

## Space Weather Highlights 09 - 15 June 2003

SWO PRF 1450  
17 June 2003

Solar activity ranged from moderate to high levels. Region 375 (N12, L=026, class/area Fkc/1250 on 11 June) was the largest and most complex region of the period and was the primary source of major flare activity. This region exhibited steady growth during its transit and had a strong beta-gamma-delta magnetic configuration when it rotated beyond the west limb on 14 June. Activity on 09 – 12 June was at high levels due to numerous M-class and three X-class events from Region 375. On 09 June, the largest event of the period occurred, an X1.7 flare at 2139 UTC with an associated ten-flare. SOHO/LASCO imagery observed a CME associated with this event; however, the CME was directed toward the northwest and did not appear to be Earth bound. Other notable activity on 09 June included an M4/1n flare at 1125 UTC with an associated Type II (666 km/s) radio sweep. Region 375 produced ten M-class flares on 10 June with two flares greater than M5; an M5.1/1n at 1115 UTC and an M5.6/Sf at 1815 UTC. On 11 June, Region 375 continued producing major activity with an X1.3/2b and an X1.6/1n at 0002 UTC and 2014 UTC respectively. The X1.6 was associated with a Type II radio sweep (490 km/s). A twenty-seven degree solar filament near S37E12 erupted on 11 June at 1730 UTC. Activity on 12 June consisted of four M-class flares from Region 375, the largest an M7/1f at 0130 UTC. Moderate levels of activity were observed on 13 – 14 June with three M-class events from Region 375 on 13 June and an M1 flare from a new region beyond the southeast limb on 14 June. The new region beyond the southeast limb is likely old Region 365 (S07, L=181) which was very active during its last rotation. At the time of this report this new Region has been designated as Region 386 (S07, L=187, class/area Dao/190 on 16 June). Activity was high on 15 June due to an X1/Sf from Region 386 at 2356 UTC. Associated with this X-class event was a Type II (841 km/s) and Type IV radio sweeps as well as a full halo CME.

Solar wind data were available from the NASA Advanced Composition Explorer (ACE) spacecraft for most of the summary period. The period began with a coronal hole high speed flow producing solar wind speed near 700 km/s on 09 -10 June. From 11 - 13 June, solar wind speed was in a gradual decline to 400 km/s. Wind speed increased on 14 June to near 550 km/s and remained at that level through the end of the period. The Bz component of the interplanetary magnetic field exhibited oscillations between +/- 5 nT for most of the period. Early on 14 June, Bz was oriented southward for a ten-hour period, but turned primarily northward from the latter half of 14 June through the end of the period on 15 June.

There were no greater than 10 MeV proton events at geosynchronous orbit during the summary period.

The greater than 2 MeV electron flux at geo-synchronous orbit reached high levels on 09 - 13 June.

The geomagnetic field ranged from quiet to major storm levels. Isolated major storm levels were observed on 09 - 10 June due to the coronal hole high speed stream. As the high speed flow subsided, activity decreased to quiet to unsettled levels on 11 - 13 June. On 14 - 15 June, activity reached unsettled to minor storm levels due to the extended period of southward Bz.

## Space Weather Outlook 18 June - 14 July 2003

Solar activity is expected to range from low to high levels during the period. For the first half of the period Region 386 will have the potential for M-class and X-class activity. On 27 June, Region 375 is due to return and may have M-class potential during the second half of the period.

A greater than 10 MeV proton event is possible early in the period because of the potential for a major event from Region 386.

The greater than 2 MeV electron flux is expected to reach high levels on 21 - 23 June, 30 June - 03 July, and again on 06 - 07 July.

The geomagnetic field is expected to range from quiet to major storm levels during the period. Unsettled to major storm levels are possible early in the period and again on 29 - 30 June due to coronal hole high speed streams. Minor storm levels are possible on 18 - 20 June, 25 - 26 June, and again on 03 - 07 July due to more high speed streams.



### *Daily Solar Data*

Date	Radio Flux 10.7 cm	Sun spot No.	Sunspot Area (10 <sup>-6</sup> hemi.)	X-ray Background	Flares							
					X-ray Flux			Optical				
					C	M	X	S	1	2	3	4
09 June	158	176	1770	C1.8	13	2	1	15	1	0	0	0
10 June	177	207	1950	C2.1	2	9	1	17	4	3	0	0
11 June	193	178	2160	C3.3	2	8	1	19	4	0	0	0
12 June	164	168	2110	C1.8	11	4	0	25	2	0	0	0
13 June	151	149	1400	C2.1	3	3	0	12	0	0	0	0
14 June	134	91	460	C1.2	4	1	0	2	0	0	0	0
15 June	129	111	480	B5.8	7	0	1	2	0	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
09 June	7.0E+5	1.1E+4	2.9E+3		6.4E+7	
10 June	5.0E+6	1.1E+4	2.9E+3		1.3E+8	
11 June	5.9E+5	1.1E+4	2.7E+3		1.3E+8	
12 June	9.2E+5	1.1E+4	2.8E+3		2.2E+8	
13 June	1.1E+6	1.2E+4	3.1E+3		2.1E+8	
14 June	7.5E+5	1.1E+4	3.2E+3		8.3E+6	
15 June	3.2E+5	1.3E+4	3.3E+3		6.4E+6	

### *Daily Geomagnetic Data*

Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
	09 June	20	3-3-2-2-3-2-3-6	36	3-4-5-6-5-4-3-4	28
10 June	19	4-2-5-3-3-3-2-3	40	4-2-6-6-5-5-3-3	27	4-3-6-4-4-4-4-3
11 June	10	2-3-3-2-2-2-3-2	20	3-3-4-4-4-3-2-4	15	3-3-4-3-3-3-3-3
12 June	7	1-2-2-1-2-2-2-3	12	1-2-2-3-4-3-3-2	11	2-2-3-2-3-3-3-3
13 June	8	1-1-1-1-1-2-4-3	7	1-2-1-2-0-2-3-3	11	3-2-1-2-2-3-4-4
14 June	18	2-3-4-3-2-3-4-4	42	3-4-6-6-6-4-3-3	32	3-4-5-5-4-5-5-4
15 June	13	3-4-2-2-2-2-3-3	27	4-5-4-4-5-3-2-3	20	4-5-3-3-3-3-4-3

