	21112	7
Oct 13	1901-2030	S16 E83	2	5900	02010	3
Oct 14	0148-0207	N09 W42	S	5884	00112	4
Oct 15	1109-1138	N15 W66	2	5884	321-1	≥ 7
Oct 15	(1715)	-	-	-	30000	3
Oct 17	(1428)	-	-	-	30000	3
Oct 23	2114-2215	N22 E90	1+	5909	21230	8
Oct 29	1026-1252	N22 E27	3	5909	332-3	≥ 11
Nov 6	1752-2030	N13 E07	3	5921	13110	6
Nov 10	1009-1635	N28 E28	3	5925	232-4	≥ 11
Nov 11	0305-0428	N28 E12	2	5925	32334	15
Nov 12	1315-1922	N27 W04	3+	5925	33333	15
Nov 14	0000-0100	N28 W18	2	5925	22110	6

Comprehensive Flare Index "Major" Flares†, 1955-1969 (Continued)

Date	Time (UT) of Flare or Event††	Position	H α Imp.	McMath Plage	Profile abcde	Index
1960 (continued)						
Nov 14	0246-0520	N27 W20	2+	5925	32332	13
Nov 15	0207-0427	N25 W35	3	5925	33433	16
Nov 19	1543-1649	N28 W90	2	5925	12010	4
	and					
	1657-1735		1			
Nov 20	2017-2032	N28 W90	1	5925	32232	12
	and					
	2126-2258		2			
Nov 27	(1523)	-	-	-	10010	2
Dec 5	1825-2350	N26 E74	3+	5959	33233	14
Dec 8	1555-1736	S09 W49	S	5953	00010	1
Dec 16	1517-1630	N17 W35	2	5961	12010	4
1961						
Jan 3	0224-0240	S15 E36	1	5990	01010	2
Jan 30	1418-1440	N11 E06	1	6013	11223	9
Jan 30	1958-2014	N11 E03	S	6013	10112	5
Jan 31	1500-1535	N10 W10	1	6013	11222	8
Feb 21	2259-2342	S13 E78	1	6042	01030	4
Mar 14	(2145)	-	-	-	10030	4
Mar 18	1604-1715	N20 W13	S	6057	00010	1
Mar 18	1738-1812	N05 E07	S	6059	20112	6
Mar 21	(2222)	-	-	-	00030	3
Mar 26	1012-1140	S15 E74	3	6069	332-2	≥ 10
Apr 4	2232-2306	N13 E18	1	6077	11132	8
Apr 26	1646-1945	S11 E53	3	6098	3310-	≥ 7
May 4	2145-2200	S10 W56	3	6098	13130	8
	2202-2340					
May 7	(1452)	-	-	-	00010	1
June 9	2129-2150	S03 W52	S	6134	00031	4
	2205-2213					
June 11	1502-1620	N02 W49	2+	6135	22232	11
June 13	0439-0456	N02 E28	1	6140	01122	6
June 14	1605-1700	N02 E08	1	6140	11122	7
June 15	1622-1730	N05 W07	2	6140	12233	11
	1716-1730	N02 W06				
June 29	1947-2002	N06 W21	S	6155	00010	1
July 11	1615-2040	S07 E32	3	6171	33332	14
July 12	1000-1300	S07 E23	3	6171	33334	16
July 15	1433-1929	N13 E15	3	6172	33122	11
July 15	1508-1549	S07 W20	2	6171	32232	12
July 18	0920-1250	S07 W59	3+	6171	333-3	≥ 12
July 20	1553-1735	S06 W90	3	6171	33333	15
	1828-1942					
July 22	(2315)	-	-	-	00032	5
July 23	2343-2430	S06 W49	1	6174	10032	6
July 24	0410-0449	N12 E15	2+	6178	22132	10
	0449-0612	N15 E19				
July 28	0240-0431	N12 W38	2	6178	22232	11
July 30	(1926)	-	-	-	00030	3
Aug 10	2307-2353	N08 E71	1	6199	01112	5
Aug 11	0350-0412	N09 E69	S	6199	00012	3
Aug 12	1612-1640	N17 W49	1	6197	01112	5
Aug 17	2102-2226	N08 W23	1	6199	01030	4
Aug 18	2038-2203	N08 W37	2	6199	12130	9
Sept 3	2040-2125	N10 E01	1	6212	11210	5
Sept 8	1545-1650	S10 E89	1	6223	21132	9
Sept 10	1958-2018	N08 W80	1	6212	31230	9
	2018-2054	N15 W90				
Sept 15	0031-0139	S15 W11	1+	6223	21210	6
Sept 16	1057-1158	N18 E77	2+	6227	222-3	≥ 9
Sept 27	1615-1644	N14 E63	S	6237	10032	6
Sept 27	1950-2015	N13 E72	1	6237	11113	7
Sept 28	2202-2530	N13 E29	3	6235	23232	12
Oct 9	1405-1417	N05 W05	S	6249	00020	2
Nov 5	1308-1410	N09 W24	1	6264	31000	4

Comprehensive Flare Index "Major" Flares†, 1955-1969 (Continued)

Date		Time (UT) of Flare or Event††	Position	H α Imp.	McMath Plage	Profile abcde	Index
1961 (continued)							
Nov	10	1434-1450	N19 W90	1 ⁺	6264	21230	8
Nov	11	1346-1357	N16 W13	S	6270	00012	3
Dec	1	(1324)	-	-	-	30000	3
Dec	3	1447-1514	N11 W42	1	6280	11010	3
Dec	23	2100-2140	S07 E90	1	6304	01030	4
		and 2209-2225	S12 E90	1			
1962							
Jan	23	(1500)	-	-	-	1-020	≥3
Feb	6	(2113)	-	-	-	20030	5
Feb	23	2202-2209	N11 E28	S	6352	10030	4
Mar	1	1634-1730	S13 W57	2	6351	22232	11
Mar	13	1444-1640	N10 E66	2 ⁺	6366	32202	9
Mar	22	0233-0236	N12 E12	1	6370	01010	2
Mar	22	2220-2310	N07 E36	3	6373	03100	4
Apr	12	(1648)	-	-	-	00032	≥5
Apr	12	2149-2248	N11 E19	S	6386	10232	8
Apr	18	1734-2129	N09 E05	3	6393	33132	12
Apr	20	1958-2040	N09 W27	2	6393	22112	8
Apr	21	2005-2107	N13 W44	S	6393	00011	2
Apr	22	1430-1710	N08 W48	2 ⁺	6393	32132	11
Apr	27	1346-1440	N08 E49	2	6403	12233	11
May	1	1915-1940	N19 E61	1	6411	11132	8
May	18	1530-1609	S10 W55	1	6416	01112	5
May	23	(0245)*	-	-	-	3-010	≥4
May	27	1511-1524	S11 E00	S	6427	00133	7
		and 1527-1539	S05 E01	S			
May	28	1629-1725	S16 E78	2	6432	12312	9
June	1	2006-2043	S08 W66	2	6426	12010	4
Aug	13	2033-2118	N07 W05	S	6514	10110	3
Aug	14	0244-0322	N06 W09	1	6514	11113	7
Aug	19	1648-1715	N01 E08	S	6522	10012	4
Aug	28	(1519)	-	-	-	00010	1
Sept	7	1507-1730	S14 E25	2	6548	12231	9
Oct	19	2021-2114	N08 E80	1	6591	01030	4
Oct	23	1642-1745	N03 W70	2	6581	02131	7
Nov	30	(0322)	-	-	-	00110	2
1963							
Feb	15	2020-2035	N08 E72	S	6701	00010	1
Mar	3	(2350)	-	-	-	00010	1
Apr	15	1613-1713	S10 W09	2	6766	32000	5
Apr	16	1640-1710	S15 W22	S	6766	0013-	≥3
Apr	24	(2005)	-	-	-	00030	3
Apr	26	(0352)	-	-	-	10112	5
May	1	0525-0835	N15 E46	2	6790	22313	11
May	20	2303-2315	N05 W19	S	6805	00030	3
May	23	1229-1305	N05 W65	1	6814	2113-	≥7
May	23	1510-1530	N04 W70	1	6814	0113-	≥5
		and 1547-1555		S			
May	24	1515-1525	N10 W70	S	6805	10112	5
May	25	0129-0135	N08 W78	1	6805	01021	4
May	25	1622-1638	N05 W85	1	6805	21132	9
June	7	2337-0102	S12 E14	1	6827	01121	5
June	14	0220-0247	N10 W32	1	6832	11120	5
		and 0247-0330	N09 W35	1			
June	26	0252-0346	N07 W68	1	6847	11110	4
July	9	(0222)	-	-	-	00010	1
Aug	9	2234-2340	N07 W80	1	6908	11231	8
Aug	11	1827-1900	N19 W90	?	6909	1-130	≥5
		and 1935-2005	N14 W90				

