

**Space Weather Highlights**  
**13 November – 19 November 2006**

**SEC PRF 1629**  
**21 November 2006**

Solar activity was at very low to low levels. Solar activity reached low levels on 13 and 15 November. On 15 November, Region 923 (S05, L=002, class/area, Cko/660 on 14 November) produced the largest event of the period, an impulsive C1.8/sf at 15/1901 UTC.

No greater than 10 MeV proton events were observed.

The greater than 2 MeV electron flux at geosynchronous orbit was at high levels on 13 – 15 November.

The geomagnetic field ranged from quiet to isolated active levels at middle latitudes while quiet to isolated minor storm periods were observed at high latitudes. The period began with wind speed elevated at approximately 465 km/s while the IMF Bz did not vary much beyond +/- 2 nT. By late on 14 November, solar wind speed decreased to a low of around 320 km/s. The geomagnetic field was mostly quiet on 13 and 14 November. By late on 15 November, density increased while the IMF Bz was around -6 nT for a prolonged period. In response, an isolated active period was observed at middle latitudes early on 16 November. By midday on 16 November, solar wind briefly increased to around 450 km/s. By 17 November, another prolonged period of southward Bz at around -4 nT was observed. Isolated active and minor storm periods were observed at high latitudes on 17 November. On 18 and 19 November, solar wind speed was around 350 – 450 km/s with the IMF Bz not varying much beyond +/- 5 nT. The geomagnetic field at all latitudes was quiet.

**Space Weather Outlook**  
**22 November – 18 December 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 22 – 23 November, 26 – 30 November, and again on 08 – 12 December.

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 on 24 – 25 November, and again on 07 – 08 December. Unsettled to minor storm periods are expected on 24 – 25 November. On 07 – 08 December, unsettled to major storm periods are expected.



**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
13 November	95	30	710	A7.5	1	0	0	1	0	0	0	0
14 November	95	41	800	A5.7	0	0	0	0	0	0	0	0
15 November	96	50	680	A5.5	1	0	0	1	0	0	0	0
16 November	94	42	690	A6.3	0	0	0	0	0	0	0	0
17 November	90	38	570	A4.3	0	0	0	2	0	0	0	0
18 November	89	39	580	A4.3	0	0	0	2	0	0	0	0
19 November	85	38	550	A4.3	0	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)		
	>1 MeV	>10 MeV	>100 MeV	>.6 MeV	>2MeV	>4 MeV
	13 November	1.8E+6	1.5E+4	3.3E+3		7.6E+8
14 November	2.1E+6	1.6E+4	3.3E+3		7.3E+8	
15 November	1.7E+6	1.6E+4	3.2E+3		2.0E+8	
16 November	7.1E+5	1.6E+4	3.3E+3		1.3E+7	
17 November	5.7E+5	1.6E+4	3.5E+3		2.2E+7	
18 November	2.9E+5	1.7E+4	3.9E+3		1.9E+7	
19 November	4.1E+5	1.6E+4	3.8E+3		2.8E+7	

