

Solar activity ranged from very low to moderate. Since rotating onto the disk late on 24 March, Region 582 (N15, L=055, class/area, Dki/390 on 28 March) produced the majority of the period's activity with six low-level C-class flares and two M-class flares, the largest an M2.3/Sf on 25/0439 UTC. Region 582 exhibited slow, steady growth and continued to be the largest group on the disk. Region 578 (N15, L=146, class/area, Fsc/190 on 23 March), last period's most active region, decayed significantly on its disk transit and ended the period as a small, unipolar region. New region 587 (S13, L=012, class/area, Dai/110 on 28 March) rotated quietly into view on the 28th as a bright, moderately sized bipolar region. Region 586 (S18, L=179, class/area, Bxo/010 on 27 March) formed near the west limb on 27 March and produced five low-level C-class flares before rotating off on the 28th.

Solar wind data were available from the NASA Advanced Composition Explorer (ACE) spacecraft during most of the summary period. The period began with solar wind velocities at speeds between 400 to 450 km/s. By 27 March, wind speeds began to gradually increase and strengthened to about 600 km/s late on 27 March. By 27/2100 UTC, solar wind speeds showed an abrupt increase from 600 km/s to about 900 km/s. At the same time, density decreased, temperature increased and Alfvén wave activity in the magnetic field components appeared to increase, all indications of the presence of a high-speed stream. During this period of high-speed stream intensification, the Bz component of the interplanetary magnetic field (IMF) did not vary much beyond +/- 10 nT. Otherwise, fluctuations in the IMF were weak, not varying much beyond +/- 5 nT.

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

The greater than 2 MeV electron flux at geosynchronous orbit was at high levels on 24, 25, and 28 March.

The geomagnetic field ranged from mostly quiet to unsettled levels with isolated active to minor storm periods observed late on 27 March and early on 28 March. The active to minor storm levels on 27 and 28 March were due to effects from a favorably positioned coronal hole.

Space Weather Outlook
31 March - 26 April 2004

Solar activity is expected to range from low to moderate levels throughout the forecast period. Isolated moderate activity is possible from Region 582 until its departure on 06 April. From 07 to 19 April, activity should be at mostly very low to low levels. Solar activity is expected to increase to low to moderate levels after old region 582 returns on 20 April.

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

The greater than 2 MeV electron flux at geosynchronous orbit is expected to reach high levels on 31 March, from 06 to 11 April, from 18 to 20 April, and again from 24 to 26 April due to recurrent coronal hole high-speed streams.

Geomagnetic activity is expected to range from quiet to minor storm levels. A large, recurrent coronal hole high-speed stream is due to return on 05 – 09 April and is expected to produce active to minor storm conditions. Unsettled to active conditions are expected on 17 to 18 April due to a weak coronal hole high-speed stream. A weak coronal hole high-speed stream is due to return on 23 – 25 April and is expected to produce unsettled to active conditions.



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
22 March	116	87	260	B2.0	2	0	0	1	1	0	0	0
23 March	118	110	380	B2.1	2	0	0	2	0	0	0	0
24 March	120	109	450	B2.7	4	1	0	2	0	0	0	0
25 March	127	128	650	B3.8	5	1	0	3	0	0	0	0
26 March	124	100	670	B2.2	0	0	0	0	0	0	0	0
27 March	128	129	690	B3.4	5	0	0	1	0	0	0	0
28 March	129	125	800	B3.8	4	0	0	1	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
	22 March	6.0E+5	1.3E+4	2.9E+3		3.4E+7
23 March	4.3E+5	1.2E+4	2.9E+3		2.9E+7	
24 March	8.6E+5	1.3E+4	2.7E+3		5.1E+7	
25 March	1.3E+6	1.2E+4	2.8E+3		3.7E+7	
26 March	8.8E+5	1.3E+4	2.7E+3		2.0E+7	
27 March	8.0E+5	1.3E+4	2.7E+3		1.1E+7	
28 March	1.5E+6	1.3E+4	2.6E+3		1.8E+8	