### *Alerts and Warnings Issued*

Date & Time of Issue	Type of Alert or Warning	Date & Time of Event UT
09 Jun 0018	10 - 245 MHz Radio Bursts	08 Jun
09 Jun 0018	1 - 245 MHz Radio Noise Storms	08 Jun
09 Jun 0431	ALERT: Electron 2MeV Integral Flux exceeded 1000pfu	09 Jun 0400
09 Jun 1249	ALERT: Type II Radio Emission	09 Jun 1144
09 Jun 1411	ALERT: Electron 2MeV Integral Flux > 1000pfu	09 Jun 1350
09 Jun 1455	EXTENDED WARNING: Geomagnetic K= 4	08 Jun 1545 - 09 Jun 1500
09 Jun 2117	WARNING: Geomagnetic K= 5	09 Jun 2120 - 10 Jun 1500
09 Jun 2137	ALERT: X-Ray Flux > M5	09 Jun 2137
09 Jun 2147	ALERT: Geomagnetic K= 5	09 Jun 2145
09 Jun 2154	SUMMARY: X-ray Event > X1	09 Jun 2131

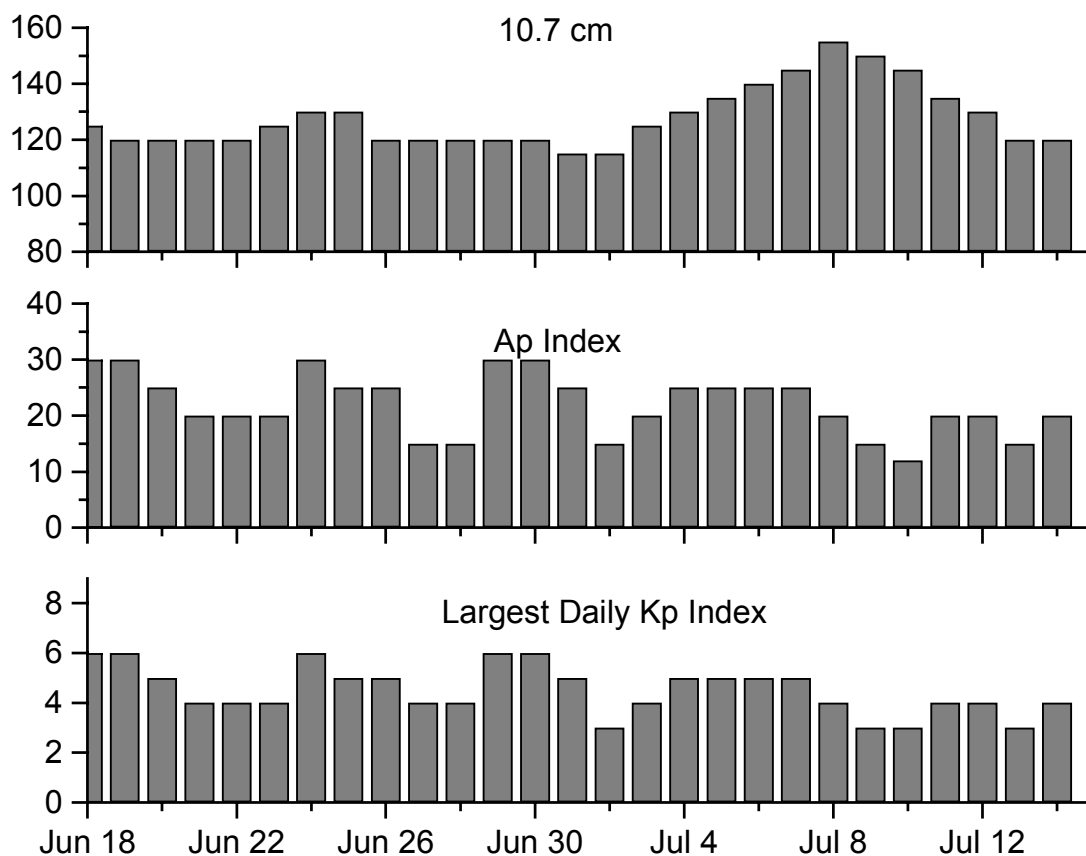


*Alerts and Warnings Issued - continued.*

<u>Date &amp; Time of Issue</u>	<u>Type of Alert or Warning</u>	<u>Date &amp; Time of Event UT</u>
09 Jun 2210	SUMMARY: 10cm Radio Burst	09 Jun 2136
09 Jun 2225	WARNING: Geomagnetic K= 6	09 Jun 2227 - 10 Jun 0900
09 Jun 2240	ALERT: Geomagnetic K= 6	09 Jun 2240
09 Jun 2249	ALERT: Type II Radio Emission	09 Jun 2138
09 Jun 2327	SUMMARY: 10cm Radio Burst	09 Jun 2220
10 Jun 0012	24 - 245 MHz Radio Bursts	09 Jun
10 Jun 0012	1 - 245 MHz Radio Noise Storm	09 Jun
10 Jun 0907	ALERT: Electron 2MeV Integral Flux exceeded 1000pfu	10 Jun 0845
10 Jun 1113	ALERT: X-Ray Flux > M5	10 Jun 1112
10 Jun 1135	SUMMARY: X-ray Event exceeded M5	10 Jun 1055
10 Jun 1500	EXTENDED WARNING: Geomagnetic K= 4	08 Jun 1545 - 10 Jun 2359
10 Jun 1848	ALERT: X-Ray Flux exceeded M5	10 Jun 1814
10 Jun 1850	SUMMARY: X-ray Event > M5	10 Jun 1808
10 Jun 1944	ALERT: Geomagnetic K= 5	10 Jun 1940
10 Jun 2357	WARNING: Geomagnetic K= 4	10 Jun 2357 - 11 Jun 1500
11 Jun 0001	ALERT: X-Ray Flux > M5	11 Jun 0001
11 Jun 0017	SUMMARY: X-ray Event > X1	10 Jun 2319
11 Jun 0045	17 - 245 MHz Radio Bursts	10 Jun
11 Jun 0045	1 - 245 Radio Noise Storm	10 Jun
11 Jun 0849	ALERT: Electron 2MeV Integral Flux exceeded 1000pfu	11 Jun 11 0830
11 Jun 1446	EXTENDED WARNING: Geomagnetic K= 4	10 Jun 2357 - 11 Jun 2359
11 Jun 2008	ALERT: X-Ray Flux exceeded M5	11 Jun 2007
11 Jun 2034	SUMMARY: X-ray Event exceeded X1	11 Jun 2001
11 Jun 2134	ALERT: Type II Radio Emission	11 Jun 2017
11 Jun 2337	EXTENDED WARNING: Geomagnetic K= 4	10 Jun 2357 - Jun 12 1500
12 Jun 0009	16 - 245 MHz Radio Bursts	11 Jun
12 Jun 0009	1 - 245 Radio Noise Storm	11 Jun
12 Jun 0123	ALERT: X-Ray Flux exceeded M5	12 Jun 0123
12 Jun 0158	SUMMARY: X-ray Event exceeded M5	12 Jun 0104
12 Jun 0737	ALERT: Electron 2MeV Integral Flux exceeded 1000pfu	12 Jun 0720 UTC
12 Jun 1726	ALERT: Geomagnetic K = 4	12 Jun 1723
12 Jun 2032	WARNING: Geomagnetic K = 4	12 Jun 2035 - 13 Jun 0600
12 Jun 2034	ALERT: Geomagnetic K= 5	12 Jun 2033
13 Jun 0034	5 - 245 MHz Radio Bursts	12 Jun
13 Jun 0034	1 - 245 Radio Noise Storm	12 Jun
13 Jun 0014	EXTENDED WARNING: Geomagnetic K= 4	12 Jun 2035 - 13 Jun 1500
13 Jun 0517	ALERT: Electron 2MeV Integral Flux > 1000pfu	13 Jun 0500
13 Jun 1942	ALERT: Geomagnetic K = 4	13 Jun 1940
13 Jun 2100	ALERT: Geomagnetic K-index of 5	13 Jun 2055
