

**Space Weather Highlights**  
**10 – 16 April 2006**

**SEC PRF 1598**  
**18 April 2006**

Solar activity was at very low to low levels.

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

The greater than 2 MeV electron flux at geosynchronous orbit was at high levels the entire summary period.

The geomagnetic field ranged from quiet to severe storm levels. Solar wind speed ranged from a low of near 400 km/s early on 13 April to a high of about 700 km/s early on 10 April, and again midday on 15 April. Early on 09 April, ACE sensors detected increases in temperature, density, and wind velocity, along with fluctuations in the IMF Bz to +10 to -18 nT. This was the result of a co-rotating interaction region preceding a high speed stream from a coronal hole. The geomagnetic field responded with unsettled to active periods through midday on 10 April at middle latitudes, while unsettled to major storm periods were observed at high latitudes through late on 10 April. Thereafter, and through midday on 13 April, wind speed decayed from a high of about 700 km/s early on the 10th to a low of about 400 km/s early on the 13th. During this time frame, the IMF Bz was very weak, not varying much beyond +/- 2 nT. The geomagnetic field responded with quiet to unsettled conditions at all latitudes. By midday on 13 April, an interval of minor to major storm conditions was observed at high latitudes between 13/1200UTC to 13/1800UTC. The interplanetary magnetic field strengthened, and the Bz component rotated smoothly from 13/1500UTC through 14/1200UTC from 17 nT to a maximum negative value of -15 nT. Solar wind speeds ranged from approximately 480 km/s to 570 km/s during this period. By early on 14 April, the geomagnetic field strengthened further with active to minor storm readings at middle latitudes, while major to severe storm levels were observed at high latitudes. These conditions persisted through late on 15 April. The unusual solar wind conditions appeared to be consistent with a co-rotating interaction region that may have been complicated by the presence of transient flow. The summary period ended with solar wind steady at about 600 km/s, while the IMF Bz relaxed, not varying much beyond +/- 3 nT. The geomagnetic field responded with quiet conditions at middle latitudes and unsettled to active conditions at high latitudes.

**Space Weather Outlook**  
**19 April - 15 May 2006**

Solar activity is expected to be at predominately very low to low levels with isolated moderate activity possible after the return of old Region 865 on 22 April - 06 May.

No greater than 10 MeV proton events are expected.

The greater than 2 MeV electron flux at geosynchronous orbit is expected to be at high to very high levels on 19 – 22 April and again on 07 – 15 May.

The geomagnetic field is expected to be at quiet to unsettled levels for the majority of the forecast period. Active to minor storm conditions are expected on 02 May and again on 06 – 07 May, while active to major storm conditions are expected on 10 -14 May, all due to effects from recurrent coronal hole wind streams.



### 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
10 April	89	70	210	B1.0	0	0	0	0	0	0	0	0
11 April	90	73	220	A7.1	3	0	0	1	1	0	0	0
12 April	81	79	230	A5.0	0	0	0	0	0	0	0	0
13 April	80	69	160	A3.8	0	0	0	0	0	0	0	0
14 April	79	62	110	A3.5	0	0	0	0	0	0	0	0
15 April	78	45	140	A3.6	0	0	0	0	0	0	0	0
16 April	77	45	90	A3.5	0	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)		
	>1 MeV	>10 MeV	>100 MeV	>.6 MeV	>2MeV	>4 MeV
	10 April	2.5E+6	1.5E+4	3.3E+3		1.1E+8
11 April	1.1E+6	1.6E+4	3.4E+3		2.1E+8	
12 April	1.8E+6	1.6E+4	3.6E+3		3.0E+8	
13 April	1.7E+6	1.5E+4	3.2E+3		8.1E+7	
14 April	4.2E+6	1.5E+4	3.4E+3		5.5E+7	
15 April	2.6E+6	1.5E+4	3.5E+3		5.0E+8	
16 April	9.8E+5	1.5E+4	3.3E+3		1.5E+9	