Daily Geomagnetic Data

Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
	22 March	8	2-2-3-1-2-2-2-2	11	2-3-3-3-2-2-3-2	11
23 March	5	3-1-2-1-1-1-1-1	4	3-1-1-2-0-0-1-0	8	3-3-2-2-2-2-3-1
24 March	1	0-1-0-0-1-0-0-1	1	1-1-0-0-0-0-0-0	4	1-1-1-2-2-2-1-0
25 March	3	0-0-0-0-1-2-2-2	4	1-0-0-0-1-3-2-1	8	1-1-1-2-2-3-2-2
26 March	10	2-1-2-1-3-3-3-3	24	0-1-1-1-6-6-3-2	11	1-0-2-1-3-3-3-3
27 March	12	2-2-2-2-3-3-2-4	27	2-2-2-5-4-6-3-4	14	3-1-2-3-3-4-3-4
28 March	12	3-4-3-2-3-2-2-1	35	4-5-6-5-4-4-3-2	17	3-5-3-3-3-3-2-2

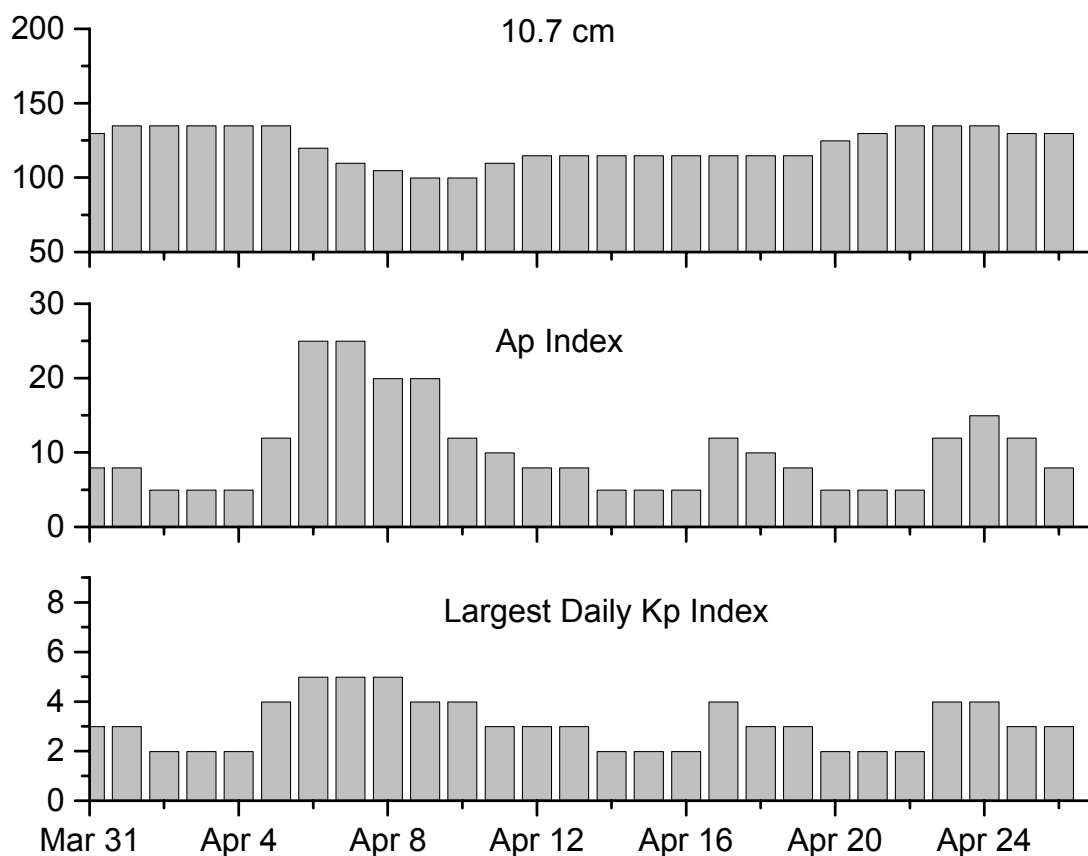


Alerts and Warnings Issued

<u>Date & Time of Issue</u>	<u>Type of Alert or Warning</u>	<u>Date & Time of Event UT</u>
22 Mar 1712	ALERT: Electron 2MeV Integral Flux > 1000pfu	22 Mar 1650
24 Mar 0015	1 – 245 MHz Radio Burst	23 Mar
24 Mar 1623	ALERT: Electron 2MeV Integral Flux > 1000pfu	24 Mar 1605
25 Mar 0014	1 – 245 MHz Radio Burst	24 Mar
25 Mar 1553	ALERT: Electron 2MeV Integral Flux > 1000pfu	25 Mar 1520
26 Mar 1449	ALERT: Electron 2MeV Integral Flux > 1000pfu	26 Mar 1430
26 Mar 1609	ALERT: Geomagnetic K = 4	26 Mar 1605
26 Mar 2201	WARNING: Geomagnetic K = 4	26 Mar 2201 – 27 Mar 1600
26 Mar 2212	ALERT: Geomagnetic K = 4	26 Mar 2210
27 Mar 1556	EXTENDED WARNING: Geomagnetic K= 4	26 Mar 2201
27 Mar 2242	WARNING: Geomagnetic K = 5	27 Mar 2242 – 28 Mar 1500
27 Mar 2244	ALERT: Geomagnetic K = 5	27 Mar 2243
28 Mar 1103	ALERT: Electron 2MeV Integral Flux > 1000pfu	28 Mar 1040
28 Mar 1608	ALERT: Geomagnetic K = 4	28 Mar 1606
28 Mar 1611	WARNING: Geomagnetic K = 4	28 Mar 1615 – 28 Mar 2359



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
31 Mar	130	8	3	14 Apr	115	5	2
01 Apr	135	8	3	15	115	5	2
02	135	5	2	16	115	5	2