**Daily Geomagnetic Data**

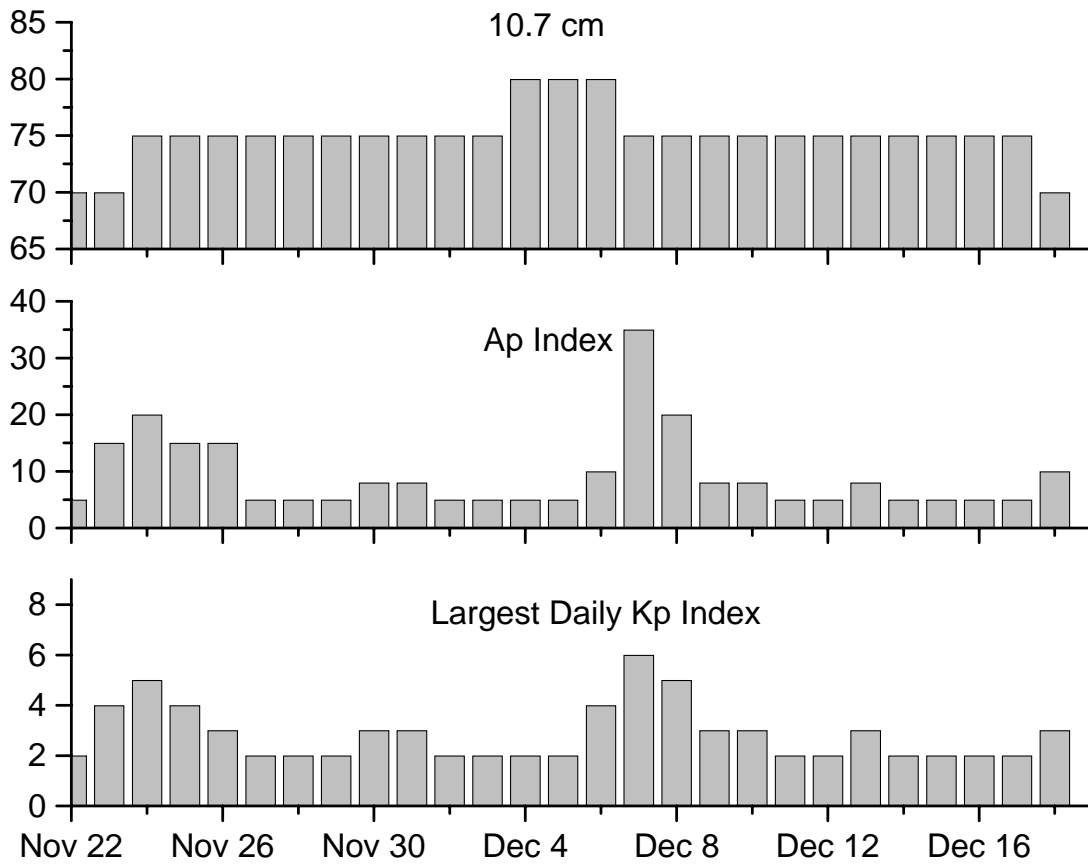
Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
	13 November	1	0-0-2-0-0-1-0-0	0	0-0-1-0-0-0-0-0	2
14 November	3	0-1-1-1-1-1-1-2	4	0-0-1-3-2-1-1-1	4	0-1-1-1-1-1-1-2
15 November	6	2-3-1-1-1-2-1-2	7	2-1-1-3-2-0-3-1	5	2-2-0-1-1-0-0-2
16 November	5	4-1-1-0-1-1-0-0	4	3-1-2-1-1-0-0-0	8	5-2-1-0-1-1-0-1
17 November	3	1-2-1-1-2-1-0-0	15	1-2-3-2-5-2-2-4	5	2-2-1-1-2-1-0-1
18 November	0	0-0-0-0-0-0-0-0	1	0-0-0-2-0-0-0-1	2	0-0-0-0-1-0-0-1
19 November	2	0-2-1-1-0-0-0-0	3	2-1-2-1-0-0-0-0	3	1-1-1-1-1-0-0-0

**Alerts and Warnings Issued**

Date & Time of Issue	Type of Alert or Warning	Date & Time of Event UTC
13 Nov 0501	ALERT: Electron 2MeV Integral Flux ≥1000pfu	13 Nov 0500
14 Nov 0503	ALERT: Electron 2MeV Integral Flux ≥1000pfu	14 Nov 0500
15 Nov 0911	ALERT: Electron 2MeV Integral Flux ≥1000pfu	15 Nov 0850
16 Nov 0107	WARNING: Geomagnetic K = 4	16 Nov 0107 – 1600
16 Nov 0112	ALERT: Geomagnetic K = 4	16 Nov 0109
16 Nov 0204	WARNING: Geomagnetic K = 5	16 Nov 0205 – 1600
16 Nov 0208	ALERT: Geomagnetic K = 5	16 Nov 0208



### 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
22 Nov	70	5	2	06 Dec	80	10	4
23	70	15	4	07	75	35	6
24	75	20	5	08	75	20	5
25	75	15	4	09	75	8	3
26	75	15	3	10	75	8	3
27	75	5	2	11	75	5	2
28	75	5	2	12	75	5	2
29	75	5	2	13	75	8	3
30	75	8	3	14	75	5	2
01 Dec	75	8	3	15	75	5	2
02	75	5	2	16	75	5	2
03	75	5	2	17	75	5	2
04	80	5	2	18	70	10	3
05	80	5	2				