### Daily Geomagnetic Data

Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
	27 March	8	3-3-0-0-1-3-1-3	5	2-2-0-0-1-3-1-2	9
10 April	11	3-4-3-2-2-2-2-1	30	3-4-6-5-5-3-2-1	18	4-5-4-3-2-2-2-1
11 April	3	1-2-0-1-1-0-0-2	5	2-2-1-2-1-1-0-1	5	2-3-0-1-1-1-0-2
12 April	1	0-0-0-0-1-1-0-0	1	0-1-0-0-0-0-1-0	2	0-1-0-0-0-1-1-1
13 April	9	1-2-2-2-3-2-2-3	22	1-2-3-5-6-3-1-2	13	2-2-3-2-4-4-2-3
14 April	32	4-5-5-5-4-4-3-3	64	3-4-7-7-6-6-3-3	58	4-6-7-7-5-5-4-4
15 April	18	3-4-4-3-3-3-3-3	50	3-4-6-7-5-5-4-3	29	3-5-4-4-3-5-4-3
16 April	8	3-3-2-1-2-2-1-1	18	3-2-4-5-4-3-1-1	10	4-3-2-2-2-2-1-2

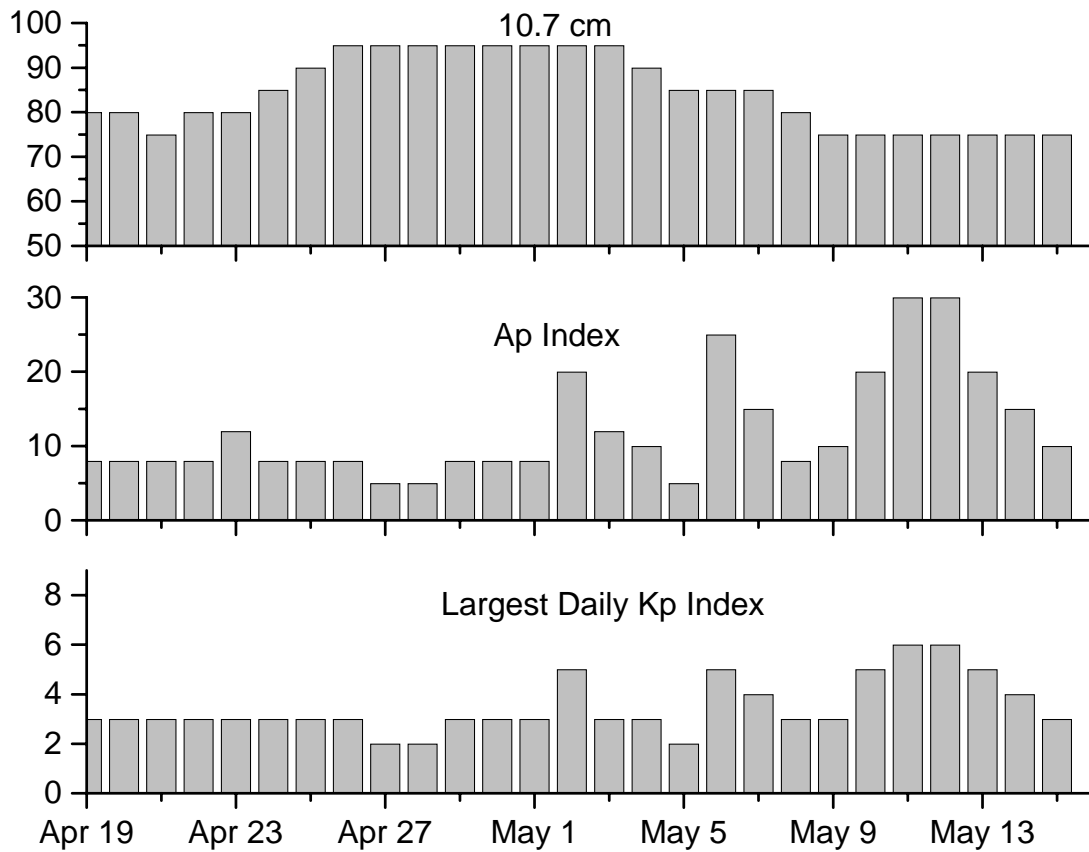


### *Alerts and Warnings Issued*

Date & Time of Issue	Type of Alert or Warning	Date & Time of Event UTC
10 Apr 0513	ALERT: Geomagnetic K = 4	10 Apr 0510
10 Apr 0515	ALERT: Geomagnetic K = 5	10 Apr 0510
10 Apr 0519	WARNING: Geomagnetic K = 5	10 Apr 0520 - 1600
10 Apr 1225	ALERT: Electron 2MeV Integral Flux > 1000pfu	10 Apr 1205
11 Apr 0540	ALERT: Electron 2MeV Integral Flux > 1000pfu	11 Apr 0520
12 Apr 0520	ALERT: Electron 2MeV Integral Flux > 1000pfu	12 Apr 0500
12 Apr 2045	WATCH: Geomagnetic A $\geq$ 20	15 Apr
13 Apr 0517	ALERT: Electron 2MeV Integral Flux > 1000pfu	13 Apr 0500
13 Apr 1331	ALERT: Geomagnetic K = 4	13 Apr 1330
13 Apr 1420	WARNING: Geomagnetic K = 4	13 Apr 1422 – 2359
13 Apr 1638	ALERT: Geomagnetic K = 4	13 Apr 1635
13 Apr 2103	WATCH: Geomagnetic A $\geq$ 20	14 Apr
13 Apr 2112	EXTENDED WARNING: Geomagnetic K = 4	13 Apr 1422 – 14 Apr 1500
14 Apr 0543	ALERT: Geomagnetic K = 5	14 Apr 0542
14 Apr 0607	WARNING: Geomagnetic K = 5	14 Apr 0610 – 1600
14 Apr 0703	ALERT: Geomagnetic K = 5	14 Apr 0702
14 Apr 0858	ALERT: Geomagnetic K = 6	14 Apr 0854
14 Apr 0953	WARNING: Geomagnetic K = 6	14 Apr 0955 - 1500
