

Solar activity ranged from low to high levels. The most significant region during the period was Region 314 (S14, L=60, class/area/mag. Eki/500/Bgd on 18 March). The region was in a rapid growth phase on 17 – 18 March and was the source of most of the activity during the period. On 17 and 18 March, Region 314 produced two X1.5/1b flares, one at 17/1905 UTC and the second at 18/1208 UTC. The X1.5 flare on 18 March was associated with a Type II (507 km/s) and Type IV radio burst, a ten-centimeter radio burst (1400 sfu), and a full halo CME. Region 314 also produced two M-class events and numerous C-class events on 18 March. Activity declined to moderate levels on 19 March with four M-class flares from Region 314, the largest an M3.7/1n at 19/0953 UTC. Moderate levels persisted through 20 March as Region 314 produced an M1/1f flare. Region 314 entered a slight decay phase on 19 March and rotated beyond the west limb on 21 March. For the remainder of the period, 21 – 23 March, activity was at low levels with numerous B-class and minor C-class flare from Region 314.

Solar wind data were available from the NASA Advanced Composition Explorer (ACE) spacecraft for most of the summary period. On 17 March, solar wind velocity was near 700 km/s due to a continuing coronal hole high speed stream. This high speed stream increased to near 800 km/s late on 17 March and into 18 March, then began to gradually decline. A CME shock from the X1.5 flare on 18 March arrived at the ACE spacecraft late on 19 March and peak solar wind velocities reached 850 km/s early on the next day. The shock arrival resulted in a rotation of structured Bz, first oriented northward, then a 3-4 hour period of southward Bz by midday on 20 March. Solar wind velocity on 21 – 23 March was in a gradual decline from around 700 km/s down to 600 km/s at the close of the period. The declining but still elevated solar wind is due to residual coronal hole high speed stream effects.

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

The greater than 2 MeV electron flux at geo-synchronous orbit reached high levels on each day of the period, 17 – 23 March.

The geomagnetic field ranged from quiet to major storm levels. The period began with unsettled to major storm levels on 17 March due to continuing effects from a large equatorial coronal hole and associated high speed stream. Activity gradually declined on 18 – 19 March with minor storm levels and active levels respectively. A CME shock that arrived late on 20 March produced active to minor storm conditions late on 20 March and into 21 March. Activity for the remainder of the period, 22 – 23 March, was predominantly at unsettled to active levels. One period of isolated major storm conditions was observed on 23 March due to elevated solar wind and periods of southward fluctuations in the Bz component of the interplanetary magnetic field.



## **Space Weather Outlook**

### **26 March – 21 April 2003**

Solar activity is expected to be at low to moderate levels. Activity is expected to be at low levels until the return of Region 306 and Region 314 on 02 and 03 April respectively. Low level activity with a chance of moderate activity is expected on 04 – 17 April.

No greater than 10 MeV proton events are expected during the forecast period.

The greater than 2 MeV electron flux may reach high levels on 27 – 28 March, 04 – 06 April and again on 14 – 19 April due to returning coronal holes.

The geomagnetic field is expected to be at quiet to major storm levels during the period. Two small but intense coronal hole streams are due on 25 – 27 March and 30 – 31 March and are expected to produce active to isolated major storm levels. A weak but persistent coronal hole stream is expected on 01 – 04 April with unsettled to isolated active conditions. The large equatorial coronal hole is due to return to a geo-effective position on 10 – 14 April.



### *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
17 March	125	80	1080	B3.0	6	0	1	2	1	0	0	0
18 March	118	64	1010	B4.2	10	2	1	5	4	1	0	0
19 March	108	53	650	B3.6	16	4	0	6	2	2	0	0
20 March	97	45	400	B2.1	1	1	0	1	1	0	0	0
21 March	91	40	200	B1.6	2	0	0	0	0	0	0	0
22 March	89	40	70	B1.4	3	0	0	0	0	0	0	0
23 March	93	43	110	B1.3	2	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
17 March	2.3E+6	1.5E+4	2.3E+3		8.4E+7	
18 March	4.0E+6	2.2E+4	2.4E+3		1.9E+8	
19 March	2.8E+6	1.5E+4	2.4E+3		2.2E+8	
20 March	3.4E+6	1.2E+4	2.1E+3		1.3E+8	
21 March	7.0E+6	1.1E+4	2.4E+3		2.5E+8	
22 March	8.4E+5	1.2E+4	2.7E+3		1.6E+8	
23 March	5.5E+6	1.2E+4	2.7E+3		3.5E+8	

