

**Space Weather Highlights  
28 Jun – 04 Jul 1999**

Solar activity was at moderate levels during most of the week. There were four regions of interest during the period. Region 8598 (N23, L=328, class/area Fki/650 on 25 June) showed moderate magnetic complexity, but slowly decayed through the week. Nonetheless, it managed to produce an M1/SF flare at 30/2012UT and an M1/1F at 01/2143UT, neither of which were impressive in radio aspects. Region 8602 (N18, L=297, class/area Dko/270 on 02 July) grew slightly during the early part of the period and produced an M1/SF flare at 29/0510UT accompanied by a Type II radio sweep. Region 8603 (S15, L=286, class/area Fai/360 on 27 June) also grew gradually during the first half of the period and was one of the most productive regions of the period. It produced a few M-class flares including an M1/1N at 29/1913UT, an M1/1B at 30/1130UT associated with a halo-CME (which caused a geomagnetic disturbance on 02 - 03 July, see the solar wind and geomagnetic activity discussions below), an M2/2B parallel-ribbon flare at 30/1808UT, and an M1/1N at 01/2331UT. The final region of interest was 8611 (S25, L=258, class/area Fai/420 on 04 July). It grew gradually throughout the period, displayed moderate magnetic complexity, and was the most flare-productive of the visible regions. It produced an M3/1N parallel-ribbon flare at 29/0821UT, an M2/1N at 30/0446UT, an M2/1B at 02/0138UT, and an M1/SF at 02/1520UT associated with a partial-halo CME. Solar activity dropped to low levels during the last two days of the period as Regions 8602, 8603, and 8611 appeared to stabilize. Region 8598 rotated out of view late in the period.

Real-time solar wind data were available from the Advanced Composition Explorer (ACE) spacecraft for most of the period. Two transient signatures were detected during the period. The first occurred on 28 June as velocities increased from 550 to 890 km/sec, densities briefly increased to 18 p/cc, and IMF Bz turned southward with maximum deflections to minus 08 nT (GSM). This transient was probably associated with a partial-halo CME seen on 24 June. The second transient structure was detected early on 02 July as a shock passed the spacecraft at 02/0024UT accompanied by a velocity increase from 480 - 700 km/sec, increased particle densities, and periods of southward IMF Bz with maximum deflections to minus 08 nT (GSM). This structure was likely associated with the 30 June halo-CME from Region 8603.

No proton events were detected at geo-synchronous orbit during the period.

The greater than 2 MeV electron flux at geo-synchronous orbit was at normal to moderate levels.

The geomagnetic field was disturbed during the first half of 28 June with active to major storm levels detected at all latitudes. Activity declined to mostly quiet levels during the latter half of 28 June and remained so through 01 July. Another disturbance occurred during 02-03 July with active to minor storm levels and isolated major storm intervals at high latitudes. Field activity subsided to mostly quiet levels during the latter half of 03 July, then remained so for the balance of the period.

**Space Weather Outlook  
07 July -02 August 1999**

Solar activity is expected to range from low to moderate levels. Isolated M-class flares may occur at any time during the period. There will also be a slight chance for a major flare sometime during the period.

There will be a slight chance for a proton event at geo-synchronous altitude.

The greater than 2 MeV electron flux at geo-synchronous altitude is expected to be at normal to moderate levels during most of the period.

Geomagnetic field activity is expected to be at quiet to unsettled levels during most of the period, barring any Earth-directed CMEs.



**Daily Solar Data**

Date	Radio Flux 10.7 cm	Sun spot No. (10 <sup>6</sup> hemi.)	Sunspot Area	X-ray Background	Flares							
					X-ray Flux			Optical				
					C	M	X	S	1	2	3	
28 June	197	268	1160	B9.6	10	0	0	20	3	0	0	0
29 June	191	259	1100	B9.6	9	3	0	16	4	0	0	0
30 June	210	237	940	C1.2	6	4	0	35	4	1	0	0
01 July	195	236	1110	C1.7	10	2	0	34	4	0	0	0
02 July	187	232	1270	C1.4	10	2	0	16	1	0	0	0
03 July	197	213	1400	B9.5	8	0	0	21	1	0	0	0
04 July	186	211	1490	C2.0	8	0	0	24	3	0	0	0

**Daily Particle Data**

Date	Proton Fluence (protons/cm <sup>2</sup> -day-sr)			Electron Fluence (electrons/cm <sup>2</sup> -day-sr)		
	>1MeV	>10MeV	>100MeV	>.6MeV	>2MeV	>4MeV
28 June	6.7E+5	1.3E+4	2.3E+3		3.0E+5	
29 June	2.0E+5	1.2E+4	2.5E+3		1.0E+7	
30 June	1.1E+5	1.6E+4	3.5E+3		1.8E+7	
01 July	1.5E+5	1.7E+4	3.6E+3		2.3E+7	
02 July	8.9E+5	1.5E+4	3.3E+3		4.7E+6	
03 July	1.6E+5	1.6E+4	3.7E+3		5.5E+6	
04 July	7.6E+4	1.5E+4	3.8E+3		1.2E+7	

**Daily Geomagnetic Data**

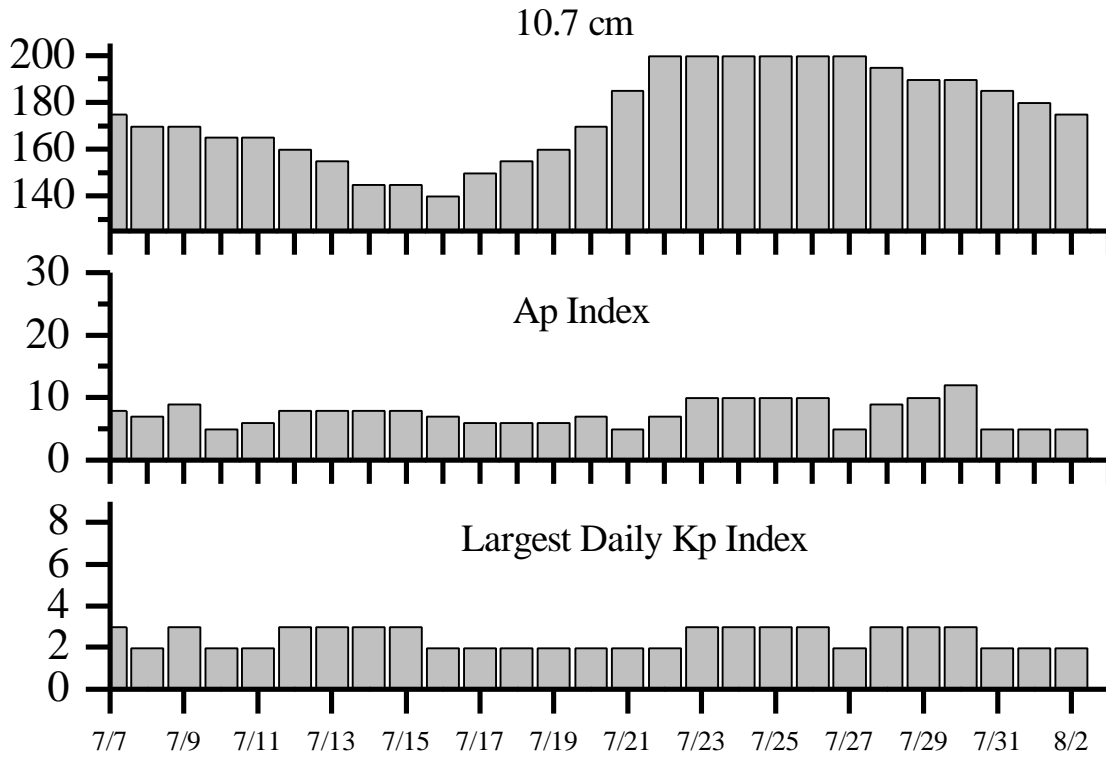
Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
28 June	22	2-6-5-3-1-2-2-2	29	2-5-6-5-4-2-2-2	26	2-6-5-3-3-3-3-3
29 June	5	2-1-1-2-2-2-1-1	14	2-2-2-5-4-2-2-1	9	2-2-2-3-3-3-3-1
30 June	3	1-0-1-1-0-2-1-1	1	1-0-2-0-0-0-0-0	5	1-1-1-1-2-2-2-2
01 July	6	1-0-2-2-1-1-2-3	5	1-2-2-1-0-1-1-3	9	2-1-2-2-3-3-3-3
02 July	23	4-3-4-3-2-3-4-5	39	4-4-6-6-4-4-3-4	26	4-3-5-4-3-4-4-5
03 July	10	4-2-3-3-1-1-0-2	19	3-3-5-5-3-2-0-1	13	3-3-4-3-2-2-3-2
04 July	0	0-0-0-0-1-0-0-0	*	0-0-0-0*-0-1-0	4	1-0-0-1-1-2-2-1