Comprehensive Flare Index "Major" Flarest, 1955-1969 (Continued)

Date	Time (UT) of Flare or Event††	Position	H α Imp.	McMath Plage	Profile abcde	Index
1963 (continued)						
Aug 11	2357-2406	N18 W90	1	6909	01010	2
Aug 12	(2057)	-	-	6909	0-030	≥ 3
Aug 17	1540-1640	S12 E09	1+	6924	21222	9
Sept 8	1951-2006	S09 E90	S	6961	1003-	≥ 4
Sept 13	0535-0840	S10 E42	1	6961	31102	7
Sept 14	2112-2205	N12 E72	1	6964	01220	5
	and					
Sept 15	2202-2221	N11 E71	1	6964	32312	11
	0015-0219	N15 E75	2			
Sept 16	0325-0617	N11 E57	3	6964	23100	6
Sept 16	1430-1532	N12 E48	2	6964	32220	9
Sept 20	2314-	N10 W09	2	6964	32334	15
	2351-2601					
Sept 26	0638-0944	N13 E78	3	6964	33302	11
Oct 18	1625-1710	N12 E90	1	7003	21133	10
Oct 18	2006-2058	N16 E90	1+	7003	21212	8
Oct 19	1650-1725	N11 E90	2	7003	22130	8
Oct 22	1321-1610	N11 E50	2	7003	32331	12
Oct 28	0135-0335	N12 W24	3	7003	332--	≥ 8
1964						
Mar 16	1553-1700	N05 W73	1+	7113	31232	11
Apr 7	0125-0300	N18 E67	2	7213	02010	3
Apr 11	(0025)	-	-	-	00030	3
1965						
Feb 5	1750-2024	N08 W25	2	7661	12132	9
May 1	1427-1436	N28 E85	S	7794	10012	4
May 25	2239-2253	N19 W73	1	7809	01132	7
June 5	1807-1835	S10 W50	S	7842	20132	8
June 13	0257-0430	N23 W03	1	7847	111-2	≥ 5
Oct 4	0937-1026	S21 W30	2	8012	02132	8
1966						
Jan 16	1845-2010	N20 E34	Sn	8131	00132	6
Jan 17	1029-1250	N19 E27	2b	8131	-2232	≥ 9
Feb 2	1510-1607	N26 E27	1n	8154	01030	4
Feb 7	1558-1700	N27 W38	1n	8154	01010	2
Mar 15	1636-1722	N23 E75	1n	8207	11312	8
Mar 15	2122-2201	N16 E70	Sn	8207	0003-	≥ 3
Mar 16	1603-1705	N18 E60	1b	8207	11132	8
Mar 16	1918-1950	N18 E58	1b	8207	11132	8
Mar 16	2252-2322	N16 E59	Sb	8207	00132	6
Mar 18	2345-2410	N15 E27	1n	8207	01112	5
Mar 19	0338-0527	N21 E33	3n	8207	33200	8
Mar 20	0928-1255	N21 E25	2b	8207	323-3	≥ 11
	1011-1130	N15 E08				
Mar 21	2138-2358	N19 W10	2b	8207	12113	8
Mar 23	2248-2335	N16 W33	1n	8207	01133	8
Mar 24	0225-0414	N20 W42	2n	8207	22233	12
Mar 25	0145-0340	N20 W54	2n	8207	32212	10
Mar 28	0442-0509	N28 E80	1b	8223	11110	4
Mar 28	2355-2453	N27 E68	1b	8223	21212	8
Mar 29	0324-0404	N28 E66	2b	8223	22213	10
Mar 29	1746-1844	N28 E60	1b	8223	21232	10
Mar 30	1241-1423	N28 E50	2n	8223	32234	14
Mar 31	1808-2042	N28 E35	2n	8223	32100	6
	1526-1535	N22 W80	Sn			
Apr 12	and	N21 W83	1n	8240	21130	7
	1621-1643					
May 2	and	N21 W80	1n	-	00030	3
	1717-1745					
May 8	(1216)	-	-	-	00030	3
May 8	0429-0435	N26 W83	Sn	8279	10010	2
May 9	2129-2141	N24 E90	Sn	8294	00011	2
May 11	2048-2215	N31 E88	1n	8300	21130	7
May 24	1413-1430	N12 E19	Sn	8310	00032	5
May 25	(0154)*	-	-	-	0-010	1

Comprehensive Flare Index "Major" Flares†, 1955-1969 (Continued)