13 Jun 2110	WARNING: Geomagnetic K = 4	13 Jun 2111 - 14 Jun 1500
13 Jun 2213	ALERT: Geomagnetic K = 5	13 Jun 2211
14 Jun 0103	WARNING: Geomagnetic K = 5	14 Jun 0105 - 1500
14 Jun 0739	ALERT: Geomagnetic K= 5	14 Jun 0739
14 Jun 1453	EXTENDED WARNING: Geomagnetic K = 5	14 Jun 0105 - 2359
14 Jun 1921	WARNING: Geomagnetic K = 6	14 Jun 1921- 2359
14 Jun 1929	ALERT: Geomagnetic K = 6	14 Jun 1926
14 Jun 2115	WATCH: Geomagnetic A ≥ 20	15 Jun
14 Jun 2348	EXTENDED WARNING: Geomagnetic K= 5	14 Jun 0105 - 15 Jun 1500
15 Jun 1458	WARNING: Geomagnetic K= 4	15 Jun 1500 - 16 Jun 1500
15 Jun 1720	ALERT: Geomagnetic K-index of 4	15 Jun 1715
15 Jun 2016	ALERT: Geomagnetic K= 5	15 Jun 2012
15 Jun 2017	WARNING: Geomagnetic K= 5	15 Jun 2018 - 16 Jun 1500
15 Jun 2348	ALERT: X-Ray Flux exceeded M5	15 Jun 2347



### 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
18 Jun	125	30	6	02 Jul	115	15	3
19	120	30	6	03	125	20	4
20	120	25	5	04	130	25	5
21	120	20	4	05	135	25	5
22	120	20	4	06	140	25	5
23	125	20	4	07	145	25	5
24	130	30	6	08	155	20	4
25	130	25	5	09	150	15	3
26	120	25	5	10	145	12	3
27	120	15	4	11	135	20	4
28	120	15	4	12	130	20	4
29	120	30	6	13	120	15	3
30	120	30	6	14	120	20	4
01 Jul	115	25	5				



### *Energetic Events*

Date	Time			X-ray		Optical Information			Peak		Sweep Freq		
	Begin	Max	$\frac{1}{2}$	Class	Integ	Imp/ Brtns	Location		Radio Flux		Intensity		
			Max		Flux		Lat	CMD	Rgn	#	245	2695	II
09 Jun 03	1121	1128	1133	M4.7	.020	1n	N11W29		375	970	46	1	
09 Jun 03	2131	2139	2143	X1.7	.050				375	47000	310	3	
09 Jun 03	2219	2231	2242	M1.4	.018				375	72	250	1	
10 Jun 03	0248	0254	0301	M2.0	.009	1n	N13W41		375				
10 Jun 03	0834	0837	0840	M2.7	.006	1n	N12W44		375	370	110		
10 Jun 03	1055	1112	1115	M5.1	.025	2n	N11W45		375	970	50		
10 Jun 03	1244	1300	1317	M2.2	.035	1f	N12W44		375	61			
10 Jun 03	1408	1436	1442	M2.2	.033	Sf	N10W45		375				
10 Jun 03	1620	1624	1627	M1.0	.003	Sf	N13W36		375	590	55		
10 Jun 03	1628	1630	1632	M3.9	.006				375	8300	37		
10 Jun 03	1808	1815	1826	M5.6	.035				375				
10 Jun 03	2204	2213	2221	M1.0	.008	2n	N14W50		375				
10 Jun 03	2319	0002	0012	X1.3	.130	2b	N10W40		375	63	68		
11 Jun 03	0301	0306	0313	M1.8	.012	Sf	N14W56		375				
11 Jun 03	1028	1033	1035	M1.1	.003	Sf	N09W61		375	170			
11 Jun 03	1051	1109	1132	M1.4	.030				375				
11 Jun 03	1309	1321	1337	M2.7	.032	1f	N11W61		375				
11 Jun 03	1437	1527	1547	M3.7	.120	Sf	N10W61		375	130	30		
11 Jun 03	1621	1636	1650	M4.5	.066	1f	N12W59		375	340	85		
11 Jun 03	1727	1743	1800	M1.8	.034	1f	S16E23		380	100			
11 Jun 03	2001	2014	2027	X1.6	.160	1n	N14W57		375	510	86	2	
11 Jun 03	2141	2151	2210	M2.9	.037	Sf	N15W63		375				
12 Jun 03	0104	0130	0152	M7.3	.130	1f	N15W65		375	82			
12 Jun 03	1358	1403	1409	M1.0	.005	Sf	N10W65		375				
12 Jun 03	1706	1712	1716	M1.1	.004	Sf	N14W73		375				
12 Jun 03	2122	2127	2131	M2.6	.009				375	130			
13 Jun 03	0154	0204	0213	M3.1	.022								
13 Jun 03	0431	0437	0443	M1.7	.008	Sf	N15W78		375	130			
13 Jun 03	0628	0645	0719	M1.8	.042	Sf	N14W81		375	100			
14 Jun 03	0507	0609	0657	M1.5	.067	56							
15 Jun 03	2325	2356	0025	X1.3	.240	Sf	S07E80		386	2000	860	2	1



