

## Space Weather Highlights 14 - 20 March 2005

SWO PRF 1542  
22 March 2005

Solar activity ranged from very low to low. On 14 and 15 March, solar activity reached low levels with a C1 flare at 14/0708 UTC and a C2 flare at 15/0647 UTC. Both of these flares were produced from Region 741 (N10, L=200, class/area, Dso/100 on 15 March). Region 741 rotated around the West limb on 16 March. On 15 and 16 March, conditions were very low. Activity increased again on 17 through 20 March to low levels. Region 743 (S08, L=124, class/area, Dki/390 on 19 March) produced four low-level C-class events during these three days. A C2.3 flare occurred from region 743 at 19/0707 UTC with a Type II radio sweep (estimated shock velocity 413 km/s); however, the associated CME was not expected to be geoeffective. The largest flare of the period was a C4.1 produced from Region 742 (S06, L=156, class/area, Eao/350 on 16 March) at 20/0159 UTC.

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 speed near 360 km/s. Solar wind speed began to rise on the 14th to around 400 km/s. Plasma density and IMF total magnetic field rose following a solar sector boundary (SSB) crossing and a weak coronal hole high speed stream (HSS). A gradual decline in solar wind measurements began on 15 March and continued until approximately midday on the 16th when another SSB crossing occurred. Solar wind speed began increasing to a maximum of approximately 490 km/s on the 19th. About midday on 18 March, Bz was fluctuating between +/- 10 nT, but the range soon decreased to +/- 5 nT by 19 March. After 18 March, solar wind speed began decreasing and ended the period near 330 km/s.

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

The greater than 2 MeV electron flux at geosynchronous orbit was below event threshold the entire reporting period.

The geomagnetic field ranged from quiet to minor storm levels at lower latitudes with minor to major storm periods at the higher latitudes. The period began on 14 March with quiet to minor storm levels at lower latitudes and minor to major storm periods at high latitudes. Heightened activity was due to a SSB crossing followed by a weak HSS. On 15 March, conditions were quiet. On 16, 18, and 20 March, conditions were quiet to unsettled. On 17 March, conditions were quiet to active with an isolated minor storm period at high latitudes due to the presence of another weak geoeffective HSS. Conditions were quiet to active, with an isolated minor storm period on 19 March due to the continued presence of the weak HSS and periods of prolonged southward Bz early in the UTC day.

## Space Weather Outlook 23 March - 18 April 2005

Solar activity is expected to be at very low to low levels. A region on the far side of the sun produced a CME at 21/1448 UTC. This region may increase activity levels when it rotates into view on approximately 24 – 25 March.

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 27 – 30 March, and 03 – 08 April.

The geomagnetic field is expected to range from quiet to minor storm levels. Coronal hole high speed wind streams are expected to produce unsettled to active levels with occasional minor storm periods on 26 – 29 March, 02 – 06 April, and again on 10 April. Quiet to active conditions are expected on 12 – 13 April due to a weak HSS. Otherwise, expect quiet to unsettled conditions.



### *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
14 March	112	49	640	B1.6	1	0	0	1	0	0	0	0
15 March	108	58	720	B1.4	1	0	0	1	0	0	0	0
16 March	105	45	670	B1.4	0	0	0	1	0	0	0	0
17 March	101	35	540	B1.4	0	0	0	2	0	0	0	0
18 March	96	37	600	B1.6	1	0	0	1	0	0	0	0
19 March	93	41	640	B1.4	2	0	0	1	0	0	0	0
20 March	89	39	370	A7.7	3	0	0	1	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
	14 March	6.1E+5	1.5E+4	3.2E+3		1.4E+7
15 March	3.5E+5	1.5E+4	3.2E+3		1.0E+7	
16 March	3.4E+5	1.4E+4	3.4E+3		1.8E+7	
17 March	4.8E+5	1.4E+4	3.1E+3		3.0E+6	
18 March	6.4E+5	1.4E+4	3.1E+3		4.6E+6	
19 March	4.3E+5	1.4E+4	2.9E+3		1.6E+7	
20 March	3.0E+5	1.4E+4	3.0E+3		2.2E+7	