14 Apr 1031	ALERT: Geomagnetic K = 6	14 Apr 1030
14 Apr 1040	ALERT: Geomagnetic K = 7	14 Apr 1040
14 Apr 1124	ALERT: Electron 2MeV Integral Flux > 1000pfu	14 Apr 1105
14 Apr 1433	EXTENDED WARNING: Geomagnetic K= 4	13 Apr 1422 -15 Apr 1600
14 Apr 2141	WATCH: Geomagnetic A $\geq$ 20	16 Apr
15 Apr 0110	WARNING: Geomagnetic K= 5	15 Apr 0600 - 1600
15 Apr 0517	ALERT: Electron 2MeV Integral Flux exceeded 1000pfu	15 Apr 0500
15 Apr 0757	ALERT: Geomagnetic K-index of 5	15 Apr 0756
15 Apr 1540	EXTENDED WARNING: Geomagnetic K= 4	13 Apr 1422 -16 Apr 1600
16 Apr 0518	ALERT: Electron 2MeV Integral Flux > 1000pfu	16 Apr 0500



### 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
19 April	80	8	3	03 May	95	12	3
20	80	8	3	04	90	10	3
21	75	8	3	05	85	5	2
22	80	8	3	06	85	25	5
23	80	12	3	07	85	15	4
24	85	8	3	08	80	8	3
25	90	8	3	09	75	10	3
26	95	8	3	10	75	20	5
27	95	5	2	11	75	30	6
28	95	5	2	12	75	30	6
29	95	8	3	13	75	20	5
30	95	8	3	14	75	15	4
01 May	95	8	3	15	75	10	3
02	95	20	5				



***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

**No Events Observed**

***Flare List***

Date	Time			Optical	Imp / Brtns	Location	Rgn
	Begin	Max	End	X-ray Class.		Lat	
10 April	0542	0548	0555	B4.4			869
	0842	0848	0937	B2.5			869
	1345	1356	1405	B4.2			866
	1557	1601	1604	B1.3			
	1753	1757	1803	B1.6			
	1927	1934	1939	B8.7			870
	2036	2041	2050	B2.6			869
11 April	0145	0200	0204	C1.0			870
	0437	0438	0441	C1.0	Sf	S07E17	870
	0742	0746	0748	B1.5			
	B1816	1820	1846	C2.3	1n	S08E40	871
12 April	No Flares Observed						
13 April	0201	0204	0207	B1.9			870
	0637	0641	0643	B1.6			870
	0656	0659	0701	B1.1			873
14 April	No Flares Observed						
15 April	1139	1144	1148	B1.1			
16 April	1820	1829	1840	B1.6			871