03	135	5	2	17	115	12	4
04	135	5	2	18	115	10	3
05	135	12	4	19	115	8	3
06	120	25	5	20	125	5	2
07 Apr	110	25	5	21	130	5	2
08	105	20	5	22	135	5	2
09	100	20	4	23	135	12	4
10	100	12	4	24	135	15	4
11	110	10	3	25	130	12	3
12	115	8	3	26	130	8	3
13	115	8	3				



Energetic Events

Date	Time		X-ray		Optical Information			Peak		Sweep Freq		
	Begin	Max	Max	Class	Flux	Imp/	Location	Rgn	Radio Flux		Intensity	
						Brtns	Lat CMD		245	2695	II	IV
24 Mar	2314	2329	2335	M1.5	.007	Sf	N15E77	582				
25 Mar	0429	0439	0443	M2.3	.011	Sf	N12E82	582				

Flare List

Date	Time			X-ray Class.	Imp / Brtns	Optical Location Lat CMD	Rgn
	Begin	Max	End				
22 March	0036	0040	0043	B3.9			578
	0103	0116	0123	B6.4			578
	0200	0213	0224	C1.3			
	0552	0553	0605		Sf	S04W01	574
	0609	0617	0658	C8.6	1f	S04W03	574
	0849	0859	0906	B8.3			578
	1206	1216	1224	B7.7			578
	1303	1308	1321	B7.3			578
	1714	1718	1720	B6.8			578
	1725	1732	1754	B7.0			578
23 March	1944	2000	2021	B5.4			578
	0036	0039	0051	C1.3	Sf	N14E19	578
	0705	0708	0747	C1.4	Sf	S03W15	574
	0851	0855	0859	B7.2			578
	1019	1022	1024	B3.4			578
24 March	1345	1349	1352	B3.9			577
	0413	0416	0420	B2.9			578
	0536	0544	0551	B4.4			
	1421	1426	1442	C5.7	Sf	N00W06	577
	1845	1851	1857	C1.5			582
25 March	2007	2018	2028	C7.4			582
	2127	2138	2148	C1.9			577
	2325	2327	2339	M1.5	Sf	N15E77	582
	0022	0027	0055	C1.1			582
	0206	0210	0213	B9.5			582
	0356	0401	0406	B9.9			582
	0412	0423	0427	C3.2			582
	0431	0435	0446	M2.3	Sf	N12E82	582
	0649	0653	0658		Sf	N15E73	
	0703	0714	0722	C6.1	Sf	N15E73	582
0912	0918	0925	B6.6			574	
1201	1212	1225	C3.7			577	
1503	1508	1512	C1.8			582	
1703	1706	1709	B4.7			582	
2039	2045	2049	B8.1			582	



Flare List – continued.