Date	Time (UT) of Flare or Event††	Position	H α Imp.	McMath Plage	Profile abcde	Index
<u>1966 (continued)</u>						
May 25	<u>1530-1554</u>	N12 E04	1b	8310	11133	9
May 28	<u>1532-1830</u>	N15 W40	2b	8310	32131	10
June 2	<u>1900-1911</u>	N04 W50	Sb	8318	00010	1
June 11	<u>2345-2424</u>	N20 E22	Sb	8336	00032	5
June 18	<u>(1604)</u>	-	-	-	00010	1
June 25	<u>1525-1639</u>	S24 W09	1b	8348	31133	11
July 7	<u>0025-0135</u>	N35 W48	2b	8362	32332	13
July 9	<u>0310-0435</u>	N35 W73	2b	8362	32232	12
July 11	<u>0900-1030</u>	N35 W90	3n	8362	03102	6
July 28	<u>2214-2450</u>	N36 E33	3b	8413	03232	10
Aug 24	<u>1453-1545</u>	N23 E55	Sn	8461	00020	2
Aug 26	<u>1805-1900</u>	N23 E22	2n	8461	1203-	≥6
Aug 28	<u>1523-1700</u>	N22 E05	3b	8461	33334	16
Aug 29	<u>1324-1430</u>	N21 W11	1n	8461	21122	8
Aug 29	<u>2022-2201</u>	N24 W18	1b	8461	01132	7
	<u>0037-0123</u>		2b			
	and					
Aug 31	<u>0154-0235</u>	N22 W30	1n	8461	32203	10
	and					
	<u>0250-0421</u>		1n			
Sept 2	<u>0542-0800</u>	N24 W56	3b	8461	33313	13
Sept 4	<u>0407-0579</u>	N21 W87	3n	8461	33233	14
Sept 4	<u>1430-1502</u>	N23 W88	Sn	8461	00010	1
Sept 8	<u>0518-0550</u>	N25 E60	Sn	8496	00011	2
Sept 16	<u>1740-1840</u>	N22 E67	1n	8509	11220	6
Sept 18	<u>1452-1522</u>	N22 E42	1b	8509	21211	7
	<u>1459-</u>					
Sept 19	<u>1528-1618</u>	N20 E05	Sn	8506	20110	4
Sept 19	<u>2347-2410</u>	N22 E22	1n	8509	3100-	≥4
Sept 20	<u>1738-2100</u>	N06 W14	2b	8505	32223	12
Sept 21	<u>0930-0950</u>	N22 E06	Sb	8509	202-0	≥4
Sept 22	<u>1615-1700</u>	N03 W42	Sf	8505	00010	1
Sept 25	<u>(1312)</u>	-	-	-	00030	3
Sept 27	<u>(1313)</u>	-	-	-	00111	3
Oct 9	<u>1045-1150</u>	N21 W00	2n	8530	021-0	≥3
Oct 24	<u>1502-1520</u>	N14 E09	Sb	8556	00213	6
Nov 22	<u>1835-2000</u>	N30 E19	1b	8584	1103-	≥5
Dec 1	<u>1746-1825</u>	N26 E10	Sn	8594	00030	3
Dec 10	<u>2305-2335</u>	N21 E90	2n	8612	12112	7
Dec 13	<u>2300-2350</u>	N24 E56	2b	8612	12210	6
Dec 21	<u>1511-1534</u>	N26 E66	Sf	8620	10123	7
Dec 30	<u>2231-2254</u>	S23 E32	1b	8629	01133	8
Dec 31	<u>1610-1700</u>	N24 W29	1n	8625	0101-	≥2
Dec 31	<u>1648-1710</u>	S22 E23	Sb	8629	1013-	≥5
<u>1967</u>						
Jan 2	<u>1512-1540</u>	S25 W04	Sn	8629	00114	6
Jan 4	<u>0204-0217</u>	S22 W33	1n	8629	01011	3
Jan 11	<u>0137-0510</u>	S27 W45	3b	8632	03110	5
Jan 11	<u>2016-2034</u>	N16 W88	Sb	8631	1013-	≥5
Jan 12	<u>0231-0305</u>	N19 W90	1f	8631	21210	6
Jan 15	<u>0316-0404</u>	N27 E80	Sf	8649	00112	4
Jan 15	<u>2310-2332</u>	N18 E82	1n	8650	0101-	≥2
Jan 20	<u>2044-2130</u>	N23 E63	1n	8659	0112-	≥4
Jan 21	<u>2131-2230</u>	N22 E48	1b	8659	11110	4
Jan 24	<u>0100-0124</u>	N22 E21	Sn	8659	00012	3
Jan 24	<u>2023-2108</u>	N22 E09	1b	8659	1113-	≥6
Jan 28	<u>0743-0850</u>	S23 E19	Sb	8667	00012	3
Jan 31	<u>0024-0034</u>	N20 E17	Sn	8670	10112	5
Feb 2	<u>0145-0228</u>	N26 E62	1n	8680	11110	4
Feb 2	<u>(1838)</u>	-	-	-	0011-	≥2
Feb 3	<u>0252-0400</u>	N13 E61	1b	8682	21232	10
Feb 4	<u>1641-1916</u>	N11 E40	2b	8682	1223-	≥8
Feb 13	<u>1747-2130</u>	N21 W11	3b	8687	1313-	≥8
Feb 18	<u>0943-1200</u>	N22 E55	3n	8698	03100	4

Comprehensive Flare Index "Major" Flares†, 1955-1969 (Continued)

Date	Time (UT) of Flare or Event††	Position	H α Imp.	McMath Flage	Profile abcde	Index
<u>1967 (continued)</u>						
Feb 21	{ 1609- -1638	N25 E70	1n	8704	11014	7
Feb 22	{ 1401-1535 or 1440-1604	N26 E62	1b	8704	12132	9
Feb 22	1925-1954	N23 W01	2n	8698		
Feb 23	0055-0145	N27 E66	1b	8704	1121-	≥ 5
Feb 23	1609-1659	N24 E50	Sn	8704	10213	7
Feb 25	1848-2015	N24 E40	1b	8704	1111-	≥ 4
Feb 27	1637-1830	N26 E25	1b	8704	1113-	≥ 6
Mar 2	{ 1543-1627 1627-1700	N27 E02	2n	8704	22233	12
Mar 3	2137-2202	N29 W38	1n	8704	1123-	≥ 7
Mar 4	1716-1734	N20 W68	1b	8704	01010	2
Mar 5	(1811)	N24 W68	1b	8704	1121-	≥ 5
Mar 10	(0134)	-	-	-	0003-	≥ 3
Mar 20	1344-1418	-	-	-	00010	1
Mar 22	0022-0240	N18 E35	1n	8733	10011	3
Mar 22	1603-1622	N24 E68	2b	8740	32331	12
Mar 26	{ 1603-1619 and 1630-1750	N25 E46	Sf	8740	00010	1
Mar 27	1718-1800	N24 E02	1b	8740	23100	6
Mar 27	2107-2205	N26 E05	3b	8740	0101-	≥ 2
Mar 28	1732-1806	N25 W23	1n	8740	11112	6
Mar 28	1909-1934	N23 W24	1b	8740	11111	5
Apr 1	{ 0119- -0632	N23 W37	1n	8740	11111	5
Apr 1	2058-2220	N25 W33	1n	8740	11111	5
Apr 7	1845-1930	N20 W70	(1n-1b)	8740	31202	8
Apr 14	1703-1737	N28 E11	1n	8751	01010	2
Apr 21	(2049)	N22 E28	Sn	8760	0001-	≥ 1
May 3	1536-1830	N24 W71	2n	8760	12020	5
May 6	0435-0545	-	-	-	00010	1
May 18	1855-1918	N22 E50	2b	8798	02132	8
May 19	1524-1615	S20 W34	3n	8791	23100	6
May 20	1508-1615	S17 W18	Sn	8809	2013-	≥ 6
May 21	1919-2025	N24 E70	1b	8818	11232	9
May 23	{ 1802- - 2200	N23 E51	1b	8818	11232	9
May 24	1808-1858	N24 E39	2n	8818	22233	12
May 25	1039-1225	N29 E25	3b	8818	33334	16
May 26	0152-0240	N23 W02	Sn	8818	10132	7
May 28	0529-0700	N22 W06	1b	8818	21135	12
May 29	1856-1930	N14 E19	2n	8821	22112	8
June 3	0226-0352	N28 W32	2b	8818	32313	12
June 18	1558-1615	N30 W68	1n	8818	0113-	≥ 5
June 23	0037-0110	N23 E12	1n	8831	11230	7
June 23	1841-1930	N17 E90	Sb	8863	00010	1
June 28	2036-2044	N15 E33	1n	8863	11133	9
July 5	1832-1935	N18 E23	Sb	8863	10130	5
July 11	(2037)	N18 W46	Sn	8863	0003-	≥ 3
July 12	(1805)	S21 W18	1b	8875	0103-	≥ 4
July 23	2112-2140	-	-	-	00030	3
July 25	{ 2250- 2316-2337	-	-	-	00030	3
July 28	1516- 1619-1635	N23 E53	Sn	8905	00130	4
July 29	0402-0511	N28 E34	Sn	8905	10032	6
Aug 1	0120-0130	N25 E28				
Aug 1	1721-1810	N30 E00	Sn	8905	10113	6
Aug 18	2131-2156	S26 W63	2n	8901	02110	4
Aug 18	2357-2430	N13 W25	Sb	8907	10112	5
		N27 W62	2b	8905	22221	9
		N26 E90	1n	8942	21212	8
		N16 E80	2n	8942	12230	8