### *Daily Geomagnetic Data*

Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
	14 March	12	4-3-2-3-3-2-2-1	30	3-5-4-5-6-3-2-1	21
15 March	3	1-1-1-0-1-1-1-1	2	1-1-1-0-1-0-0-1	4	2-1-1-1-1-1-1-1
16 March	4	1-0-0-1-3-2-1-1	6	0-0-0-1-4-3-1-1	6	0-0-1-1-3-2-2-2
17 March	8	2-2-2-2-2-3-2-1	25	3-4-4-6-3-4-2-1	12	3-3-2-4-2-3-2-2
18 March	6	0-1-2-2-0-1-3-3	9	1-1-1-4-1-2-3-2	9	1-1-2-3-1-3-3-3
19 March	9	4-4-2-1-1-0-0-1	12	3-3-3-4-4-0-0-0	14	5-4-2-2-2-1-1-1
20 March	4	0-3-1-1-1-0-1-1	5	0-0-1-3-3-1-1-0	5	1-2-1-2-2-1-1-1

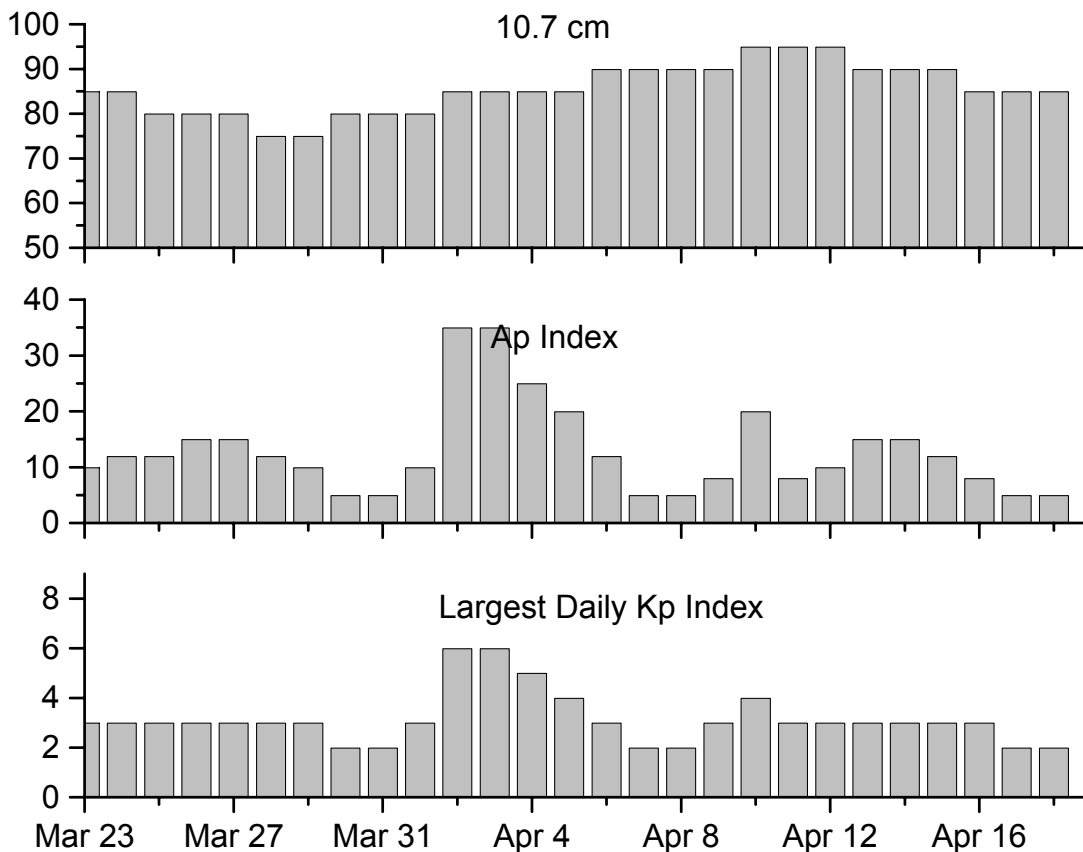


### *Alerts and Warnings Issued*

<u>Date &amp; Time of Issue</u>	<u>Type of Alert or Warning</u>	<u>Date &amp; Time of Event UTC</u>
14 Mar 0209	ALERT: Geomagnetic K= 4	14 Mar 0205
14 Mar 0236	WARNING: Geomagnetic K= 4	14 Mar 0237 -1500
14 Mar 0243	ALERT: Geomagnetic K= 5	14 Mar 0240
15 Mar 0014	2 – 245 MHz Radio Bursts	14 Mar
15 Mar 0014	1 – 245 MHz Radio Noise Storm	14 Mar
16 Mar 0006	7 – 245 MHz Radio Bursts	15 Mar
16 Mar 0006	1 – 245 MHz Radio Noise Storm	15 Mar
17 Mar 0006	6 – 245 MHz Radio Bursts	16 Mar
17 Mar 0006	1 – 245 MHz Radio Noise Storm	16 Mar
17 Mar 0445	WARNING: Geomagnetic K= 4	17 Mar 0445 - 1500
17 Mar 0452	ALERT: Geomagnetic K= 4	17 Mar 0450
18 Mar 0014	5 – 245 MHz Radio Bursts	17 Mar
18 Mar 0014	1 – 245 MHz Radio Noise Storm	17 Mar
19 Mar 0237	WARNING: Geomagnetic K= 4	19 Mar 0237 –20 Mar 1600
19 Mar 0239	ALERT: Geomagnetic K-index of 4	19 Mar 0238
19 Mar 0251	ALERT: Geomagnetic K-index of 5	19 Mar 0249
19 Mar 0759	ALERT: Type II Radio Emission	19 Mar 0707