### *Daily Geomagnetic Data*

Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
	17 March	19	2-3-4-3-4-3-3-4	78	3-3-7-6-8-6-4-4	39
18 March	16	4-4-3-3-4-2-1-2	43	4-4-6-6-6-4-2-3	26	4-4-4-5-4-3-3-3
19 March	9	3-3-2-1-2-2-2-2	23	3-3-4-5-5-3-3-1	14	4-4-3-3-3-3-3-2
20 March	13	1-2-3-3-4-3-2-3	48	1-3-4-6-6-6-6-3	21	1-3-3-5-4-4-4-4
21 March	19	4-4-3-4-3-2-2-4	47	4-4-5-7-6-3-3-4	29	5-5-4-5-4-3-3-4
22 March	11	3-3-3-2-2-1-2-3	29	4-3-4-6-5-2-3-3	16	3-4-4-4-3-3-2-3
23 March	13	4-1-4-3-2-2-2-2	37	3-2-4-7-5-4-4-2	24	4-2-4-6-4-3-3-3

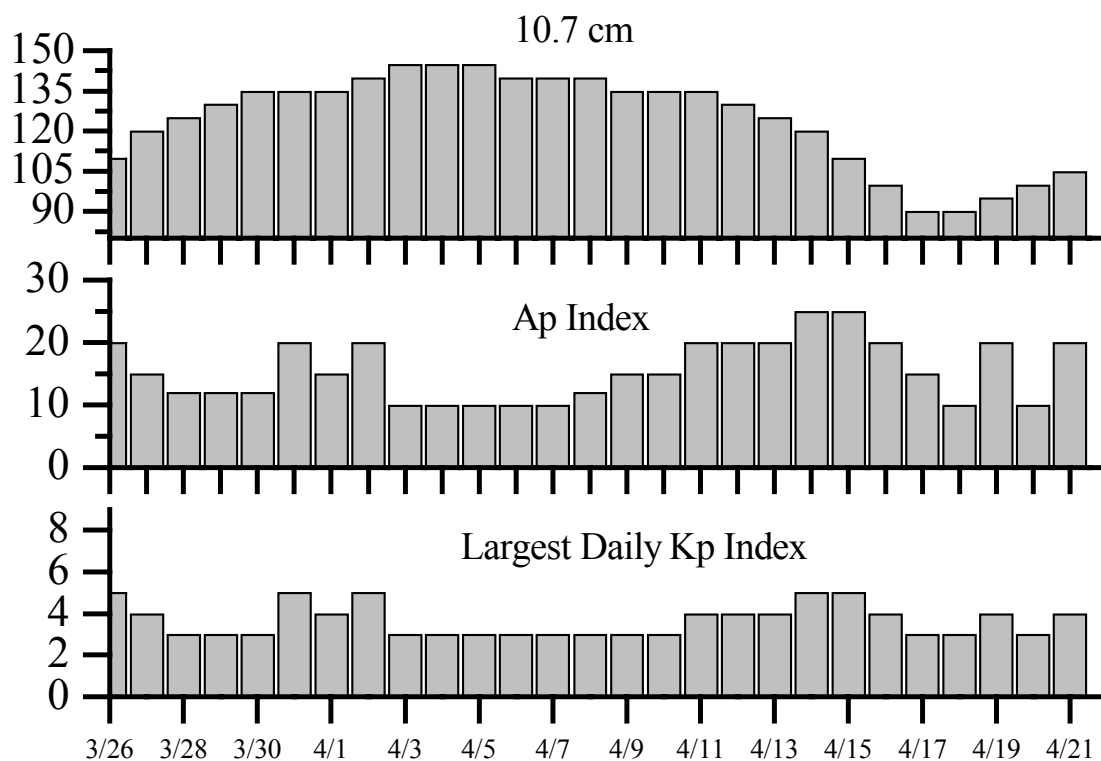


### *Alerts and Warnings Issued*

Date & Time of Issue	Type of Alert or Warning	Date & Time of Event UT
17 Mar 0006	245 MHz Radio Burst	16 Mar
17 Mar 0721	WARNING: Geomagnetic K = 5	17 Mar 0723 – 1500
17 Mar 0727	ALERT: Geomagnetic K = 5	17 Mar 0723
17 Mar 1329	ALERT: Electron 2MeV Flux $\geq$ 1000pfu	17 Mar 1305
17 Mar 1411	EXTENDED WARNING: Geomagnetic K = 5	17 Mar 0723 – 2359
17 Mar 1901	ALERT: X-Ray $\geq$ M5	17 Mar 1859
17 Mar 1919	SUMMARY: X-ray Event $\geq$ X1	17 Mar 1905
17 Mar 2000	WATCH: Geomagnetic A $\geq$ 20	18 Mar
17 Mar 2031	SUMMARY: 10cm Radio Burst	17 Mar 1901
17 Mar 2344	EXTENDED WARNING: Geomagnetic K = 5	17 Mar 0723 – 18/1500
18 Mar 0008	5 – 245 MHz Radio Bursts	17 Mar
18 Mar 1148	ALERT: Electron 2MeV Flux $\geq$ 1000pfu	18 Mar 1130
18 Mar 1204	ALERT: X-Ray $\geq$ M5	18 Mar 1203
18 Mar 1225	SUMMARY: X-ray Event $\geq$ X1	18 Mar 1208
18 Mar 1238	ALERT: Type II Radio Emission	18 Mar 1216
18 Mar 1315	ALERT: Type IV Radio Emission	18 Mar 1223
18 Mar 1342	SUMMARY: 10cm Radio Burst	18 Mar 1225
18 Mar 1427	ALERT: Type II Radio Emission	18 Mar 1351
18 Mar 1429	EXTENDED WARNING: Geomagnetic K = 5	17 Mar 0723 – 19/1500
18 Mar 2124	WATCH: Geomagnetic A $\geq$ 20	19 Mar