### Region Summary

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

#### Region 866

29 Mar S06E69	088	0070	02	Hsx	001	A									
30 Mar S08E56	087	0070	03	Hsx	002	A									
31 Mar S07E42	088	0120	03	Hsx	001	A									
01 Apr S06E28	089	0080	03	Hsx	001	A									
02 Apr S06E16	088	0100	03	Hax	003	A									
03 Apr S06E05	086	0120	09	Cao	006	B									
04 Apr S06W11	089	0100	03	Cao	003	B									
05 Apr S06W23	087	0110	06	Cao	006	B									
06 Apr S06W36	087	0120	04	Cao	006	B									
07 Apr S05W53	091	0090	03	Dso	005	B									
08 Apr S06W63	088	0080	04	Cso	004	B									
09 Apr S06W79	091	0040	04	Cao	002	B									
10 Apr S05W92	090	0030	01	Axx	001	A									
							0	0	0	0	0	0	0	0	0

Crossed West Limb.

Absolute heliographic longitude: 086

#### Region 867

02 Apr S16E16	088	0050	07	Dso	008	B									
03 Apr S16E03	088	0100	08	Dao	012	Bg	2								
04 Apr S16W11	089	0130	10	Dso	009	Bg									
05 Apr S16W26	090	0120	11	Esi	014	Bg	2								
06 Apr S16W39	090	0080	10	Dsi	011	Bg									
07 Apr S15W56	094	0080	04	Cho	005	B	1								
08 Apr S16W67	092	0050	04	Cao	003	B									
09 Apr S16W82	094	0030	02	Hrx	002	A									
10 Apr S15W96	094	0030	01	Axx	001	A									
							5	0	0	0	0	0	0	0	0

Crossed West Limb.

Absolute heliographic longitude: 088



### Region Summary- Continued

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

#### Region 868

05 Apr	S07W06	070	0030	05	Cao	006	B										
06 Apr	S07W19	070	0040	05	Dso	006	B										
07 Apr	S06W34	072															
08 Apr	S06W47	072															
09 Apr	S06W60	072															
10 Apr	S06W73	072															
11 Apr	S06W86	072															
										0	0	0	0	0	0	0	0

Crossed West Limb.

Absolute heliographic longitude: 070

#### Region 869

06 Apr	S12E24	027	0030	05	Bxo	007	B										
07 Apr	S12E08	030	0050	06	Dso	008	B										
08 Apr	S12W04	029	0070	07	Cao	007	B										
09 Apr	S12W16	028	0050	09	Cai	012	B										
10 Apr	S12W31	029	0090	11	Eai	015	B										
11 Apr	S12W44	029	0060	08	Dao	007	B										
12 Apr	S11W61	033	0040	05	Cso	004	B										
13 Apr	S09W76	035	0040	01	Hax	001	A										
14 Apr	S11W88	034	0040	01	Hax	001	A										
										0	0	0	0	0	0	0	0

Crossed West Limb.

Absolute heliographic longitude: 029

#### Region 870

10 Apr	S08E22	336	0010	01	Axx	001	A										
11 Apr	S08E09	336	0020	02	Hsx	003	A	2			1						
12 Apr	S08W05	337	0020	02	Cso	005	B										
13 Apr	S08W19	338	0010	01	Axx	002	A										
14 Apr	S09W30	336	0000	01	Axx	001	A										
15 Apr	S09W43	336															
16 Apr	S09W56	336															
										2	0	0	1	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 337



