

Solar activity was very low to low. Low levels were observed on 24 March with B-class and low C-class activity from Region 321 (N04, L=215, class/area/mag. Eac/370/Bgd on 27 March). Activity decreased to very low levels on 25 March with just occasional B-class flares from Region 321. The period (26 – 28 March) saw a return to low levels with occasional low C-class flares, primarily from Regions 321 and 322 (N19, L=348, class/area/mag. Hsx/60/A on 27 March). Region 321 developed a weak magnetic delta configuration early on 27 March, but produced only minor activity for the remainder of the period. Regions 318 (S14, L=243, class/area/mag. Dao/90/B on 29 March) and 323 (S08, L=225, class/area/mag. Dai/230/Bg on 30 March) emerged rapidly on 29 March and between them, produced several moderate to high C-class flares, including a C8/1f flare from Region 318. Both regions appeared to mature by 30 March and were responsible for the few small C-class flares observed on 30 March.

Solar wind data were available from the NASA Advanced Composition Explorer (ACE) spacecraft for most of the summary period. The period began in the waning stages of a high speed coronal hole stream. Solar wind velocity declined from 650 km/s on 24 March to 375 km/s on 26 March. Solar wind increased on 27 March due to another small coronal hole high speed stream and reached velocities near 550 km/s. By midday on the 28 March, a transient flow was detected at ACE with sustained periods of southward Bz in the interplanetary magnetic field. A transition from transient flow back into a high speed coronal hole stream was observed early on the 30 March. Solar wind speed went from near 400 km/s (early on the 30th) to near 650 km/s at end the period.

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 24 - 26 March, and again on 28 March.

The geomagnetic field ranged from quiet to minor storm levels. The period began on 24 March with quiet to unsettled levels and one period of isolated active conditions. On 25 – 26 March, activity decreased to quiet levels. The high speed stream on 27 and 28 March produced occasional minor storm conditions. The active - occasional minor storm periods persisted through 29 March as we transitioned into a weak transient flow with extended periods of southward Bz. Predominantly unsettled to active levels closed out the period, 30 March, with the onset of yet another high speed coronal stream.



Space Weather Outlook

02 – 28 April 2003

Solar activity is expected to range from very low to low levels. There's a slight chance of a low M-class flare during most of the forecast period. Isolated M-class activity is possible from Region 318, 321, and 323 before they exit the disk (4-6 Apr) and after they return around 18 April. Isolated M-class activity is also possible from the return of old Region 306 and Region 314 on 02 and 03 April respectively.

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 04 – 06 April, 13 – 15 April and again on 27 – 28 April due to returning coronal holes.

The geomagnetic field is expected to range from unsettled to major storm conditions during the period. Coronal hole high speed stream effects are expected to produce unsettled to active condition through 04 April. Returning coronal holes are expected to produce unsettled to isolated minor storm levels on 10 – 14 April and unsettled to isolated major storm levels on 23 – 27 April.



Daily Solar Data

Date	Radio Flux 10.7 cm	Sun spot No.	Sunspot Area (10 ⁻⁶ hemi.)	X-ray Background	Flares								
					X-ray Flux			Optical					
					C	M	X	S	1	2	3	4	
24 March	98	64	190	B1.6	2	0	0	0	0	0	0	0	0
25 March	109	89	480	B1.7	0	0	0	5	0	0	0	0	0
26 March	127	116	640	B3.3	2	0	0	3	0	0	0	0	0
27 March	141	156	1030	B4.2	8	0	0	0	0	0	0	0	0
28 March	147	189	1280	B3.4	0	0	0	0	0	0	0	0	0
29 March	155	155	1120	B4.3	9	0	0	6	1	0	0	0	0
30 March	155	176	1270	B3.8	3	0	0	1	0	0	0	0	0