### 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
23 Mar	85	10	3	06 Apr	90	12	3
24	85	12	3	07	90	5	2
25	80	12	3	08	90	5	2
26	80	15	3	09	90	8	3
27	80	15	3	10	95	20	4
28	75	12	3	11	95	8	3
29	75	10	3	12	95	10	3
30	80	5	2	13	90	15	3
31	80	5	2	14	90	15	3
01 Apr	80	10	3	15	90	12	3
02	85	35	6	16	85	8	3
03	85	35	6	17	85	5	2
04	85	25	5	18	85	5	2
05	85	20	4				



### *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	Rgn
	Begin	Max	End	X-ray Class.		Lat	
14 March	0238	0242	0244	B3.9			741
	0418	0426	0436	B6.1	Sf	S06W14	742
	0651	0708	0725	C1.0			741
	1259	1304	1310	B9.8			742
15 March	0354	0411	0437	B4.0			
	0546	0554	0608	B3.7			
	0645	0647	0651	C2.0	Sf	N12W65	741
16 March	1602	1614	1623	B5.5			741
	0522	0528	0532	B4.2			
	0741	0744	0748	B1.9			
	1205	1208	1210	B3.5			742
	1217	1221	1223	B5.1			742
	1242	1245	1247	B3.1			742
	1318	1322	1332	B3.0			742
	1542	1547	1554	B3.8			742
	1947	1953	1959	B5.9			742
	2029	2034	2036	B5.3			742
	2049	2053	2056	B3.6			742
	2313	2313	2318	B9.8	Sf	S06W52	742
17 March	0101	0106	0111	B6.0			742
	0201	0204	0207	B3.4			
	0244	0250	0257	B3.7			
	0501	0506	0524	B8.3	Sf	S06W55	742
	0642	0645	0656	B6.4	Sf	S06W56	742
	0901	0910	0921	B4.4			743
	1649	1657	1700	B4.4			
	1916	1924	1933	B3.7			742
18 March	B0235	0235	0241	C1.3	Sf	S08W34	743
	0341	0349	0359	B5.3			743
	1237	1243	1250	B4.9			743
	1306	1310	1314	B5.8			
	1314	1323	1327	B8.7			743
	1511	1514	1516	B3.2			743
	1558	1602	1607	B2.8			743
	1622	1626	1630	B3.0			743
1922	1932	1938	B4.1			743	
19 March	0243	0248	0252	B3.5			743