### *Alerts and Warnings Issued*

Date and Time of Issue (UT)	Type of Alert or Warning	Date and Time of Event (UT)
28 Jun0000	A=20 Observed	27 Jun 2359
28 Jun 0025	1- 245 MHz Burst	27 Jun
28 Jun 0326	Sudden Impulse observed at Boulder 20nT	28 Jun 0304
28 Jun 0555	K= 6 Observed	28 Jun 03 - 06
28 Jun 2129	Type II Radio Emission	28 Jun 2056
29 Jun 0533	Type II Radio Emission	29 Jun 0515
29 Jun 0024	4- 245 MHz Bursts	28 Jun
30 Jun 2035	10cm Radio Burst 270 s.f.u.	30 Jun 2010
01 Jul 0225	Type II Radio Emission	01 Jul 0148
02 Jul 0129	6- 245 MHz Bursts	01 Jul
02 Jul 0129	245 MHz Noise Storm	01 Jul
02 Jul 0122	Sudden Impulse observed at Boulder 48 nT	02 Jul 0101
02 Jul 0214	K = 4 Warning	02 Jul 03 - 15
02 Jul 0300	K = 4 Observed	02 Jul 00 - 03
02 Jul 1532	K = 4 Warning	02 Jul 1600 - 03 Jul 0000
02 Jul 1646	K = 5 Warning	02 Jul 1700 to 2100
02 Jul 1800	A=20 Observed	02 Jul 1800
02 Jul 1800	K = 5 Observed	02 Jul 15-18
03 Jul 0103	9- 245 MHz Bursts	02 Jul
03 Jul 0103	245 MHz Noise Storm	02 Jul
03 Jul 0001	K = 5 Observed	02 Jul 21-24
03 Jul 0907	K = 4 Observed	03 Jul 06-09
04 Jul 0101	8- 245 MHz Bursts	03 Jul
04 Jul 0101	245 MHz Noise Storm	03 Jul





*Twenty-seven Day Outlook*

Date	Radio Flux 10.7 cm	Planetary A Index	Largest Kp Index	Date	Radio Flux 10.7 cm	Planetary A Index	Largest Kp Index
07 Jul	175	8	3	21 Jul	185	5	2
08	170	7	2	22	200	7	2
09	170	9	3	23	200	10	3
10	165	5	2	24	200	10	3
11	165	6	2	25	200	10	3
12	160	8	3	26	200	10	3
13	155	8	3	27	200	5	2
14	145	8	3	28	195	9	3
15	145	8	3	29	190	10	3
16	140	7	2	30	190	12	3
17	150	6	2	31	185	5	2
18	155	6	2	01 Aug	180	5	2
19	160	6	2	02	175	5	2
20	170	7	2				



***Energetic Events***

Date	Time (UT)			X-ray		Optical Information			Peak		Sweep Freq	
	Begin	Max	$\frac{1}{2}$	Class	Integ Flux	Imp/ Brtns	Location		Radio Flux		Intensity	
			Max				Lat	CMD	245	2695	II	IV
29 Jun	0501	0510	0517	M1.4	.009	SF	N18E07	8602	470	28	2	
29 Jun	0813	0821	0827	M3.1	.016	1N	S27E41	8611	28	140		
29 Jun	1907	1913	1920	M1.6	.007	1N	S14E01	8603	530	140		
30 Jun	0433	0446	0455	M2.1	.017	1N	S26E28	8611	36	33		
30 Jun	1124	1130	1138	M1.9	.011	1B	S15E00	8603	2200	190		
30 Jun	1803	1808	1816	M2.0	.010	2B	S13W05	8603	70	86		
30 Jun	2007	2012	2015	M1.1	.003	SF	N20W5	8598	93	270		
01 Jul	2136	2143	2151	M1.1	.007	1F	N24W6	8598	37			
01 Jul	2324	2331	2334	M1.7	.006	1N	S15W27	8603				
02 Jul	0129	0138	0147	M2.5	.016	1B	S27E05	8611	71			
02 Jul	1512	1520	1530	M1.6	.010	SF	S27E01	8611	58			

***Flare List***

Date	Time			X-ray Class.	Optical Imp / Brtns	Location Lat CMD	Rgn #
	Begin	Max	End				
28 June	0032	0037	0058	C4.0	SF	S27E618611	
	0301	0306	0319	C5.6	SF	S26E57	8611
	0322	0322	0326		SF	S26E56	8611
	0336	0341	0353	C2.2	SF	N16W0	8606
	0533	0535	0538	C1.3	SF	S27E55	8611
	0548	0555	0617		SF	N22W3	8592
	0704	0722	0730		SF	S14E20	8603
	0715	0715	0722		SF	N16W1	8594
	0748	0751	0758		SF	N22W1	8598
	0821	0823	0828		SF	S16E21	8603
	0917	0917	0924		SF	S16E12	8612
	0917	0920	0925		SF	S16E21	8603
	1023	1031	1035	C2.3	SF	S27E55	8611
	1213	1218	1225	C1.6	SF	S27E54	8611
	1251	1253	1300		SF	N23W3	8596
	1305	1305	1308		SF	S16E19	8603
	1357	1400	1402		SF	S25E52	8611
	1550	1558	1604	C1.9	SF	S26E52	8611
	1627	1627	1633		SF	S26E52	8611
	1815	1822	1832	C2.2			
1839	1903	2017	C6.2	1F	S25E49	8611	
2039	2042	2047		SF	S25E49	8611	
2055	2101	2117	C3.5				
2056	2058	2137		1F	N26W4	8596	
2057	2058	2101		1N	N22W4	8592	