18 Mar 2125	WATCH: Geomagnetic A $\geq$ 20	20 Mar
19 Mar 0017	8 – 245 MHz Radio Bursts	18 Mar
19 Mar 0248	ALERT: Type II Radio Emission	19 Mar 0223
19 Mar 0541	ALERT: Electron 2MeV Flux $\geq$ 1000pfu	19 Mar 0525
20 Mar 0023	2 – 245 MHz Radio Bursts	19 Mar
20 Mar 0508	SUMMARY: Geomagnetic Sudden Impulse	20 Mar 0455
20 Mar 0942	ALERT: Electron 2MeV Flux $\geq$ 1000pfu	20 Mar 0920
20 Mar 1144	SUMMARY: 10cm Radio Burst	20 Mar 1127
20 Mar 1406	ALERT: Geomagnetic K = 4	20 Mar 1406
20 Mar 1739	ALERT: Geomagnetic K = 4	20 Mar 1723
20 Mar 1741	WARNING: Geomagnetic K = 4	20 Mar 1741 – 21/1500
21 Mar 0016	2 – 245 MHz Radio Bursts	20 Mar
21 Mar 0137	WATCH: Geomagnetic A $\geq$ 20	21 Mar
21 Mar 0210	ALERT: Geomagnetic K = 5	21 Mar 0205
21 Mar 0509	WARNING: Geomagnetic K = 5	21 Mar 0510 – 1500
21 Mar 511	ALERT: Geomagnetic K = 5	21 Mar 0510
21 Mar 0540	ALERT: Electron 2MeV Flux $\geq$ 1000pfu	21 Mar 0520
21 Mar 2250	WARNING: Geomagnetic K = 4	21 Mar 2251 – 22/1500
21 Mar 2253	ALERT: Geomagnetic K = 4	21 Mar 2250
22 Mar 1107	ALERT: Electron 2MeV Flux $\geq$ 1000pfu	18 Mar 1130
22 Mar 1503	EXTENDED WARNING: Geomagnetic K = 4	20 Mar 1741 – 22/2359
22 Mar 2355	EXTENDED WARNING: Geomagnetic K = 4	20 Mar 1741 – 23/1500
23 Mar 0836	ALERT: Electron 2MeV Flux $\geq$ 1000pfu	23 Mar 0815
23 Mar 1012	ALERT: Geomagnetic K = 5	23 Mar 1012
23 Mar 2037	WATCH: Geomagnetic A $\geq$ 20	26 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
26 Mar	110	20	5	09 Apr	135	15	3
27	120	15	4	10	135	15	3
28	125	12	3	11	135	20	4
29	130	12	3	12	130	20	4
30	135	12	3	13	125	20	4
31	135	20	5	14	120	25	5
01 Apr	135	15	4	15	110	25	5
02	140	20	5	16	100	20	4
03	145	10	3	17	90	15	3
04	145	10	3	18	90	10	3
05	145	10	3	19	95	20	4
06	140	10	3	20	100	10	3
07	140	10	3	21	105	20	4
08	140	12	3				



