

**Space Weather Highlights**  
**15-21 March 1999**

Solar activity varied from very low to high levels. The week began with activity at moderate levels by virtue of an M1/1N flare from Region 8487 (N17, L = 239, class/area Eai/200 on 15 March) at 15/0336UT with an associated Type II radio sweep. Activity increased to high levels on 16 March due to an impulsive M6/2N at 16/2141UT from Region 8485 (N23, L = 277, class/area Fki/610 on 16 March). Region 8485 also produced five impulsive, low-level M-class flares during 16 - 18 March, all of which were weak in radio emission. This region was moderate in size and magnetic complexity throughout its disk passage. Solar activity dropped to very low to low levels after Region 8485 crossed the west limb on 20 March.

Real-time solar wind data were available from the Advanced Composition Explorer (ACE) spacecraft during most of the period. Solar wind velocities gradually decreased from a high of 590 km/sec on 15 March to 300 km/sec by the end of the period. Phi data indicated that Earth was within an away (positive polarity) solar sector throughout the period. Particle densities varied from 01 to 10 p/cc. IMF Bz ranged from plus to minus 05 nT (GSM) during most of the period. However, southward deflections to around minus 10 nT were observed on 15 and 21 March.

There were no significant proton enhancements detected at geo-synchronous altitude.

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

The geomagnetic field was disturbed on 15 March with unsettled to active levels at middle latitudes and unsettled to minor storm levels at high latitudes. This disturbance may have been due to coronal hole effects. Field activity declined to quiet to unsettled levels for the remainder of the period.

**Space Weather Outlook**  
**24 March - 19 April 1999**

Solar activity is expected to be low to moderate. Isolated M-class flares may occur during 28 March - 03 April with the return of old Region 8485.

No significant proton enhancements are expected at geo-synchronous altitude.

The greater than 2 MeV electron flux at geosynchronous altitude is expected to be at normal to moderate levels during most of the period. However, fluxes may reach high levels during 29 March - 04 April.

Geomagnetic field activity may increase to unsettled to active levels around 26 March in response to a recent CME occurrence. Active levels are also expected during 28 March - 03 April due to recurrent coronal hole effects.



**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	4
15 March	150	126	800	B4.3	7	1	0	12	2	0	0	0
16 March	156	134	900	B5.3	16	3	0	16	2	1	0	0
17 March	155	131	820	B5.0	12	2	0	11	1	0	0	0
18 March	148	127	640	B5.9	13	1	0	3	2	0	0	0
19 March	139	157	550	B4.6	2	0	0	3	0	0	0	0
20 March	133	119	220	B3.9	0	0	0	0	0	0	0	0
21 March	124	97	230	B4.4	1	0	0	0	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
	15 March	6.2E+4	1.5E+4	3.3E+3		2.5E+6
16 March	6.2E+4	1.5E+4	3.3E+3		3.2E+6	
17 March	6.8E+4	1.4E+4	3.1E+3		7.9E+6	
18 March	6.8E+4	1.4E+4	3.0E+3		9.2E+6	
19 March	3.9E+4	1.4E+4	3.0E+3		6.6E+6	
20 March	3.0E+4	1.3E+4	3.0E+3		1.2E+6	
21 March	2.9E+4	1.4E+4	3.0E+3		7.0E+5	

**Daily Geomagnetic Data**

Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
	15 March	11	3-4-3-2-2-1-1-2	24	2-4-5-5-5-2-0-1	16
16 March	3	1-0-1-2-1-1-0-1	2	2-0-0-2-0-1-0-0	4	1-0-1-2-1-2-1-1
17 March	5	1-0-2-2-2-2-1-1	*	*_*_*_*_*_*_*_*	5	1-0-1-2-1-2-2-2
18 March	5	1-2-2-2-2-1-1-1	*	*_*_*_*_*_*_*_*	7	1-2-2-3-2-3-2-1
19 March	4	1-0-1-2-1-1-2-1	*	*_*_*_*_*_*_*_*	6	1-1-2-2-2-3-2-2
20 March	3	1-1-0-1-2-1-1-0	*	*_*_*_*_*_*_*_*	6	1-1-1-2-2-2-3-0
21 March	6	1-1-1-3-3-0-1-1	*	*_*_*_*_*_*_*_*	6	0-1-1-3-3-2-2-0