**Flare List – continued.**

Date	Time			Optical X-ray Class.	Imp / Brtns	Location Lat CMD	Rgn
	Begin	Max	End				
19 March	0410	0413	0417	B3.5			742
	0429	0441	0447	B6.6			
	0700	0707	0713	C2.3	Sf	S08W48	743
	0754	0758	0801	B3.9			742
	1718	1722	1726	B1.9			743
	1746	1801	1807	B8.2			743
	1939	1946	1955	B2.5			742
	2012	2023	2032	C2.2			742
	2317	2323	2331	B3.1			743
20 March	0132	0159	0208	C4.1			742
	0353	0359	0402	B4.6			743
	0613	0614	0619	C1.2	Sf	S08W62	743
	1142	1152	1154	C2.1			743
	1920	1926	1933	B1.3			743

**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 739</i>																		
26 Feb	S04E52	291	0030	05	Bxo	004	B											
27 Feb	S04E38	292	0020	01	Axx	002	A											
28 Feb	S04E21	295	0000	01	Axx	001	A											
01 Mar	S03E10	293	0010	01	Axx	001	A											
02 Mar	S03W03	293	0000	00		000												
03 Mar	S03W16	293	0010	03	Bxo	002	B											
04 Mar	S03W29	293																
05 Mar	S03W42	293																
06 Mar	S03W55	293																
07 Mar	S04W67	291	0020	05	Bxo	004	B											
08 Mar	S07W81	292	0040	06	Axx	003	A											
09 Mar	S08W92	290	0090	02	Bxo	002	B											
								0	0	0	0	0	0	0	0	0	0	

Crossed West Limb.

Absolute heliographic longitude: 293



**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

*Region 740*

02 Mar	S07W24	314	0020	01	Hsx	001	A											
03 Mar	S07W37	314	0010	01	Axx	002	A											
04 Mar	S07W50	314																
05 Mar	S07W63	314																
06 Mar	S07W76	314																
07 Mar	S07W89	314																

0 0 0 0 0 0 0 0

Crossed West Limb.

Absolute heliographic longitude: 314

*Region 741*

04 Mar	N12E70	194	0110	05	Cao	003	B											
05 Mar	N12E57	193	0110	08	Cao	012	B	1										
06 Mar	N12E44	193	0080	07	Dao	012	B				1							
07 Mar	N13E30	194	0060	05	Cao	007	B											
08 Mar	N14E17	194	0040	06	Cao	008	B											
09 Mar	N12E03	195	0060	06	Dsi	017	B	1			3							
10 Mar	N13W11	195	0100	05	Cai	015	B	1										
11 Mar	N12W26	197	0110	07	Cai	008	B	1										
12 Mar	N12W41	200	0030	06	Cso	005	Bg	1										
13 Mar	N12W57	203	0060	06	Dao	007	B	3										

8 0 0 4 0 0 0 0

Still on Disk.

Absolute heliographic longitude: 195

*Region 742*

07 Mar	S05E67	157	0060	03	Hax	002	A											
08 Mar	S06E56	155	0080	12	Bxo	011	B											
09 Mar	S06E43	155	0170	11	Eai	017	B											
10 Mar	S05E31	153	0190	11	Eai	024	B											
11 Mar	S05E17	154	0190	12	Eai	020	B											
12 Mar	S06E03	156	0240	10	Dac	030	B											
13 Mar	S05W12	158	0340	12	Eai	037	B	2			1							

2 0 0 1 0 0 0 0

Still on Disk.