(a) Unusual limb activity

Comprehensive Flare Index "Major" Flares†, 1955-1969 (Continued)

Date	Time (UT) of Flare or Event††	Position	H α Imp.	McMath Plage	Profile abcde	Index
<u>1967</u> (continued)						
Aug 19	0530-0620	N16 E85	1b	8942	11112	6
Aug 25	1405-1500	S20 E07	1b	8949	11111	5
Aug 26	0014-0108	S19 E00	1b	8949	11232	9
Aug 29	2036-2135	N22 W50	1b	8942	2111-	≥5
Sept 17	1050-1200	N18 W38	1n	8973	01032	6
Sept 18	2316-2545	N16 W60	2b	8973	12131	8
Sept 29	(1548)	-	-	-	00012	3
Oct 25	1327-1445	N09 W24	1n	9034	01031	5
Oct 26	0608-0640	N10 W38	1b	9034	11112	6
Oct 27	(1320)	-	-	-	00030	3
Oct 29	2347-2500	N10 W90	2b	9034	22302	9
Oct 31	1124-1200	S19 E21	2n	9047	02112	6
Nov 2	0852-0914	S18 W02	2b	9047	22233	12
Nov 4	1151-1220	S18 W33	1b	9047	11212	7
Nov 8	(0222)	-	-	-	00010	1
Nov 10	{ 1750-1830	S16 E42	Sf	?		
	or				1013-	≥5
Nov 12	1825-1850	S25 W90	?	9047		
Nov 12	2109-2130	N20 E88	Sn	9073	00010	1
Nov 16	2124-2318	N11 E33	3b	9073	2310-	≥6
Nov 19	1018-1130	N11 W38	1n	9067	010-1	≥2
Nov 26	1500-1527	N22 W09	Sn	9082	0003-	≥3
Nov 28	1530-1610	S20 W06	Sn	9088	0013-	≥4
Dec 3	(0854)	-	-	-	00010	1
Dec 11	2347-2510	S22 W17	1b	9108	11213	8
Dec 13	0942-1050	N09 W07	Sn	9111	00112	4
Dec 13	1340-1500	S22 W37	1b	9108	11132	8
Dec 16	0247-0430	N23 E66	3n	9118	13212	9
Dec 17	(1838)	-	-	-	1013-	≥5
Dec 20	1523-1554	S20 E26	Sn	9125	0003-	≥3
Dec 20	1800-1825	N22 W82	1f	9113	1101-	≥3
Dec 27	0838-0920	S17 E59	1n	9132	01113	6
<u>1968</u>						
Jan 2	0519-0545	S22 E89	1b	9145	21312	9
Jan 4	2235-2300	N11 E76	2b	9146	12122	8
Jan 5	0458-0504	N12 E72	2b	9146	12212	8
Jan 10	2145-2213	S26 W26	1b	9145	0111-	≥3
Jan 11	1659-1728	S25 W38	1b	9145	11232	9
Jan 12	1807-1832	S25 W53	2b	9145	1221-	≥6
Jan 14	1836-1904	N15 W42	Sn	9146	1013-	≥5
Jan 14	2007-2040	N17 W40	2b	9146	22131	9
Jan 15	0000-0035	N17 W44	2b	9146	12112	7
Jan 17	0534-0558	N08 W90	1n	9146	2111-	≥5
Jan 29	1537-1558	N14 E28	1b	9184	11224	10
Feb 1	{ 1802-1820	N09 W35	Sb			
	1809-1835	N17 W20	Sb	9184	1021-	≥4
Feb 1	1915-2005	N16 W16	1n	9184	1111-	≥4
Feb 2	0541-0605	N15 W24	1b	9184	11213	8
Feb 8	1404-1415	N32 W15	Sf	9197	00013	4
Feb 10	1615-1636	S17 E57	2n	9206	2223-	≥9
Feb 14	1535-1552	N20 E00	Sb	9204	1013-	≥5
Feb 15	1450-1540	S14 W11	1b	9206	11132	8
Feb 16	2354-2407	N05 E64	Sn	9216	00012	3
Feb 17	0252-0313	N17 W47	1b	9204	11112	6
Feb 21	2010-2050	N17 E73	Sf	9222	0001-	≥1
Feb 25	0344-0430	S30 W17	1b	9218	1111-	≥4
Feb 27	1948-2120	S30 W52	1b	9218	0101-	≥2
Mar 14	1008-1035	S20 W53	1f	9268	01012	4
Mar 20	(2300)	-	-	-	00031	4
Mar 21	1421-1515	N17 W54	1b	9266	11010	3
Mar 21	1913-1930	S24 E53	Sb	9279	2011-	≥4
Mar 21	(2207)	-	-	-	10112	5
Mar 28	0321-0400	S15 W51	1n	9273	11110	4
Mar 30	(1423)	-	-	-	00012	3
Apr 1	1306-1325	S15 E30	Sb	9292	00113	5

Comprehensive Flare Index "Major" Flares†, 1955-1969 (Continued)