### *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	Begin	Time		Optical	Imp / Brtns	Location Lat CMD	Rgn
		Max	End	X-ray Class.			
13 November	0009	0012	0014	B3.1			
	0559	0604	0608	B6.8			
	B0640	0640	0645	C1.0	Sf	S06E19	
	1259	1305	1312	B1.5			
	1409	1415	1420	B1.6			
14 November	1535	1541	1548	B2.5			
	0000	0004	0007	B1.2			
	0059	0102	0110	B1.0			
	0123	0130	0134	B2.7			
	0804	0809	0814	B1.1			
15 November	1610	1613	1617	B1.1			
	0219	0230	0241	B1.5			
	1057	1100	1102	B1.0			
	1339	1343	1347	B1.1			
16 November	1848	1901	1934	C1.8	Sf	S10E29	924
	2120	2124	2128	B1.0			
17 November	1627	1630	1637	B3.4	Sf	S09W47	923
	2231	2233	2244	B2.4	Sf	S07W50	923
18 November	0816	0822	0831	B2.1	Sf	S05W48	923
	0927	0928	0933	B3.7	Sf	S06W56	923
19 November	1457	1513	1525	B1.4			
	2229	2229	2233		Sf	S05W74	923



### Region Summary

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

#### Region 923

08 Nov S05E71	005	0280	04	Hkx	001	A									
09 Nov S06E59	004	0450	05	Hkx	006	A									
10 Nov S05E46	004	0530	06	Hkx	003	A									
11 Nov S04E34	003	0620	06	Hkx	003	A									
12 Nov S04E22	003	0610	07	Dki	008	B	3								
13 Nov S05E07	003	0640	06	Cko	007	B									
14 Nov S05W05	002	0660	08	Cko	007	B									
15 Nov S05W20	004	0610	06	Cko	011	B									
16 Nov S05W33	003	0580	06	Cko	005	B									
17 Nov S05W48	006	0510	05	Cho	002	B					2				
18 Nov S05W61	006	0510	05	Cko	004	B					2				
19 Nov S05W74	005	0510	05	Hkx	002	A					1				
							3	0	0	5	0	0	0	0	

Still on Disk.

Absolute heliographic longitude: 002

#### Region 924

13 Nov S07E59	311	0070	11	Cao	003	B									
14 Nov S08E44	313	0040	06	Dso	003	B									
15 Nov S08E28	316	0030	04	Dso	005	B	1			1					
16 Nov S08E16	315	0050	05	Dao	005	B									
17 Nov S08E00	318	0040	05	Cao	004	B									
18 Nov S09W15	320	0030	05	Cao	002	A									
19 Nov S09W30	321	0020	01	Cso	002	B									
							1	0	0	1	0	0	0	0	

Still on Disk.

Absolute heliographic longitude: 318

#### Region 925

14 Nov S06E52	305	0100	03	Hax	001	A									
15 Nov S05E38	306	0040	03	Cao	004	B									
16 Nov S05E26	305	0060	03	Hsx	002	A									
17 Nov S05E11	307	0020	02	Hrx	002	A									
18 Nov S07E00	305	0040	05	Cso	003	B									
19 Nov S09W13	305	0020	03	Cso	004	A									
							0	0	0	0	0	0	0	0	

Still on Disk.