### *Energetic Events*

Date	Time		X-ray		Optical Information			Peak		Sweep Freq			
	Begin	Max	$\frac{1}{2}$	Class	Integ Flux	Imp/ Brtns	Location		Radio Flux		Intensity		
			Max				Lat	CMD	Rgn	#	245	2695	II
17 Mar	1850	1905	1916	X1.5	.130	1b	S14W39		314	500	520		
18 Mar	0030	0037	0042	M1.6	.007	1n	S15W44		314	92			
18 Mar	0551	0600	0602	M2.5	.005	1b	S15W46		314	3600	36		
18 Mar	1151	1208	1220	X1.5	.130	1b	S15W46		314	450	1400	3	2
19 Mar	0258	0307	0421	M1.5	.052						52		
19 Mar	0636	0646	0649	M1.6	.005	2f	S12W60		314				
19 Mar	0934	0953	1000	M3.7	.018	1n	S15W57		314		30		
19 Mar	1325	1332	1338	M1.4	.006	2f	S07W61		314		34		
20 Mar	1125	1131	1137	M1.5	.008	1f	S04W75		314		210		

### *Flare List*

Date	Time			X-ray Class.	Imp / Brtns	Optical		Rgn
	Begin	Max	End			Location Lat CMD		
17 March	0055	0103	0117	C3.1				
	0150	0155	0158	C1.8				
	0240	0247	0302	B9.1				
	0613	0617	0620	B5.1				
	1147	1152	1156	B5.7				
	1204	1226	1244	B8.3				
	1313	1318	1326	B8.7				
	1518	1551	1610	C2.1				
	1640	1640	1647	C7.7	Sf	S14W39		314
	1857	1902	2010	X1.5	1b	S14W39		314
18 March	2014	2021	2028	C6.9				
	2355	2358	0005	C1.7	Sf	S16W43		314
	0033	0035	0128	M1.6	1n	S15W44		314
	0141	0147	0324	C4.7	1f	S15W45		314
	0337	0348	0504	C7.5	Sf	S15W43		314
	0522	0523	0530		Sf	S16W43		314
	0554	0600	0631	M2.5	1b	S15W46		314
	0649	0650	0702	C2.1	Sf	S15W45		314
	0734	0743	0753		Sf	S15W48		314
	0940	0944	0949	B6.9				
	1009	1023	1039	C2.4				
	1156	1207	1311	X1.5	1b	S15W46		314
	1620	1620	A1625	C2.8	Sf	S16W48		314
	1638	1641	1643	C1.3				
	1705	1708	1710	B8.4				
1849	1903	1915	C5.9					
2024	2028	2031	B6.4					
2101	2106	2114	B8.9					
2154	2201	2209	B7.5				314	