*Flare List-continued*

Date	Time			X-ray Class.	Optical		Rgn #	
	Begin	Max	End		Imp / Brtns	Location Lat CMD		
29 June	0447	0508	0533		SF	S15E08	8603	
	0511	0521	0554	M1.4	SF	N18E07	8602	
	B0551	U0600	A0618		SF	N19E02	8602	
	0600	0600	0613	C1.9	SF	S26E48	8611	
	0625	0627	A0741	C3.0	SF	N19E02	8602	
	0653	0653	0658		SF	S26E44	8611	
	0705	0709	0739		SF	S14E12	8603	
	0805	0806	0812		SF	S15E15	8603	
	0805	0805	0828		SF	N18E05	8602	
	0815	0818	0849	M3.1	1N	S27E41	8611	
	1024	1027	1030	C2.9				
	29 June	B1240	U1243	A1328	C2.8	1F	N21W4	8596
		1407	1413	1417	C3.7			
B1455		U1504	1630	C3.9	SN	N15E02	8602	
1755		1801	1823	C3.0	SF	S15E01	8603	
1833		1841	1850		SF	S27E36	8611	
1851		1851	1856		SF	S27E36	8611	
1909		1912	1940	M1.6	1N	S14E01	8603	
2006		2007	2010		SF	N20W0	8602	
2013		2013	2022		SF	N20W0	8602	
2149		2149	2202	C1.9	SF	N25W4	8598	
30 June	2205	2210	2238	C7.9	1N	S13E03	8603	
	0009	0030	0059		SF	S25E34	8611	
	0014	0015	0020		SF	S13E01	8603	
	0305	0312	0318	C4.5				
	0435	0441	0526	M2.1	1N	S26E28	8611	
	0524	0531	0559		SF	S26E31	8611	
	0641	0646	0727	C5.2	1F	S16W13	8612	
	0710	0710	0717		SF	S26E34	8611	
	0716	0716	0722		SF	N23W5	8596	
	0843	0846	0853	C2.1	SF	S15W03	8603	
	0921	0945	1004	C2.6				
	B1123	1133	1156	M1.9	1B	S15E00	8603	
	1229	1235	1244	C2.0				
	1312	1312	1324		SF	S26E27	8611	
	1357	1406	1429		SF	N18W1	8602	
	1432	1432	1451		SF	S14W14	8603	
	1451	1451	1454		SF	S25E26	8611	
	1452	1502	1510		SF	S15W10	8603	
1453	1454	1507		SF	S25E26	8611		
1459	1500	1508		SF	S15W02	8603		



*Flare List-continued*

Date	Time			X-ray Class.	Optical		Rgn #	
	Begin	Max	End		Imp / Brtns	Location Lat CMD		
29 June	1514	1516	1521		SF	S15W11	8603	
	1533	1535	1539		SF	S21E23	8611	
	1548	1557	1616		SF	S15W10	8603	
	1618	1620	1623		SF	S27E26	8611	
	1630	1659	1709	C3.8	SF	S27E25	8611	
	1634	1641	1702		SF	S15W09	8603	
	1717	1739	1802		SF	N19W1	8602	
30 June	1740	1741	1748		SF	S16W08	8603	
	1759	1800	1817		SF	S11W40	8599	
	1805	1808	1914	M2.0	2B	S13W05	8603	
	1911	1919	1946		SF	S25E23	8611	
	1931	1935	1945		SF	S15W12	8603	
	2010	2011	2023	M1.1	SF	N20W5	8598	
	2011	2011	2017		SF	N17W4	8606	
	2020	2021	2025		SF	S15W11	8603	
	2107	2123	2147		1F	S24E22	8611	
	2148	2231	2249		SF	S25E23	8611	
	2149	2153	2211		SF	S15W13	8603	
	2220	2222	2229		SF	S14W14	8603	
	2250	2257	2307		SF	S24E21	8611	
	2303	2303	2320		SF	N19W1	8602	
	2308	2314	2323		SF	S24E18	8611	
	2326	0022	0128		SF	S25E22	8611	
	2334	2347	2357		SF	N27W5	8598	
	01 July	0001	0002	0008		SF	N25W5	8598
		0004	0004	0009		SF	S16W12	8603
0037		0110	0131		SF	S26E19	8611	
0103		0104	0122		SF	N19W1	8602	
0142		0146	0212	C5.4	SF	S15W16	8603	
0211		0220	0255		SF	N13W2	8610	
0300		0309	0328		SF	S25E19	8611	
0419		0421	0425		SF	S27E17	8611	
0447		0450	0455	C1.9				
0535		0537	0551		SF	N15W2	8602	
0640		0706	0725		SF	S25E15	8611	
0706		0709	0726	C2.8	SN	N21W6	8596	
0802		0807	0817		SF	S25E16	8611	
B0809		0810	0819	C4.8	SF	N17E66	8613	
0823		0829	0838		SF	S27E17	8611	
0839		0840	0844		SF	S17W17	8603	
0843		0854	0919		SF	S27E14	8611	
0849		0857	0907		SF	S15W21	8612	



*Flare List-continued*

Date	Time			X-ray Class.	Optical		Rgn #
	Begin	Max	End		Imp / Brtns	Location Lat CMD	
01 July	1014	1014	1037	C3.1	SF	S26E15	8611
	1057	1057	1109		SF	S15W22	8603
	1246	1251	1258		SF	S26E14	8611
	1257	1259	1303		SF	S15W23	8603
	1305	1310	1324		SF	N20W6	8596
	1345	1348	1420	C5.7	1N	S14W16	8603
	1435	1441	1448	C3.5			
	1524	1526	1529		SF	S15W16	8603
	1528	1532	1610	C3.0	1F	N12W3	8610
	1549	1549	1552		SF	S15W23	8603
	1619	1621	1627		SF	N20W6	8592
	B1719	U1748	A1753		SF	S14W19	8603
	1732	1743	1815	C8.1	SF	S25E12	8611
	1818	1820	1828		SF	S16W21	8603
	1902	1907	1913		SF	S25E14	8611
	1914	1918	1920		SF	S25E09	8611
	1926	1927	1946		SF	S15W25	8603
	2028	2040	2127	C3.0	SF	S25E12	8611
	2055	2055	2100		SF	N16W3	8602
	2139	2145	2158	M1.1	1F	N24W6	8598
	2325	2329	2356	M1.7	1N	S15W27	8603
	2353	0001	0006		SF	S24E06	8611
	02 July	0113	0126	0139		SF	N21W7
0121		0122	0136		SF	N19E59	8614
0132		0137	0322	M2.5	1B	S27E05	8611
0320		0322	0334	C2.3	SF	N17W3	8602
0344		0345	0420	C4.7	SF	N18E44	8613
0445		0512	0548	C2.8	SF	N18W3	8602
0452		0455	0458		SF	N20E57	8613
0503		0504	0509		SF	N18E44	8613
0616		0620	0632	C1.6			
0717		0722	0730	C3.0	SN	S15W24	8603
0747		0749	0751		SF	N17W3	8602
0752		0759	0803		SF	N17W3	8602
0829		0830	0837		SF	S26E09	8611
0901		0901	0908	C1.7	SF	S15W25	8603
1136		1152	1239	C2.1	SF	N15W3	8602
1516	1521	1610	M1.6	SF	S27E01	8611	
1752	1753	1816	C1.4	SF	S15W31	8603	





*Flare List-continued*

Date	Time			X-ray Class.	Optical		Rgn #
	Begin	Max	End		Imp / Brtns	Location Lat CMD	
02 July	2028	2054	2108	C2.3	SF	S24W03	8611
	2238	2242	2247	C1.4			
03 July	0027	0031	0034		SF	S15W40	8603
	0056	0101	0103		SF	S15W34	8603
	0129	0129	0134		SF	S26W05	8611
	0327	0342	0350	C1.7	SF	N18W4	8602
	0505	0507	0513		SF	N22W6	8598
	0509	0511	0518	C2.3	SF	S28E63	8615
	0521	0521	0526		SF	S16W69	8599
	0721	0724	0736		SF	S27W08	8611
	0752	0753	0756	C1.3	SF	S15W53	8603
	0808	0809	0817		SF	N19W5	8602
	0823	0827	0834	C1.7	SF	S15W38	8603
	1117	1118	1127	C1.9	SF	S14W46	8603
	1505	1505	1511	C4.1	SF	N23W8	8598
	1613	1614	1626		SF	S15W43	8603
	1858	1901	1939	C5.6	SF	S26W15	8611
	1905	1908	1913		SF	N19W5	8602
	B1940	U1941	A1953		SF	N18W5	8602
	B2000	U2032	A2057		SF	N15W5	8602
	2000	U2027	2111	C7.5	1F	N16W5	8602
	2044	2049	2101		SF	S25W18	8611
2101	2101	2109		SF	S26W17	8611	
2238	2239	2245		SF	N22W5	8598	
04 July	0006	0022	0038		SF	S24W23	8611
	0242	0245	0247		SF	S15W51	8603
	0601	0603	0622	C1.8	SF	S27W20	8611
	0722	0726	0743		SF	N15W4	8617
	0822	0825	0853	C6.4	1N	S24W25	8611
	0923	0924	0937	C3.1	SF	S27W22	8611
	1130	1132	1141		SF	S27W23	8611
	1135	1148	1207	C3.8	SF	N20E35	8614
	1142	1148	1205		SF	S27W23	8611
	1218	1218	1222		SF	S16W86	8599
	1227	1227	1235		SF	S15W54	8603
	1227	1231	1239		SF	S16W86	8599
	1254	1259	1303		SF	S17W61	8603
	1314	1318	1336		SF	S18W57	8603
	1436	1437	1443		SF	S25W28	8611
	1611	1620	1731	C4.5	1F	S27W26	8611
	1613	1615	1618		SF	S15E48	8618
	1625	1625	1630		SF	S15W56	8603