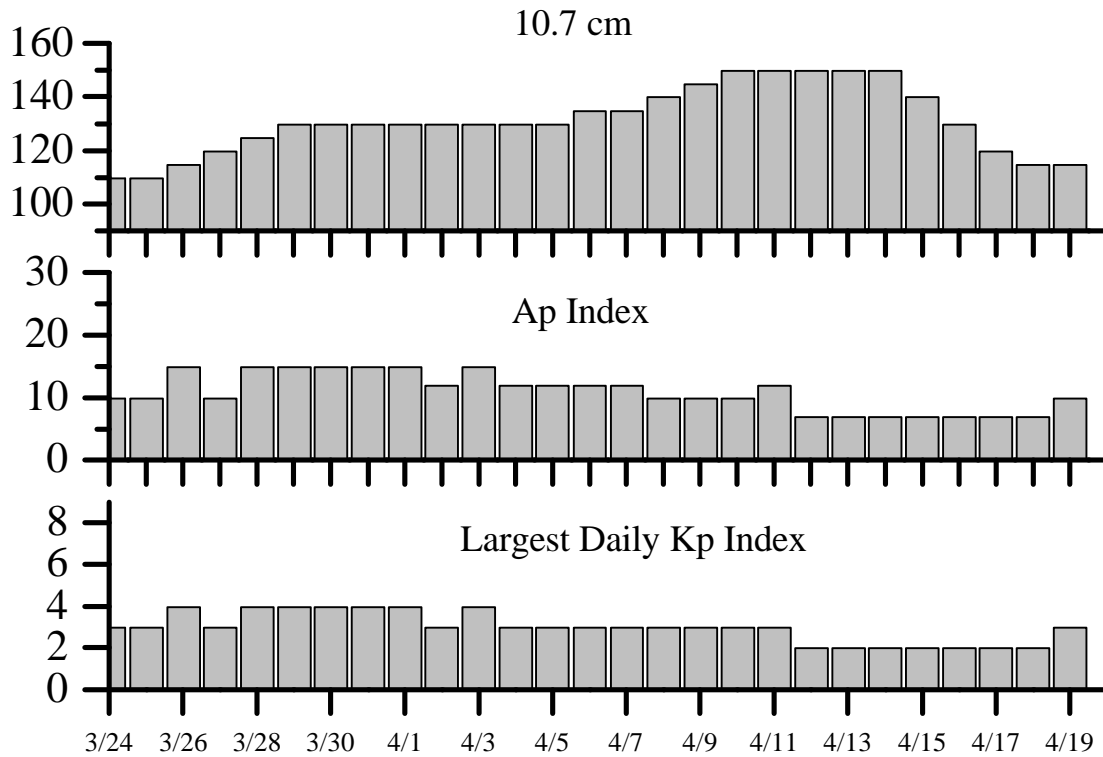


*Alerts and Warnings Issued*

<u>Date and Time of Issue (UT)</u>	<u>Type of Alert or Warning</u>	<u>Date and Time of Event (UT)</u>
15 Mar 0019	1-245 MHz Burst	14 Mar
15 Mar 0019	245 MHz Radio Noise Storm	14 Mar
15 Mar 0356	Type II Radio Emission	15 Mar 0336
16 Mar 2153	X-Ray event M6.2/2N/N23W39	16 Mar 2134
17 Mar 0124	1-245 MHz Burst	16 Mar
17 Mar 0124	245 MHz Radio Noise Storm	16 Mar
18 Mar 0052	3-245 MHz Bursts	17 Mar
18 Mar 0052	245 MHz Radio Noise Storm	17 Mar
19 Mar 0120	2-245 MHz Bursts	18 Mar
19 Mar 0120	245 MHz Radio Noise Storm	18 Mar