Absolute heliographic longitude: 156



***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

*Region 743*

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											
										0	0	0	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 122



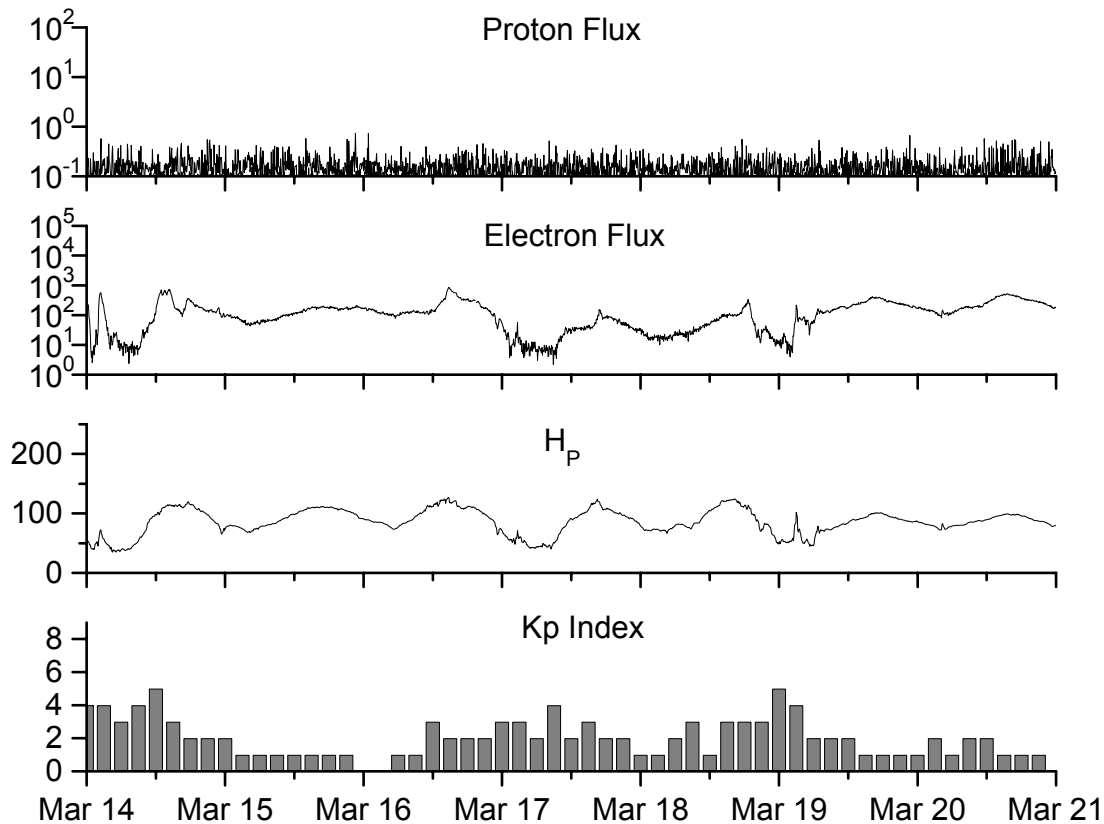


**Recent Solar Indices (preliminary)  
of the observed monthly mean values**

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
<b>2003</b>									
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
<b>2004</b>									
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	
<b>2005</b>									
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 14 March 2005*

*Protons* plot contains the five-minute averaged integral proton flux (protons/cm<sup>2</sup>-sec-sr) as measured by GOES-11 (W110) for each of three energy thresholds: greater than 10, 50, and 100 MeV.

