

Space Weather Highlights **21 – 27 March 2005**

SWO PRF 1543
29 March 2005

Solar activity ranged from very low to low. Two low-level C-class flares were observed from Region 745 (N12, L=345, class/area, Dai/190 on 25 March), one each on 21 and 24 March. The largest region on the disk, Region 743 (S08, L=124, class/area, Dki/390 on 19 March) quietly rotated around the west limb on 22 March. The remainder of the disk and limb were quiet and stable.

Solar wind data were available from the NASA Advanced Composition Explorer (ACE) spacecraft during most of the summary period. The period began on 21 March with solar wind speed near 320 km/s and the IMF Bz weakly south at -3 nT. By 21/0700 UTC, wind speed rapidly rose to near 500 km/s and the IMF Bz began fluctuating north and south +/- 5 nT as a small coronal hole rotated into a geoeffective position. Wind speed maxed at near 640 km/s by 0900 UTC and began a gradual decrease in speed shortly after. By early on 22 March, speed declined to near 350 km/s and the IMF was mostly northward +3 to +5 nT. These conditions persisted through midday on the 24th. By 1030 UTC on 24 March, the IMF Bz began to oscillate through +/- 6 nT while temperature and wind speed increased, all indicative of a co-rotating interactive region (CIR) and a high speed coronal hole wind stream. By around 1700 UTC on 25 March, wind speed hit a maximum of near 725 km/s and the IMF Bz was fluctuating north and south +13 and - 11 nT. By late on the 25th, the IMF relaxed and did not vary much beyond +/- 3 nT through the remainder of the summary period. During the same interval, the solar wind indicated a gradual decline in speed and ended the summary period near 530 km/s.

No greater than 10 MeV proton events were observed this period.

The greater than 2 MeV electron flux at geosynchronous orbit reached high levels on 26 and 27 March.

The geomagnetic field ranged from quiet to minor storm levels at lower latitudes with minor to severe storm periods at the higher latitudes. The period began on 21 March with quiet conditions. By midday on the 21st, activity levels increased to unsettled to active with major storming at high latitudes as a weak coronal hole rotated into a geoeffective position. Activity was short-lived as conditions returned to quiet levels by late on 21 March. These conditions persisted through midday on 24 March when activity levels gradually increased to quiet to unsettled as a large, recurrent, northern coronal hole began to rotate into a geoeffective position. By 0600 UTC on the 25th, activity levels increased to active to minor storming. By midday on the 26th, the higher latitudes experienced major to severe storming. The reporting period ended with quiet to active conditions at middle latitudes with quiet to minor storming at higher latitudes.

Space Weather Outlook **30 March – 25 April 2005**

Solar activity is expected to be at very low to low levels.

A greater than 10 MeV proton event is not expected.

The greater than 2 MeV electron flux at geosynchronous orbit is expected to be at high levels on 30 – 31 March, 03 – 08 April and again on 22 – 25 April.

The geomagnetic field is expected to range from quiet to major storm levels. A large, recurrent coronal hole high speed wind stream is expected to produce active to minor storm levels with occasional major storm periods on 02 – 05 April. On 21 – 23 April, a small coronal hole is expected to produce unsettled to active conditions. Otherwise, expect quiet to unsettled 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
21 March	90	53	330	A6.2	1	0	0	2	0	0	0	0
22 March	87	49	360	A6.9	0	0	0	0	0	0	0	0
23 March	88	56	220	A7.5	0	0	0	1	0	0	0	0
24 March	87	57	170	A5.8	1	0	0	1	0	0	0	0
25 March	82	65	290	A3.7	0	0	0	1	0	0	0	0
26 March	78	41	140	A3.1	0	0	0	0	0	0	0	0
27 March	78	35	120	A3.3	0	0	0	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
	21 March	3.2E+5	1.3E+4	3.0E+3		2.3E+7
22 March	4.6E+5	1.3E+4	2.9E+3		3.0E+7	
23 March	6.9E+5	1.5E+4	3.0E+3		2.5E+7	
24 March	3.2E+5	1.4E+4	3.3E+3		1.0E+6	
25 March	3.8E+5	1.4E+4	3.1E+3		1.6E+6	
26 March	2.9E+6	1.3E+4	2.9E+3		5.2E+7	
27 March	9.8E+5	1.3E+4	2.9E+3		1.2E+8	