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
24 Mar	110	10	3	07 Apr	135	12	2
25	110	10	3	08	140	10	2
26	115	15	4	09	145	10	2
27	120	10	3	10	150	10	2
28	125	15	4	11	150	12	3
29	130	15	4	12	150	7	2
30	130	15	4	13	150	7	2
31	130	15	4	14	140	7	2
01 Apr	130	15	4	15	130	7	2
02	130	12	3	16	120	7	2
03	130	12	4	17	120	7	2
04	130	12	3	18	115	7	2
05	130	12	3	19	115	10	3
06	135	12	3				



### Energetic Events

Date	Time (UT)			X-ray		Optical Information			Peak		Sweep Freq	
	Begin	Max	Max	Class	Flux	Imp Brtns	Location Lat CMD	Rgn #	Radio Flux		Intensity	
									245	2695	II	IV
15 Mar 99	0317	0336	0350	M1.1	.013	1N	N16E26	8487			2	
16 Mar 99	0618	0635	0656	M1.6	.024	1F	N22W31	8485				
16 Mar 99	2101	2107	2114	M1.1	.005	1N	N23W36	8485		51		
16 Mar 99	2134	2141	2146	M6.2	.025	2N	N23W39	8485		80		
17 Mar 99	0950	0956	1005	M3.2	.020	1F	N23W44	8485		86		
17 Mar 99	1442	1449	1458	M1.2	.008	SN	N23W46	8485				
18 Mar 99	0825	0831	0835	M3.3	.009					22		

### Flare List

Date	Time			X-ray Class	Imp / Brtns	Optical Location Lat CMD	Rgn #
	Begin	Max	End				
15 March	0038	0041	0043	B7.4			
	0157	0201	0203	B8.2			
	0322	0335	0410	M1.1	1N	N16E26	8487
	0338	0340	0342		SF	N22W17	8485
	0348	0351	0359		SF	N22W16	8485
	0621	0701	0744	C1.6			
	0705	0705	0725		SF	N17E19	8487
	0823	0825	0829	C1.6	SF	N19W20	8485
	0834	0835	0839		SF	N23W18	8485
	B1118	U1124	1144	C2.1	SF	N22W20	8485
	1231	1253	1302	C1.3			
	1404	1409	1421	B6.4			
	1514	1514	1520		SF	N23W23	8485
	1549	1553	1557	B7.1			
	1647	1647	1704	C3.3	1F	N21W24	8485
	1750	1752	1755		SF	N23W25	8485
	1816	1818	1821		SF	N15E14	8487
	1840	1841	1848		SF	N15E15	8487
	1913	1916	1918		SF	N15E14	8487
	2122	2125	2127	C1.7			
2320	2322	2325	C2.0	SF	N19W28	8485	
16 March	0028	0031	0033	B9.2			
	0132	0136	0138	C1.2			
	0249	0252	0255	C2.2			
	0439	0443	0446	C1.8			
	0626	0628	0726	M1.6	1F	N22W31	8485
	0819	0823	0828		SF	N15E10	8487
	0848	0851	0853	B6.8			
	0936	0942	1002	C4.1	SF	N23W28	8485