**Flare List-continued**

Date	Time			X-ray Class.	Imp / Brtns	Optical	Rgn #
	Begin	Max	End			Location Lat CMD	
04 July	1625	1627	1631		SF	S15E40	8618
	1656	1705	1734		SF	N20E32	8614
	1723	1725	1729		SF	N19W7	8602
	1754	1807	1829		SF	S26W31	8611
	1846	1849	1851		SF	S26W31	8611
	1854	1858	1943	C3.4	1F	S24W30	8611
	1944	2008	2029		SF	S24W30	8611
	2016	2017	2032		SF	S16W62	8603
	2030	2039	2045	C3.1	SF	S24W30	8611
	2322	2328	2335	C9.5			

**Region Summary**

Date	Location		Sunspot Characteristics					Flares						
	( ° Lat ° CMD)	Helio	Area (10 <sup>6</sup> hemi)	Extent (helio)	Spot Class	Spot Count	Mag Class	X-ray			Optical			
		Lon						C	M	X	S	1	2	3

*Region 8592*

19 Jun	N23E71	351	0100	03	HSX	002	A	1									
20 Jun	N22E63	346	0200	20	FAO	006	B	1	1	2							
21 Jun	N22E45	351	0170	09	DAO	008	B										
22 Jun	N24E30	352	0100	06	CSO	008	B		1			1					
23 Jun	N22E18	351	0060	02	CSO	002	B	1				1					
24 Jun	N22E04	352	0060	03	CSO	003	B	1				1					
25 Jun	N23W0	351	0060	02	HSX	001	A										
26 Jun	N22W2	351	0050	02	HSX	001	A										
27 Jun	N22W3	350	0040	02	HSX	001	A		1						1		
28 Jun	N23W4	349	0030	01	HSX	001	A	1				1	1				
29 Jun	N23W6	350	0030	01	HSX	001	A										
30 Jun	N23W7	351	0030	01	HSX	001	A										
01 Jul	N23W8	350	0020	01	AXX	001	A					1					
								5	3	0	6	2	1	0	0		

Crossed West Limb.

Absolute heliographic longitude: 352





**Region Summary-continued**

Date	Location		Sunspot Characteristics					Flares															
	( ° Lat ° CMD)	Helio	Area (10 <sup>6</sup> hemi)	Extent (helio)	Spot Class	Spot Count	Mag Class	X-ray			Optical												
		Lon						C	M	X	S	1	2	3	4								
<i>Region 8596</i>																							
21 Jun	N23E53	343	0040	03	DAO	003	B																
22 Jun	N22E40	342	0040	04	CSO	005	B																
23 Jun	N20E27	342	0020	01	HSX	001	A						1										
24 Jun	N21E13	343	0020	01	HRX	001	A	1				1											
25 Jun	N21E00	343	0010	04	BXO	004	B																
26 Jun	N22W1	342	0010	01	HSX	001	A	2	1			2	1	1									
28 Jun	N23W3	342						1				1	1										
29 Jun	N22W5	342						1					1										
30 Jun	N22W6	337											1										
01 Jul	N22W7	337						1					2										
								6	1	0	8	3	1	0	0								

Crossed West Limb.

Absolute heliographic longitude: 343

<i>Region 8598</i>																							
21 Jun	N26E69	327	0110	03	HAX	002	A																
22 Jun	N25E56	326	0110	15	EAO	007	B					1											
23 Jun	N23E43	326	0270	16	FAI	017	B	1	1			3		1									
24 Jun	N23E28	328	0360	17	FAI	029	B	4				13	2										
25 Jun	N23E13	330	0650	19	FKI	039	B					7											
26 Jun	N23E02	328	0530	19	FAI	050	BG	2	1			4	1	1									
27 Jun	N22W1	328	0530	21	FKI	065	BG	1				1											
28 Jun	N22W2	328	0380	19	FAC	063	BG					1											
29 Jun	N23W3	328	0240	14	EAI	037	BG	1				1											
30 Jun	N23W5	327	0140	17	FAO	014	B			1		2											
01 Jul	N22W6	331	0120	14	EAO	007	B			1		1	1										
02 Jul	N22W7	330	0130	16	FAO	009	B																
03 Jul	N22W9	329	0050	03	HAX	001	A	1				3											
								10	4	0	37	4	2	0	0								

Crossed West Limb.

Absolute heliographic longitude: 328



**Region Summary-continued**

Date	Location		Sunspot Characteristics					Flares															
	( ° Lat ° CMD)	Helio	Area (10 <sup>6</sup> hemi)	Extent (helio)	Spot Class	Spot Count	Mag Class	X-ray			Optical												
		Lon						C	M	X	S	1	2	3	4								
<i>Region 8599</i>																							
21 Jun	S16E76	320	0060	02	HAX	002	A																
22 Jun	S16E64	318	0100	06	DAC	005	B	2				6											
23 Jun	S17E52	317	0110	07	CAO	007	B																
24 Jun	S17E39	317	0120	09	CAO	008	B					1											
25 Jun	S16E27	316	0110	10	DSO	010	B																
26 Jun	S16E13	317	0090	12	EAO	011	B																
27 Jun	S16E00	317	0070	13	CAO	016	B																
28 Jun	S14W14	317	0040	09	CAO	007	B																
29 Jun	S14W30	320	0020	03	CRO	008	B																
30 Jun	S15W43	320	0020	03	BXO	005	B		1			1											
01 Jul	S14W55	319	0010	01	AXX	002	A																
02 Jul	S14W68	319																					
03 Jul	S14W82	319										1											
								2	1	0	9	0	0	0	0	0							

Still on Disk.

Absolute heliographic longitude: 317

<i>Region 8602</i>																							
23 Jun	N19E75	294	0100	05	CAO	006	B																
24 Jun	N19E57	297	0350	10	DAO	009	B					1											
25 Jun	N18E48	295	0320	12	CAO	016	B																
26 Jun	N17E35	295	0330	09	DKI	021	B	2				4											
27 Jun	N18E22	295	0350	08	DKO	025	B	2				3											
28 Jun	N18E08	295	0260	07	DKO	022	B																
29 Jun	N18W0	297	0260	07	DKO	020	B	2	1			7											
30 Jun	N18W2	298	0210	06	DAO	015	B					3											
01 Jul	N18W3	298	0260	06	DAO	014	B					3											
02 Jul	N18W4	299	0270	06	DKO	011	B	3				5											
03 Jul	N19W6	299	0240	05	DAO	011	B	1				5	1										
04 Jul	N19W7	299	0200	05	CAO	006	B					1											
								10	1	0	32	1	0	0	0								

Still on Disk.

