

**Space Weather Highlights**  
**15 – 21 May 2006**

**SEC PRF 1603**  
**23 May 2006**

Solar activity was at very low levels.

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

The greater than 2 MeV electron events were at high levels 15 – 17 May.

The geomagnetic field generally ranged from quiet to active levels with one interval of minor storm conditions observed at high latitudes late on 18 May. Solar wind speed ranged from a low of about 305 km/s early on 17 May to a high of near 615 km/s beginning midday on 18 May, and extending through early on 20 May. The period began with wind speed slightly elevated at about 475 km/s and the Bz component of the IMF weakly south at about -2 nT as a coronal hole wind stream rotated out of a geoeffective position. Early in the summary period, the geomagnetic field was at quiet to unsettled levels, and remained so through early on 18 May. By midday on 17 May, wind speed, temperature, and density showed gradual increases, all indicative of a co-rotating interaction region in advance of a coronal hole high speed wind stream. By late on 17 May, the IMF Bz began fluctuating between +/- 5 nT, and by early on 18 May, the fluctuations increased to +/- 15 nT and remained at these levels through about 18/0900 UTC. During this period, the geomagnetic field responded with unsettled to active conditions at middle latitudes, while high latitudes observed active to minor storm levels.

These geomagnetic conditions persisted through late on the 18th. The remainder of the summary period saw the geomagnetic field at mostly quiet to unsettled levels with an isolated active interval observed midday on 20 May at high latitudes. By midday on the 18th, the IMF Bz relaxed and did not vary much beyond +/- 5 nT through the remainder of the summary period. Wind speed remained elevated between 550 to 600 km/s through 21 May.

**Space Weather Outlook**  
**24 May – 19 June 2006**

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

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 levels on 04 – 13 June.

The geomagnetic field is expected to be mostly quiet to unsettled for the majority of the forecast period. Recurrent coronal hole high speed wind streams are expected to rotate into geoeffective positions 01 – 04 June, 07 – 08 June, and again on 14 June. Active to minor storm conditions are expected with the first coronal hole, while unsettled to active conditions are expected with the latter two coronal holes.



### 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
15 May	72	0	0	A1.4	0	0	0	0	0	0	0	0
16 May	72	0	0	A1.5	0	0	0	0	0	0	0	0
17 May	72	0	0	A2.0	0	0	0	0	0	0	0	0
18 May	73	0	0	A2.2	0	0	0	0	0	0	0	0
19 May	75	15	20	A1.4	0	0	0	0	0	0	0	0
20 May	76	29	130	A2.1	0	0	0	0	0	0	0	0
21 May	78	30	110	A2.1	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
	15 May	5.9E+5	1.6E+4	3.6E+3		5.6E+8
16 May	5.3E+5	1.5E+4	3.7E+3		7.6E+8	
17 May	4.4E+5	1.6E+4	3.7E+3		2.4E+8	
18 May	2.9E+5	1.7E+4	3.8E+3		4.4E+6	
19 May	4.3E+5	1.5E+4	3.3E+3		2.6E+6	
20 May	3.2E+5	1.5E+4	3.6E+3		7.6E+6	
21 May	3.0E+5	1.6E+4	3.6E+3		9.3E+6	

### Daily Geomagnetic Data

Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
	15 May	3	1-2-0-0-0-1-2-1	3	1-1-1-2-2-0-1-0	4
16 May	0	0-0-0-0-1-0-0-1	1	1-0-0-0-1-0-0-0	2	1-0-0-0-1-0-1-1
17 May	4	1-2-1-1-2-1-1-1	4	1-2-1-0-2-2-1-1	5	1-2-1-1-1-1-1-3
18 May	11	2-1-3-2-2-3-4-2	23	1-4-4-4-3-5-4-2	16	2-2-3-2-2-5-4-2
19 May	7	1-2-3-1-1-1-2-3	8	2-3-3-1-2-2-1-1	8	2-2-3-0-1-2-2-3
20 May	5	1-1-2-2-1-1-2-2	9	1-1-3-4-2-1-2-1	7	2-2-2-3-1-2-2-2
21 May	4	2-1-1-1-1-1-2-1	6	3-1-0-2-0-2-2-2	7	3-0-1-2-1-1-3-2