**Region Summary- Continued**

Location		Sunspot Characteristics						Flares															
Date	( ° 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 871</i>																							
10 Apr	S08E52	306	0050	12	Cao	002	B																
11 Apr	S08E39	306	0040	02	Hax	002	A	1						1									
12 Apr	S08E23	309	0050	05	Cso	003	B																
13 Apr	S07E08	311	0030	05	Cao	006	B																
14 Apr	S07W04	310	0030	05	Cso	003	B																
15 Apr	S06W18	311	0060	05	Cao	006	B																
16 Apr	S06W33	312	0060	05	Cso	005	B																
								1	0	0	0	1	0	0	0								
Still on Disk.																							
Absolute heliographic longitude: 310																							
<i>Region 872</i>																							
11 Apr	S09E74	271	0050	01	Hsx	001	A																
12 Apr	S07E59	273	0030	01	Hsx	001	A																
13 Apr	S07E46	273	0030	01	Hsx	001	A																
14 Apr	S07E33	273	0020	03	Cso	003	B																
15 Apr	S08E21	272	0060	09	Bxo	008	B																
16 Apr	S06E08	271	0020	08	Bxo	006	B																
								0	0	0	0	0	0	0	0	0	0	0					
Still on Disk.																							
Absolute heliographic longitude: 271																							
<i>Region 873</i>																							
11 Apr	S04E48	297	0050	05	Dso	010	B																
12 Apr	S04E35	297	0090	08	Dai	016	B																
13 Apr	S04E22	297	0050	08	Dsc	009	B																
14 Apr	S03E08	298	0020	07	Cao	004	B																
15 Apr	S03W05	298	0020	01	Hsx	001	A																
16 Apr	N01W17	296	0010	03	Bxo	004	B																
								0	0	0	0	0	0	0	0	0	0						
Still on Disk.																							
Absolute heliographic longitude: 298																							