Date	Time			X-ray Class.	Optical		Rgn
	Begin	Max	End		Imp / Brtns	Location Lat CMD	
26 March	0758	0801	0804	B7.7			582
	1011	1016	1019	B9.6			
	1330	1333	1335	B7.3			582
	1743	1747	1751	B6.4			582
	2231	2236	2244	B6.4			582
	2314	2319	2326	B6.1			582
27 March	0022	0025	0030	B4.8			582
	0655	0655	0659	B6.7	Sf	N16E52	582
	0942	0949	0959	C1.3			586
	1246	1257	1309	C1.4			586
	1427	1432	1436	C1.9			586
	1616	1646	1655	C1.7			586
28 March	1931	1942	1950	C1.0			586
	0002	0008	0015	C1.0			582
	0346	0347	0402	C1.3	Sf	S13E48	585
	0438	0443	0447	C1.2			
	0631	0636	0641	B8.0			582
	1157	1244	1307	C1.8			582
	2151	2157	2202	B5.9			

Region Summary

Date	Location		Sunspot Characteristics				Flares		Optical					
	(° Lat ° CMD)	Helio Lon	Area (10 ⁻⁶ hemi)	Extent (helio)	Spot Class	Spot Count	Mag Class	X-ray			Optical			
							C	M	X	S	1	2	3	4

Region 573

12 Mar S14E71	225	0080	04	Hsx	001	A								
13 Mar S12E57	226	0070	02	Hax	002	A								
14 Mar S13E44	226	0050	02	Hax	002	A								
15 Mar S12E33	224	0030	01	Hax	002	A								
16 Mar S12E20	224	0020	04	Cso	004	B								
17 Mar S12E06	224	0010	03	Bxo	002	B								
18 Mar S12W07	224	0010	01	Axx	001	A								
19 Mar S12W22	226	0010	01	Axx	001	A								
20 Mar S12W35	226													
21 Mar S12W48	226													
22 Mar S12W61	226													
23 Mar S12W74	226													
24 Mar S12W87	226													

0 0 0 0 0 0 0 0

Crossed West Limb.

Absolute heliographic longitude:224



Region Summary - continued.

Date	Location		Sunspot Characteristics				Flares			X-ray				Optical			
	(° Lat ° CMD)	Helio Lon	Area (10 ⁻⁶ hemi)	Extent (helio)	Spot Class	Spot Count	Mag Class	C	M	X	S	1	2	3	4		
<i>Region 574</i>																	
16 Mar	S02E70	174	0040	05	Cso	004	B										
17 Mar	S02E56	174	0110	08	Dsi	018	Bg	3			3						
18 Mar	S02E43	174	0160	09	Dac	021	Bg	2	1		1		1				
19 Mar	S04E28	176	0140	10	Dac	020	Bg	2			3						
20 Mar	S04E14	177	0120	11	Esi	022	Bg										
21 Mar	S04E01	177	0100	11	Esi	020	Bg										
22 Mar	S03W13	178	0080	12	Eao	024	B	1			1		1				
23 Mar	S04W25	176	0130	12	Esc	033	Bg	1			1						
24 Mar	S04W40	178	0130	13	Eac	024	B										
25 Mar	S04W52	177	0140	12	Eao	017	Bg										
26 Mar	S04W65	177	0070	12	Eao	013	B										
27 Mar	S05W83	182	0010	01	Axx	001	A										
									9	1	0	9	1	1	0	0	

Still on Disk.