Date	Time (UT) of Flare or Event††	Position	H α Imp.	McMath Plage	Profile abcde	Index
1968 (continued)						
Apr 15	1320-1345	S24 E37	Sn	9326	00010	1
Apr 19	{ 1610- 1640-1738	N20 W62	Sn	9313	00032	5
Apr 22	(1436)	-	-	-	00030	3
Apr 22	(1752)	-	-	-	3003-	≥ 6
Apr 26	(1529)	-	-	-	00010	1
May 3	2123-2150	N18 E49	1b	9372	31212	9
May 8	1415-1419	N23 E58	Sf	9382	00212	5
May 10	1937-1949	N19 W76	Sb	9364	1011-	≥ 3
May 13	2125-2133	S33 E90	Sn	9399	0003-	≥ 3
May 19	0405-0423	S30 E32	Sb	9399	00032	5
May 21	1952-2003	N19 E90	Sn	9410	1011-	≥ 3
May 29	1505-1545	N28 E09	Sn	9413	00030	3
May 30	2123-2210	S12 E29	1n	9418	01010	2
June 1	1611-1645	N08 E04	Sb	9419	10213	7
June 3	2330-2415	S30 W15	1n	9420	11130	6
June 9	0025-0155	N14 E38	2n	9443	02220	6
June 9	0830-1030	S14 W09	3b	9429	33233	14
June 11	0935-0955	S15 E34	1b	9449	11213	8
June 17	0255-0410	N26 E41	1n	9459	01020	3
June 25	0609-0715	N13 W62	Sb	9462	00010	1
June 26	2250-2350	S38 E65	2n	9485	02020	4
July 3	(0036)	-	-	-	00010	1
July 5	2029-2043	N12 E86	1n	9503	01010	2
July 6	0943-1033	N13 E89	1n	9503	212-4	≥ 9
July 7	(0320)	-	-	-	00010	1
July 8	1708-1815	N13 E58	3b	9503	33335	17
July 9	1809-1915	N13 E40	2b	9503	32200	7
July 29	1143-1205	N08 E21	1n	9545	31000	4
Aug 3	0313-0442	N10 E75	2n	9567	22212	9
Aug 7	(0241)	-	-	-	00010	1
Aug 11	2159-2212	N18 E21	Sn	9582	00012	3
Aug 13	1253-1304	S19 E65	1n	9593	11113	7
Aug 14	{ 1327- 1400-1425	N13 W80	1b 1n	9567	31210	7
Aug 18	1330-1415	S16 W01	1n	9593	11020	4
Aug 20	1115-1138	S16 W35	Sn	9593	30000	3
Aug 21	0146-0158	S16 W43	1n	9593	21212	8
Aug 23	2345-2403	N12 W49	Sb	9598	00010	1
Aug 24	0633-0700	S17 E06	Sb	9610	30000	3
Aug 19	0035-0110	N12 E68	Sn	9630	10110	3
Sept 1	1622-1645	N16 W90	Sn	9611	10030	4
Sept 4	0031-0200	N13 W14	1n	9630	11232	9
Sept 8	0343-0419	S28 W11	1f	9641	01-10	≥ 2
Sept 9	1746-1754	S17 E77	1n	9658	1101-	≥ 3
Sept 26	0026-0108	N14 E34	2b	9687	22212	9
Sept 28	0721-0930	S18 E39	2b	9692	222-2	≥ 8
Sept 29	0920-1050	N13 W13	2b	9687	222-3	≥ 9
Sept 29	1617-1700	N17 W51	2b	9678	22233	12
Oct 2	2013-2046	N19 E68	1n	9705	2113-	≥ 7
Oct 3	2343-2600	S17 W36	2b	9692	22122	9
Oct 4	2120-2230	N19 E40	2b	9705	12132	9
Oct 6	1721-1814	N14 W09	1n	9700	1113-	≥ 6
Oct 12	1219-1235	N09 W90	Sn	9701	30000	3
Oct 13	0650-0755	N04 W90	Sf	9701	30101	5
Oct 20	0649-0720	N17 E42	1n	9735	311-0	≥ 5
Oct 21	0604-0655	N18 E29	2b	9735	32200	7
Oct 23	2352-2540	S13 E59	2b	9740	22232	11
Oct 24	2051-2200	S18 E52	1b	9740	1123-	≥ 7
Oct 27	1232-1306 1318-1500	S17 E17	1b 2n	9740	32232	12
Oct 28	1629-1648	N15 W77	Sb	9735	1012-	≥ 4
Oct 29	1222-1300	S16 W12	2b	9740	32234	14

Comprehensive Flare Index "Major" Flares[†], 1955-1969 (Continued)

Date	Time (UT) of Flare or Event ^{††}	Position	H α Imp.	McMath Flage	Profile abcde	Index
<u>1968</u> (continued)						
Oct 29	<u>1515-1525</u>	N15 W82	Sn	9735		
	or				00333	9
Oct 30	<u>1515-1558</u>	S14 W19	Sn	9740		
	<u>1235-1445</u>	S18 W26	2b	9740	32130	9
Oct 30	<u>2143-2228</u>	N05 E26	Sn	9747	00030	3
Oct 30	<u>2340-2535</u>	S14 W37	3b	9740	23332	13
Oct 31	<u>2229-2452</u>	S14 W49	2b	9740	12232	10
Nov 1	<u>0814-0930</u>	S16 W47	2n	9740	22312	10
Nov 1	<u>2001-2021</u>	S13 W56	1b	9740	1122-	≥ 6
Nov 2	<u>0940-1115</u>	S15 W65	2b	9740	32212	10
Nov 2	(1439)	-	-	-	00010	1
Nov 2	<u>1513-1535</u>	S13 W67	Sn	9740	10130	5
Nov 4	<u>0202-</u>	S13 W89	1n			
	<u>0237-0334</u>	S19 W89	1b	9740	0101-	≥ 2
Nov 4	<u>0524-0606</u>	S15 W90	1b	9740	2122-	≥ 7
Nov 11	<u>1439-1512</u>	N17 E03	Sn	9760	00033	6
Nov 18	<u>1026-1127</u>	N21 W87	1b	9760	31303	10
Dec 2	<u>2115-2130</u>	N20 E89	1n			
	<u>2202-2400</u>	N19 E80	3n	9802	1323-	≥ 9
Dec 11	(1144)	-	-	-	10233	9
Dec 12	(2314)	-	-	-	00112	4
Dec 13	<u>0434-0448</u>	S32 E07	Sn	9811	00112	4
Dec 14	(1010)	-	-	-	00012	3
Dec 23	<u>1112-1122</u>	N18 E50	1n	9842	01113	6
Dec 24	<u>0633-0655</u>	N17 E38	Sn	9842	00112	4
Dec 24	<u>2227-2242</u>	N19 E29	1b	9842	11232	9
Dec 25	<u>0645-0707</u>	N19 E25	1n	9842	1111-	≥ 4
Dec 27	<u>1050-1150</u>	N16 E03	2b	9842	22213	10
Dec 28	<u>1126-1148</u>	S11 W85	Sn	9826	30200	5
Dec 28	<u>2120-2200</u>	N15 W55	1b	9836	0101-	≥ 2
Dec 29	<u>1914-2100</u>	N16 W33	1b	9842	3120-	≥ 6
Dec 30	<u>1424-1444</u>	N13 E26	Sn	9847	00113	5
<u>1969</u>						
Jan 13	<u>2040-2047</u>	S13 W35	Sf	9859	0003-	≥ 3
	<u>2121-2147</u>					
Jan 17	<u>1703-1717</u>	N16 E45	Sb	9873	1023-	≥ 6
Jan 18	<u>0153-0213</u>	N16 E42	Sn	9873	10212	6
Jan 24	<u>0706-0930</u>	N20 W08	3n	9879	132-2	≥ 8
Feb 1	<u>2125-2205</u>	N11 E77	1b	9911	3112-	≥ 7
Feb 2	<u>0508-0532</u>	N09 E73	2n	9911	1221-	≥ 6
Feb 8	<u>0005-0025</u>	N13 E07	Sn	9911	00012	3
Feb 8	<u>0412-0435</u>	N12 E06	Sn	9911	1021-	≥ 4
Feb 8	<u>1750-1807</u>	N18 E13	Sb	9918	2013-	≥ 6
Feb 9	<u>1431-1449</u>	N18 E02	Sb	9918	00113	5
Feb 9	<u>1723-1737</u>	N18 E00	Sb	9918	2021-	≥ 5
Feb 20	<u>0618-0645</u>	N14 E38	2b	9946	1220-	≥ 5
Feb 23	<u>0442-0509</u>	N12 W09	1n	9946	11212	7
Feb 24	<u>2305-2400</u>	N12 W31	2b	9946	22233	12
Feb 25	<u>0900-1040</u>	N13 W37	2b	9946	12334	13
Feb 25	<u>1647-1727</u>	N12 W41	1n	9946	11233	10
Feb 25	<u>1937-2112</u>	N13 W43	1n	9946	3122-	≥ 8
Feb 26	<u>0418-0525</u>	N13 W46	2b	9946	22323	12
Feb 27	<u>1246-1328</u>	N13 W66	Sn	9946	30100	4
Feb 27	<u>1348-1505</u>	N13 W65	2b	9946	22233	12
Mar 1	<u>2149-</u>	N10 W89	1n	9946	21112	7
	<u>2105-2203</u>					
Mar 2	<u>0251-0320</u>	S26 W05	2b	9957		
	or				12211	7
Mar 2	<u>0251-0320</u>	N16 E47	1n	9966		
	<u>1110-1132</u>	N11 E66	Sn	9966	00010	1
Mar 3	<u>2215-2300</u>	N12 E46	1n	9966	11113	7
Mar 12	<u>1739-1809</u>	N12 W80	2b	9966	32333	14
Mar 13	<u>1315-1328</u>	N12 W85	1b	9966	31100	5
Mar 16	<u>2011-2035</u>	N16 E07	1f	9996	0113-	≥ 5
Mar 17	<u>2334-2355</u>	N13 E19	Sn	9994	10112	5