Absolute heliographic longitude: 297



**Region Summary-continued**

Date	Location		Sunspot Characteristics					Flares						
	(° Lat ° CMD)	Helio Lon	Area (10 <sup>6</sup> hemi)	Extent (helio)	Spot Class	Spot Count	Mag Class	X-ray			Optical			
								C	M	X	S	1	2	3

*Region 8603*

23 Jun	S16E75	294	0040	05	CSO	002	B												
24 Jun	S15E61	295	0160	13	EAO	009	B	1				2							
25 Jun	S15E54	289	0320	20	FAI	018	B												
26 Jun	S16E43	287	0300	18	FAI	024	B	1				5							
27 Jun	S15E30	287	0360	18	FAI	039	B												
28 Jun	S15E18	285	0210	14	EAI	034	B					4							
29 Jun	S15E04	286	0160	15	EAI	040	B	2	1			4	2						
30 Jun	S14W11	288	0110	13	EAI	036	BG	1	2			13	1	1					
01 Jul	S14W25	289	0170	13	EAI	033	BG	2	1			10	2						
02 Jul	S15W38	289	0220	15	EAI	026	BG	3				3							
03 Jul	S15W54	291	0290	14	EAI	021	BG	3				6							
04 Jul	S16W68	292	0260	13	EAI	014	BG	1				6							
												14	4	0	53	5	1	0	0

Still on Disk.

Absolute heliographic longitude: 286

*Region 8606*

24 Jun	N17E33	323	0060	05	DAO	007	B												
25 Jun	N17E21	322	0060	07	DAO	011	B					1							
26 Jun	N17E08	322	0100	07	DAI	013	B					1							
27 Jun	N17W08	323	0090	07	DAO	016	B												
28 Jun	N17W18	321	0050	06	DAO	012	B	1				1							
29 Jun	N17W32	322	0060	08	DSO	011	B												
30 Jun	N17W46	323	0050	08	DSO	005	B		1			1							
01 Jul	N16W60	324	0060	08	DSO	009	B												
02 Jul	N17W72	323	0010	05	BXO	003	B												
03 Jul	N17W86	323																	
												1	1	0	4	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 323

*Region 8608*

26 Jun	S12W06	336	0010	02	BXO	003	B												
27 Jun	S12W19	336																	
01 Jul	S12W71	336																	
02 Jul	S12W84	336																	
												0	0	0	0	0	0	0	0

Crossed West Limb.

Absolute heliographic longitude: 336









**Region Summary-continued**

Date	Location		Sunspot Characteristics				Flares							
	( ° Lat ° CMD)	Helio	Area (10 <sup>6</sup> hemi)	Extent (helio)	Spot Class	Spot Count	Mag Class	X-ray			Optical			
		Lon						C	M	X	S	1	2	3

*Region 8617*

02 Jul	N14W2	279	0010	04	BXO	006	B											
03 Jul	N14W4	279	0100	06	DAO	012	B											
04 Jul	N14W5	281	0190	08	DAO	014	B											

Still on Disk.

Absolute heliographic longitude: 279

*Region 8618*

03 Jul	S17E57	180	0010	01	AXX	001	A											
04 Jul	S18E44	180	0010	00	AXX	001	A											

Still on Disk.

Absolute heliographic longitude: 180

*Region 8619*

03 Jul	S17E71	166	0010	04	BXO	002	B											
04 Jul	S18E57	167	0010	01	AXX	002	A											

Still on Disk.

Absolute heliographic longitude: 167

*Region 8620*

03 Jul	N22E56	181	0040	02	HAX	001	A											
04 Jul	N21E42	182	0080	02	HSX	001	A											

Still on Disk.

Absolute heliographic longitude: 182

*Region 8621*

04 Jul	N20E68	156	0030	02	HSX	001	A											

Still on Disk.

Absolute heliographic longitude: 156



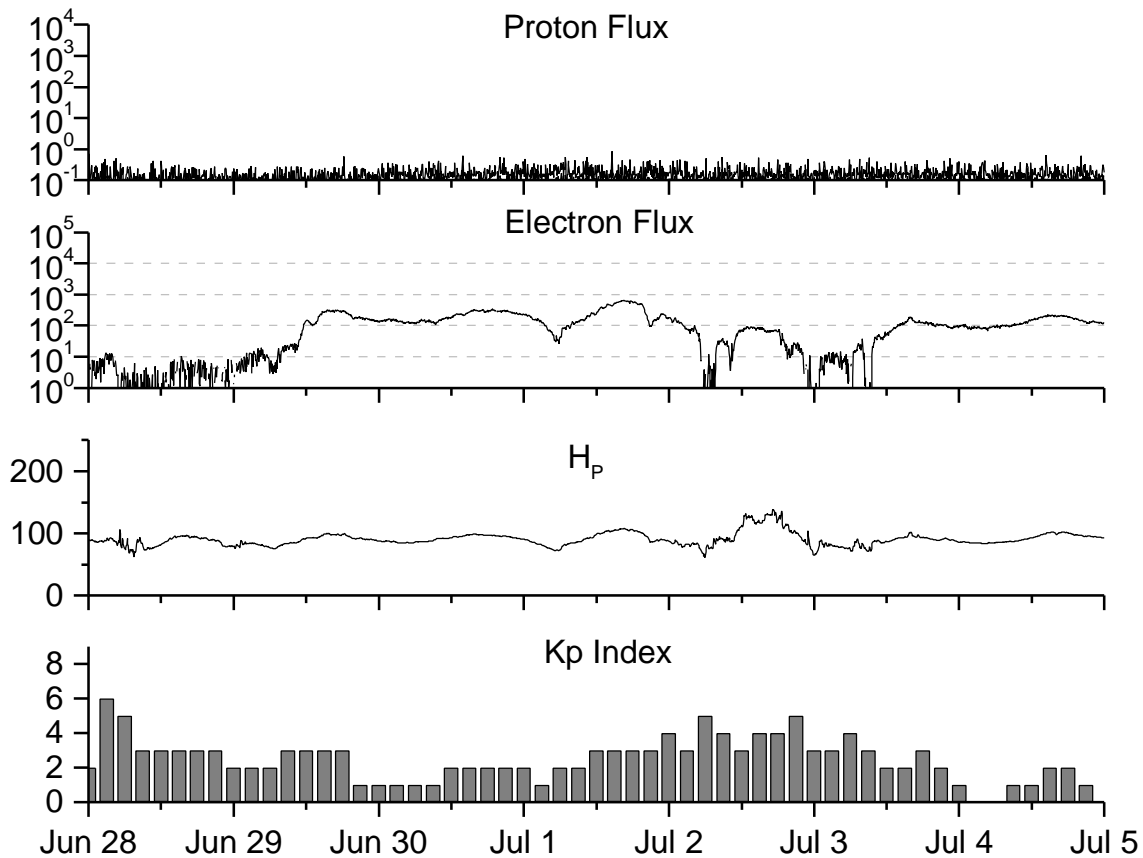
**Recent Solar Indices (preliminary)  
of the observed monthly mean values**