Daily Geomagnetic Data

Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
	21 March	5	0-0-2-3-3-1-0-1	21	0-0-1-6-6-1-1-0	8
22 March	2	1-0-0-0-1-1-1-2	0	0-0-0-0-0-0-0-0	3	0-0-1-0-1-1-1-2
23 March	3	0-0-0-0-2-1-2-2	2	1-0-0-0-1-1-2-0	4	1-0-0-0-1-1-2-2
24 March	4	0-1-0-0-3-2-1-1	5	0-0-0-3-3-2-1-1	6	0-1-1-1-3-2-2-2
25 March	15	1-3-4-2-4-3-2-3	22	1-3-5-3-5-4-3-2	18	1-4-5-3-3-3-2-3
26 March	12	1-4-3-3-3-2-2-1	43	2-2-6-7-6-3-2-2	16	2-4-4-4-3-2-2-2
27 March	8	2-1-3-2-2-2-2-2	24	3-2-4-5-5-4-3-2	13	2-1-4-3-3-3-3-2

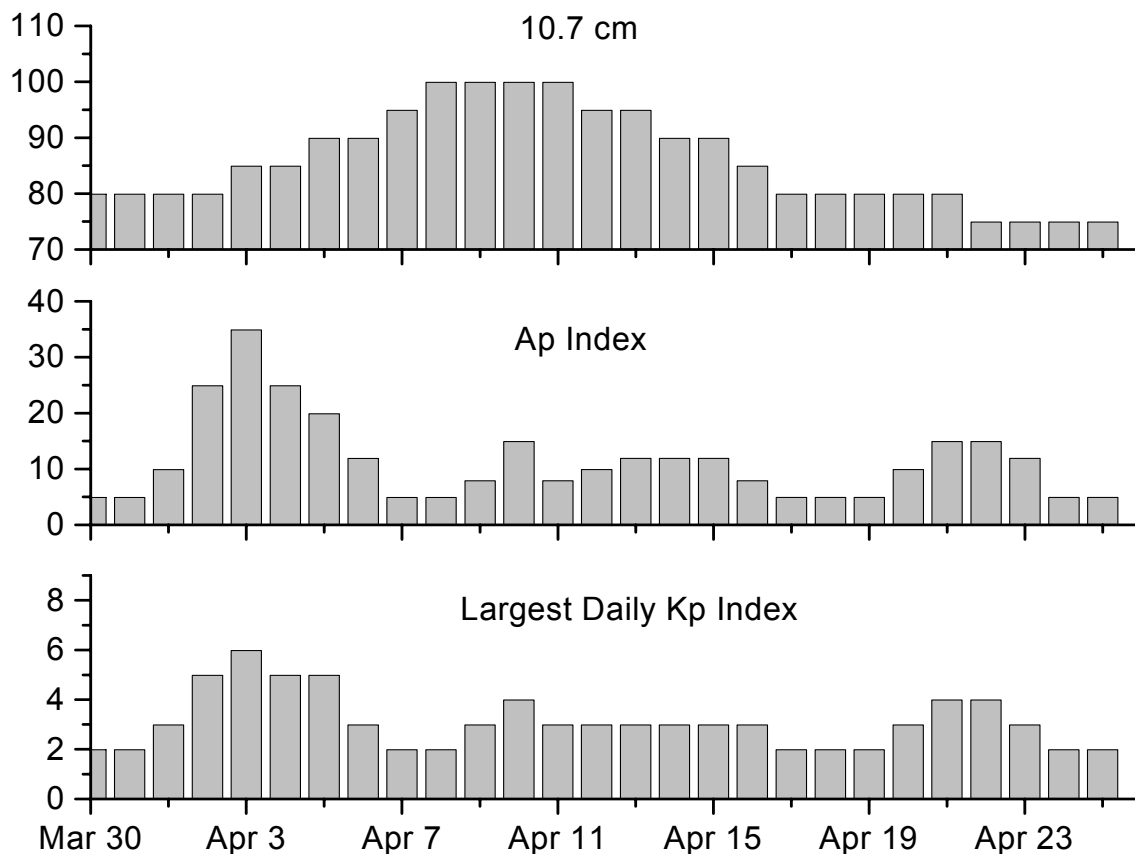


Alerts and Warnings Issued

<u>Date & Time of Issue</u>	<u>Type of Alert or Warning</u>	<u>Date & Time of Event UTC</u>
21 Mar 0006	245 MHz Radio Burst	20 Mar
21 Mar 1317	WARNING: Geomagnetic K= 4	21 Mar 1317 – 1600
21 Mar 1336	ALERT: Geomagnetic K= 4	21 Mar 1335
21 Mar 1457	WARNING: Geomagnetic K= 5	21 Mar 1456 – 2359
25 Mar 0453	WARNING: Geomagnetic K= 4	25 Mar 0453 – 1600
25 Mar 0501	ALERT: Geomagnetic K= 4	25 Mar 0500
25 Mar 1556	EXTENDED WARNING: Geomagnetic K= 4	25 Mar 0453 – 2359
26 Mar 0403	WARNING: Geomagnetic K= 4	26 Mar 0403 – 1600
26 Mar 0405	ALERT: Geomagnetic K= 4	26 Mar 0403
26 Mar 1154	ALERT: Electron 2MeV Integral Flux \geq 1000pfu	26 Mar 1135
26 Mar 1455	EXTENDED WARNING: Geomagnetic K= 4	26 Mar 0403 – 2359
27 Mar 0714	WARNING: Geomagnetic K= 4	27 Mar 0715 – 1600
27 Mar 0721	ALERT: Geomagnetic K= 4	27 Mar 0720
27 Mar 1222	ALERT: Electron 2MeV Integral Flux \geq 1000pfu	27 Mar 1200



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
30 Mar	80	5	2	13 Apr	95	12	3
31	80	5	2	14	90	12	3
01 Apr	80	10	3	15	90	12	3