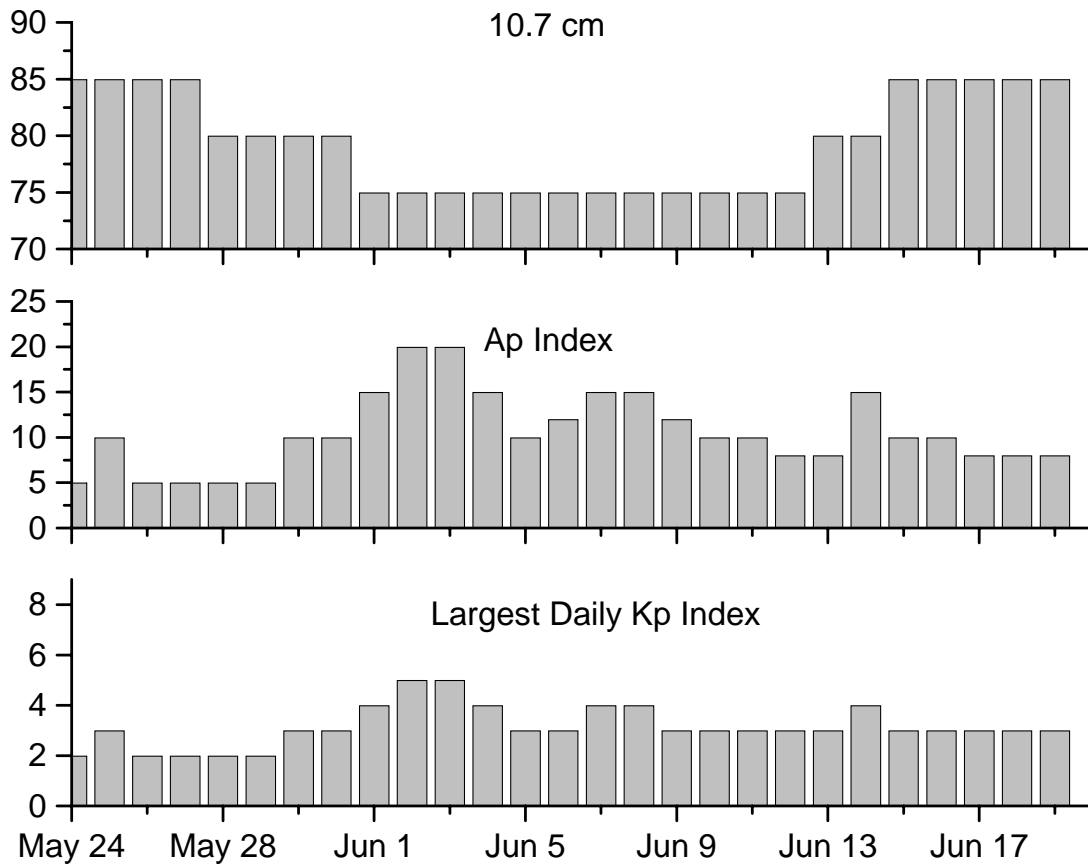


### *Alerts and Warnings Issued*

<u>Date &amp; Time of Issue</u>	<u>Type of Alert or Warning</u>	<u>Date &amp; Time of Event UTC</u>
15 May 0509	ALERT: Electron 2MeV Integral Flux $\geq 1000$ pfu	15 May 0500
16 May 0510	ALERT: Electron 2MeV Integral Flux $\geq 1000$ pfu	16 May 0500
17 May 0518	ALERT: Electron 2MeV Integral Flux $\geq 1000$ pfu	17 May 0500
18 May 0811	ALERT: Geomagnetic K = 4	18 May 0810
18 May 1515	WARNING: Geomagnetic K = 4	18 May 1515 – 2359
18 May 1549	ALERT: Geomagnetic K = 4	18 May 1548
18 May 1602	WARNING: Geomagnetic K = 5	18 May 1602 – 2359
18 May 1718	ALERT: Geomagnetic K = 5	18 May 1717
18 May 2353	EXTENDED WARNING: Geomagnetic K = 4	18 May 1515 – 19/1600
20 May 1125	WARNING: Geomagnetic K = 4	20 May 1125 – 1600
20 May 1132	ALERT: Geomagnetic K = 4	20 May 1132