Absolute heliographic longitude: 177

<i>Region 575</i>																
17 Mar	S18W02	232	0010	03	Bxo	003	B									
18 Mar	S18W15	232	0020	04	Cao	004	B									
19 Mar	S15W25	229														
20 Mar	S15W38	229														
21 Mar	S15W51	229														
22 Mar	S15W64	229														
23 Mar	S15W77	229														
24 Mar	S15W90	229														
									0	0	0	0	0	0	0	0

Crossed West Limb.

Absolute heliographic longitude: 232



Region Summary - continued.

Date	Location		Sunspot Characteristics				Flares			X-ray				Optical			
	(° Lat ° CMD)	Helio Lon	Area (10 ⁻⁶ hemi)	Extent (helio)	Spot Class	Spot Count	Mag Class	C	M	X	S	1	2	3	4		

Region 577

17 Mar	S01E77	153	0060	02	Hsx	001	A								
18 Mar	N00E09	208	0040	02	Hax	001	A								
19 Mar	S01E52	152	0070	02	Hsx	001	A								
20 Mar	S01E39	152	0070	02	Hsx	001	A								
21 Mar	N00E27	151	0040	02	Hsx	001	A								
22 Mar	N00E13	152	0040	02	Hsx	001	A								
23 Mar	N00W01	152	0050	03	Cso	004	B								
24 Mar	S01W14	152	0060	04	Cso	004	B	2			1				
25 Mar	N00W25	150	0050	04	Cso	005	B	1							
26 Mar	N00W38	150	0060	06	Cso	006	B								
27 Mar	S02W54	153	0020	01	Hsx	001	A								
28 Mar	S03W68	153	0020	02	Hax	001	A								
								3	0	0	1	0	0	0	0

Still on Disk.

Absolute heliographic longitude:152

Region 578

18 Mar	N15E76	141	0060	02	Hax	002	A	6	1		3	1			
19 Mar	N15E60	144	0080	09	Dao	011	B	9			2				
20 Mar	N15E47	144	0160	10	Dsc	016	B	2			1				
21 Mar	N15E34	144	0180	12	Eao	014	B	3			3				
22 Mar	N16E20	145	0120	12	Eao	021	B								
23 Mar	N15E05	146	0190	16	Fsc	031	Bg	1			1				
24 Mar	N15W07	145	0190	15	Eao	027	B								
25 Mar	N15W21	146	0180	15	Eao	024	B								
26 Mar	N15W34	146	0150	14	Eao	018	Bg								
27 Mar	N15W47	146	0060	13	Eao	009	B								
28 Mar	N14W57	142	0020	01	Hsx	002	A								
								21	1	0	10	1	0	0	0

Still on Disk.

Absolute heliographic longitude:146



Region Summary - continued.

Date	Location		Sunspot Characteristics				Flares			X-ray				Optical			
	(° Lat ° CMD)	Helio Lon	Area (10 ⁻⁶ hemi)	Extent (helio)	Spot Class	Spot Count	Mag Class	C	M	X	S	1	2	3	4		

Region 579

22 Mar	S11E48	117	0020	01	Axx	001	A								
23 Mar	S13E35	116	0010	02	Bxo	002	B								
24 Mar	S13E22	116													
25 Mar	S13E07	118	0000	01	Axx	001	A								
26 Mar	S13W06	118													
27 Mar	S13W19	118													
28 Mar	S13W32	118													

0 0 0 0 0 0 0 0 0

Still on Disk.

Absolute heliographic longitude: 118

Region 580

24 Mar	S07W07	145	0010	01	Axx	003	A								
25 Mar	S06W21	146	0010	01	Hsx	002	A								
26 Mar	S06W34	146													
27 Mar	S06W47	146													
28 Mar	S06W60	146													

0 0 0 0 0 0 0 0 0

Still on Disk.

Absolute heliographic longitude: 145

Region 581

24 Mar	S03E81	057	0060	03	Hax	001	A								
25 Mar	S03E66	059	0100	02	Hsx	001	A								
26 Mar	S03E53	059	0140	05	Cso	004	B								
27 Mar	S04E39	060	0120	03	Hsx	001	A								
28 Mar	S03E24	061	0140	03	Hax	001	A								

0 0 0 0 0 0 0 0 0

Still on Disk.

