

**Space Weather Highlights**  
**14 August – 20 August 2006**

**SEC PRF 1616**  
**22 August 2006**

Solar activity was at very low to low levels. During the period, Region 904 (S13, L=120, class/area, Eki/750 on 12 August) produced eight C-class flares. The largest was a C4.3 that occurred at 20/2109 UTC. However, the most significant of these flares was a long duration C3.6 X-ray event that began at 16/1437 UTC, reached a maximum at 16/1617 UTC, and ended at 16/1922 UTC. A Type IV radio sweep was associated with this event. During this long duration event, LASCO/EIT imagery observed a couple of Halo events. The first one was a very faint, asymmetric event first seen in C2 at 16/0731 UTC, while the second one was a very intense, asymmetric event first seen at 16/1630 UTC. The plane-of-sky speed for the second Halo event was estimated at about 800 km/s. During the summary period, Region 904 generally remained unchanged, maintaining its Beta-Gamma magnetic complexity until 19 August when it was classified as a simple Beta group. The region is due to rotate around the west limb on 22 August.

No greater than 10 MeV proton events were observed.

The greater than 2 MeV electron flux at geosynchronous orbit was at high levels on 14 – 17 August.

The geomagnetic field was at quiet to severe storm levels. Solar wind speed ranged from a low of near 280 km/s late on 16 August to a high of about 500 km/s midday on 19 August. The period began with solar wind speed variable between 280 and 340 km/s, while the IMF Bz was very weak, not varying much beyond +/- 5 nT. These conditions persisted through early on 18 August. During this period, the geomagnetic field was very quiet. At 18/1644 UTC, a weak sudden impulse of 5 nT was detected at the Boulder magnetometer, most likely due to effects from the first Halo CME on 16 August. Following the shock, solar wind speed increased from about 350 km/s to about 410 km/s. However, the IMF Bz remained predominately northward, so the geomagnetic field was mostly quiet to unsettled with an isolated active periods observed early on the 18th at high latitudes. On 19 August, the total IMF strength increased to about 20 nT while the Bz component turned southward and reached -15 nT. The solar wind speed also increased from about 350 km/s to about 440 km/s. This resulted in minor to severe storm levels at high latitudes with active to minor storm levels at middle latitudes beginning midday on 19 August. Activity persisted through early on 20 August and then returned to mostly quiet conditions.

**Space Weather Outlook**  
**23 August – 18 September 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 September and again on 17 – 18 September.

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 August, 27 - 28 August, and again on 03 – 04 September. Unsettled to active periods are possible on 24 August and again on 27 – 28 August. Active to major storm conditions are possible on 03 – 04 September.



**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 August	86	45	700	A7.5	0	0	0	0	0	0	0	0
15 August	86	32	700	A7.7	0	0	0	0	0	0	0	0
16 August	86	29	600	B1.2	3	0	0	1	0	0	0	0
17 August	86	26	590	A8.0	1	0	0	0	0	0	0	0
18 August	89	29	590	A7.7	0	0	0	0	0	0	0	0
19 August	89	21	540	B1.3	2	0	0	0	0	0	0	0
20 August	88	15	520	B1.9	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)		
	>1 MeV	>10 MeV	>100 MeV	>.6 MeV	>2MeV	>4 MeV
	14 August	6.1E+5	1.6E+4	3.8E+3		2.7E+8
15 August	1.3E+6	1.6E+4	3.8E+3		1.9E+8	
16 August	1.1E+6	1.6E+4	3.8E+3		9.5E+7	
17 August	1.6E+6	1.7E+4	3.7E+3		4.9E+7	
18 August	1.2E+6	1.7E+4	3.6E+3		1.9E+6	
19 August	1.5E+6	1.6E+4	3.5E+3		1.6E+6	
20 August	1.8E+5	1.5E+4	3.1E+3		1.4E+6	