### Flare List

Date	Time			X-ray Class.	Optical		Rgn	
	Begin	Max	End		Imp / Brtns	Location Lat CMD		
09 June	B0102	U0108	A0157	C8.8	Sf	S17E49	380	
	0404	0409	0416	C2.8			375	
	0601	0603	0608		Sf	N10W16	375	
	0657	0658	0703	C3.0	Sf	N10W17	375	
	0857	0902	0922	C3.3			375	
	1016	1020	1026	C4.0	Sf	N11W29	375	
	1057	1058	1102		Sf	N11W29	375	
	B1124	U1128	A1137	M4.7	1n	N11W29	375	
	1433	1438	1440	C5.3			375	
	1625	1629	1635	C5.9			375	
	1703	1725	1755	C5.4	Sf	N16W25	375	
	1756	1756	1847		Sf	N13W24	375	
	1858	1901	1906	C9.4			375	
	1933	1934	1952		Sf	N12W29	375	
	1937	1939	1941	C5.0	Sf	S20E47	380	
	2006	2009	2042		Sf	S13E41	380	
	2008	2010	2015	C3.4	Sf	N13W36	375	
	2025	2029	2033		Sf	N13W37	375	
	2043	2043	2048		Sf	S14E40	380	
	2055	2058	2109	C7.1	Sf	N12W38	375	
	2108	2112	2115	C4.8			375	
	2131	2139	2143	X1.7			375	
	2219	2231	2242	M1.4			375	
	2327	2329	2334		Sf	N13W32	375	
	10 June	0024	0032	0043		Sf	N14W45	375
		0039	0040	0114		Sf	S21E49	380
0132		0132	0154		Sf	S18E50	380	
0152		0153	0200		Sf	N13W45	375	
0212		0213	0223	C3.0	Sf	N14W45	375	
0226		0227	0242	C3.3	Sf	N13W45	375	
0251		0254	0336	M2.0	1n	N13W41	375	
0337		0346	0353		Sf	N13W41	375	
0618		0620	0627		Sf	N11W44	375	
0653		0700	0702		Sf	N13W30	375	
0659		0701	0705		Sf	S21E23	381	
0758		0806	0817		1f	N12W45	375	
0826		0838	0848	M2.7	1n	N12W44	375	
1056		1111	1138	M5.1	2n	N11W45	375	
1316		1631	1653	M2.2	1f	N12W44	375	
1410		1441	1447	M2.2	Sf	N10W45	375	
1527		1528	1533		Sf	S12E30	380	
1622	1629	1638	M1.0	Sf	N13W36	375		



*Flare List - continued.*

Date	Time			X-ray Class.	Optical		Rgn	
	Begin	Max	End		Imp / Brtns	Location Lat CMD		
10 June	1628	1630	1632	M3.9			375	
	1708	1710	1724		Sf	N12W41	375	
	1727	1906	1933		Sf	N14W44	375	
	1808	1815	1826	M5.6			375	
	1952	1952	2009		Sf	N13W38	375	
	2031	2031	2034		Sf	N14W45	375	
		2206	2213	2221	M1.0	2n	N14W50	375
		2353	0002	0128	X1.3	2b	N10W40	375
11 June	0244	0302	0317	M1.8	Sf	N14W56	375	
	0453	0507	0521	C8.1	Sf	N10W55	375	
	0717	0718	0721		Sf	N10W59	375	
11 June	0825	0829	0839	C8.3	Sf	N12W60	375	
	0931	0934	0939		Sf	N10W60	375	
	0943	0945	0950		Sf	N10W61	375	
	1018	1019	1026		Sf	N10W63	375	
	1027	1033	1038	M1.1	Sf	N09W61	375	
	1051	1109	1132	M1.4			375	
	1314	1322	1342	M2.7	1f	N11W61	375	
	1347	1350	1356		Sf	N11W67	375	
	1404	1404	1407		Sf	N09W65	375	
	1413	1413	1421		Sf	N10W65	375	
	1443	1522	1549	M3.7	Sf	N10W61	375	
	1609	1635	1716	M4.5	1f	N12W59	375	
	1721	1747	1830	M1.8	1f	S16E23	380	
	1832	1835	1901		Sf	N13W60	375	
	1943	1950	1955		Sf	N10W64	375	
	2001	2023	2122	X1.6	1n	N14W57	375	
	2108	2108	2117		Sf	S19W05	381	
	2122	2123	2126		Sf	N14W55	375	
	2144	2144	2222	M2.9	Sf	N15W63	375	
	2239	2242	2247		Sf	N05W27	377	
	2337	2340	0020		Sf	N13W65	375	
	12 June	0101	0124	0331		1n	N10W54	375
		0101	0122	A0143	M7.3	1f	N15W65	375
0443		0444	0447	Sf		N10W55	375	
0529		0534	0539		Sf	N08W69	375	
0547		0623	0652		Sf	S16E16	380	
0651		0653	0657		Sf	N13W57	375	
0713		0714	0718	C6.1	Sf	N11W77	375	
0812		0812	0817	C7.2	Sf	N12W78	375	
0814		0830	0921		Sf	S18E15	380	