Absolute heliographic longitude: 061



Region Summary - continued.

Date	Location		Sunspot Characteristics				Flares							
	(° Lat ° CMD)	Helio Lon	Area (10 ⁻⁶ hemi)	Extent (helio)	Spot Class	Spot Count	Mag Class	X-ray			Optical			
							C	M	X	S	1	2	3	4
<i>Region 582</i>														
24 Mar	N16E85	053					2	1		1				
25 Mar	N16E72	053	0170	09	Dsi	008	B	4	1		2			
26 Mar	N16E59	053	0250	09	Dai	009	Bg							
27 Mar	N14E45	054	0380	11	Eko	012	B			1				
28 Mar	N15E30	055	0390	09	Dki	023	B	2						
							7	2	0	4	0	0	0	0
Still on Disk.														
Absolute heliographic longitude:055														
<i>Region 583</i>														
27 Mar	N07W66	165	0010	07	Bxo	002	B							
28 Mar	N08W81	166	0040	05	Bxo	003	B							
							0	0	0	0	0	0	0	0
Still on Disk.														
Absolute heliographic longitude:165														
<i>Region 584</i>														
27 Mar	S13E21	078	0030	05	Cso	006	B							
28 Mar	S13E08	077	0030	06	Cao	004	B							
							0	0	0	0	0	0	0	0
Still on Disk.														
Absolute heliographic longitude:077														
<i>Region 585</i>														
27 Mar	S15E50	049	0050	07	Dso	005	B							
28 Mar	S14E40	045	0050	05	Dai	007	B	1		1				
							1	0	0	1	0	0	0	0
Still on Disk.														
Absolute heliographic longitude:045														
<i>Region 586</i>														
27 Mar	S18W80	179	0010	05	Bxo	002	B	5						
							5	0	0	0	0	0	0	0
Still on Disk.														
Absolute heliographic longitude:179														
<i>Region 587</i>														
28 Mar	S13E73	012	0110	08	Dai	004	B							
							0	0	0	0	0	0	0	0
Still on Disk.														
Absolute heliographic longitude:012														