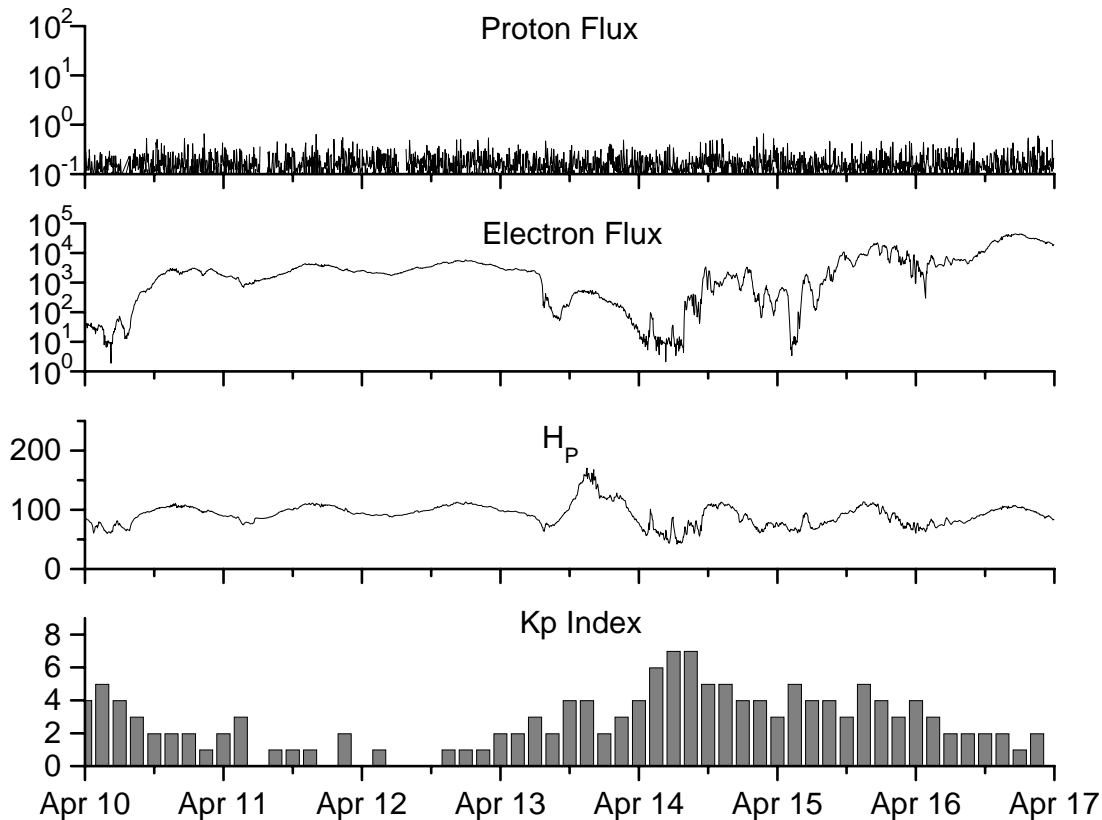


**Recent Solar Indices (preliminary)  
of the observed monthly mean values**

Month	Sunspot Numbers			Radio Flux		Geomagnetic			
	Observed SEC	values RI	Ratio RI/SEC	Smooth SEC	values RI	*Penticton 10.7 cm	Smooth Value	Planetary Ap	Smooth Value
<b>2004</b>									
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	63.7	37.6	103.1	103.7	10	13.6
October	77.9	48.4	0.62	61.3	35.9	105.7	102.1	9	13.5
November	70.5	43.7	0.62	60.0	35.4	113.2	101.5	26	14.1
December	34.7	17.9	0.52	58.8	35.3	94.6	101.3	11	14.8
<b>2005</b>									
January	52.0	31.3	0.60	57.3	34.7	102.4	100.3	22	14.7
February	45.4	29.1	0.64	56.4	34.0	97.3	98.5	11	14.6
March	41.0	24.8	0.60	55.8	33.6	90.0	97.2	12	15.3
April	41.5	24.4	0.59	52.6	31.7	85.9	95.5	12	15.7
May	65.4	42.6	0.65	48.3	29.0	99.5	93.2	20	14.8
June	59.8	39.6	0.66	47.9	28.9	93.7	91.9	13	13.9
July	71.0	39.9	0.56	42.9	25.9	96.6	87.8	16	11.8
August	65.6	36.4	0.55	45.4	27.5	90.7	89.3	16	12.2
September	39.2	22.1	0.56			90.8		21	
October	13.0	8.5	0.65			76.7		7	
November	32.2	18.0	0.56			86.3		8	
December	62.6	41.2	0.66			90.8		7	
<b>2006</b>									
January	28.0	15.4	0.55			83.8		6	
February	5.3	4.7	0.89			76.6		6	
March	21.3	10.8	0.51			75.5		8	

**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 10 April 2006*

*Protons* plot contains the five-minute averaged integral proton flux (protons/cm<sup>2</sup>-sec -sr) as measured by GOES-11 (W103) for each of three energy thresholds: greater than 10, 50, and 100 MeV.