1158 1204 1210 C2.3

*Flare List-continued*

Date	Time			X-ray Class	Imp / Brtns	Optical		Rgn
	Begin	Max	End			Location #	Lat CMD	
16 March	1227	1230	1232	B9.3				
	1324	1328	1346	C3.7	SF	N21W33	8485	
	1417	1419	1437	B8.1	SF	N21W34	8485	
	1431	1433	1442		SF	N15E06	8487	
	1456	1456	1506		SF	N23W34	8485	
	1547	1550	1554		SF	N17E03	8487	
	1608	1608	1612	C1.4	SF	N25W42	8485	
	1647	1648	1654		SF	N17E03	8487	
	1653	1658	1708		SF	N24W39	8485	
	1708	1711	1727	C2.0	SF	N21W36	8485	
	1746	1754	1758		SF	N16E02	8487	
	1827	1837	1845	C4.6	SF	N22W37	8485	
	1859	1916	1936	C5.0	SF	N22W38	8485	
	1925	1930	1934	C2.7				
	1947	1951	1957	C2.4				
	2010	2012	2033	C3.4	SF	N20W40	8485	
	2042	2045	2050	C1.9				
	B2051	U2052	2059		SF	N22W38	8485	
	2102	2110	A2132	M1.1	1N	N23W36	8485	
	2134	2144	2221	M6.2	2N	N23W39	8485	
	2245	2251	2257	C1.1				
	2358	0002	0008	C1.0				
	17 March	0342	0342	0347	C1.1	SF	N22W47	8485
0358		0359	0405	C1.0	SF	N22W41	8485	
0426		0427	0430		SF	N22W41	8485	
0456		0456	0503	C1.3	SF	N22W41	8485	
0835		0840	0853	C1.1				
B1000		U1013	A1034	M3.2	1F	N23W44	8485	
1035		1037	1059		SF	N16W07	8487	
1134		1144	1207	C4.8	SF	N25W43	8485	
1210		1212	1233	C2.2	SF	N23W44	8485	
1234		1236	1252	C2.5	SF	N24W44	8485	
1357		1405	1417	C1.8	SF	N25W50	8485	
1445		1446	1526	M1.2	SN	N23W46	8485	
1828		1832	1835	B9.7				
2011		2018	2023	C1.6				
B2041		U2041	2050	C1.0	SF	N22W50	8485	
2145	2156	2200	C9.5					
2236	2241	2243	C1.2					



*Flare List-continued*

Date	Time			X-ray Class	Optical		Rgn
	Begin	Max	End		Imp / Brtns	Location Lat CMD #	
18 March	0016	0021	0026	C4.0			
	0032	0036	0039	C3.1			
	0047	0052	0107	C2.4			
	0358	0404	0413	C5.2			
	0519	0525	0528	C3.0			
	0718	0728	0733	C3.1			
	0810	0815	0818	C1.5			
	0825	0831	0835	M3.3			
	1258	1320	1339	C2.1	1F	N26W70	8485
	1411	1415	1441	C5.3	1N	N27W74	8485
	1557	1558	1623	C1.6	SF	N24W58	8485
	1741	1744	1756	C2.0	SF	N23W62	8485
	1825	1829	1849	C1.5	SF	N24W62	8485
	2002	2006	2015	C2.0			
19 March	0057	0101	0103	B9.4			
	0245	0248	0250	B7.0			
	0856	0900	0902	B5.5			
	2009	2010	2014		SF	S12W02	
	2112	2112	2116	C1.1	SF	N20W21	8493
	2228	2233	2239	B8.0			
	2328	2330	2336	C4.9	SF	N20W22	8493
20 March	No Flares Observed						
21 March	0638	0642	0645	C1.0			
	1025	1036	1046	B9.9			
	1224	1230	1241	B7.4			



### Region Summary

Date	Location		Sunspot Characteristics				Flares							
	° Lat	° CMD	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 8482

06 Mar	S26E64	304	0000	00	AXX	001	A												
07 Mar	S27E54	301	0010	05	BXO	004	B												
08 Mar	S31E49	293	0010	03	BXO	002	B												
09 Mar	S34E36	293																	
10 Mar	S34E23	293																	
11 Mar	S34E10	293																	
12 Mar	S34W03	293																	
13 Mar	S34W16	293																	
14 Mar	S34W29	293																	
15 Mar	S34W42	293																	
16 Mar	S34W55	293																	
17 Mar	S34W68	293																	
18 Mar	S34W81	293																	
																			0 0 0 0 0 0 0 0

Crossed West Limb.