Month	Sunspot Numbers			Radio Flux		Geomagnetic			
	Observed values SWO	Ratio RI	Ratio RI/SWO	Smooth values SWO	Smooth values RI	*Penticton 10.7 cm	Smooth Value	Planetary Ap	Smooth Value
<b>1997</b>									
July	17.0	10.4	0.61	32.4	22.6	71.1	81.8	06	08.5
August	36.7	24.4	0.66	35.9	25.0	79.0	83.4	07	08.3
September	52.8	51.3	0.88	40.5	28.3	96.2	85.7	10	08.4
October	33.6	22.8	0.68	45.4	31.8	84.9	88.6	11	08.6
November	53.5	39.0	0.73	49.3	35.0	99.5	91.3	11	09.0
December	57.9	41.2	0.71	54.2	39.0	98.8	94.2	05	09.5
<b>1998</b>									
January	51.8	31.9	0.62	60.6	43.7	93.4	97.5	08	09.9
February	54.4	40.3	0.74	67.4	48.8	93.4	101.7	08	10.5
March	81.8	54.8	0.67	73.3	53.4	109.1	105.8	13	11.1
April	73.6	53.4	0.73	77.7	56.5	108.3	109.1	10	11.3
May	74.3	56.3	0.76	81.4	59.3	106.7	112.4	18	11.6
June	93.6	70.7	0.76	85.9	62.4	108.4	116.2	10	11.9
July	98.3	66.2	0.67	90.3	65.4	114.0	120.3	11	12.2
August	118.6	91.7	0.77	93.7	67.8	136.0	124.1	18	12.4
September	119.0	92.9	0.78	96.1	69.4	138.4	126.8	13	12.5
October	77.0	55.5	0.72	97.7	70.5	117.3	127.9	13	12.5
November	99.5	74.0	0.74	101.3	73.0	140.2	130.0	16	12.3
December	120.8	81.9	0.69	108.8	77.9	150.1	134.3	08	11.9
<b>1999</b>									
January	94.3	62.4	0.66			142.6		10	
February	93.4	66.1	0.70			142.0		11	
March	100.5	69.1	0.70			126.3		13	
April	92.9	63.9	0.69			117.3		12	
May	140.5	106.3	0.76			148.6		10	
June	208.3	137.4	0.66			170.0		08	

**NOTE:** All smoothed values after January 1998 and monthly values after September 1998 are preliminary estimates.

The lowest smoothed sunspot indices number for Cycle 22, RI = 8.0, occurred in May 1996. The highest smoothed sunspot number for Cycle 22, RI= 158.5, occurred July 1989. \* After June 1991, the 10.7 cm radio flux data source is Penticton, B.C. Canada. Prior to that, it was Ottawa.





*Weekly Geosynchronous Satellite Environment Summary*  
*Week Beginning 28 June 1999*

*Protons* plot contains the five-minute averaged integral proton flux (protons/cm<sup>2</sup>-sec -sr) as measured by GOES-8 (W75) for each of three energy thresholds: greater than 10, 50, and 100 MeV.

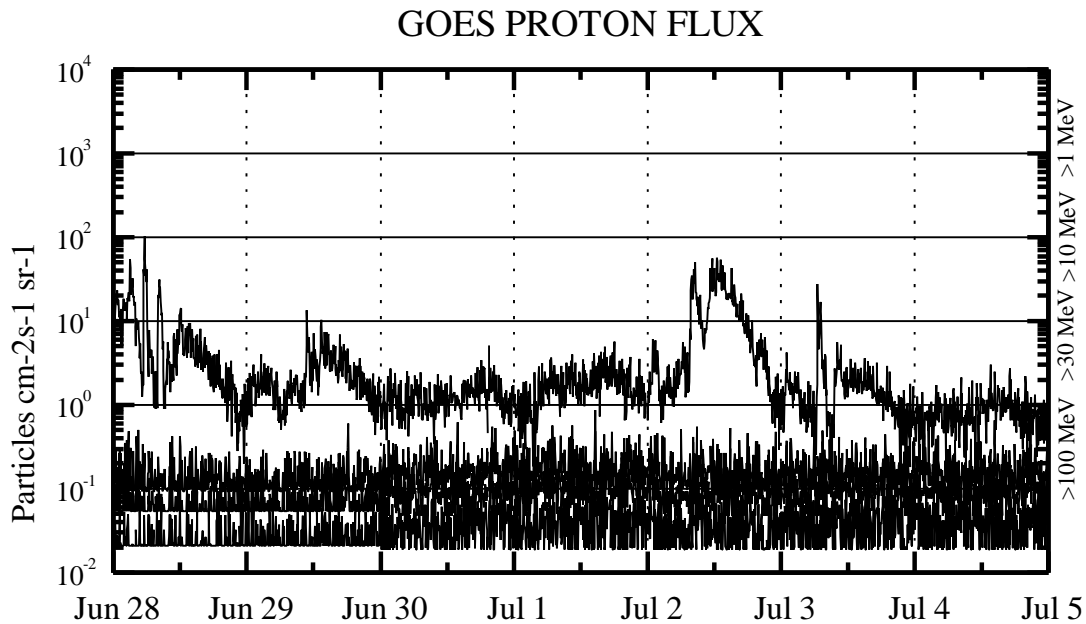
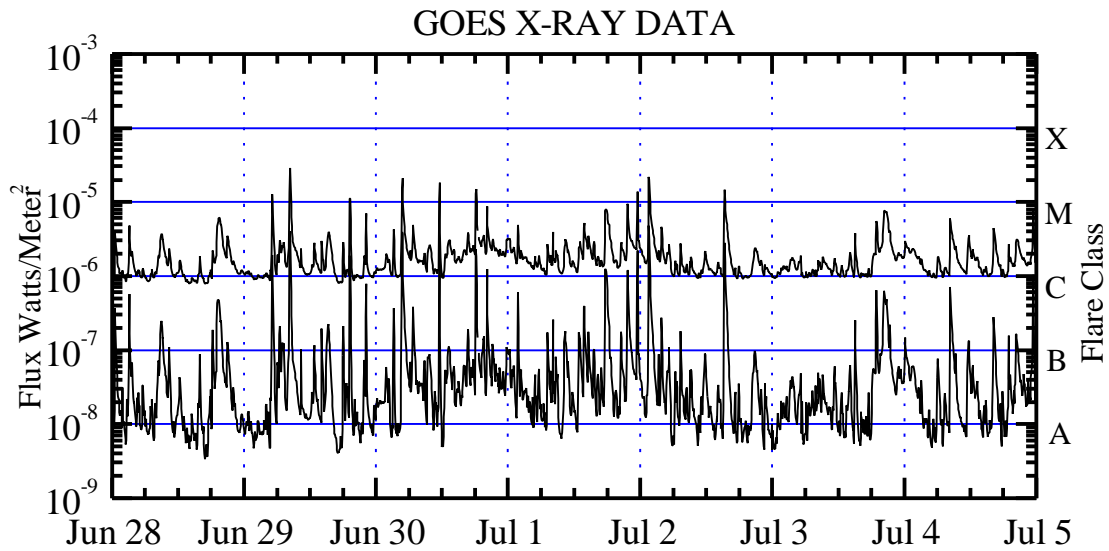
*Electrons* plot contains the five-minute averaged integral electron flux (electrons/cm<sup>2</sup>-sec -sr) with energies greater than 2 MeV at GOES-8.

*H<sub>p</sub>* plot contains the five minute averaged magnetic field H - component in nanoteslas (nT) as measured by GOES-8. The H component is parallel to the spin axis of the satellite, which is nearly parallel to the Earth's rotation axis.

*K<sub>p</sub>* plot contains the estimated planetary 3-hour K-index (derived by the USAF 55<sup>th</sup> Space Weather Squadron) in real time from magnetometers at Meanook, Canada; Sitka, AK; Glenlea, Canada; St. Johns, Canada; Ottawa, Canada; Newport, WA; Fredericksburg, VA; Boulder, CO; Fresno, CA and Heartland, UK. These data are made available through cooperation from the Geological Survey of Canada (GSC) and the US Geological Survey. These may differ from the final K<sub>p</sub> values derived from a more extensive network of magnetometers.

The data included here are those now available in real time at the SWO and are incomplete in that they do not include the full set of parameters and energy ranges known to cause satellite operating anomalies. The proton and electron fluxes and K<sub>p</sub> are "global" parameters that are applicable to a first order approximation over large areas. H<sub>p</sub> is subject to more localized phenomena and the measurements generally are applicable to within a few degrees of longitude of the measuring satellite.