Comprehensive Flare Index "Major" Flares†, 1955-1969 (Continued)

Date	Time (UT) of Flare or Event††	Position	H α Imp.	McMath Flage	Profile abcde	Index
1969 (continued)						
Mar 18	0625-0657	N13 E17	1b	9994	11213	8
Mar 18	1908-1938	N18 E42	1n	9994	3110-	≥ 5
Mar 20	1335-1345	N15 W02	Sn	9994	00030	3
Mar 21	0139-0330	N20 E17	2b	9994	32322	12
Mar 21	1312-1430	N19 E09	2b	9994	32333	14
Mar 22	0643-0700	N10 W20	1b	9994	11233	10
Mar 24	1449-1510	N18 W42	1n	9994	31100	5
Mar 26	0832-0902	N23 E75	Sn	10011	30100	4
Mar 26	(1230)	-	-	-	30100	4
Mar 27	1115-1132	N24 W65	1f	9994	31000	4
Mar 27	1315-1430	N20 W69	2b	9994	22233	12
Mar 30	(0250)	great eruptive prom. NW limb		9994	27412	≥ 9
Apr 10	0410-0445	N11 E90	1n	10032	21212	8
Apr 21	2004-2100	N24 W33	3b	10035	23302	10
Apr 26	2258-2415	N07 E38	2n	10057	22233	12
May 2	1745-1900	N09 W40	1b	10057	21232	10
May 17	0514-0527	N16 W70	1n	10085	01031	5
May 17	1923-1947	N11 E90	Sb	10109	20220	6
May 19	1911-1929	N08 E64	Sb	10109	0003-	≥ 3
May 22	1900-1931	N12 E40	2b	10109	22213	10
	1933-2022	N07 E21				
May 24	1031-1115	S22 W26	1b	10103	31202	8
May 26	1107-1132	S21 W50	Sb	10103	10133	8
May 28	1241-1320	N10 W59	1b	10109	11112	6
May 29	0020-0047	N11 W64	1b	10109	11112	6
May 29	0406-0443	N12 W67	1n	10109	21110	5
May 29	1442-1516	N11 W73	1b	10109	21112	7
May 30	1242-1300	N11 W84	1n	10109	31000	4
June 1	(1723)	-	-	-	00030	3
June 5	0952-1050	N12 E64	2b	10134	32333	14
June 5	1442-1703	N09 E53	3b	10134	13232	11
June 5	1824-1840	N13 E68	Sn	10134	00030	3
June 6	0949-1110	S16 E52	2n	10135	32100	6
June 6	1604-1700	N10 E19	2b	10130	32100	6
June 7	0945-1050	N11 E34	1n	10134	31201	7
June 11	1615-1730	N10 W20	2b	10134	22233	12
June 13	1550-1800	S23 E69	2n	10146	32110	7
June 14	2037-2340	S12 W63	2b	10135	32121	9
June 18	1731-1745	N10 E06	Sb	10148	10113	6
June 18	2108-2120	N10 E09	Sn	10148	00122	5
July 3	1515-1543	S11 W33	1b	10166	31113	9
July 7	0536-0559	S19 W03	1b	10181	11213	8
July 7	0615-0620	N14 E63	1n	10191	01032	6
July 19	(1814)	-	-	-	00032	5
Aug 7	0901-0955	N21 E28	2n	10253	1201-	≥ 4
Aug 11	0747-0810	S21 W57	Sn	10250	30002	5
Aug 18	2201-2300	S15 W53	1b	10262	0101-	≥ 2
Aug 29	2049-2103	N14 W26	Sb	10283	1001-	≥ 2
Aug 29	2304-2430	N03 E37	1n	10289	01010	2
Sept 10	0518-0541	S20 E69	1b	10309	1101-	≥ 3
Sept 15	(0250)	-	-	-	00112	4
Sept 17	1012-1030	S04 W06	Sn	10317	00113	5
Sept 17	1207-1230	S04 W06	Sb	10317	00012	3
Sept 18	0509-0519	S06 W31	Sn	10317	00112	4
Sept 23	(1701)	-	-	-	1001-	≥ 2
Sept 25	0658-0900	N13 W15	3n	10326	03101	5
Sept 27	0350-0558	N09 E02	3b	10333	23232	12
Sept 30	(1922)	-	-	-	0001-	≥ 1
Oct 3	0245-0311	N07 W85	1n	10333	11210	5
Oct 8	0725-0733	N16 W36	Sn	10351	10013	5
Oct 8	1631-1640	N16 W40	Sb	10351	10224	9
Oct 9	0430-0440	N16 W48	Sn	10351	10113	6
Oct 13	0041-0054	S13 W37	Sn	10357	00110	2
Oct 13	(2118)	-	-	-	00011	2

Comprehensive Flare Index "Major" Flares†, 1955-1969 (Continued)

Date	Time (UT) of Flare or Event††	Position	H α Imp.	McMath Flage	Profile abcde	Index
1969 (continued)						
Oct 13	(2336)	-	-	-	00210	3
Oct 14	0539-0616	N25 W71	2n	10352	02010	3
Oct 14	(1853)	-	-	-	00011	2
Nov 2	1102-1220	N14 W90	1n	10385	31322	11
Nov 4	0410-0435	N08 E89	1n	10411	11231	8
Nov 5	1025-1102	N12 E32	1n	10406	01033	7
Nov 5	1750-1838	N25 E60	1b	10412	01121	5
Nov 10	1646-1701	N23 E04	Sf	10412	00030	3
Nov 18	1633-1756	N14 E40	2b	10432	32333	14
Nov 19	0458-0615	N14 E33	2n	10432	12321	9
Nov 19	0659-0728	N07 E29	1b	10432	01302	6
Nov 19	1852-1942	N13 E25	1b	10432	31121	8
Nov 21	2120-2218	N08 W03	2b	10432	3210-	≥ 6
Nov 22	0829-0854	N09 W15	1n	10432	31102	7
Nov 23	0958-1125	N15 W19	1b	10432	312-1	≥ 7
Nov 24	0914-1030	N13 W31	2b	10432	323-4	≥ 12
Nov 27	1928-2010	N16 W82	2b	10432	32224	13
Nov 28	(1953)	-	-	-	30100	4
Nov 28	2255-2320	S15 E21	1n	10449	01112	5
Nov 30	1700-1727	N23 E02	Sn	10447	00233	8
Nov 30	(2206)	-	-	-	00020	2
Dec 18	(1450)	-	-	-	00132	6
Dec 19	0335-0357	N12 E65	Sn	10493	00110	2
Dec 19	(2330)	-	-	-	0001-	≥ 1
Dec 26	0240-0313	S22 W04	Sb	10495	20212	7
Dec 30	1927-2004	S14 W85	1n	10491	21211	7

Notes: † This list of "major" flares includes all flares that satisfied any one of the five criteria stated on page 2 of this report.

abcde The successive entries in the "profile" refer respectively to evaluations of the ionizing radiation, the H α flare, the ν 10 cm. flux, the type of event in the dynamic spectrum, and the ν 200 MHz flux. See page 1 of this report.