### 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
24 May	85	5	2	07 June	75	15	4
25	85	10	3	08	75	15	4
26	85	5	2	09	75	12	3
27	85	5	2	10	75	10	3
28	80	5	2	11	75	10	3
29	80	5	2	12	75	8	3
30	80	10	3	13	80	8	3
31	80	10	3	14	80	15	4
01 June	75	15	4	15	85	10	3
02	75	20	5	16	85	10	3
03	75	20	5	17	85	8	3
04	75	15	4	18	85	8	3
05	75	10	3	19	85	8	3
06	75	12	3				



***Energetic Events***

Date	Time		X-ray	Optical Information			Peak		Sweep Freq	
	$\frac{1}{2}$		Integ	Imp/	Location	Rgn	Radio Flux		Intensity	
	Begin	Max	Class	Flux	Brtns	Lat CMD	#	245	2695	II

*No Events Observed*

***Flare List***

Date	Time			Optical	Imp/ Brtns	Location	Rgn
	Begin	Max	End	X-ray Class.		Lat CMD	
15 May	<i>No Flares Observed</i>						
16 May	2027	2030	2033	B1.4			880
17 May	<i>No Flares Observed</i>						
18 May	<i>No Flares Observed</i>						
19 May	1952	1955	1959	B1.0			884
20 May	<i>No Flares Observed</i>						
21 May	<i>No Flares Observed</i>						

***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

*Region 880*

04 MayS08E63	338	0080	03	Hhx	001	A
05 MayS08E50	338	0100	04	Cso	002	B
06 MayS08E37	338	0050	03	Cso	003	B
07 MayS09E22	339	0050	01	Hsx	002	A
08 MayS09E08	340	0060	02	Hax	001	A
09 MayS09W04	339	0040	02	Hax	003	A
10 MayS09W17	339	0020	02	Hax	002	A
11 MayS09W29	338	0020	01	Hsx	002	A
12 MayS09W42	338	0020	01	Cso	003	B
13 MayS08W57	339	0020	02	Hax	002	A
14 MayS09W71	340	0030	02	Axx	001	A
15 MayS09W84	340					

0 0 0 0 0 0 0 0

Crossed West Limb.

Absolute heliographic longitude: 339



**Region Summary-Continued**

Location		Sunspot Characteristics						X-ray			Optical			
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

*Region 881*

05 May	S12E75	313	0000	01	Axx	001	A										
06 May	S12E68	307	0070	08	Dao	007	B										
07 May	S10E50	311	0050	05	Cso	005	B										
08 May	S10E33	315	0010	01	Axx	002	A										
09 May	S08E17	318	0010	01	Axx	001	A										
10 May	S08E04	318															
11 May	S08W09	318															
12 May	S08W22	318	0000	01	Axx	001	A										
13 May	S12W29	312															
14 May	S12W42	312															
15 May	S12W55	312															
16 May	S12W68	312															
17 May	S12W81	312															

0 0 0 0 0 0 0 0

Crossed West Limb.

Absolute heliographic longitude: 318

*Region 883*

07 May	S04E56	305	0020	01	Axx	001	A										
08 May	S04E43	305	0010	07	Bxo	003	B										
09 May	S04E26	309	0010	02	Bxo	002	B										
10 May	S04E13	309															
11 May	S04E02	307	0000	01	Axx	001	A					1					
12 May	S04W10	307	0010	03	Cao	004	B										
13 May	S02W27	309	0010	02	Bxo	002	B										
14 May	S02W40	309															
15 May	S02W53	309															
16 May	S02W66	309															

0 0 0 1 0 0 0 0

Crossed West Limb.

Absolute heliographic longitude: 307

*Region 884*

19 May	S13E47	156	0020	05	Bxo	005	B										
20 May	S13E33	157	0090	06	Cso	007	B										
21 May	S14E22	154	0050	07	Cso	005	B										

0 0 0 0 0 0 0 0

Still on Disk.