Daily Particle Data

Date	Proton Fluence (protons/cm ² -day-sr)			Electron Fluence (electrons/cm ² -day-sr)		
	>1MeV	>10MeV	>100MeV	>.6MeV	>2MeV	>4MeV
24 March	8.0E+5	1.2E+4	2.8E+3		3.7E+8	
25 March	1.4E+6	1.2E+4	2.7E+3		6.3E+8	
26 March	9.7E+5	1.2E+4	2.6E+3		1.4E+8	
27 March	4.2E+5	1.1E+4	2.6E+3		8.3E+6	
28 March	4.5E+5	1.1E+4	2.6E+3		2.7E+7	
29 March	3.0E+5	1.1E+4	2.5E+3		1.1E+7	
30 March	2.0E+5	1.1E+4	2.5E+3		1.0E+7	

Daily Geomagnetic Data

Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
	24 March	5	3-2-2-2-1-1-0-0	14	2-2-5-4-1-1-0-3	10
25 March	5	1-2-2-1-2-1-1-2	*	*-*-*-*-*-*-*	6	2-2-2-1-2-2-2-2
26 March	7	0-3-1-1-2-1-3-2	11	0-1-3-4-4-1-2-1	8	1-3-2-3-2-2-2-3
27 March	16	4-2-4-3-3-3-2-3	47	3-3-6-5-5-7-4-2	27	5-2-5-4-4-5-3-3
28 March	23	5-3-4-2-2-3-3-5	38	3-3-7-2-2-6-3-4	24	4-4-3-2-3-4-4-5
29 March	17	4-4-2-2-3-2-3-4	39	4-4-5-3-5-6-5-3	27	5-5-4-3-4-4-3-4
30 March	19	3-3-3-3-3-3-3-5	33	4-3-5-4-5-5-4-4	26	4-5-3-3-3-3-4-5