*Flare List - continued.*

Date	Time			X-ray Class.	Optical		Rgn
	Begin	Max	End		Imp / Brtns	Location Lat CMD	
12 June	0826	0829	0850	C8.4	Sf	S20E22	380
	0858	0859	0902		Sf	N07W72	375
	0947	0949	0958		Sf	S17E14	380
	1000	1004	1010	C4.1			
	1025	1027	1031	C8.1	Sf	N09W78	375
	1136	1147	1151	C7.1			
	1401	1404	1411	M1.0	Sf	N10W65	375
	1412	1414	1416		Sf	N11W74	375
	1416	1419	1421		Sf	N12W72	375
	1443	1447	1449	C2.9			
	1533	1537	1542		Sf	N15W73	375
	1547	1549	1559		Sf	N14W73	375
	1700	1704	1721	M1.1	Sf	N14W73	375
	1722	1729	1751		Sf	N12W85	375
	1901	1902	1908		Sf	S19E09	380
	1920	1922	1931	C3.2	Sf	N15W76	375
	1958	2007	2018	C3.2	Sf	N13W77	375
	2005	2014	2018	C8.5			
	2046	2047	2050		Sf	N13W76	375
	2052	2055	2100		Sf	N13W76	375
	2122	2127	2131	M2.6			375
	2244	2249	2252	C7.1			375
	2303	2306	2312		Sf	N14W90	375
	2340	2346	2356		Sf	N13W77	375
13 June	0002	0004	0007		Sf	N12W73	375
	0008	0009	0036		Sf	S20W01	380
	0012	0016	0034		Sf	N12W76	375
	0101	0103	0107		Sf	N13W81	375
	0114	0116	0122		Sf	S18W23	381
	0154	0204	0213	M3.1			
	0434	0442	0445	M1.7	Sf	N15W78	375
	0521	0523	0531		Sf	N14W80	375
	0528	0529	0531		Sf	N15W78	375
	0629	0638	0714	M1.8	Sf	N14W81	375
	0700	0704	0717		Sf	N16W52	384
	1618	1623	1630	C4.4			
	1652	1656	1704		Sf	N05W50	377
	1730	1734	1736	C4.6			
1824	1824	1828		Sf	N13W86	375	
2012	2034	2107	C8.7				





**Flare List - continued.**

Date	Time			X-ray Class.	Optical		Rgn
	Begin	Max	End		Imp / Brtns	Location Lat CMD	
14 June	0003	0018	0024		Sf	S18W16	380
	0249	0253	0259	C7.5			380
	0507	0609	0657	M1.5			
	1519	1533	1557	C1.9			
	1754	1757	1810	C2.0	Sf	S20W16	380
15 June	2327	2340	2345	C3.0			375
	0042	0045	0049		Sf	N02W72	377
	0215	0220	0227	C2.3			375
	0523	0546	0555	C1.4			
	0819	0843	0858	C1.2			
	0945	0958	1010	C1.7			375
	1222	1228	1235	C1.3			375
	1407	1457	1558	C3.3			
	2235	2238	2241	C2.1			
	2357	0000	0027	X1.3	Sf S07E80	386	

**Region Summary**

Date	Location		Sunspot Characteristics				Flares										
	Helio		Area (10 <sup>-6</sup> hemi)	Extent (helio)	Spot Class	Spot Count	Mag Class	X-ray			Optical						
	(° Lat ° CMD)	Lon						C	M	X	S	1	2	3	4		
<i>Region 373</i>																	
27 May	N08E81	082	0120	02	Hax	001	A										
28 May	N08E66	082	0130	02	Hsx	002	A										3
29 May	N08E53	084	0110	04	Cso	003	B										
30 May	N08E41	082	0080	02	Hsx	001	A	1									1
31 May	N08E28	082	0110	02	Hsx	001	A	1									1
01 Jun	N07E15	082	0120	04	Cso	007	B										
02 Jun	N06E00	084	0160	06	Cso	010	B										1
03 Jun	N07W14	085	0130	05	Dso	007	B										
04 Jun	N07W28	085	0130	06	Dao	005	B										
05 Jun	N07W40	084	0110	06	Cso	004	B										
06 Jun	N07W52	083	0080	02	Cso	002	B										
07 Jun	N08W65	083	0070	02	Hsx	001	A										
08 Jun	N07W78	082	0100	02	Hsx	001	A										
09 Jun	N04W92	082	0070	04	Hsx	001	A										
								2	0	0	6	0	0	0	0	0	0

Crossed West Limb.

Absolute heliographic longitude: 084



**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 375</i>																	
01 Jun	N11E74	023	0140	10	Dao	002	B		3		1						
02 Jun	N12E64	020	0370	06	Dso	006	B	1	1		13	1					
03 Jun	N12E50	021	0390	10	Dko	011	Bg	2			3						
04 Jun	N11E39	018	0370	12	Eai	019	Bg	1									
05 Jun	N12E24	020	0360	12	Eai	030	Bg	1			2						
06 Jun	N12E09	022	0490	07	Dki	025	Bgd	3	1		4	2					
07 Jun	N12W04	022	0570	14	Eki	041	Bgd	6			4						
08 Jun	N13W18	022	0800	12	Ekc	064	Bgd	10			7	1					
09 Jun	N12W32	022	0870	16	Fkc	054	Bgd	11	2	1	11	1					
10 Jun	N12W46	023	1200	17	Fkc	065	Bgd	2	9	1	13	4	3				
11 Jun	N12W62	026	1250	18	Fkc	041	Bgd	2	7	1	17	3					
12 Jun	N11W73	024	1170	19	Fkc	031	Bgd	6	4		20	2					
13 Jun	N12W84	022	0550	15	Ekc	012	Bgd		2		8						
14 Jun	N12W97	022															
									45	29	3	10	1	3	0	0	

Crossed West Limb.