**Daily Geomagnetic Data**

Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
	14 August	2	0-0-1-0-2-1-1-0	1	0-0-0-0-2-0-0-1	4
15 August	2	1-1-1-0-0-1-1-1	1	0-0-1-1-0-0-0-0	3	1-0-0-0-0-1-1-1
16 August	2	1-0-0-1-1-0-1-1	0	1-0-0-0-0-0-0-0	3	1-1-0-1-1-0-1-1
17 August	4	0-0-2-1-2-1-2-1	2	0-0-2-0-0-1-1-1	5	1-0-2-1-1-1-2-2
18 August	9	2-3-2-2-2-1-2-3	13	2-4-3-4-3-1-1-1	12	2-4-2-2-2-3-2-3
19 August	21	2-1-1-2-5-4-4-5	61	2-2-0-4-7-8-5-3	38	2-1-1-2-6-6-6-5
20 August	14	4-5-2-1-2-2-2-1	12	4-4-2-1-2-3-2-1	24	5-6-2-0-2-4-3-2

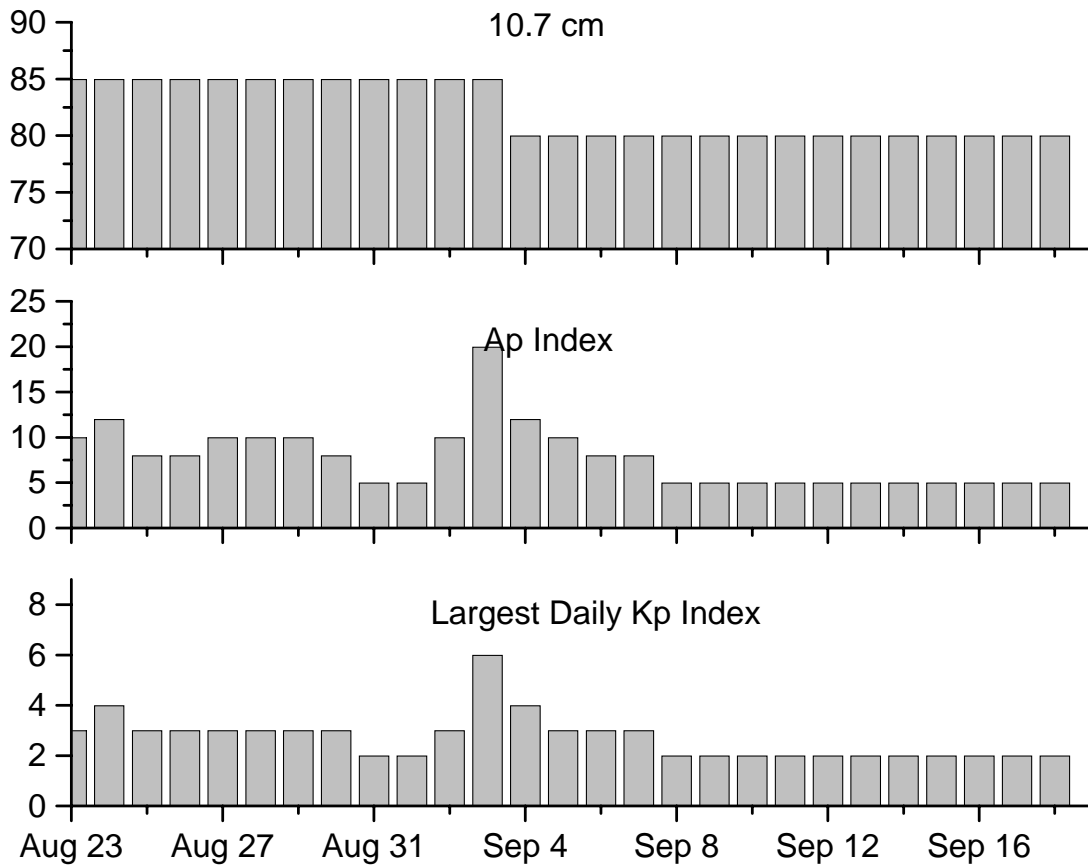


*Alerts and Warnings Issued*

Date & Time of Issue	Type of Alert or Warning	Date & Time of Event UTC
14 Aug 0506	ALERT: Electron 2MeV Integral Flux $\geq 1000$ pfu	14 Aug 0500
15 Aug 0836	ALERT: Electron 2MeV Integral Flux $\geq 1000$ pfu	15 Aug 0820
16 Aug 1136	ALERT: Electron 2MeV Integral Flux $\geq 1000$ pfu	16 Aug 1120
16 Aug 1907	ALERT: Type IV Radio Emission	16 Aug 1537
16 Aug 2150	WATCH: Geomagnetic A $\geq 20$	19 Aug
17 Aug 1350	ALERT: Electron 2MeV Integral Flux $\geq 1000$ pfu	17 Aug 1330
18 Aug 0605	ALERT: Geomagnetic K = 4	18 Aug 0600
18 Aug 0611	WARNING: Geomagnetic K = 4	18 Aug 0615 – 1600
18 Aug 1624	WARNING: Geomagnetic Sudden Impulse	18 Aug 1645- 1745
18 Aug 1646	SUMMARY: Geomagnetic Sudden Impulse	18 Aug 1644
19 Aug 1143	WARNING: Geomagnetic K = 4	19 Aug 1145 – 2359
19 Aug 1403	ALERT: Geomagnetic K = 4	19 Aug 1400
19 Aug 1428	WARNING: Geomagnetic K = 5	19 Aug 1430 – 2359