02	80	25	5	16	85	8	3
03	85	30	6	17	80	5	2
04	85	25	5	18	80	5	2
05	90	20	5	19	80	5	2
06	90	12	3	20	80	10	3
07	85	5	2	21	80	15	4
08	100	5	2	22	75	15	4
09	100	8	3	23	75	12	3
10	100	15	4	24	75	5	2
11	100	8	3	25	75	5	2
12	95	10	3				



Energetic Events

Date	Time		X-ray	Optical Information			Peak		Sweep Freq	
	Begin	Max	Integ	Imp/	Location	Rgn	Radio Flux		Intensity	
			Class	Flux	Lat	CMD	#	245	2695	II

No Events Observed

Flare List

Date	Time			Optical	Imp / Brtns	Location Lat CMD	Rgn
	Begin	Max	End	X-ray Class.			
21 March	0234	0244	0251	B2.0			743
	0336	0344	0350	B5.5			
	0647	0651	0659	B1.0			
	0659	0708	0721	B2.4			743
	0747	0748	0752	B1.9	Sf	S08W88	743
	0801	0805	0813	B1.9			743
	0836	0837	0841	B3.9	Sf	S08W77	743
	1116	1123	1138	B1.5			743
	1229	1235	1237	B2.4			
	1307	1323	1328	B1.8			743
	1357	1403	1408	B1.5			743
	1540	1547	1552	C2.7			745
	2057	2100	2106	B1.5			
	22 March	0006	0010	0015	B1.5		
0111		0115	0118	B1.4			743
2106		2114	2118	B4.9			743
2217		2221	2223	B1.2			745
23 March	B0251	0252	0255		Sf	N13E42	745
	0307	0313	0317	B1.7			745
	0426	0431	0437	B2.8			
	0505	0515	0521	B1.6			
	0636	0643	0654	B3.6			745
	1332	1337	1344	B2.6			745
	1421	1429	1441	B4.6			745
	2111	2114	2117	B1.3			744
24 March	2228	2232	2236	B1.3			745
	0206	0209	0212	B1.0			
	0858	0901	0904	B1.1			
	0908	0911	0914	B1.3			
	1019	1031	1043	B3.5			745
	1109	1117	1124	B3.8			745
	1759	1804	1808	B1.8			744
	1917	1922	1928	B1.3			744
	2041	2045	2055	B1.1			
	2221	2239	2255	B1.8			
	2340	2344	2355	C1.0	Sf	N09E18	745
25 March	0742	0742	0750	B2.8	Sf	N13E12	745
	1232	1237	1243	B1.4			



Flare List – continued.