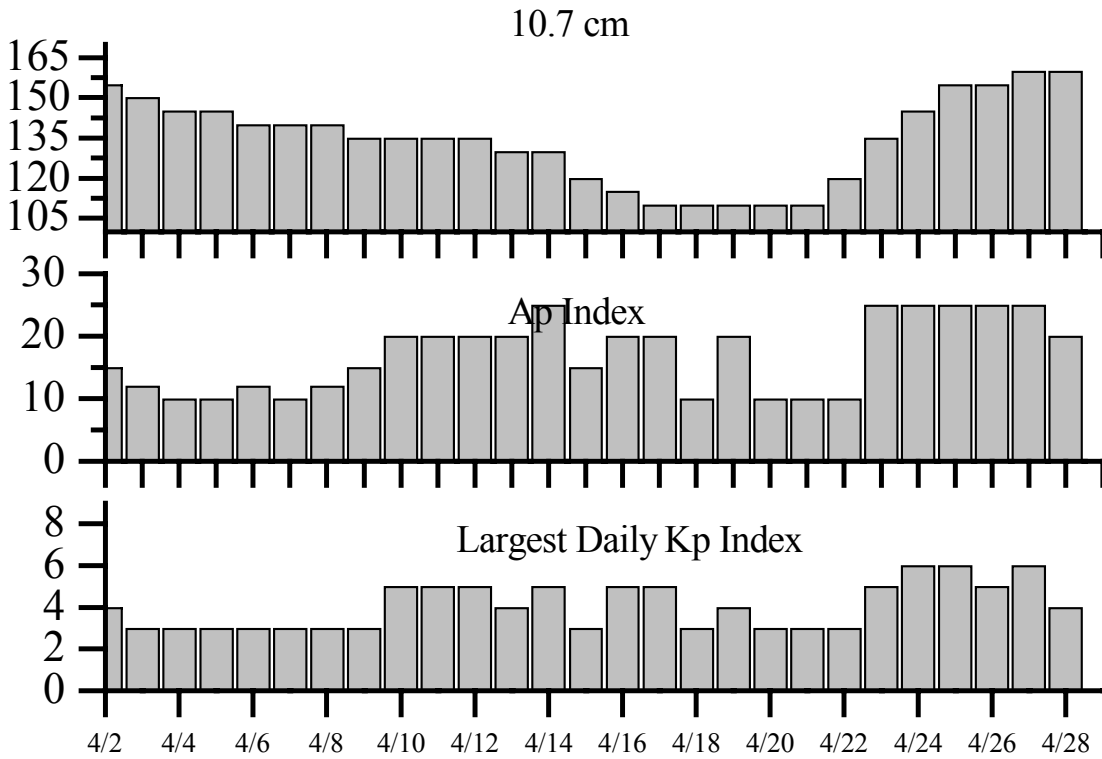


Alerts and Warnings Issued

Date & Time of Issue	Type of Alert or Warning	Date & Time of Event UT
24 Mar 0921	ALERT: Electron 2MeV Flux \geq 1000pfu	24 Mar 0735
25 Mar 0645	ALERT: Electron 2MeV Flux \geq 1000pfu	25 Mar 0500
26 Mar 0500	ALERT: Electron 2MeV Flux \geq 1000pfu	26 Mar 0500
26 Mar 0501	WARNING: Geomagnetic K = 4	26 Mar 0505 – 1500
26 Mar 0510	ALERT: Geomagnetic K = 4	26 Mar 0510
26 Mar 1455	EXTENDED WARNING: Geomagnetic K = 4	26 Mar 0505 – 26/2359
26 Mar 2320	EXTENDED WARNING: Geomagnetic K = 4	26 Mar 0505 – 27/2359
27 Mar 0009	245 MHz Radio Burst	26 Mar
27 Mar 0642	ALERT: Geomagnetic K = 5	27 Mar 0642
27 Mar 1453	EXTENDED WARNING: Geomagnetic K = 4	26 Mar 0505 – 28/1500
28 Mar 0137	WARNING: Geomagnetic K = 5	28 Mar 0137 – 1500
28 Mar 0139	ALERT: Geomagnetic K = 5	28 Mar 0135
28 Mar 1705	WARNING: Geomagnetic K = 4	28 Mar 1706 – 29/1500
28 Mar 1707	ALERT: Geomagnetic K = 4	28 Mar 1706
28 Mar 1742	ALERT: Electron 2MeV Flux \geq 1000pfu	28 Mar 1725
29 Mar 0042	2 – 245 MHz Radio Bursts	28 Mar
29 Mar 0346	WARNING: Geomagnetic K = 5	29 Mar 0346 – 1500
29 Mar 0348	ALERT: Geomagnetic K = 5	29 Mar 0348
29 Mar 2223	WARNING: Geomagnetic K = 4	30 Mar 0000 – 1500
29 Mar 2357	WARNING: Geomagnetic K = 5	30 Mar 0100 – 1500
30 Mar 0009	245 MHz Radio Burst	29 Mar
30 Mar 1210	ALERT: STRATWARM	30 Mar
30 Mar 1555	WARNING: Geomagnetic K = 4	30 Mar 1555 – 31/1500
30 Mar 1556	ALERT: Geomagnetic K = 4	30 Mar 1556



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
02 Apr	155	15	4	16 Apr	115	20	5
03	150	12	3	17	110	20	5
04	145	10	3	18	110	10	3
05	145	10	3	19	110	20	4
06	140	12	3	20	110	10	3
07	140	10	3	21	110	10	3
08	140	12	3	22	120	10	3
09	135	15	3	23	135	25	5
10	135	20	5	24	145	25	6
11	135	20	5	25	155	25	6
12	135	20	5	26	155	25	5
13	130	20	4	27	160	25	6
14	130	25	5	28	160	20	4
15	120	15	3				



Energetic Events

Date	Time		X-ray		Optical Information			Peak		Sweep Freq		
	Begin	Max	½ Max	Class	Integ Flux	Imp/ Brtns	Location Lat CMD	Rgn #	Radio Flux		Intensity	
									245	2695	II	IV
<i>No Events Observed</i>												