#### Weekly GOES Satellite X-ray and Proton Plots

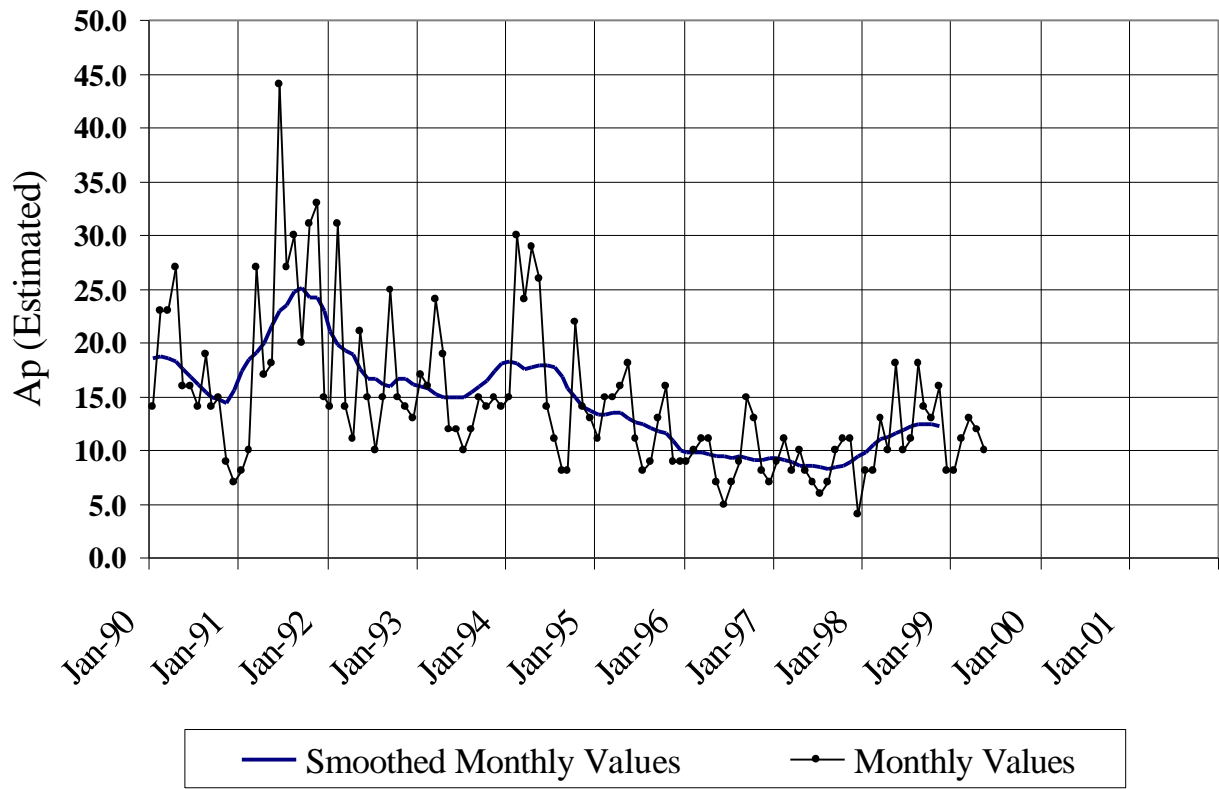
X-ray plot contains five minute averaged x-ray flux ( watts /  $m^2$  ) as measured by GOES 8 and 10 in two wavelength bands, .05 -.4 and .1 - .8 nm. The letters A, B, C, M and X refer to x-ray event levels for the .1 - .8 nm band.

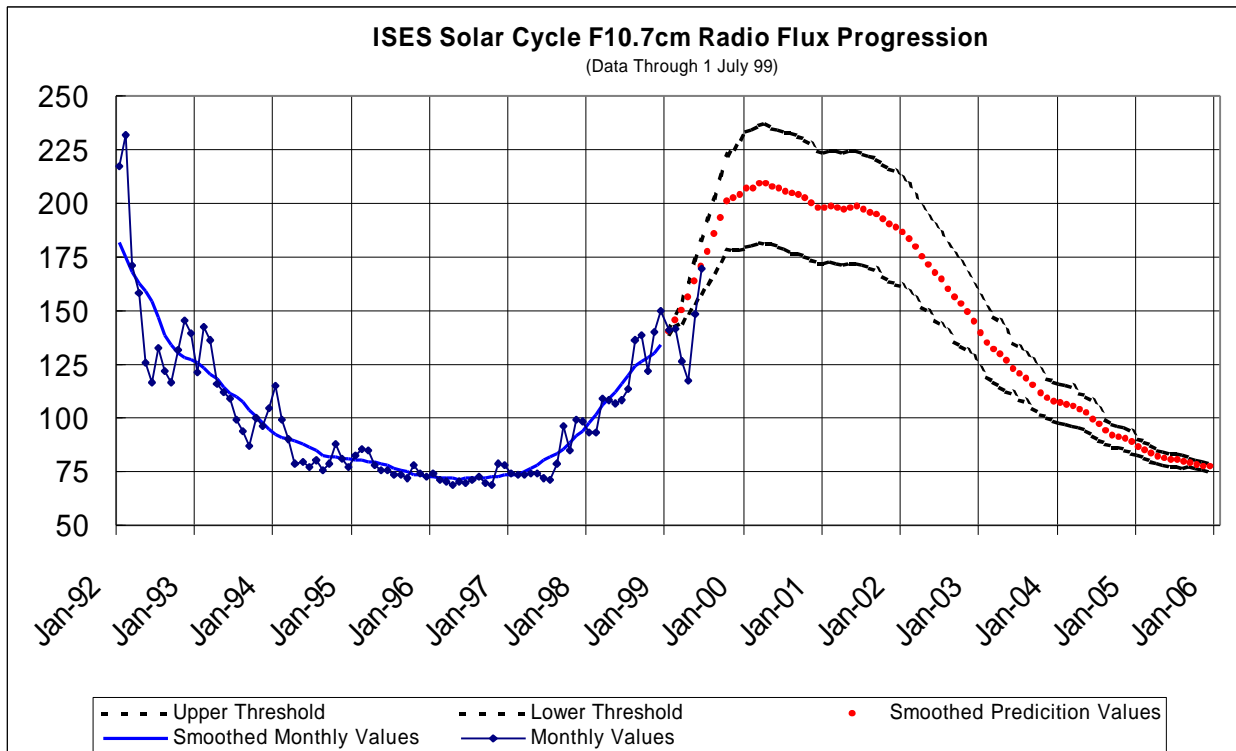
Proton plot contains the five minute averaged integral proton flux (protons/cm<sup>2</sup> –sec –sr) as measured by GOES-8 (W75) for each of the energy thresholds:  $>1$ ,  $>10$ ,  $>30$  and  $>100$  MeV. P10 event threshold is 10 pfu (protons/cm<sup>2</sup>-sec-sr) at greater than 10 MeV.



# Smoothed and Monthly Values

(Data Through 1 June 99)