Absolute heliographic longitude: 293

#### Region 8484

08 Mar	S22E76	266	0100	03	HHX	001	A		1		1								
09 Mar	S24E64	266	0190	05	DAO	002	B	2			3	2							
10 Mar	S23E54	263	0140	04	DAO	005	B				1								
11 Mar	S23E41	262	0120	06	DAO	009	B												
12 Mar	S22E30	260	0090	05	DSO	008	B												
13 Mar	S23E18	259	0070	04	DSO	011	B												
14 Mar	S24E05	259	0060	05	DSO	010	B												
15 Mar	S23W08	259	0040	04	CSO	007	B												
16 Mar	S23W21	259	0040	04	CSO	006	B												
17 Mar	S23W34	258	0020	03	CSO	004	B												
18 Mar	S23W46	257	0010	04	BXO	003	B												
19 Mar	S23W59	257	0010	01	AXX	001	A												
20 Mar	S25W71	256	0000	00	AXX	001	A												
21 Mar	S25W84	256																	
																			2 1 0 5 2 0 0 0

Still on Disk.

Absolute heliographic longitude: 259





### 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 8485</i>																				
08 Mar	N22E66	276	0030	08	BXO	004	B					1								
09 Mar	N22E53	277	0200	08	CAO	011	B	1				1								
10 Mar	N22E40	277	0250	11	EAO	015	B					5								
11 Mar	N22E27	276	0290	13	EAO	022	B	1				2								
12 Mar	N23E13	277	0310	14	EAI	025	BG	4				6								
13 Mar	N23E00	277	0420	15	EKO	038	BG					3								
14 Mar	N23W12	276	0520	16	FHC	046	BG	2				10								
15 Mar	N23W25	276	0560	18	FKI	058	G	4				8	1							
16 Mar	N23W38	276	0610	18	FKI	050	G	7	3			11	2	1						
17 Mar	N24W52	276	0570	19	FAI	036	BG	8	2			10	1							
18 Mar	N24W64	275	0360	18	FAO	020	BG	5				3	2							
19 Mar	N22W79	277	0200	12	EAO	008	B													
20 Mar	N22W92	277																		
													32	5	0	60	6	1	0	0

Crossed West Limb.

Absolute heliographic longitude: 277

<i>Region 8487</i>																				
11 Mar	N17E63	240	0020	08	BXO	003	B	3				13								
12 Mar	N17E51	239	0090	08	CAO	008	B	6				16	2							
13 Mar	N17E39	238	0100	10	DAO	016	B	4	1			15								
14 Mar	N16E25	239	0190	11	ESI	020	B	1	2			2	1							
15 Mar	N16E11	240	0200	12	EAI	018	B			1		4	1							
16 Mar	N17W01	239	0180	12	ESI	022	B					5								
17 Mar	N17W15	239	0180	12	ESI	021	B					1								
18 Mar	N17W25	236	0150	14	CSO	017	B													
19 Mar	N16W45	243	0160	03	HAX	002	A													
20 Mar	N17W59	244	0100	02	HSX	003	A													
21 Mar	N17W72	244	0090	05	CSO	002	B													
													14	4	0	56	4	0	0	0

Still on Disk.