Flare List

Date	Time			X-ray Class.	Optical Imp / Brtns	Location Lat CMD	Rgn
	Begin	Max	End				
24 March	0301	0306	0313	B4.2			321
	0407	0415	0421	B5.6			321
	0426	0431	0435	C2.0			321
	0705	0752	0815	B6.3			321
	1210	1317	1330	C1.2			321
	1959	2002	2004	B2.1			318
25 March	0011	0019	0022	B4.7			321
	0100	0103	0106	B2.5			
	0150	0154	0157	B4.9			321
	0210	0216	0218	B7.3			
	0538	0542	0544	B3.5			
	1001	1005	1010	B3.4			
	1259	1301	1304	B3.8	Sf	N10E33	319
	1539	1540	1547	B5.8	Sf	N07E72	321
	1605	1605	1610	B4.9	Sf	S01E72	321
	1627	1636	1641	B4.9	Sf	N05E69	321
	B1634	U1634	1640	B9.1	Sf	N06E71	321
26 March	0141	0149	0158	B9.5			
	0426	0431	0436	B5.1			
	0753	0754	0757	B8.9	Sf	N00E65	321
	1652	1652	1656		Sf	N06E59	321
	1707	1708	1723	C2.2	Sf	S01E60	
27 March	2138	2142	2144	C1.3			321
	0105	0109	0111	B8.6			322
	0156	0201	0214	C2.2			325
	0412	0416	0418	C1.2			319
	0531	0540	0551	C1.2			319
	0656	0701	0715	C1.3			321
	0940	0945	0949	C3.6			322
	1449	1455	1505	C2.3			322
	1938	1943	1951	C1.6			320
	2307	2325	2333	C1.0			
28 March	1127	1130	1132	B4.6			
	1806	1809	1811	B8.2			
29 March	0402	0407	0414	C1.1			
	B1015	U1019	A1034	C7.2	Sf	S12W14	318



Flare List - continued

Date	Time			X-ray Class.	Optical		Rgn
	Begin	Max	End		Imp / Brtns	Location Lat CMD	
29 March	1229	U1231	1240	C5.7	Sf	S09E05	323
	1303	1308	1313	C1.2			
	1304	1308	1312	C1.1			
	1351	1352	1357		Sf	S09E06	323
	1451	1452	1457		Sf	S09E06	323
	1509	1515	1524	C4.2	Sf	S11W19	318
	1655	1658	1709	C4.7			
	1834	1838	1840	C8.2	1f	S13W21	318
	2049	2050	2057	C1.3	Sf	S11W21	318
30 March	0121	0125	0129	C3.6			323
	0155	0159	0202	C1.1			
	1803	1808	1816	C1.3	Sf	N01W02	321



Region Summary

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

Region 316

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										
24 Mar	S11W15	304															
25 Mar	S11W28	304															
26 Mar	S11W41	304															
27 Mar	S11W54	304															
28 Mar	S11W67	304															
29 Mar	S11W80	304															

0 0 0 0 0 0 0 0

Still on Disk.

Absolute heliographic longitude: 304

Region 317

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															
24 Mar	N06W51	340															
25 Mar	N06W64	340															
26 Mar	N06W77	340															
27 Mar	N06W90	340															

0 0 0 0 0 0 0 0

Crossed West Limb.

Absolute heliographic longitude: 338

Region 318

22 Mar	S16E74	241	0040	05	Cao	004	B										
23 Mar	S15E62	240	0070	08	Cao	006	B	1									
24 Mar	S15E49	240	0060	07	Cao	007	B										
25 Mar	S15E36	240	0040	03	Dso	003	B										
26 Mar	S15E22	240	0040	10	Dao	010	B										
27 Mar	S15E09	240	0030	08	Dro	007	B										
28 Mar	S15W06	242	0030	07	Dso	011	B										
29 Mar	S14W20	243	0090	06	Dao	014	B	3			3						
30 Mar	S13W34	244	0060	09	Dai	014	B										

4 0 0 3 0 0 0 0

Still on Disk.

Absolute heliographic longitude: 242



Region Summary - continued.