*Flare List - continued*

Date	Time			X-ray Class.	Optical		Rgn
	Begin	Max	End		Imp / Brtns	Location Lat CMD	
18 March	2241	2254	2303	C2.9			
	B2302	2313	0037	C5.1	2f	S13W55	314
	2351	0002	0008	C5.3			
19 March	0013	0018	0023	C6.2			
	0159	0200	0204	C1.5	Sf	S15W54	314
	0211	0306	0518	C1.7	1n	S14W56	314
	0230	0244	0251	C3.4			
	0258	0307	0421	M1.5			
	B0701	U0701	0704	M1.6	2f	S12W60	314
	0839	0842	0844	B5.3			
	0942	0952	A0957	M3.7	1n	S15W57	314
	0956	0956	A0957		Sf	S15W78	311
	B1124	U1124	1135	C5.8	Sf	S15W58	314
	1305	1309	1311	C1.0			
	B1330	U1331	A1354	M1.4	2f	S07W61	314
	1407	1411	1414	B7.1			
	1606	1610	1613	C1.1			
	B1647	U1647	1654	C3.2	Sf	S11W66	314
	1707	1711	1714	C1.9			
	1819	1820	1834	C1.3	Sf	S11W66	314
	1848	1850	1922	C6.3	Sf	S14W64	314
	2039	2051	2055	C1.3			
	2100	2104	2107	C1.8			314
	2122	2128	2132	C2.2			314
	2155	2200	2202	C3.5			314
	2310	2315	2319	C2.0			314
20 March	0013	0016	0019	B5.1			314
	0151	0157	0159	B4.9			314
	0223	0225	0236	C9.2	Sf	S13W72	314
	0520	0524	0529	B4.2			
	0737	0741	0743	B3.8			314
	0826	0829	0832	B3.0			314
	1128	1128	1135	M1.5	1f	S04W75	314
	1635	1639	1644	B4.0			314
	1844	1848	1852	B4.6			314
	2031	2036	2039	B8.6			314
21 March	0556	0601	0605	B4.9			
	0858	0910	0917	C1.1			314
	1415	1429	1441	C1.8			314
	1600	1604	1609	B5.2			314
	1650	1654	1657	B3.5			314
	1724	1728	1736	B3.3			314
	1750	1755	1758	B4.1			314



*Flare List - continued*

Date	Time			X-ray Class.	Optical		Rgn
	Begin	Max	End		Imp / Brtns	Location Lat CMD	
21 March	1925	1930	1933	B4.7			314
	2024	2028	2031	B2.8			314
	2036	2042	2047	B4.6			314
	2100	2106	2113	B3.7			314
	2225	2238	2244	B4.9			314
22 March	0028	0031	0037	B5.5			314
	0050	0055	0057	C2.3			314
	0420	0424	0427	B4.0			314
	0435	0442	0448	C1.0			314
	0450	0453	0455	B8.0			314
	0543	0549	0552	B5.2			314
	0650	0658	0701	C1.3			314
	0849	0857	0906	B4.0			314
	0938	0949	0959	B5.1			314
	1102	1116	1124	B4.0			314
	1222	1230	1241	B3.8			314
	1529	1537	1547	B3.5			314
	1724	1732	1741	B2.9			314
	2236	2245	2303	B2.6			314
	23 March	1146	1214	1247	C1.9		
1341		1347	1354	B7.3			321
1903		1910	1917	C1.1			321





### 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 306</i>																		
07 Mar	N05E76	076	0280	04	Hhx	001	A											
08 Mar	N05E63	076	0470	04	Hhx	001	A	1				1						
09 Mar	N05E47	076	0540	06	Dko	007	B					3						
10 Mar	N05E34	076	0510	06	Cko	008	B	1				1						
11 Mar	N05E21	078	0520	05	Dko	006	B											
12 Mar	N06E08	079	0590	06	Dko	008	B					1						
13 Mar	N07W05	079	0570	07	Cko	015	Bg											
14 Mar	N07W19	080	0580	08	Dko	016	Bg											
15 Mar	N07W33	080	0640	06	Dko	015	Bg											
16 Mar	N08W45	079	0630	07	Dko	012	Bg											
17 Mar	N06W60	081	0600	07	Dko	008	Bg											
18 Mar	N07W72	080	0460	06	Dko	003	Bg											
19 Mar	N08W88	083	0260	07	Cko	003	B											
								2	0	0	6	0	0	0	0	0	0	

Crossed West Limb.

Absolute heliographic longitude: 079

<i>Region 308</i>																		
08 Mar	N08E75	064	0060	02	Hax	001	A											
09 Mar	N08E61	064	0080	03	Cao	003	B											
10 Mar	N08E48	064	0030	01	Hax	001	A											
11 Mar	N08E35	064	0020	01	Hsx	002	A											
12 Mar	N10E21	066	0010	01	Hrx	001	A											
13 Mar	N10E06	068	0010	03	Bxo	002	B											
14 Mar	N11W07	068	0010	01	Bxo	003	B											
15 Mar	N10W20	067	0010	03	Cro	005	B											
16 Mar	N11W33	067	0020	03	Bxo	004	B											
17 Mar	N11W46	067																
18 Mar	N11W59	067																
19 Mar	N11W72	067																
20 Mar	N11W85	067																
								0	0	0	0	0	0	0	0	0	0	

Crossed West Limb.