Date	Time			Optical	Imp / Brtns	Location		Rgn
	Begin	Max	End	X-ray Class.		Lat	CMD	
26 March	No Flares Observed							
27 March	No Flares Observed							

Region Summary

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 743</i>																						
09 Mar	S09E76	122	0240	03	Hkx	001	A															
10 Mar	S07E63	121	0180	03	Hax	001	A															
11 Mar	S07E50	121	0190	04	Hsx	001	A															
12 Mar	S08E36	123	0260	04	Hhx	002	A															
13 Mar	S07E24	122	0250	05	Hkx	003	A															
14 Mar	S07E10	123	0250	04	Hhx	001	A															
15 Mar	S08W04	124	0290	05	Hkx	005	A															
16 Mar	S08W17	123	0320	06	Cko	007	B															
17 Mar	S08W31	124	0300	06	Cko	007	B															
18 Mar	S08W44	124	0300	06	Dhi	014	Bg	1				1										
19 Mar	S08W57	124	0390	08	Dki	020	Bg	1				1										
20 Mar	S08W70	124	0310	07	Dao	012	Bg	2				1										
21 Mar	S08W84	124	0210	07	Cso	005	Bg					2										
22 Mar	S08W96	123	0180	05	Hkx	001	A															
								4	0	0	0	5	0	0	0	0	0	0				

Crossed West Limb.

Absolute heliographic longitude:124

Region 744

20 Mar	S12E01	053	0060	05	Dso	007	B													
21 Mar	S12W13	053	0100	07	Dao	014	B													
22 Mar	S13W26	053	0070	06	Dso	011	B													
23 Mar	S13W40	054	0100	05	Cao	007	B													
24 Mar	S13W53	054	0030	02	Hsx	001	A													
25 Mar	S14W68	056	0020	01	Axx	002	A													
26 Mar	S14W81	056																		
27 Mar	S14W94	056																		
								0	0	0	0	0	0	0	0	0	0	0		

Still on Disk.

Absolute heliographic longitude:053



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 745</i>																		
21 Mar	N12E54	346	0020	03	Bxo	004	B	1										
22 Mar	N12E43	344	0110	07	Cao	007	B											
23 Mar	N12E30	344	0090	08	Dao	017	B					1						
24 Mar	N12E15	346	0100	09	Dai	020	B	1				1						
25 Mar	N12E03	345	0190	09	Dai	022	B					1						
26 Mar	N12W11	346	0090	10	Dao	008	B											
27 Mar	N12W24	345	0090	09	Cao	007	B											
								2	0	0	0	3	0	0	0	0	0	0
Still on Disk.																		
Absolute heliographic longitude:345																		
<i>Region 746</i>																		
23 Mar	S11E07	007	0030	03	Cao	002	B											
24 Mar	S11W06	007	0040	05	Dso	006	B											
25 Mar	S12W21	009	0080	06	Dao	011	B											
26 Mar	S12W35	010	0050	06	Dao	013	B											
27 Mar	S11W47	008	0030	04	Dso	008	B											
								0	0	0	0	0	0	0	0	0	0	0
Still on Disk.																		
Absolute heliographic longitude:007																		