Absolute heliographic longitude: 305

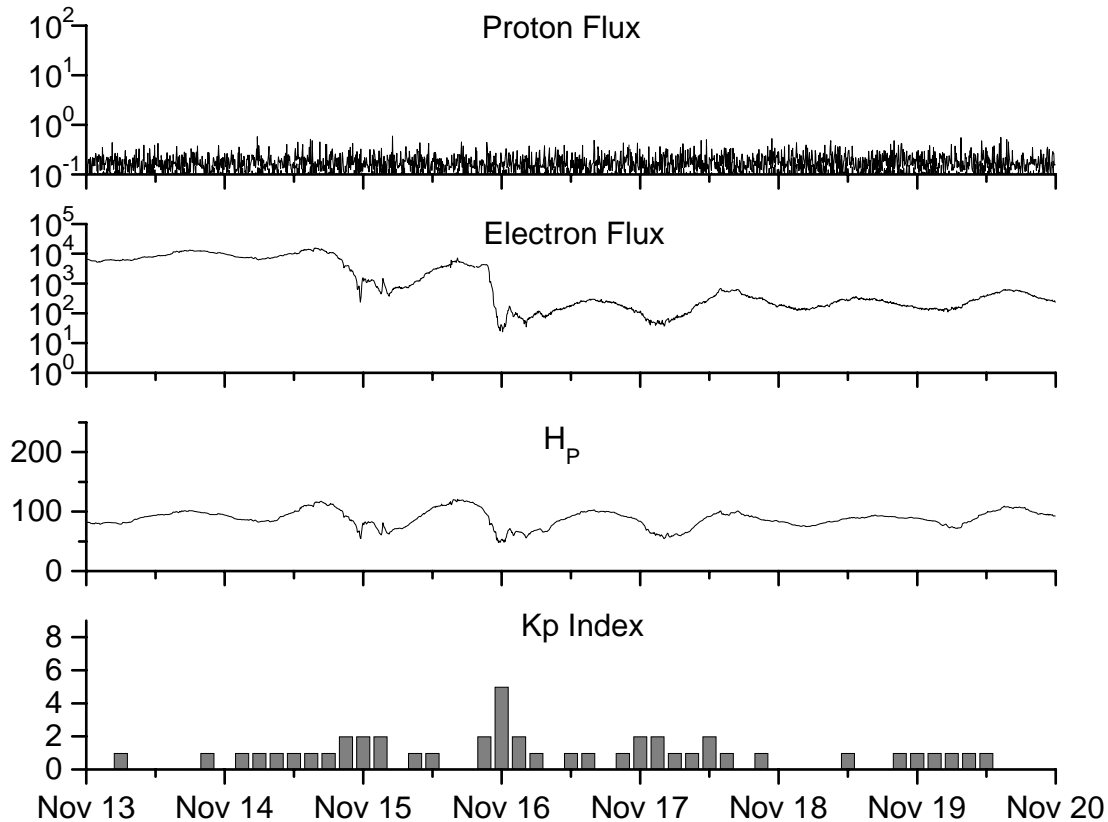


**Recent Solar Indices (preliminary)  
of the observed monthly mean values**

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>									
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	48.1	29.2	96.6	90.9	16	13.1
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	42.9	25.9	90.8	87.8	21	11.8
October	13.0	8.5	0.65	42.6	25.5	76.7	87.4	7	11.6
November	32.2	18.0	0.56	42.1	24.9	86.3	86.7	8	11.1
December	62.6	41.2	0.66	40.1	23.0	90.8	85.4	7	10.4
<b>2006</b>									
January	28.0	15.4	0.55	37.2	20.8	83.8	84.0	6	9.9
February	5.3	4.7	0.89	33.4	18.7	76.6	82.6	6	9.2
March	21.3	10.8	0.51	31.0	17.4	75.5	81.6	8	8.4
April	55.2	30.2	0.55	30.6	17.1	89.0	80.9	11	7.9
May	39.6	22.2	0.56			81.0		8	
June	37.7	13.9	0.37			80.1		8	
July	22.6	12.2	0.54			75.8		7	
August	22.8	12.9	0.57			79.0		9	
September	25.2	14.5	0.58			77.8		8	
October	15.7	10.4	0.66			74.3		7	

**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 13 November 2006*

*Protons* plot contains the five-minute averaged integral proton flux (protons/cm<sup>2</sup>-sec -sr) as measured by GOES-11 (W135) for each of three energy thresholds: greater than 10, 50, and 100 MeV.