Date	Location		Sunspot Characteristics					Flares															
	(° Lat ° CMD)	Helio	Area (10 ⁻⁶ hemi)	Extent (helio)	Spot Class	Spot Count	Mag Class	X-ray			Optical												
		Lon						C	M	X	S	1	2	3	4								
<i>Region 319</i>																							
23 Mar	N13E53	249	0030	05	Cao	005	B																
24 Mar	N13E40	249	0040	09	Dso	009	B																
25 Mar	N13E27	249	0070	09	Dsi	010	B						1										
26 Mar	N13E13	249	0120	08	Dai	017	B																
27 Mar	N13W01	250	0340	09	Dki	030	Bg	2															
28 Mar	N12W18	254	0440	11	Eki	032	Bg																
29 Mar	N12W30	253	0300	11	Cao	013	B	1						1									
30 Mar	N13W42	252	0250	12	Eao	011	Bg																
									3	0	0	1	1	0	0	0							

Still on Disk.

Absolute heliographic longitude: 250

Region 320

24 Mar	N05E07	282	0030	04	Dso	005	B														
25 Mar	N05W06	282	0020	06	Bxo	005	B														
26 Mar	N05W20	282	0020	02	Hsx	005	A														
27 Mar	N05W33	282	0020	05	Bxo	006	B	1													
28 Mar	N06W48	284	0030	05	Cso	011	B														
29 Mar	N07W63	286	0040	06	Cso	006	B														
30 Mar	N06W74	284	0100	06	Cao	004	B														
									1	0	0	0	0	0	0	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 282

Region 321

24 Mar	N05E78	211	0060	10	Dao	003	B	1													
25 Mar	N05E65	211	0290	10	Dko	008	B						4								
26 Mar	N05E51	211	0350	10	Dki	015	Bg	1					3								
27 Mar	N05E34	211	0320	12	Eac	029	Bgd	1													
28 Mar	N04E21	215	0370	12	Eac	038	Bg														
29 Mar	N04E11	212	0200	09	Dai	017	B														
30 Mar	N05W03	213	0210	11	Ehi	025	B	1					1								
									4	0	0	8	0	0	0	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 213

Region 322

25 Mar	N19W72	348	0040	01	Hsx	001	A														
26 Mar	N19W86	348	0060	02	Hax	002	A														
									0	0	0	0	0	0	0	0	0	0	0	0	0

Crossed West Limb.

Absolute heliographic longitude: 348



Region Summary - continued.

Date	Location		Sunspot Characteristics				Flares										
	° Lat ° CMD)	Helio	Area (10 ⁻⁶ hemi)	Extent (helio)	Spot Class	Spot Count	Mag Class	X-ray			Optical						
		Lon						C	M	X	S	1	2	3	4		
<i>Region 323</i>																	
25 Mar	S07E55	221	0020	03	Cso	002	B										
26 Mar	S07E41	221	0050	06	Dso	007	B										
27 Mar	S07E28	221	0040	07	Cso	008	B										
28 Mar	S09E11	225	0030	08	Dso	012	B										
29 Mar	S08W01	224	0120	09	Dsi	020	B	1				3					
30 Mar	S08W15	225	0230	09	Dai	024	Bg	1									
								2	0	0	0	3	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 224

<i>Region 324</i>																	
27 Mar	S16E68	181	0080	03	Dao	005	B										
28 Mar	S14E53	183	0060	05	Dao	003	B										
29 Mar	S14E41	182	0020	04	Bxo	003	B										
30 Mar	S13E23	187	0050	11	Eso	011	B										
								0	0	0	0	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 187

<i>Region 325</i>																	
27 Mar	N12E80	169	0200	03	Hhx	001	A	1									
28 Mar	N12E65	171	0260	06	Hhx	001	A										
29 Mar	N13E54	169	0300	03	Hax	001	A										
30 Mar	N13E40	170	0320	05	Hkx	005	A										
								1	0	0	0	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 170

<i>Region 326</i>																	
28 Mar	S12E74	162	0060	03	Hsx	001	A										
29 Mar	S13E62	161	0050	01	Hsx	001	A										
30 Mar	S13E49	161	0050	01	Hsx	002	A										
								0	0	0	0	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 161