Absolute heliographic longitude: 022

<i>Region 376</i>																	
02 Jun	S12E13	071	0030	04	Cro	004	B										
03 Jun	S11E00	071	0060	05	Dao	006	B										
04 Jun	S11W14	071	0070	05	Dso	007	B										
05 Jun	S11W30	074	0030	02	Hsx	001	A										
06 Jun	S11W44	075	0020	01	Hsx	001	A										
07 Jun	S14W43	061	0060	04	Cho	004	B										
08 Jun	S14W57	061	0020	03	Cso	003	B										
09 Jun	S11W72	075															
10 Jun	S11W85	075															
									0	0	0	0	0	0	0	0	0

Crossed West Limb.

Absolute heliographic longitude: 071



**Region Summary - continued.**

Date	Location		Sunspot Characteristics				Flares															
	Helio		Area (10 <sup>-6</sup> hemi)	Extent (helio)	Spot Class	Spot Count	Mag Class	X-ray			Optical											
	( ° Lat ° CMD)	Lon						C	M	X	S	1	2	3	4							
<i>Region 377</i>																						
04 Jun	N04E71	346	0030	09	Cso	003	B															
05 Jun	N05E57	347	0070	08	Dso	007	B															
06 Jun	N04E43	348	0090	07	Dso	005	B															
07 Jun	N04E29	349	0070	10	Dso	007	B															
08 Jun	N04E14	350	0140	11	Esi	014	B															
09 Jun	N04E00	350	0130	12	Eso	019	Bg															
10 Jun	N04W14	351	0130	10	Dso	018	B															
11 Jun	N03W28	352	0170	12	Eso	018	B														1	
12 Jun	N03W41	352	0150	10	Dao	017	B															
13 Jun	N03W58	356	0140	07	Cso	005	B														1	
14 Jun	N03W72	357	0150	06	Cso	002	B															
15 Jun	N03W84	355	0160	08	Cao	004	B														1	
																					0	0
																					0	3
																					0	0
																					0	0
																					0	0

Still on Disk.

Absolute heliographic longitude: 350

<i>Region 378</i>																						
05 Jun	N16E69	335	0020	06	Cso	003	B															
06 Jun	N16E57	334	0040	05	Cro	002	B														1	
07 Jun	N17E44	334	0030	07	Cro	002	B														1	
08 Jun	N16E28	336	0020	03	Cso	005	B															
09 Jun	N16E14	336	0010	01	Axx	001	A															
10 Jun	N15E00	337	0010	01	Axx	001	A															
11 Jun	N15W13	337																				
12 Jun	N15W26	337																				
13 Jun	N15W39	337																				
14 Jun	N15W52	337																				
15 Jun	N14W66	337	0000	01	Axx	001	A															
																					1	
																					0	
																					0	
																					0	
																					0	
																					0	
																					0	
																					0	

Still on Disk.

Absolute heliographic longitude: 337



***Region Summary - continued.***

Date	Location		Sunspot Characteristics				Flares										
	Helio		Area (10 <sup>-6</sup> hemi)	Extent (helio)	Spot Class	Spot Count	Mag Class	X-ray			Optical						
	( ° Lat ° CMD)	Lon						C	M	X	S	1	2	3	4		
<i>Region 380</i>																	
07 Jun	S16E68	310	0400	13	Eho	010	B	2									
08 Jun	S15E56	308	0550	11	Eki	020	Bg	3	1		10		1				
09 Jun	S14E41	308	0680	13	Eki	036	Bg	2			4						
10 Jun	S15E29	308	0560	14	Eki	049	Bgd				3						
11 Jun	S15E15	309	0640	13	Eki	041	Bg		1				1				
12 Jun	S15E03	308	0570	13	Ekc	031	B	1			5						
13 Jun	S16W11	309	0500	16	Fki	048	Bg				1						
14 Jun	S16W25	310	0250	13	Eki	027	B	2			2						
15 Jun	S17W36	307	0180	10	Dai	018	B										
								10	2	0	25	1	1	0	0		

Still on Disk.

Absolute heliographic longitude: 308

<i>Region 381</i>																	
09 Jun	S18E19	331	0010	03	Bxo	005	B										
10 Jun	S18E07	330	0030	04	Dso	007	B				1						
11 Jun	S19W06	330	0070	06	Dao	007	B				1						
12 Jun	S18W19	330	0110	06	Csi	017	B										
13 Jun	S20W34	332	0110	06	Dai	015	B				1						
14 Jun	S18W48	333	0030	05	Cso	006	B										
15 Jun	S18W61	332	0050	04	Cso	007	B										
								0	0	0	3	0	0	0	0	0	

Still on Disk.

Absolute heliographic longitude: 330

<i>Region 382</i>																	
10 Jun	S18W16	353	0020	03	Cao	007	B										
11 Jun	S17W30	354	0020	05	Bxo	009	B										
12 Jun	S18W45	356	0070	06	Dso	007	B										
13 Jun	S18W60	358	0040	07	Dro	003	B										
14 Jun	S17W76	001	0010	07	Bxo	002	B										
15 Jun	S17W84	355	0020	07	Bxo	002	B										
								0	0	0	0	0	0	0	0	0	

Still on Disk.

Absolute heliographic longitude: 353



**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 383</i>																			
11 Jun	N19E22	302	0010	04	Axx	002	A												
12 Jun	N19E09	302																	
13 Jun	N19W04	302																	
14 Jun	N19W17	302																	
15 Jun	N19W30	302																	
																			0 0 0 0 0 0 0 0
Still on Disk.																			
Absolute heliographic longitude: 302																			
<i>Region 384</i>																			
12 Jun	N16W42	353	0040	03	Cso	005	B												
13 Jun	N15W56	354	0060	05	Dao	006	B												1
14 Jun	N15W70	355	0020	03	Bxo	004	B												
15 Jun	N15W82	353	0030	01	Bxo	002	B												
																			0 0 0 1 0 0 0 0
Still on Disk.																			
Absolute heliographic longitude: 353																			
<i>Region 385</i>																			
15 Jun	N30E30	241	0040	06	Dso	007	B												
																			0 0 0 0 0 0 0 0
Still on Disk.																			
Absolute heliographic longitude: 241																			