Absolute heliographic longitude: 239



**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 8488</i>																	
14 Mar	S27E37	227	0020	03	CSO	004	B										
15 Mar	S26E22	229	0000	03	BXO	003	B										
16 Mar	S26E09	229	0020	03	CSO	003	B										
17 Mar	S26W04	228	0040	05	CSO	008	B										
18 Mar	S26W17	228	0110	07	DSO	018	B										
19 Mar	S27W30	228	0090	08	DAO	014	B										
20 Mar	S26W44	229	0030	07	CSO	006	B										
21 Mar	S26W58	230	0010	02	AXX	002	A										
								0	0	0	0	0	0	0	0	0	0
Still on Disk.																	
Absolute heliographic longitude: 228																	
<i>Region 8489</i>																	
16 Mar	N13W27	265	0050	04	CRO	003	B										
17 Mar	N14W41	265	0010	01	AXX	001	A										
18 Mar	N14W54	265															
19 Mar	N14W67	265															
20 Mar	N14W80	265															
								0	0	0	0	0	0	0	0	0	0
Crossed West Limb.																	
Absolute heliographic longitude: 265																	
<i>Region 8490</i>																	
17 Mar	S20E66	158	0000	00	AXX	001	A										
18 Mar	S19E54	157	0000	00	AXX	001	A										
19 Mar	S19E40	158	0010	01	AXX	002	A										
20 Mar	S19E27	158	0010	01	BXO	003	B										
21 Mar	S18E10	162	0010	03	BXO	003	B										
								0	0	0	0	0	0	0	0	0	0
Still on Disk.																	
Absolute heliographic longitude: 162																	
<i>Region 8491</i>																	
18 Mar	N19W09	220	0010	06	BXO	008	B										
								0	0	0	0	0	0	0	0	0	0
Died on Disk.																	
Absolute heliographic longitude: 220																	
<i>Region 8492</i>																	
19 Mar	S27W46	244	0010	02	AXX	002	A										
20 Mar	S27W59	244															
21 Mar	S27W72	244															
								0	0	0	0	0	0	0	0	0	0
Still on Disk.																	
Absolute heliographic longitude: 244																	



**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 8493</i>																						
19 Mar	N19W22	220	0040	07	CRO	016	B	2			2											
20 Mar	N20W36	221	0030	06	DSO	011	B															
21 Mar	N20W50	222	0020	05	BXO	004	B															
												2	0	0	2	0	0	0	0	0		
Still on Disk.																						
Absolute heliographic longitude: 220																						
<i>Region 8494</i>																						
19 Mar	S22E15	183	0010	05	BXO	006	B															
20 Mar	S23E02	183	0010	04	BXO	004	B															
21 Mar	S24W12	184	0030	04	CRO	007	B															
												0	0	0	0	0	0	0	0	0		
Still on Disk.																						
Absolute heliographic longitude: 183																						
<i>Region 8495</i>																						
19 Mar	S21E62	136	0000	00	AXX	001	A															
20 Mar	S21E47	138	0000	07	BXO	002	B															
21 Mar	S21E33	139	0010	07	BXO	002	B															
												0	0	0	0	0	0	0	0	0		
Still on Disk.																						
Absolute heliographic longitude: 139																						
<i>Region 8496</i>																						
19 Mar	S11W03	201	0020	03	BXO	005	B															
20 Mar	S09W18	203	0040	06	CAO	009	B															
21 Mar	S11W32	204	0060	06	DAO	007	B															
												0	0	0	0	0	0	0	0	0		
Still on Disk.																						
Absolute heliographic longitude: 201																						