Absolute heliographic longitude: 068



**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	4				
<i>Region 311</i>																			
09 Mar	S16E45	080	0020	04	Cso	004	B												
10 Mar	S16E32	080	0070	05	Dao	012	B												
11 Mar	S16E19	080	0070	07	Dai	016	B												
12 Mar	S12E05	082	0100	07	Dso	012	B												
13 Mar	S12W08	082	0110	07	Dao	012	B	1				1							
14 Mar	S13W22	083	0080	06	Dao	013	B												
15 Mar	S12W36	083	0060	05	Cao	011	B												
16 Mar	S10W50	084	0050	04	Cao	007	B												
17 Mar	S10W64	085	0020	01	Hrx	002	A												
18 Mar	S12W76	084	0020	02	Hrx	002	A												
								1	0	0	1	0	0	0	0	0	0	0	0

Crossed West Limb.  
 Absolute heliographic longitude: 082

<i>Region 313</i>																			
13 Mar	N32E00	074	0030	06	Cso	008	B												
14 Mar	N33W14	075	0070	06	Dao	006	B												
15 Mar	N33W26	073	0060	07	Dso	004	B												
16 Mar	N33W38	072	0050	07	Dao	005	B												
17 Mar	N30W53	074	0010	02	Axx	003	A												
18 Mar	N30W66	074																	
19 Mar	N30W79	074																	
								0	0	0	0	0	0	0	0	0	0	0	

Crossed West Limb.  
 Absolute heliographic longitude: 074

<i>Region 314</i>																			
14 Mar	S14E00	061	0080	07	Dso	014	Bg												
15 Mar	S13W14	061	0220	11	Eao	027	Bg	2			1								
16 Mar	S14W26	060	0380	11	Eki	031	Bgd	1			2								
17 Mar	S16W39	060	0450	13	Eki	027	Bgd	2		1	2	1							
18 Mar	S16W52	060	0500	14	Eki	016	Bgd	5	2	1	5	4	1						
19 Mar	S13W66	061	0370	14	Eki	017	Bgd	10	3		5	2	2						
20 Mar	S13W80	061	0360	14	Eao	010	Bg	1	1		1	1							
21 Mar	S13W94	062	0180	12	Eao	007	Bg	2											
								23	6	2	16	8	3	0	0	0	0	0	

Crossed West Limb.  
 Absolute heliographic longitude: 061



**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 316</i>																	
18 Mar	S12E66	302	0030	03	Cro	003	B										
19 Mar	S12E52	303	0020	04	Cso	003	B										
20 Mar	S13E38	303	0020	01	Hsx	001	A										
21 Mar	S11E24	304	0010	01	Hsx	001	A										
22 Mar	S11E11	304	0010	03	Cso	003	B										
23 Mar	S11W02	304	0010	02	Cro	002	B										
								0	0	0	0	0	0	0	0	0	0
Still on Disk.																	
Absolute heliographic longitude: 304																	
<i>Region 317</i>																	
20 Mar	N04E03	338	0020	04	Cso	004	B										
21 Mar	N04W12	340	0010	01	Axx	002	A										
22 Mar	N04W25	340	0020	03	Bxo	003	B										
23 Mar	N06W38	340															
								0	0	0	0	0	0	0	0	0	0
Still on Disk.																	
Absolute heliographic longitude: 338																	
<i>Region 318</i>																	
22 Mar	S16E74	241	0040	05	Cao	004	B										
23 Mar	S15E62	240	0070	08	Cao	006	B	1									
								1	0	0	0	0	0	0	0	0	0
Still on Disk.																	
Absolute heliographic longitude: 240																	
<i>Region 319</i>																	
23 Mar	N13E53	249	0030	05	Cao	005	B										
								0	0	0	0	0	0	0	0	0	0
Still on Disk.																	
Absolute heliographic longitude: 249																	