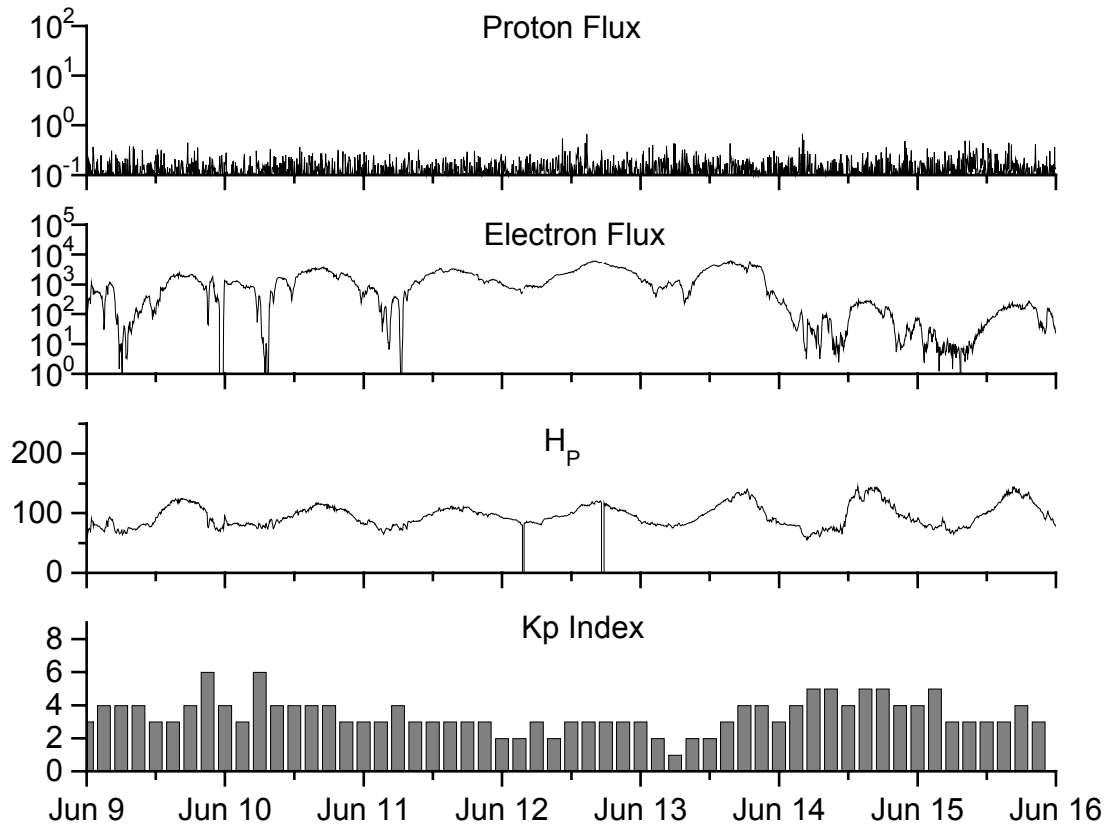


**Recent Solar Indices (preliminary)  
of the observed monthly mean values**

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>2001</b>									
June	196.7	134.0	0.68	167.2	109.9	173.7	178.8	12	12.4
July	124.6	82.2	0.66	172.1	111.8	131.3	183.9	11	12.4
August	159.4	106.8	0.67	176.7	113.8	163.1	188.8	13	12.5
September	229.1	150.7	0.66	178.8	114.3	233.8	191.3	13	12.8
October	197.4	125.6	0.64	179.5	114.1	208.1	191.9	20	12.0
November	178.6	106.5	0.60	183.7	115.6	212.7	193.7	16	12.0
December	217.5	132.2	0.61	184.5	114.6	235.6	193.9	09	12.2
<b>2002</b>									
January	189.0	114.1	0.60	184.8	113.5	227.3	194.6	08	12.4
February	194.5	107.4	0.55	188.6	114.7	205.0	197.2	10	12.8
March	153.1	98.4	0.64	188.9	113.4	180.3	195.7	10	13.0
April	194.9	120.7	0.62	186.2	110.5	189.8	191.5	15	13.2
May	204.1	120.8	0.59	183.6	108.9	178.4	188.0	15	13.3
June	146.0	88.3	0.60	179.9	106.3	148.7	183.0	11	13.5
July	183.5	99.9	0.54	175.4	102.7	173.5	173.5	13	13.9
August	191.0	116.4	0.61	169.3	98.7	183.9	169.5	16	14.3
September	206.4	109.6	0.53	163.4	94.6	175.8	164.2	14	14.9
October	153.9	97.5	0.63	158.7	90.5	167.0	159.5	23	15.5
November	159.8	95.5	0.60	150.5	85.3	168.7	154.3	16	16.1
December	147.9	80.8	0.55			158.6		13	
<b>2003</b>									
January	149.3	79.5	0.53			144.6		13	
February	87.9	46.2	0.53			124.6		15	
March	119.7	61.5	0.51			132.3		19	
April	114.3	60.0	0.52			126.5		20	
May	89.6	55.2	0.62			116.2		25	

**NOTE:** All smoothed values after June 1999 and monthly values after December 2000 are preliminary estimates. The lowest smoothed sunspot index 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 09 Jun 2003*