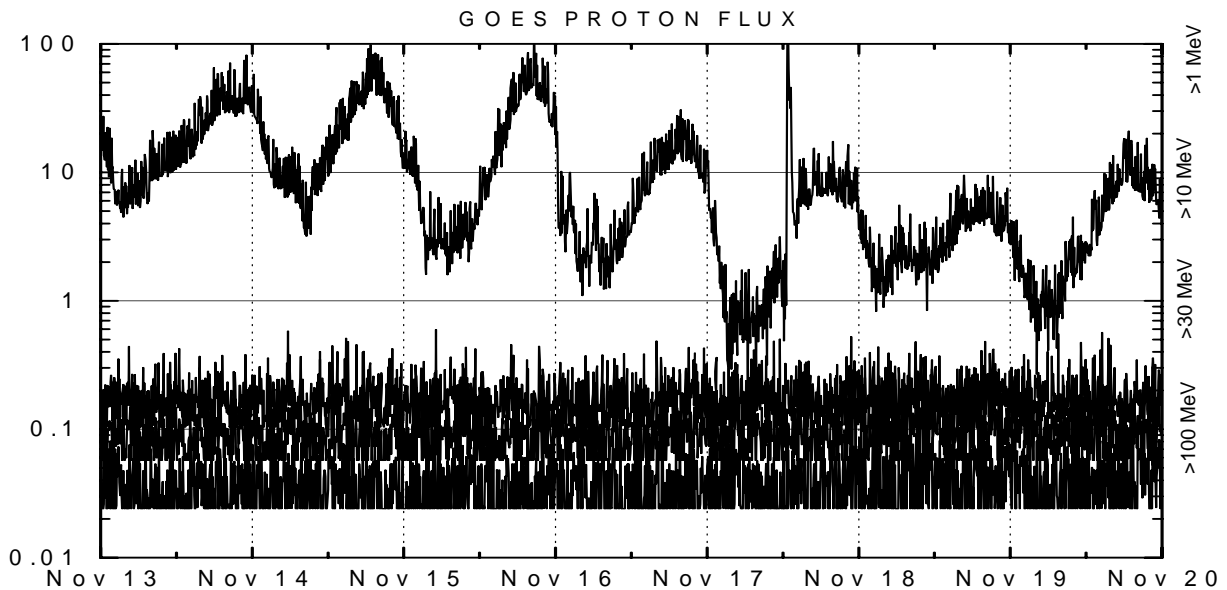
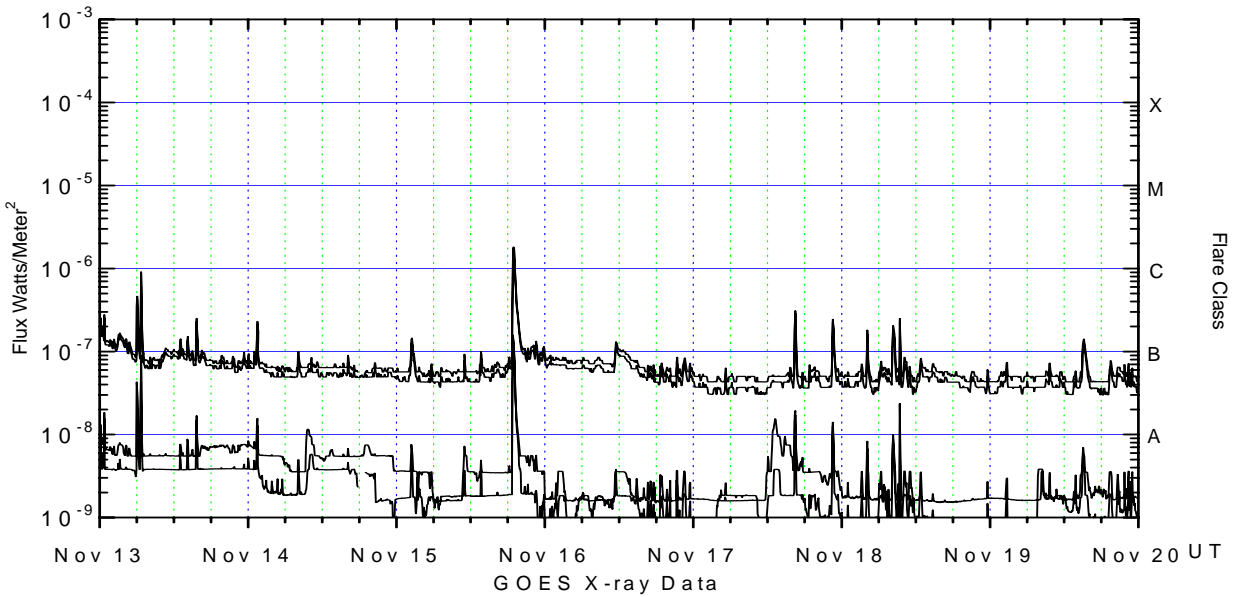
*Electrons* plot contains the five-minute averaged integral electron flux (electrons/cm<sup>2</sup>-sec -sr) with energies greater than 2 MeV at GOES-12 (W075).

*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 (W075) and GOES 11 (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 (W135) 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.