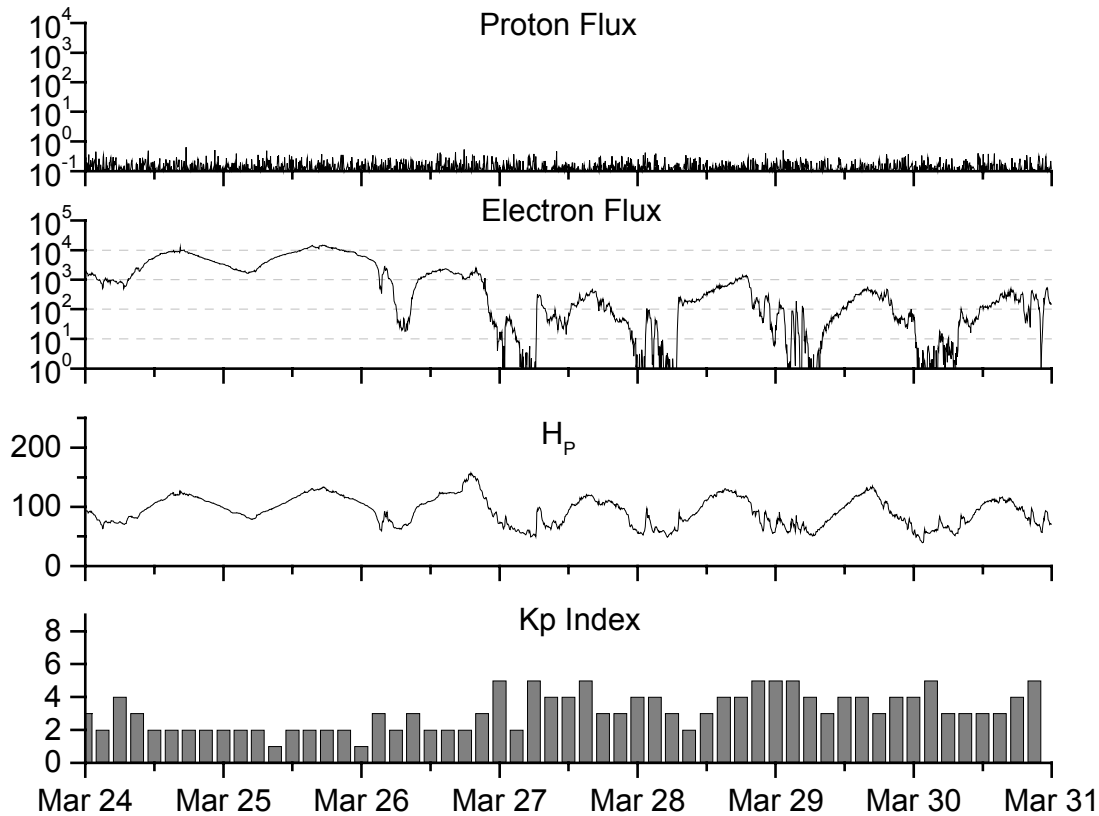


**Recent Solar Indices (preliminary)
of the observed monthly mean values**

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
2001									
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
2002									
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	
2003									
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 24 March 2003*