†† When no flare or subflare was reported the time of the SID or the radio frequency event is shown in parentheses.

* H α flare patrol was not in progress.

Table I above provides summarized information about the principal "major" flares for the years 1955-1969. Flare observations and evaluations have not been uniform throughout this time interval and Table I unavoidably reflects certain of these inhomogeneities. For example, the number of entries per year in Table I has been influenced in part by the increased coverage in recent years in the dynamic spectrum. For solar cycle 19, many of the indices are only lower limits since there were numerous cases of incomplete observational data in these earlier years.

It should be noted that H α flares of importance 2 without either ionizing or radio frequency emission great enough to qualify them for inclusion in this study are omitted from Table I. Some of these omitted flares represent important solar events with relatively high values of the Comprehensive Index. When desired, their indices generally can be derived on the basis of information given in the Quarterly Bulletin on Solar Activity of the IAU and the Solar-Geophysical Data Bulletin of NOAA (formerly ESSA). On the other hand, the inclusion in the survey of all flares with Type II bursts has led to the listing in Table I of a relatively large number of events with no other outstanding characteristic. For many of these flares the value of the Comprehensive Index is small.

Comparison of H α Importance and Comprehensive Flare Indices for "Major" Flares

Relationships between H α importance and Comprehensive Indices for the "major" flares included in this survey are shown in Table II. Thirty-nine percent of the "major" flares listed in Table I were of H α importance 2 and 3 and 31 percent were of importance 1. Sixteen percent of the events that qualified as "major" flares in this study were associated with subflares. For the remaining

14 percent, no H α event was reported through either lack of solar patrol or no detection of an H α flare. These data confirm the well known fact that significant radio frequency and ionizing radiations sometimes occur concomitantly with apparently minor H α flares. The flare profiles and Comprehensive Flare Indices identify such flares.

It is only for flares of importance 3 that the present survey of "major" flares provides complete data on the distribution of Comprehensive Indices within an H α importance category. For flares of importance 3, 1955-1969, 47 percent had comprehensive indices ≥ 10 . For almost a quarter of the flares of importance 3, however, the Comprehensive Index was no greater than 6, and indicated that for these large flares the known associated ionizing and radio frequency emission was relatively weak. Comparison of the data in Table II with general figures relating to flares of importance 2, shows that fewer than 20% of all flares of importance 2 qualified as "major" flares for the survey and that for not even half of these highly selected flares was the Comprehensive Index ≥ 10 . It is clear that a relatively large number of H α flares of importance 2 and 3 occur without unusually strong ionizing and radio frequency emission.

Table II

H α Importance of Flares in Survey of "Major" Flares 1955-1969

H α Importance	Value of Comprehensive Index						Total
	1-3	4-6	7-9	10-12	13-15	>15	
	<u>Number of Flares</u>						
3	5	33	48	40	30	8	164
2	7	39	117	87	19	0	269
1	42	141	137	23	0	0	343
S	83	78	19	3	0	0	183
?	96	44	16	1	0	0	157
Total	233	335	337	154	49	8	1116
	<u>Percent of Flares</u>						
3	2	10	14	26	61	100	15
2	3	12	35	56	39	0	24
1	18	42	40	15	0	0	31
S	36	23	6	2	0	0	16
?	41	13	5	1	0	0	14
Total	100	100	100	100	100	100	100

For flares of lesser H α importance (importance 1 and subflares) the survey indicates that while certain of these flares were accompanied by strong ionizing and radio frequency emission, such events represent an exceedingly small proportion of the totality of flares of importance 1 and subflares. Of the many thousands of flares of importance 1 from 1955 to 1969, only 343 qualified as "major" flares according to the criteria in this survey, and of these highly selected flares only 7 percent had comprehensive indices ≥ 10 . For the same 15 years, the survey identified only 22 subflares for which the comprehensive index was as great as 7. (See Table II)

Possible Applications and Usefulness of the Comprehensive Flare Index

A. Flare Profiles

A comprehensive flare index of the type here described should prove useful in efforts to distinguish between different types of flares. According to the data in Table I, some flares are great in all aspects. Other flares have disproportionately strong radio frequency emission. A third type is outstanding primarily in the optical range. Examples of the profiles of these three types of flare are shown in Figure 1.

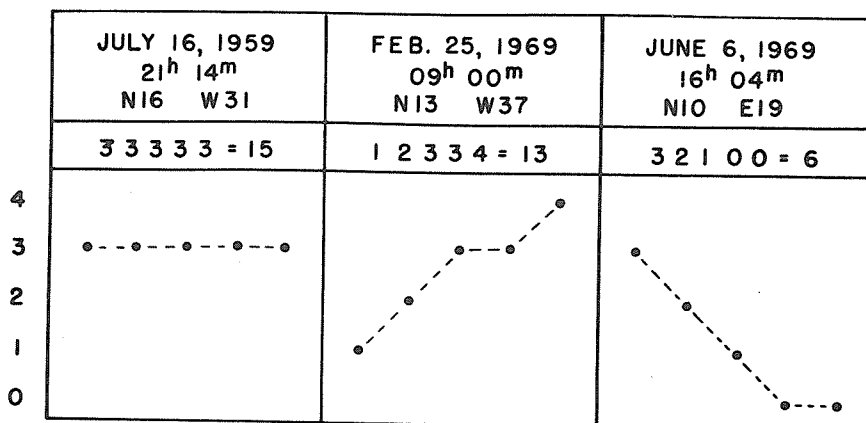


Fig. 1. Examples of flare "profiles"

B. Individual Flare Evaluation

The indices here described also can provide a basis for the evaluation of the overall relative importance of any one flare. According to the data in Table I, an index >10 represents an unusual flare. In the 15 years covered by this survey, there were 1116 flares that qualified as "major" flares according to the criteria here used, but of these flares, only 158 had an overall index as great as 11. These truly great flares are rare and have occurred with a frequency of about 20/year near maximum in cycle 19 (1957-59) and 10/year near maximum in cycle 20 (1967-69). (See Table III and Figure 2.)