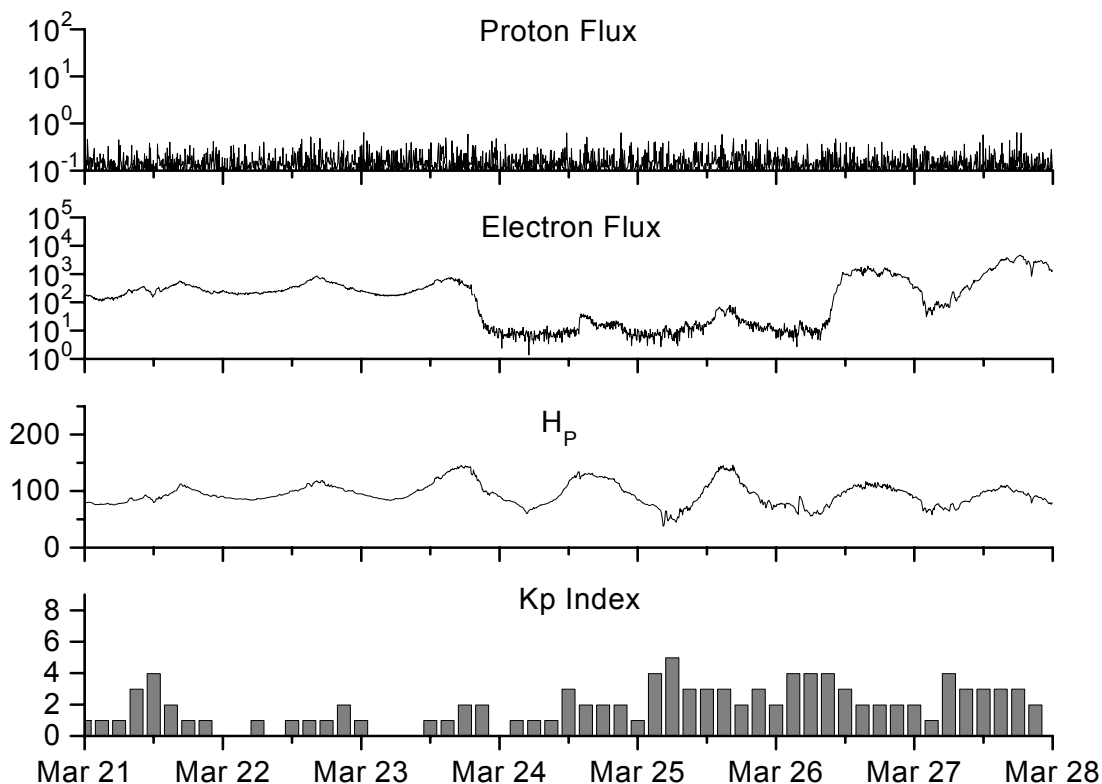


**Recent Solar Indices (preliminary)
of the observed monthly mean values**

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
2003									
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	135.0	20	20.1
May	89.6	55.2	0.62	118.3	67.8	129.3	133.1	26	21.0
June	118.4	77.4	0.65	113.6	65.2	129.4	130.2	24	21.5
July	132.8	85.0	0.64	106.9	62.0	127.8	127.2	19	22.0
August	114.3	72.7	0.64	102.8	60.3	122.1	125.2	23	22.2
September	82.6	48.8	0.59	100.7	59.8	112.3	123.7	18	21.8
October	118.9	65.5	0.55	96.6	58.4	153.1	121.8	35	21.1
November	118.9	67.3	0.57	93.6	57.0	153.1	120.1	28	20.0
December	75.4	46.5	0.62	91.4	55.0	115.1	118.0	16	18.6
2004									
January	62.3	37.7	0.61	87.9	52.0	114.1	116.3	22	18.1
February	75.6	45.8	0.61	84.2	49.4	107.0	115.5	13	17.7
March	81.0	49.1	0.61	80.9	47.2	112.2	114.6	14	16.9
April	59.3	39.3	0.66	77.9	45.6	101.2	112.3	11	15.5
May	77.3	41.5	0.54	74.1	43.9	99.8	109.2	8	14.3
June	78.9	43.2	0.55	70.4	41.7	97.4	107.2	8	14.0
July	87.8	51.0	0.58	68.3	40.2	118.5	105.9	23	13.8
August	69.5	40.9	0.59	66.6	39.3	110.1	105.0	11	13.8
September	50.0	27.7	0.55			103.1		10	
October	77.9	48.4	0.62			105.7		9	
November	70.5	43.7	0.62			113.2		26	
December	34.7	17.9	0.52			94.6		11	
2005									
January	52.0	31.3	0.60			102.4		22	
February	45.4	29.1	0.64			97.3		11	

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 21 March 2005*

Protons plot contains the five-minute averaged integral proton flux (protons/cm²-sec -sr) as measured by GOES-11 (W110) for each of three energy thresholds: greater than 10, 50, and 100 MeV.