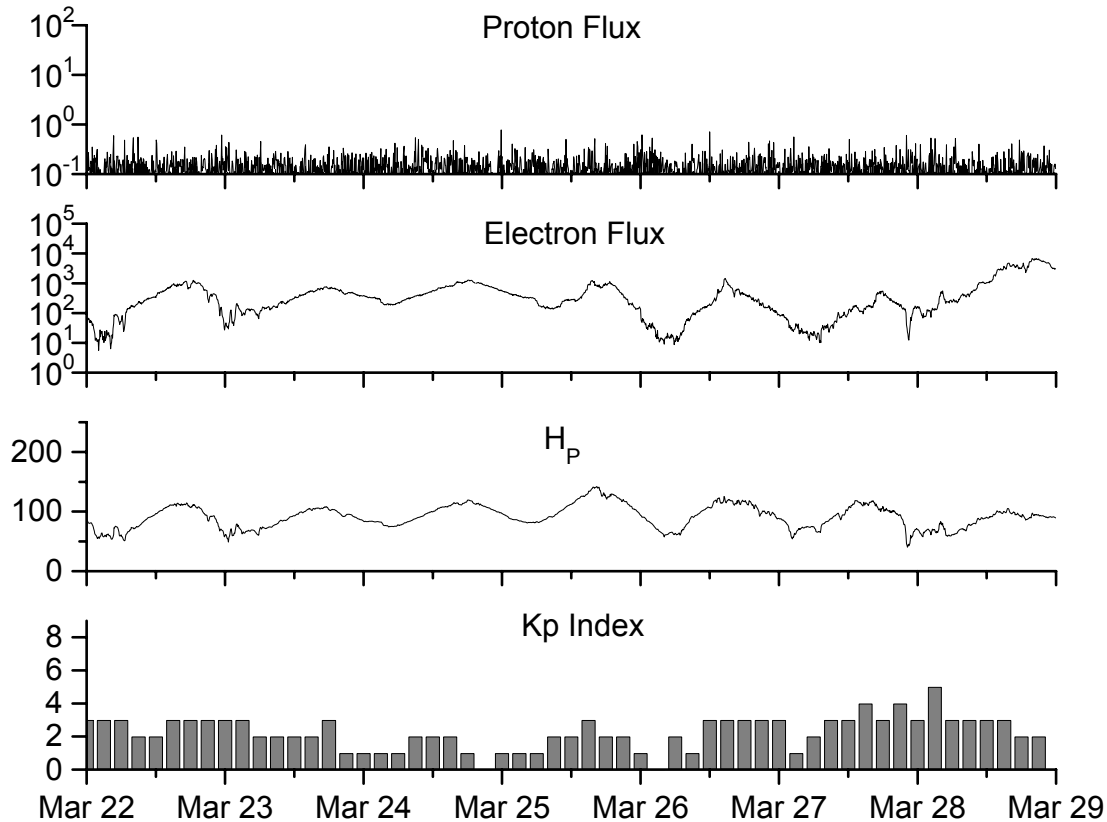


**Recent Solar Indices (preliminary)
of the observed monthly mean values**

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
2002									
March	153.1	98.4	0.64	188.9	113.3	180.3	195.7	10	12.9
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	99.6	0.54	175.4	102.7	173.5	176.3	11	13.7
August	191.0	116.4	0.61	169.2	98.7	183.9	169.5	16	14.2
September	206.4	109.6	0.53	163.4	94.6	175.8	164.1	14	15.0
October	153.9	97.5	0.63	158.8	90.5	167.0	159.4	23	15.6
November	159.8	95.5	0.60	150.9	85.2	168.7	154.8	16	16.3
December	147.9	80.8	0.55	144.6	82.1	158.6	150.9	13	17.0
2003									
January	149.3	79.7	0.53	141.7	81.0	144.0	149.2	13	18.2
February	87.0	46.0	0.53	136.4	78.5	124.5	144.7	17	18.9
March	119.7	61.1	0.51	128.1	74.2	132.2	139.5	21	19.4
April	119.7	60.0	0.50	121.5	70.3	126.3	136.3	20	20.0
May	89.6	55.2	0.62	118.3	67.8	129.3	135.0	26	21.0
June	118.4	77.4	0.65	113.6	65.2	129.4	132.6	24	21.8
July	132.8	85.0	0.64	106.9	62.0	127.8	129.5	20	22.3
August	114.3	72.7	0.64	102.8	60.3	122.1	127.5	23	22.4
September	82.6	48.8	0.59			112.3		19	
October	118.9	65.6	0.55			153.1		32	
November	118.9	67.2	0.57			153.1		31	
December	75.4	47.0	0.62			115.1		18	
2004									
January	62.3	37.2	0.60			114.1		20	
February	75.6	46.0	0.61			107.0		13	

NOTE: All smoothed values after September 2002 and monthly values after March 2003 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 23, RI= 120.8, occurred April 2000. *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 22 March 2004

Protons plot contains the five-minute averaged integral proton flux (protons/cm²-sec -sr) as measured by

GOES-11 (W99) for each of three energy thresholds: greater than 10, 50, and 100 MeV.