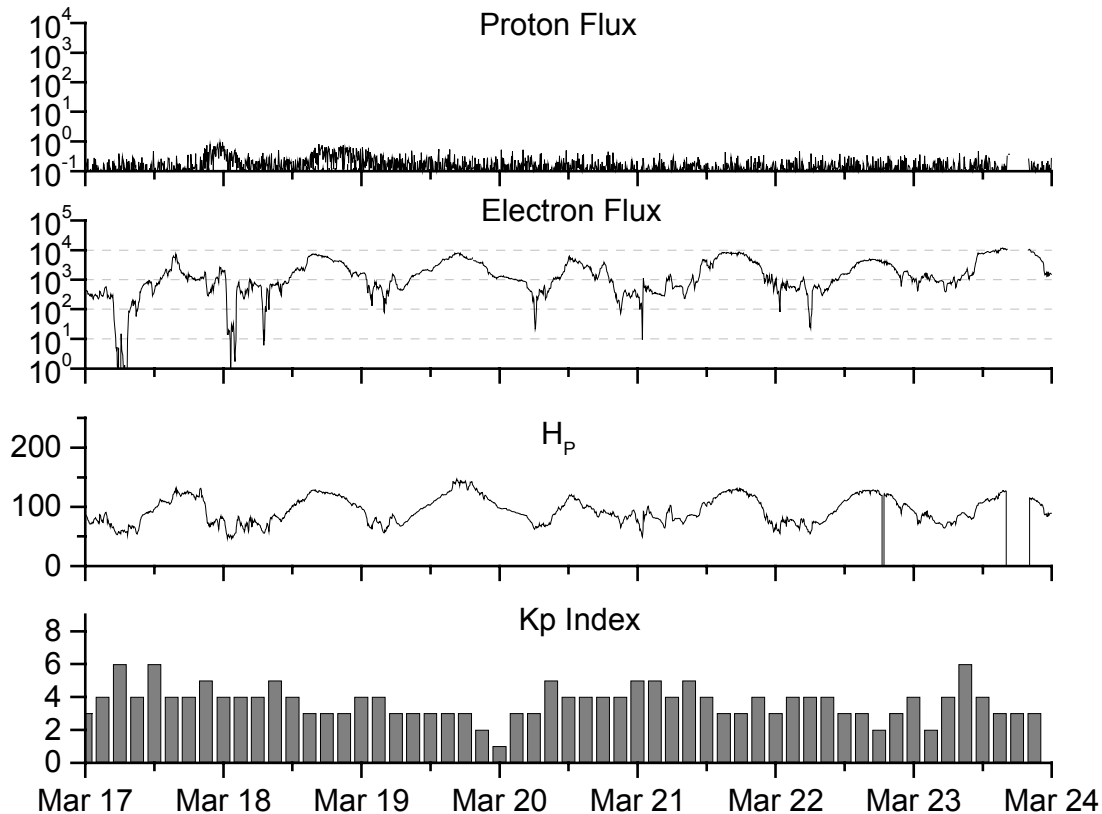


**Recent Solar Indices (preliminary)  
of the observed monthly mean values**

Month	Sunspot Numbers			Smooth values		Radio Flux	Geomagnetic		
	Observed SWO	values RI	Ratio RI/SWO	SWO	RI	*Penticton 10.7 cm	Smooth Value	Planetary Ap	Smooth Value
<b>2001</b>									
March	166.7	114.2	0.69	154.0	104.9	177.7	167.9	17	12.9
April	163.6	108.2	0.66	159.4	107.7	178.1	171.7	18	12.7
May	135.1	97.3	0.72	163.1	108.8	147.9	174.8	12	12.5
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	0.61	179.9	106.3	148.7	183.0	11	13.5
July	183.5	99.9	0.54	175.4	102.7	173.5	176.3	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			175.8		14	
October	153.9	97.5	0.63			167.0		23	
November	159.8	95.5	0.60			168.7		16	
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	