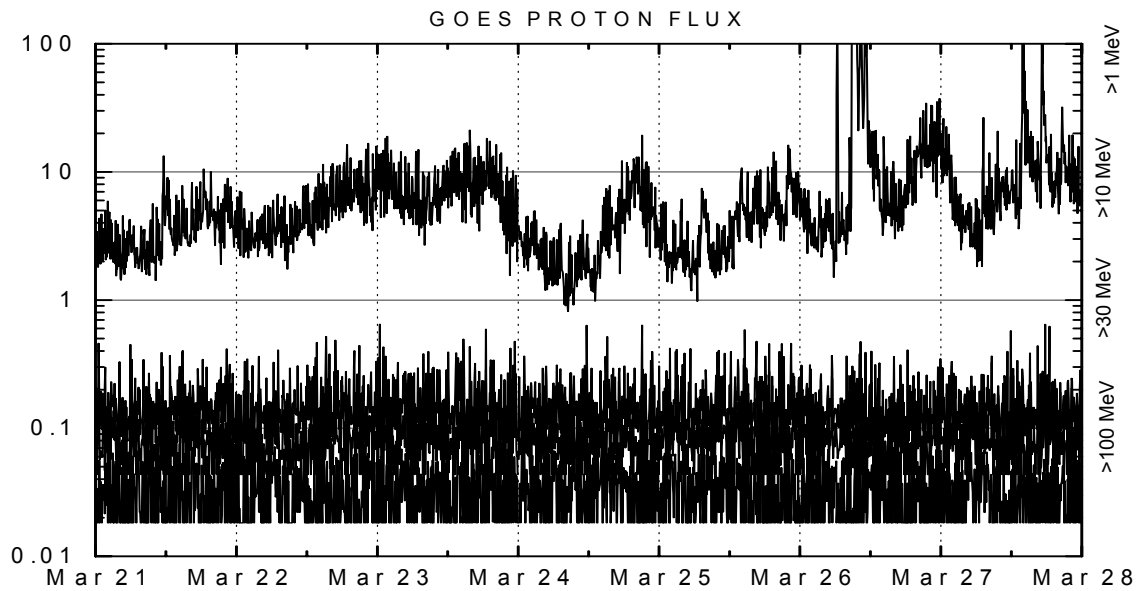
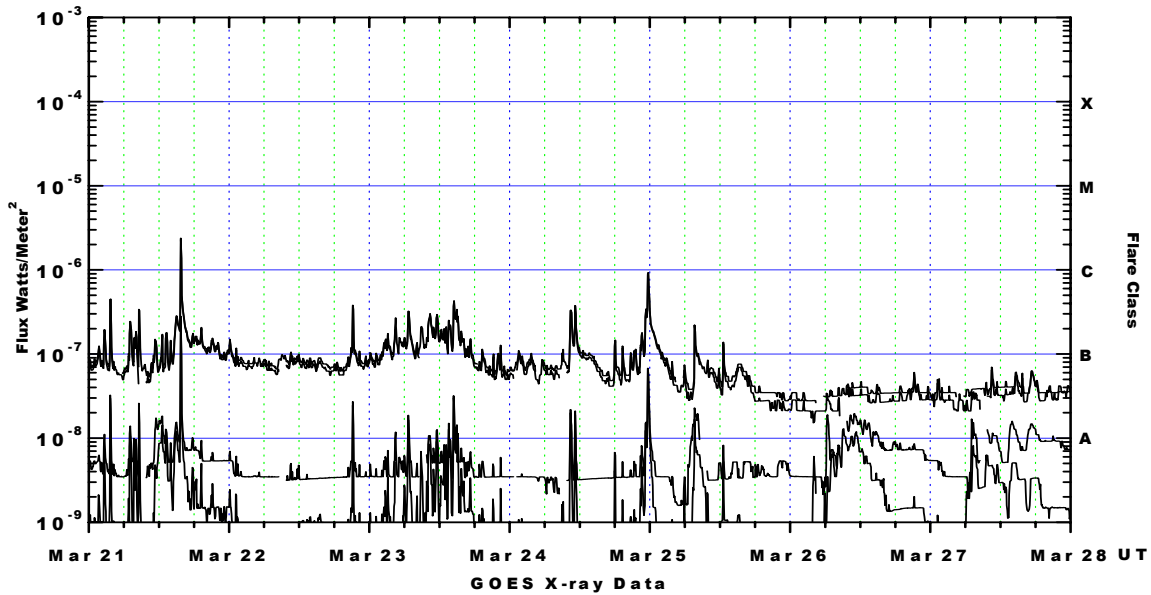
Electrons plot contains the five-minute averaged integral electron flux (electrons/cm²-sec -sr) with energies greater than 2 MeV at GOES-12 (W75).

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 Hartland, UK. These data are made available through cooperation from the Geological Survey of Canada (GSC), British Geological Survey (BGS) 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 parallel 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 (W76) 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 (W110) 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.