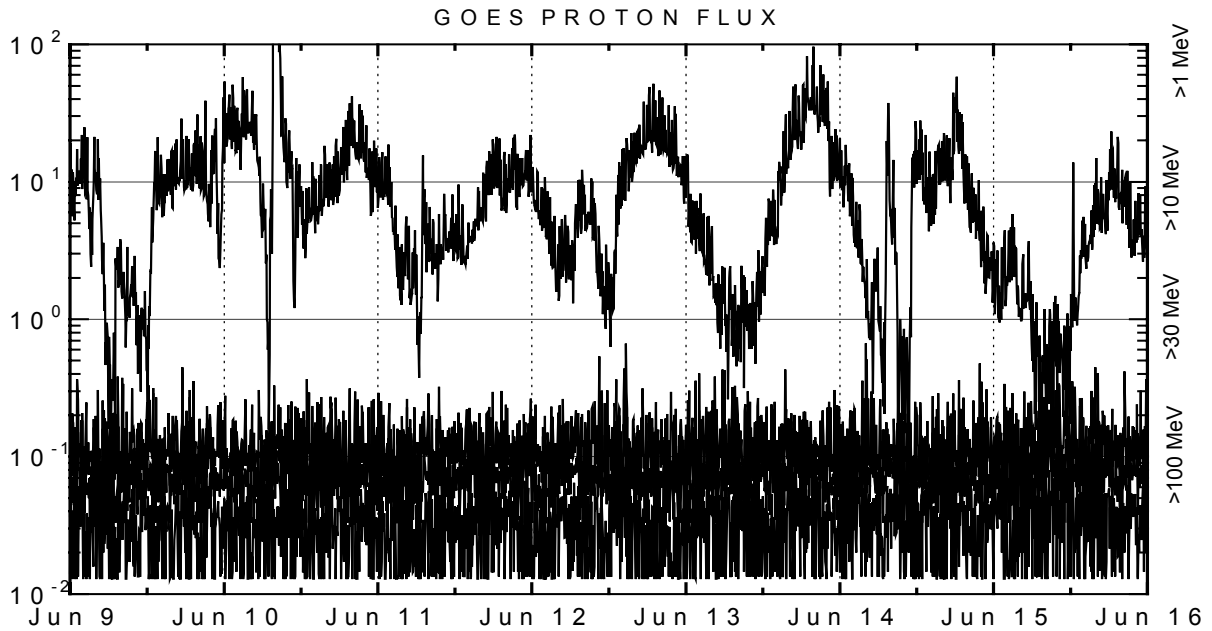
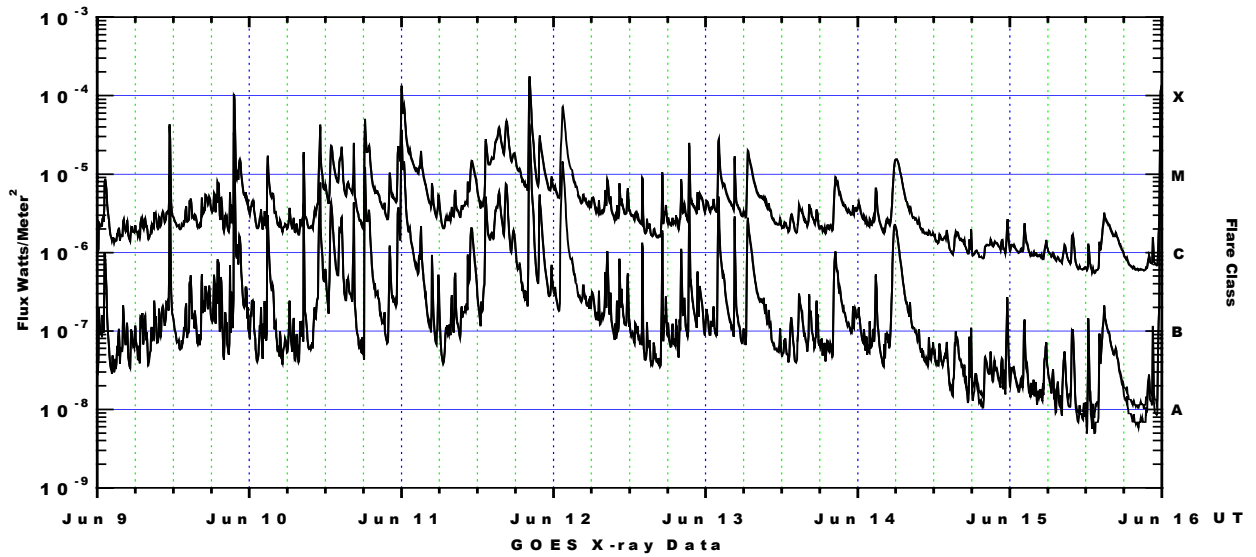
*Protons* plot contains the five-minute averaged integral proton flux (protons/cm<sup>2</sup>-sec-sr) as measured by GOES-8 (W75) for each of three energy thresholds: greater than 10, 50, and 100 MeV.

*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-12.

*H<sub>p</sub>* plot contains the five minute averaged magnetic field H - component in nanoteslas (nT) as measured by GOES-12. 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 Air Force Weather Agency) 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<sup>2</sup>) as measured by GOES 12 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.



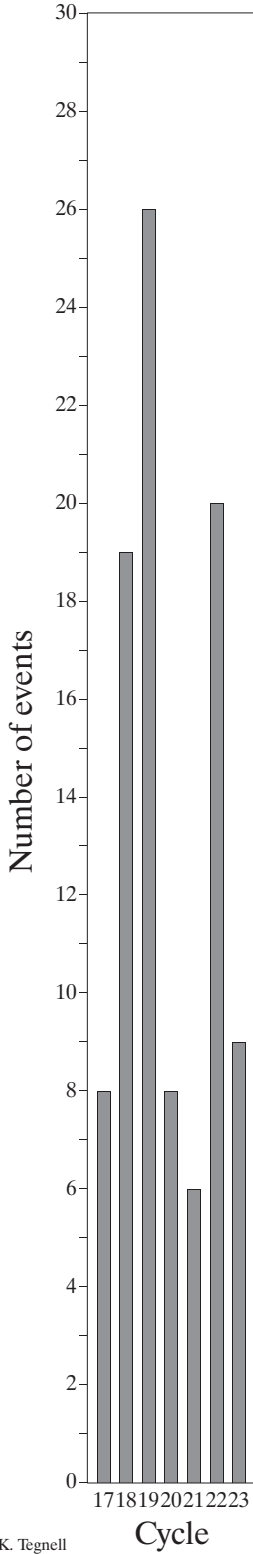


# Severe Storm ( $A_p \geq 100$ ) Geomagnetic Conditions



Space Environment Center

Comparison of Cycles at current month in cycle



K. Tegnell

April 2003  
(Month 79)

█ Preliminary data