**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 17 March 2003*

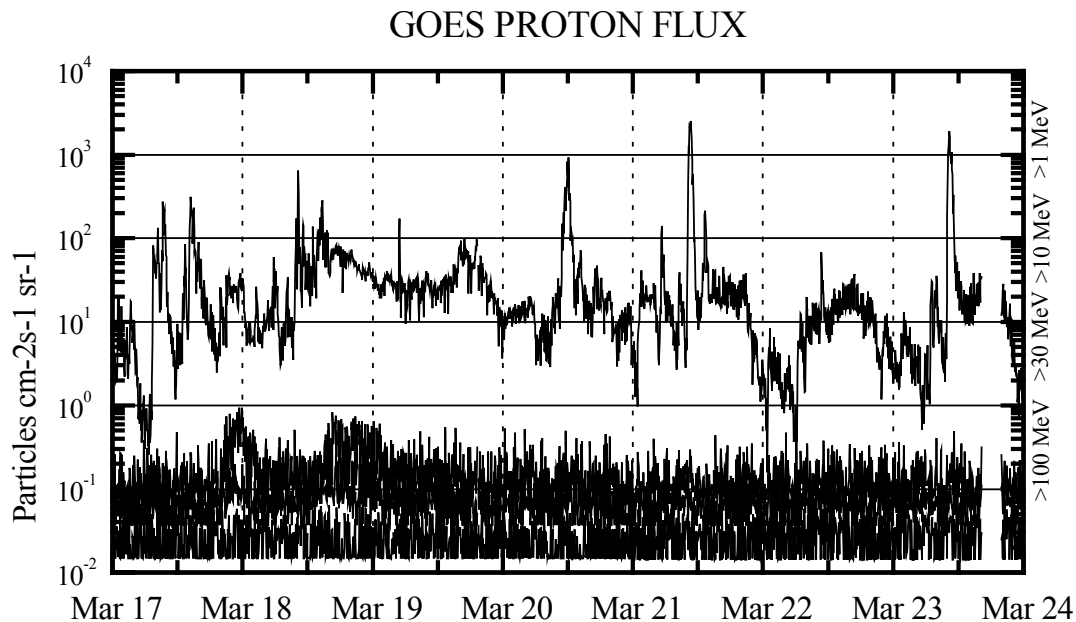
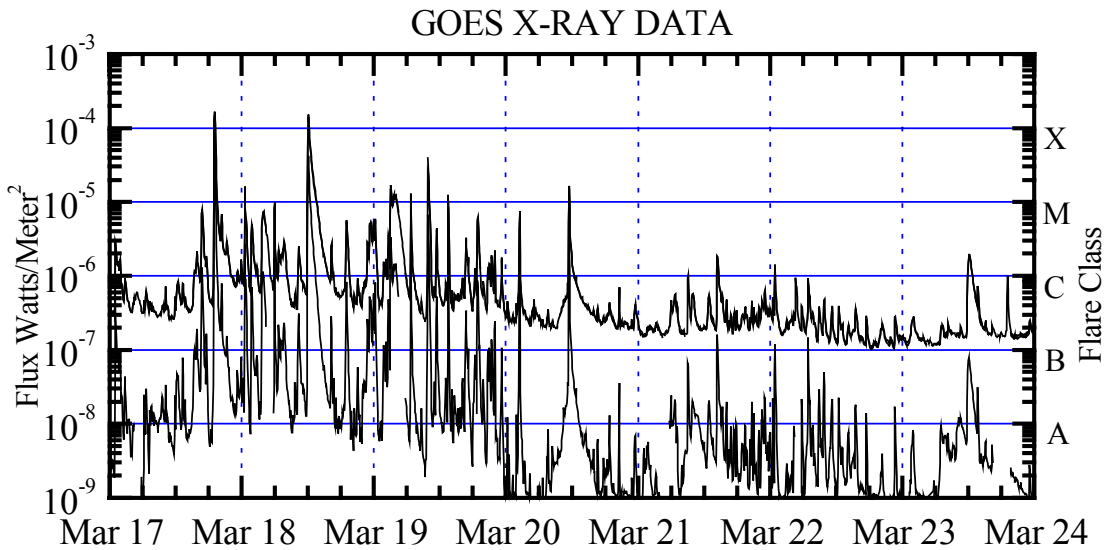
*Protons* plot contains the five-minute averaged integral proton flux (protons/cm<sup>2</sup>-sec-sr) as measured by GOES-8 (W75) for each of three energy thresholds: greater than 10, 50, and 100 MeV.

*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-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 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 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