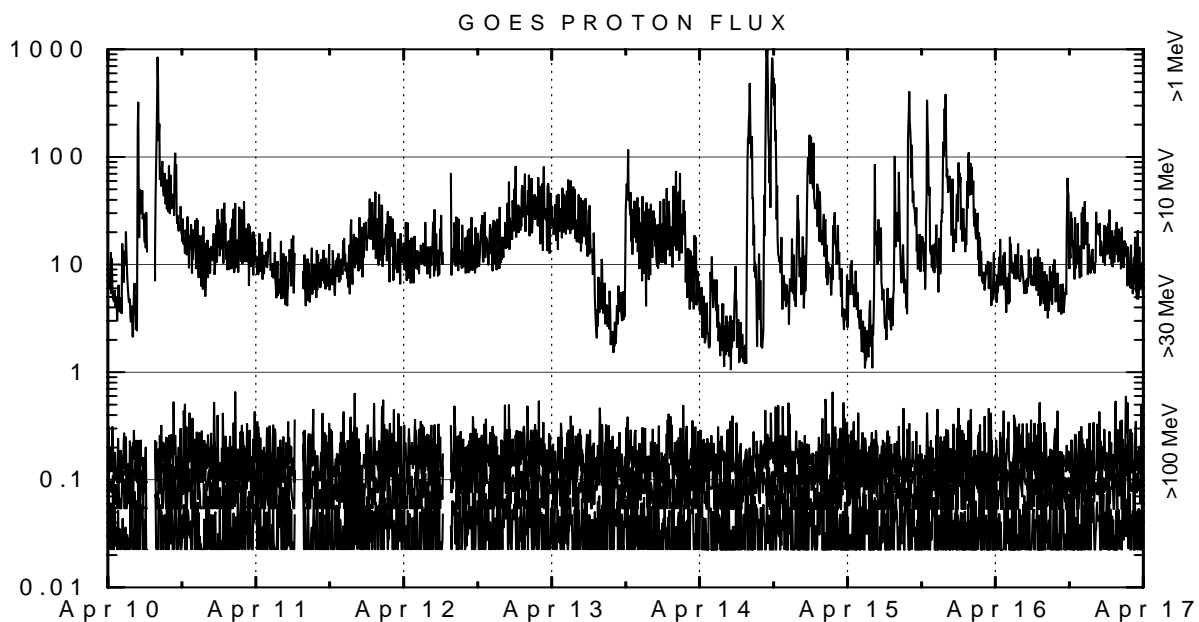
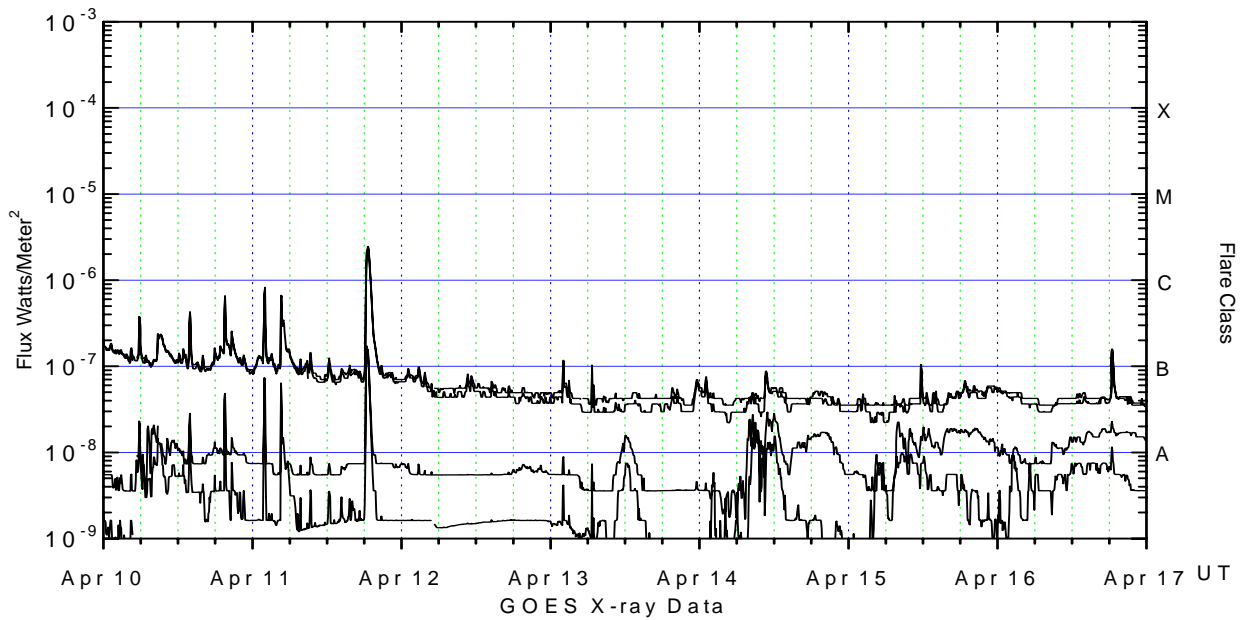
*Electrons* plot contains the five-minute averaged integral electron flux (electrons/cm<sup>2</sup>-sec -sr) with energies greater than 2 MeV at GOES-12 (W75).

*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 SEC 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 (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/cm<sup>2</sup>-sec-sr) as measured by GOES-11 (W103) 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.