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

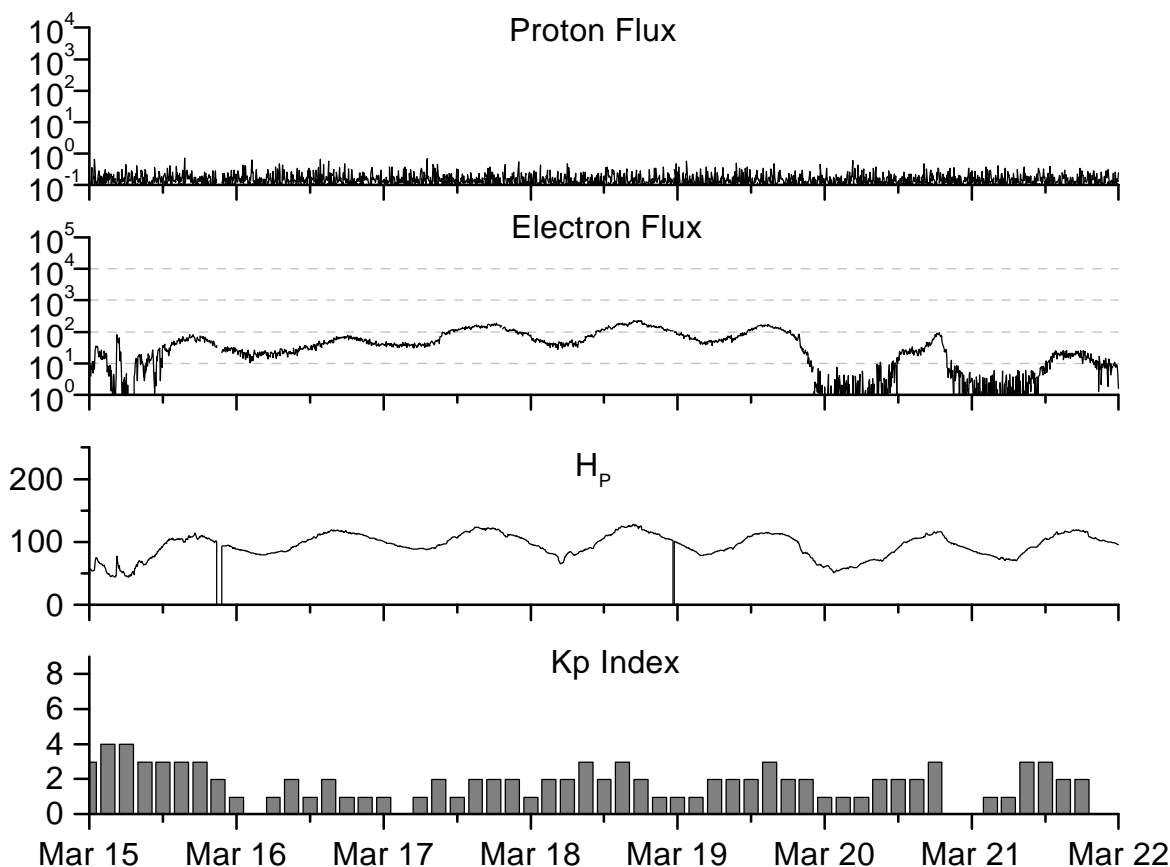
Month	Sunspot Numbers			Radio Flux		Geomagnetic			
	<u>Observed values</u> SWO	RI	Ratio RI/SWO	<u>Smooth values</u> SWO	RI	**Penticton 10.7 cm	Smooth Value	<u>Planetary</u> Ap	<u>Smooth</u> Value
<b>1997</b>									
March	14.4	08.7	0.60	20.4	13.5	73.5	75.1	08	08.9
April	24.5	15.5	0.63	24.0	16.5	74.5	76.8	10	08.6
May	28.6	18.5	0.65	26.4	18.3	74.6	78.4	08	08.6
June	22.1	12.7	0.57	29.0	20.3	71.7	80.1	07	08.6
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	11.2*
April	73.6	53.4	0.73	77.7	56.5*	108.3	109.1*	10	11.4*
May	74.3	56.3	0.76	81.4	59.3*	106.7	112.4*	18	11.7*
June	93.6	70.7*	0.76*	85.9	62.4*	108.4*	116.2*	10	12.0*
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*			136.0*		18*	
September	119.0	92.9*	0.78*			138.4*		14*	
October	77.0	55.6*	0.72*			121.9*		13*	
November	99.5	73.6*	0.74*			140.2*		16*	
December	120.8	81.6*	0.68*			150.1*		08*	
<b>1999</b>									
January	94.3	62.4*	0.66*			140.6*		08*	
February	93.4	66.1	0.70*			142.0*		11*	

\*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.

\*\* From June 1991 onward, 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 15 March 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.