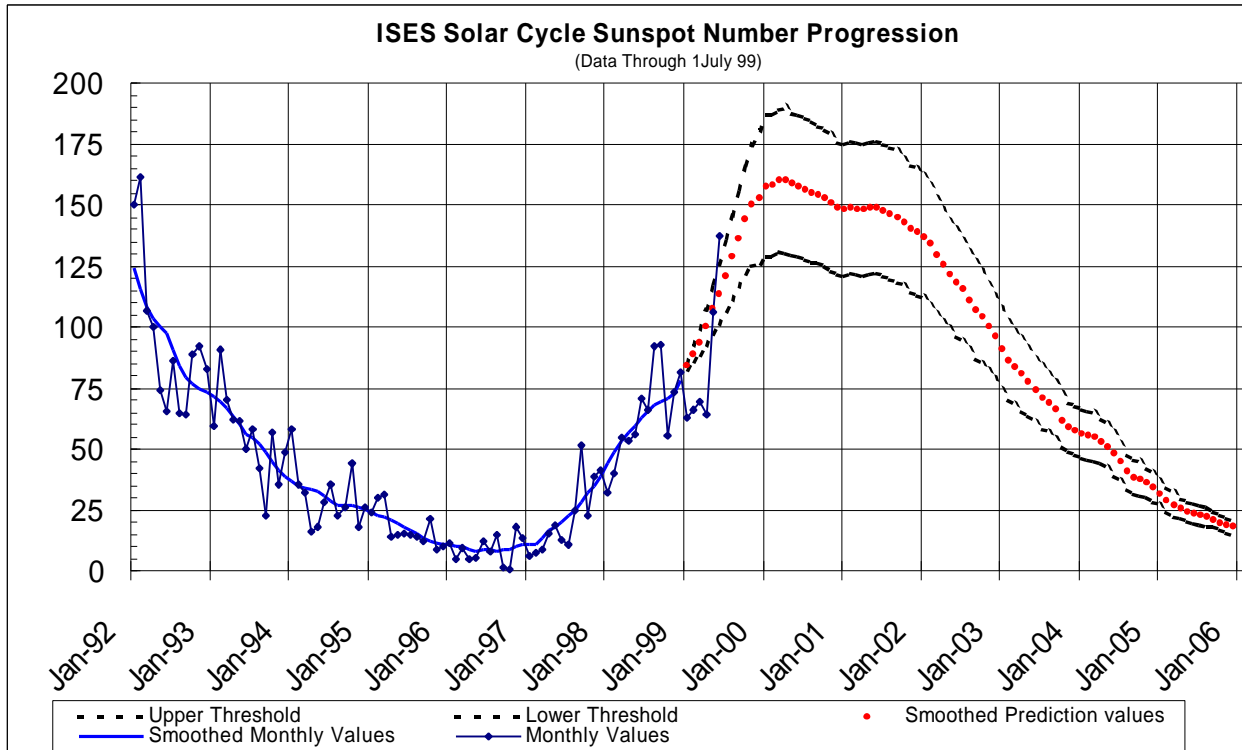




#### SEC Prediction of Smoothed F10.7cm Radio Flux

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1996	73 (***)	72 (***)	72 (***)	71 (***)	71 (***)	72 (***)	71 (***)	71 (***)	71 (***)	72 (***)	72 (***)	73 (***)
1997	73 (***)	74 (***)	75 (***)	77 (***)	78 (***)	80 (***)	82 (***)	83 (***)	86 (***)	88 (***)	91 (***)	94 (***)
1998	98 (***)	102 (***)	106 (***)	109 (***)	112 (***)	116 (***)	120 (***)	124 (***)	127 (***)	128 (***)	130 (***)	134 (***)
1999	<b>140</b> (1)	<b>145</b> (3)	<b>150</b> (5)	<b>156</b> (7)	<b>164</b> (10)	<b>170</b> (12)	<b>178</b> (15)	<b>185</b> (17)	<b>193</b> (20)	<b>201</b> (22)	<b>202</b> (24)	<b>204</b> (26)
2000	<b>207</b> (27)	<b>207</b> (27)	<b>209</b> (27)	<b>209</b> (28)	<b>208</b> (27)	<b>207</b> (27)	<b>206</b> (27)	<b>204</b> (28)	<b>204</b> (27)	<b>202</b> (27)	<b>200</b> (27)	<b>198</b> (26)
2001	<b>198</b> (26)	<b>198</b> (26)	<b>198</b> (26)	<b>197</b> (26)	<b>198</b> (26)	<b>198</b> (26)	<b>197</b> (26)	<b>196</b> (26)	<b>195</b> (26)	<b>192</b> (26)	<b>190</b> (26)	<b>188</b> (26)
2002	<b>187</b> (25)	<b>184</b> (25)	<b>179</b> (24)	<b>175</b> (23)	<b>171</b> (22)	<b>167</b> (22)	<b>164</b> (21)	<b>160</b> (20)	<b>156</b> (20)	<b>153</b> (19)	<b>149</b> (18)	<b>145</b> (17)
2003	<b>140</b> (17)	<b>135</b> (16)	<b>132</b> (15)	<b>130</b> (15)	<b>126</b> (14)	<b>123</b> (12)	<b>120</b> (12)	<b>118</b> (11)	<b>115</b> (11)	<b>112</b> (10)	<b>110</b> (9)	<b>108</b> (9)
2004	<b>107</b> (9)	<b>106</b> (9)	<b>105</b> (9)	<b>104</b> (8)	<b>102</b> (8)	<b>100</b> (8)	<b>97</b> (7)	<b>94</b> (6)	<b>92</b> (5)	<b>91</b> (5)	<b>90</b> (5)	<b>88</b> (5)
2005	<b>87</b> (4)	<b>85</b> (4)	<b>83</b> (4)	<b>82</b> (3)	<b>81</b> (3)	<b>81</b> (3)	<b>80</b> (3)	<b>80</b> (3)	<b>79</b> (2)	<b>78</b> (2)	<b>78</b> (2)	<b>77</b> (2)





### SEC Prediction of Smoothed Sunspot Number

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1996	10 (***)	10 (***)	10 (***)	8 (***)	8 (***)	9 (***)	8 (***)	8 (***)	8 (***)	9 (***)	10 (***)	10 (***)
1997	11 (***)	11 (***)	14 (***)	17 (***)	18 (***)	20 (***)	23 (***)	25 (***)	28 (***)	32 (***)	35 (***)	39 (***)
1998	44 (***)	49 (***)	53 (***)	57 (***)	59 (***)	62 (***)	65 (***)	68 (***)	69 (***)	71 (***)	73 (***)	78 (***)
1999	<b>84</b> (1)	<b>89</b> (3)	<b>94</b> (5)	<b>100</b> (7)	<b>107</b> (10)	<b>114</b> (12)	<b>121</b> (15)	<b>128</b> (17)	<b>136</b> (20)	<b>144</b> (22)	<b>150</b> (25)	<b>153</b> (27)
2000	<b>157</b> (29)	<b>158</b> (29)	<b>160</b> (29)	<b>160</b> (30)	<b>159</b> (29)	<b>158</b> (29)	<b>156</b> (29)	<b>155</b> (29)	<b>154</b> (28)	<b>153</b> (28)	<b>151</b> (28)	<b>148</b> (27)
2001	<b>148</b> (27)	<b>149</b> (27)	<b>148</b> (27)	<b>148</b> (27)	<b>149</b> (27)	<b>149</b> (27)	<b>147</b> (27)	<b>146</b> (27)	<b>145</b> (27)	<b>143</b> (26)	<b>140</b> (26)	<b>139</b> (26)
2002	<b>137</b> (25)	<b>134</b> (25)	<b>130</b> (24)	<b>125</b> (23)	<b>122</b> (22)	<b>118</b> (22)	<b>115</b> (21)	<b>111</b> (20)	<b>107</b> (20)	<b>104</b> (19)	<b>100</b> (18)	<b>96</b> (17)
2003	<b>91</b> (17)	<b>86</b> (16)	<b>83</b> (15)	<b>81</b> (15)	<b>77</b> (14)	<b>74</b> (13)	<b>71</b> (13)	<b>69</b> (12)	<b>66</b> (12)	<b>62</b> (11)	<b>59</b> (10)	<b>57</b> (10)
2004	<b>56</b> (10)	<b>56</b> (10)	<b>55</b> (10)	<b>53</b> (9)	<b>51</b> (9)	<b>48</b> (9)	<b>44</b> (8)	<b>41</b> (7)	<b>38</b> (7)	<b>38</b> (7)	<b>36</b> (6)	<b>34</b> (6)
2005	<b>31</b> (5)	<b>29</b> (5)	<b>27</b> (5)	<b>25</b> (4)	<b>24</b> (4)	<b>23</b> (4)	<b>23</b> (4)	<b>22</b> (4)	<b>21</b> (3)	<b>20</b> (3)	<b>19</b> (3)	<b>18</b> (3)