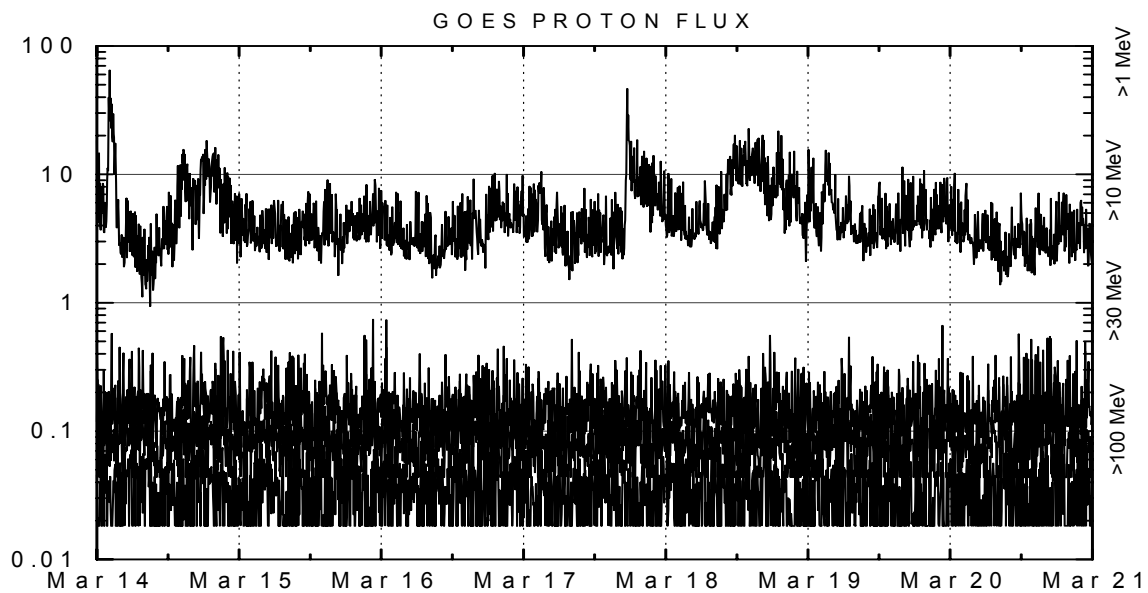
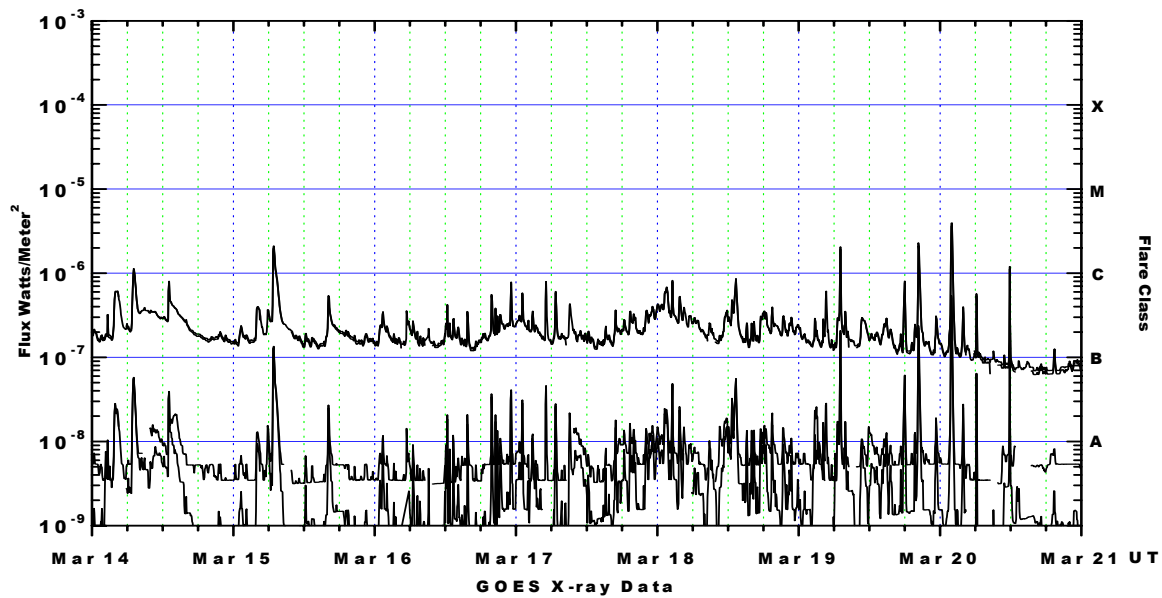
*Electrons* plot contains the five-minute averaged integral electron flux (electrons/cm<sup>2</sup>-sec-sr) with energies greater than 2 MeV at GOES-12 (W75).

*H<sub>p</sub>* 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<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 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<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 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/m<sup>2</sup>) 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/cm<sup>2</sup>-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/cm<sup>2</sup>-sec-sr) at greater than 10 MeV.




# Solar Radio Flux (10.7 cm)



Space Environment Center

February 2005  
( Month 101 )

 Preliminary data