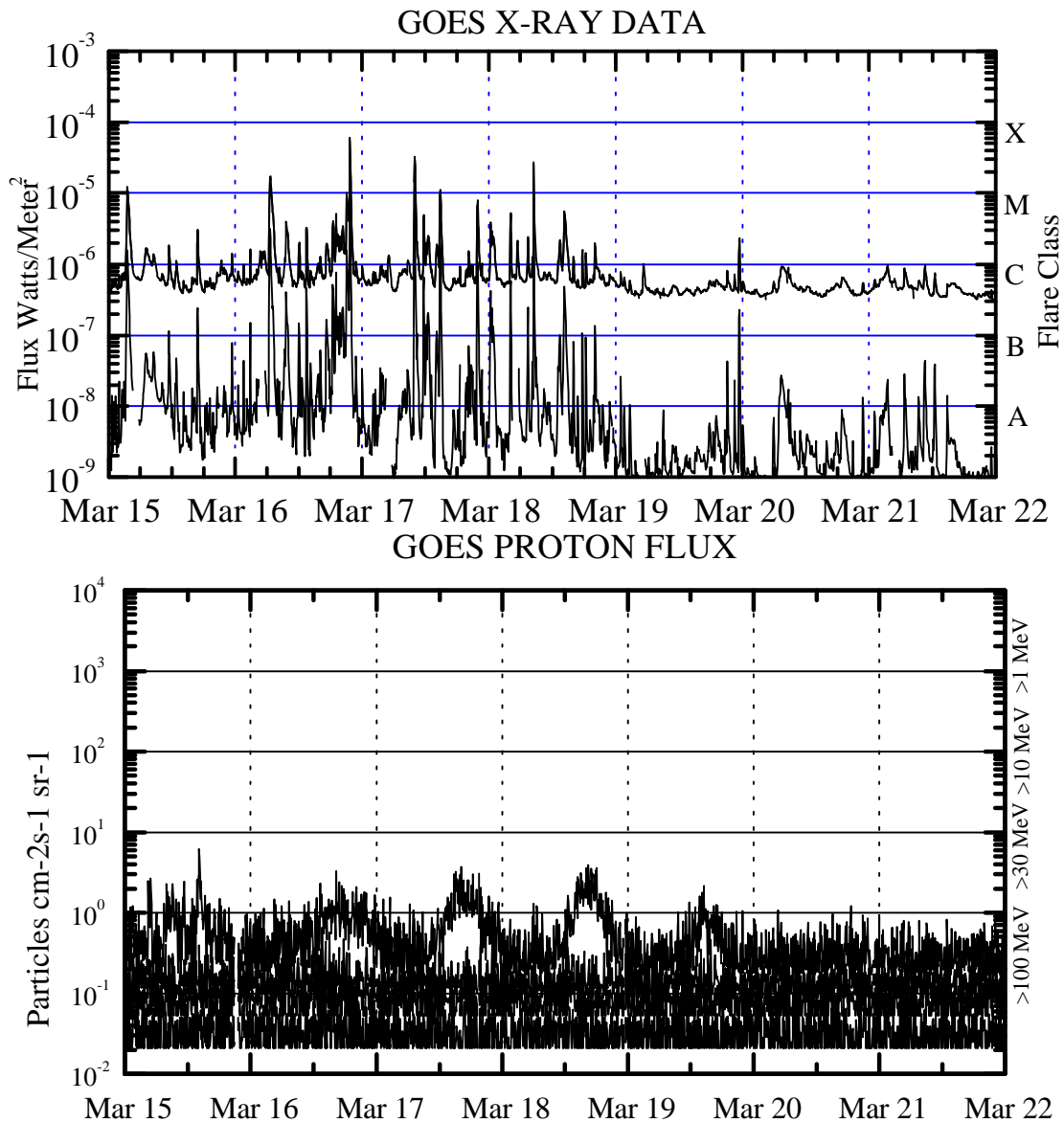
*Electrons* plot contains the five-minute averaged integral electron flux (electrons/ cm<sup>2</sup> -sec-sr) with energies greater than 2 MeV at GOES-8.

*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 a 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 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.



# Solar Radio Flux (10.7 cm)



Space Environment Center

February 1999  
(Month 29)

Preliminary data

Comparison of Cycles at current month in cycle