Absolute heliographic longitude: 154



***Region Summary-Continued***

Location		Sunspot Characteristics													
Date	( ° Lat ° CMD)	Helio Lon	Flares				X-ray			Optical					
			Area (10 <sup>-6</sup> hemi)	Extent (helio)	Spot Class	Spot Count	Mag Class	C	M	X	S	1	2	3	4
<i>Region 885</i>															
20 May	S12E44	146	0040	04	Cro	002	B								
21 May	S12E32	144	0060	06	Dro	005	B								
									0	0	0	0	0	0	0
Still on Disk.															
Absolute heliographic longitude: 144															



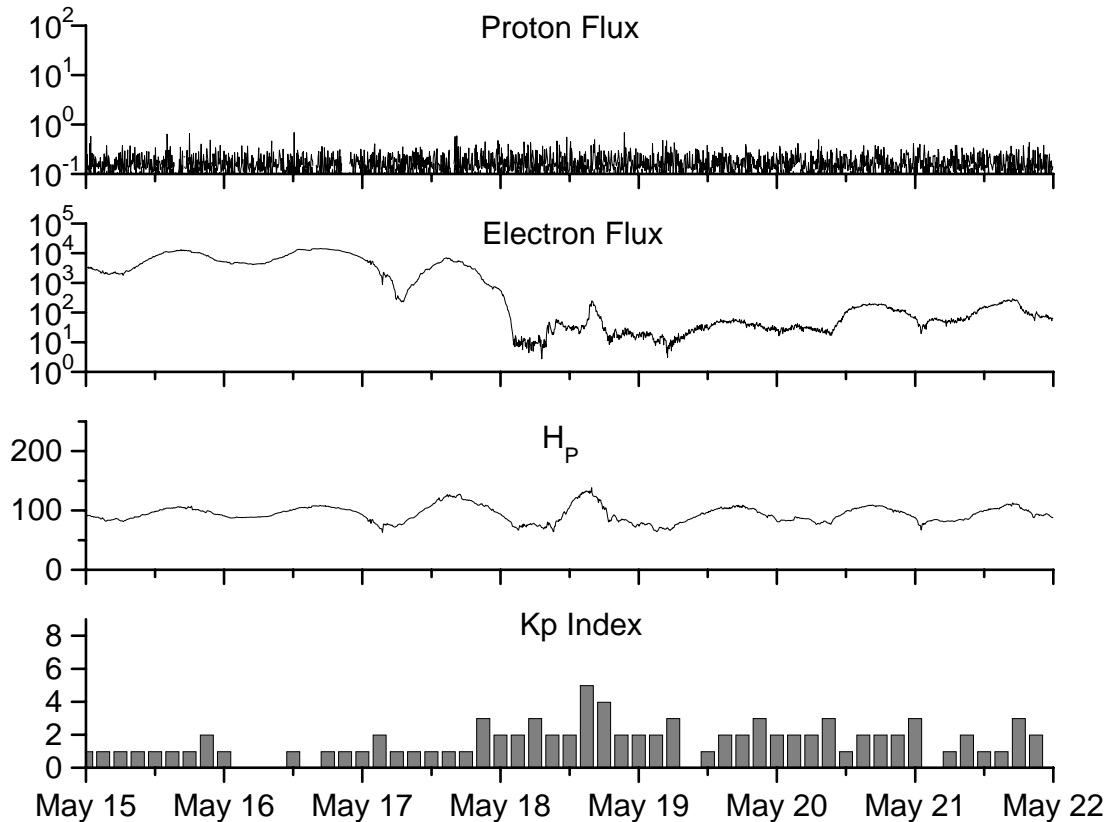
**Recent Solar Indices (preliminary)  
of the observed monthly mean values**

Month	Sunspot Numbers			Radio Flux		Geomagnetic			
	Observed values SEC	Ratio RI	Ratio RI/SEC	Smooth values SEC	Smooth 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 16 May 2006*

*Protons* plot contains the five-minute averaged integral proton flux (protons/cm<sup>2</sup>-sec -sr) as measured by GOES-11 (W101) for each of three energy thresholds: greater than 10, 50, and 100 MeV.