Table III

Number of "Major" Flares Distributed by Value of Comprehensive Flare Index, 1955-1969

Year	Comprehensive Flare Index																	Total No. "Major" Flares 1955-1969
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	
1955	4	0	6	3	1	3	1	1	1	-	-	1	-	-	-	-	-	21
1956	5	1	7	5	8	10	20	10	5	2	1	2	1	-	-	-	-	77
1957	8	8	15	14	18	18	15	19	18	7	12	2	1	4	3	-	-	162
1958	4	2	11	7	11	7	19	14	12	8	4	6	2	3	3	2	-	115
1959	2	6	10	6	7	9	17	12	11	10	5	6	3	3	1	1	-	109
1960	2	4	11	10	7	7	9	11	6	5	9	12	3	3	3	1	-	103
1961	3	2	6	6	5	5	3	4	5	2	4	3	-	1	1	1	-	51
1962	1	3	2	6	3	-	3	3	3	-	3	1	-	-	-	-	-	28
1963	3	1	4	3	8	1	2	4	3	1	3	1	-	-	1	-	-	35
1964	-	-	2	-	-	-	-	-	-	-	1	-	-	-	-	-	-	3
1965	-	-	-	1	1	-	1	2	1	-	-	-	-	-	-	-	-	6
1966	5	6	6	5	5	8	6	9	2	6	2	3	2	2	-	1	-	68
1967	8	6	13	11	16	16	6	10	8	1	-	6	-	-	-	1	-	102
1968	9	6	18	17	13	10	9	7	17	6	1	2	1	2	-	-	1	119
1969	3	9	11	10	19	15	13	10	5	5	2	9	2	4	-	-	-	117
Total	57	54	122	104	122	109	124	116	97	53	47	54	15	22	12	7	1	1116

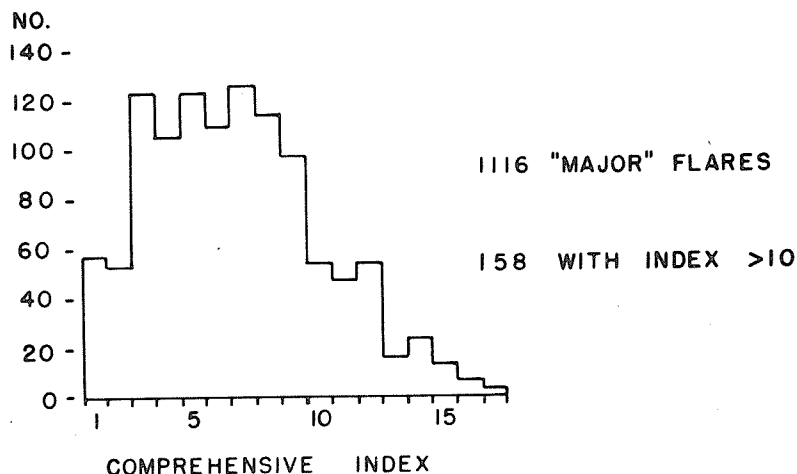


Fig. 2. Distribution of Comprehensive Indices for "major" flares, 1955-1969

The flare profile and Comprehensive Flare Index also permit recognition of the small number of minor H α flares with strong ionizing and radio frequency emission.

C. Statistical Studies

On the basis of the Comprehensive Flare Index some of the old and vexing problems can be re-examined. For example, preliminary investigations suggest that "major" flares as here defined, do not as a group provide evidence for statistical association with subsequent geomagnetic disturbance unless the Comprehensive Index is >10. (See Figure 3.)

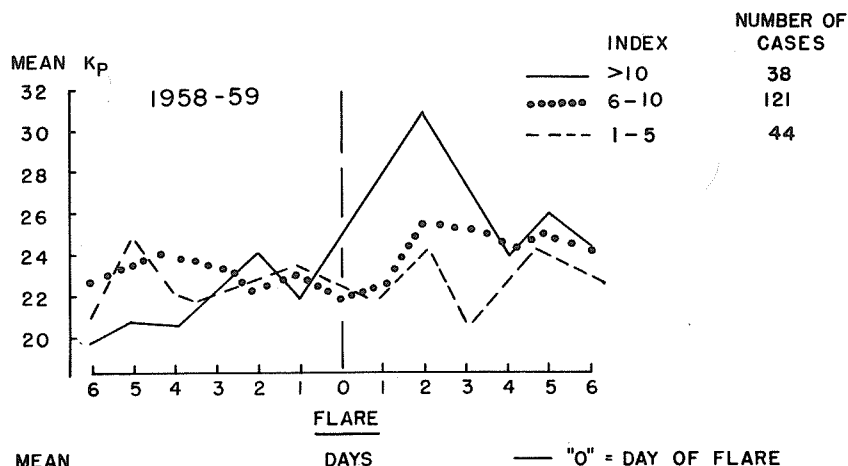


Fig. 3. Comparison of mean values of daily ΣK_p for six days before and six days after the occurrence of "major" flares, 1958-1959, separated according to values of the Comprehensive Index.

Additionally, the Comprehensive Index shows the abnormally great magnitude of flares associated with energetic particle emission when compared to the total group of "major" flares as defined in this study. Figure 4 gives the percentage distribution of Comprehensive Flare Indices for "major" flares in Table I and the distribution for the flares associated with polar cap absorption, 1953-1961, according to the identifications by Warwick and Haurwitz (J.G.R. 67, 1317, 1962). For PCA flares, 70% of the comprehensive indices were ≥ 11 , but for "major" flares in general, only 14% had indices of this magnitude. These figures suggest that only under unusual circumstances is an energetic particle event associated with a flare with small Comprehensive Index.

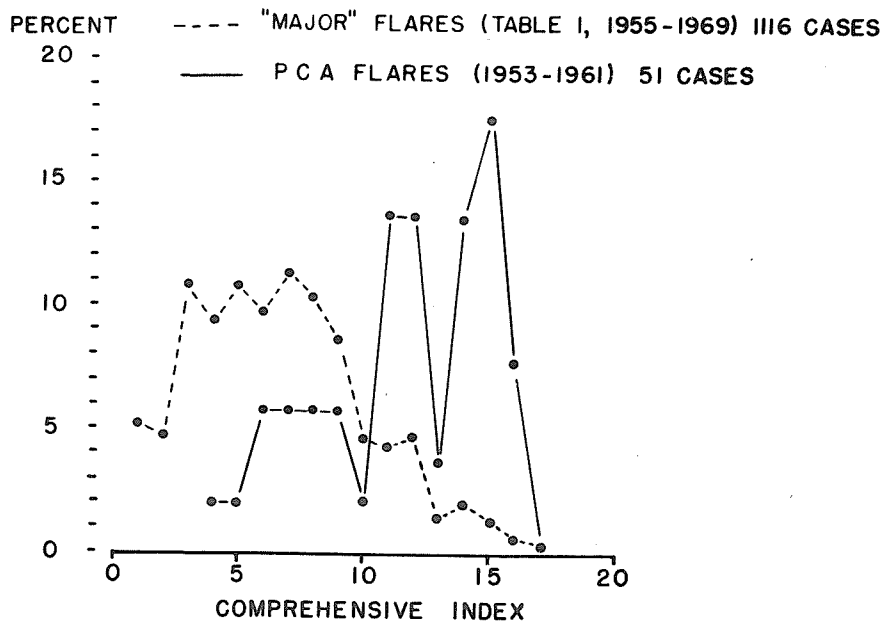


Fig. 4. Comparison of percentage distributions of Comprehensive Flare Indices for "major" and PCA flares.

It is hoped that experience with this experimental Comprehensive Flare Index can provide a basis for determining the possible usefulness of some type of composite flare evaluation and give needed guidance to the form such an index should take.

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