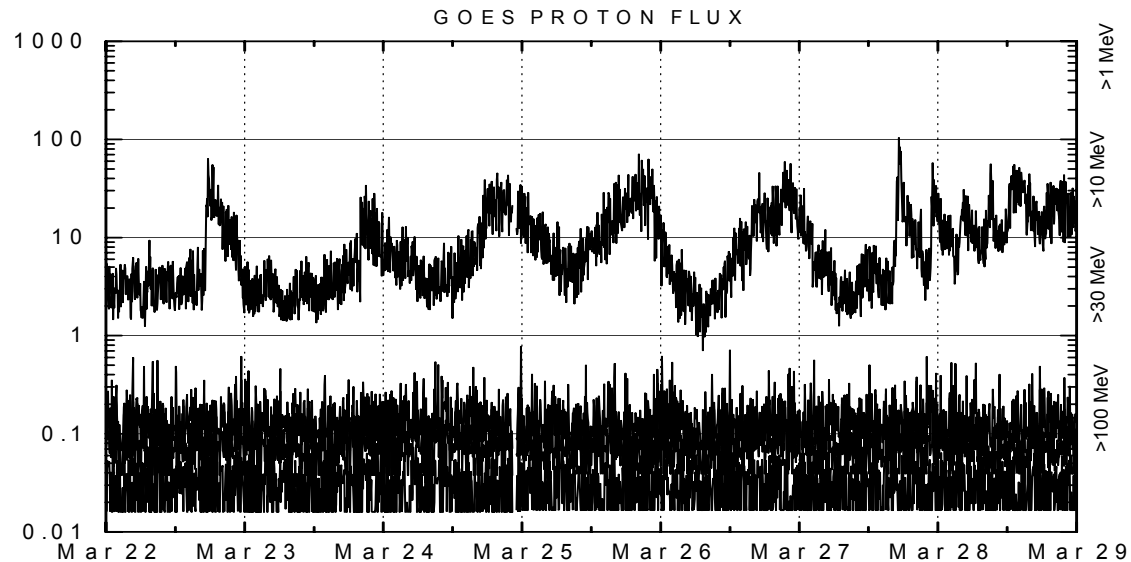
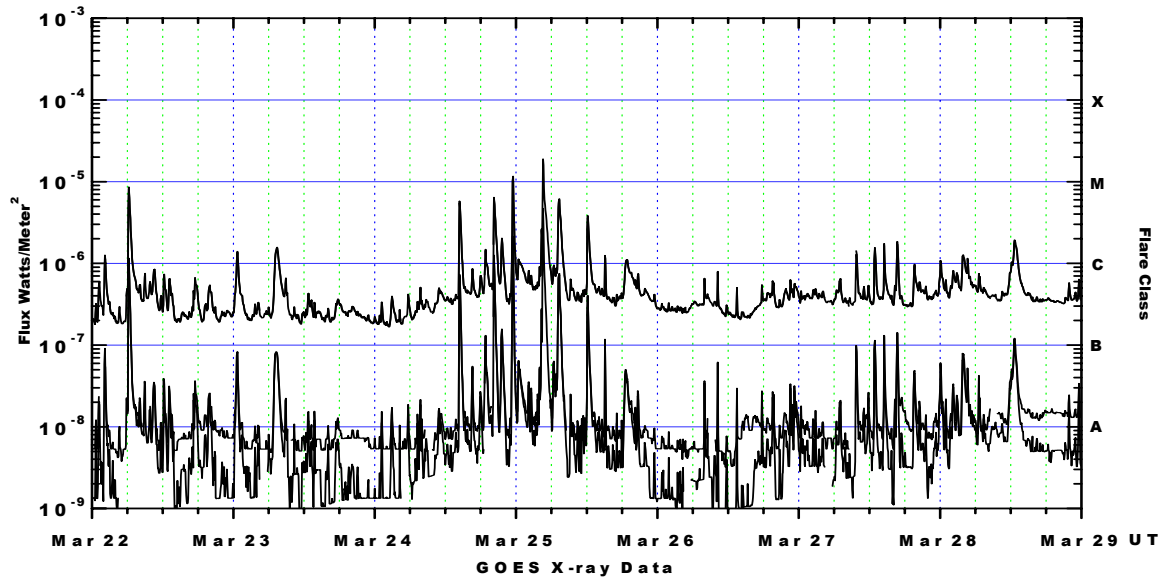
Electrons plot contains the five-minute averaged integral electron flux (electrons/cm²-sec -sr) with energies greater than 2 MeV at GOES-12 (W75).

H_p 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_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 12 (W75) and GOES 10 (W135) 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-11 (W99) 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.