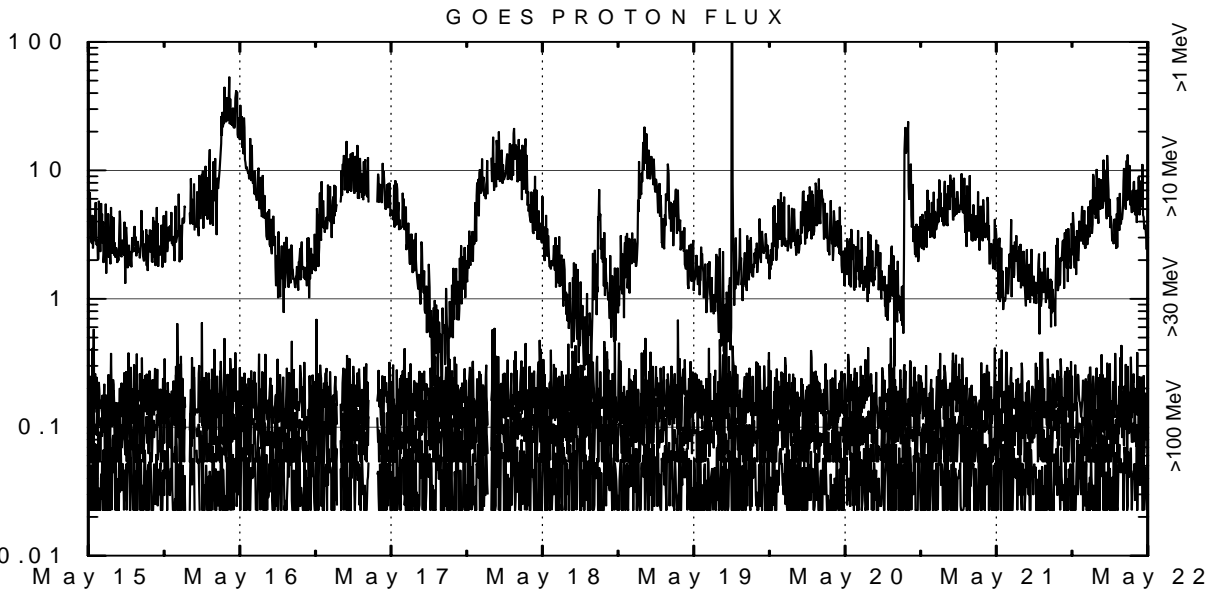
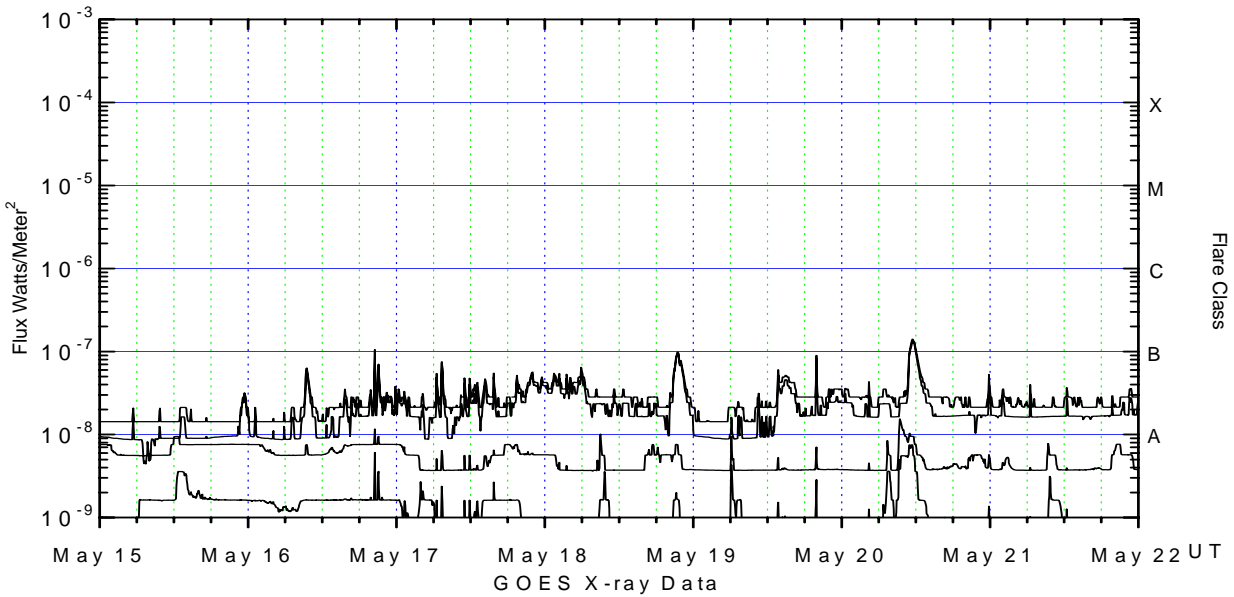
*Electrons* plot contains the five-minute averaged integral electron flux (electrons/cm<sup>2</sup>-sec -sr) with energies greater than 2 MeV at GOES-12 (W075).

*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 (W101) 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.