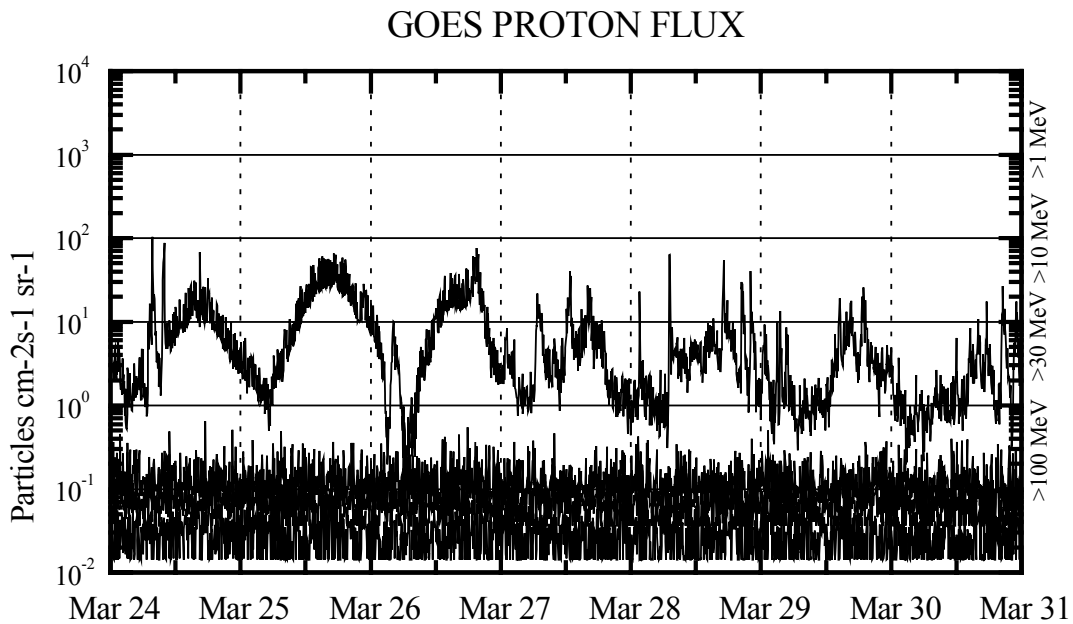
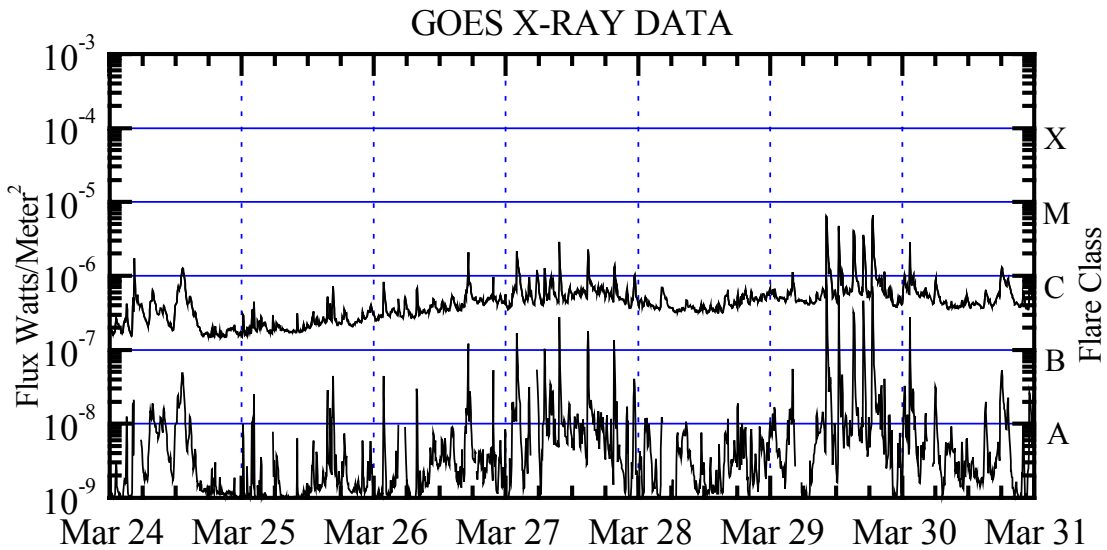
Protons plot contains the five-minute averaged integral proton flux (protons/cm²-sec-sr) as measured by GOES-8 (W75) for each of three energy thresholds: greater than 10, 50, and 100 MeV.

Electrons plot contains the five-minute averaged integral electron flux (electrons/cm²-sec-sr) with energies greater than 2 MeV at GOES-8.

H_p 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_p 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_p 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_p are "global" parameters that are applicable to a first order approximation over large areas. H_p 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/m²) 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/cm²-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/cm²-sec-sr) at greater than 10 MeV