19 Aug 1432	ALERT: Geomagnetic K = 5	19 Aug 1428
19 Aug 2337	EXTENDED WARNING: Geomagnetic K = 5	19 Aug 1430 – 20/1600
20 Aug 0532	ALERT: Geomagnetic K = 6	20 Aug 0530
20 Aug 1636	ALERT: Geomagnetic K = 4	20 Aug 1633
20 Aug 1820	SUMMARY: 10cm Radio Burst	20 Aug 1630



### 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 August	85	10	3	06 Sept	80	8	3
24	85	12	4	07	80	8	3
25	85	8	3	08	80	5	2
26	85	8	3	09	80	5	2
27	85	10	3	10	80	5	2
28	85	10	3	11	80	5	2
29	85	10	3	12	80	5	2
30	85	8	3	13	80	5	2
31	85	5	2	14	80	5	2
01 Sept	85	5	2	15	80	5	2
02	85	10	3	16	80	5	2
03	85	20	6	17	80	5	2
04	80	12	4	18	80	5	2
05	80	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.			
14 August	0852	0857	0900	B2.7			
	1434	1440	1444	B1.4			
	1623	1628	1635	B1.1			
15 August	0217	0221	0228	B1.4			
	0610	0614	0616	B1.9			904
	1041	1044	1046	B8.1			904
16 August	1902	1906	1909	B2.3			
	0454	0457	0500	B2.1			904
	0812	0815	0819	B3.4			904
	1244	1249	1252	B2.0			904
	1344	1352	1354	B5.4			904
	1406	1410	1414	B3.3			904
	1437	1617	1922	C3.6	Sf	S14W13	904
	1844	1847	1850	C3.5			904
	2158	2204	2207	B9.3			904
17 August	2312	2317	2319	C1.0			
	0422	0425	0427	B3.0			904
	0427	0430	0432	C1.0			904
18 August	0809	0813	0815	B2.3			904
	0042	0046	0052	B1.2			904
	1215	1255	1310	B3.1			904
	2000	2004	2006	B1.2			903
	2126	2129	2131	B1.6			
	2201	2205	2210	B2.9			
19 August	2338	2342	2346	B3.0			
	0210	0215	0225	B2.5			
	1116	1124	1129	C3.8			903
	1240	1244	1246	B5.6			903
	1729	1734	1738	B6.3			904
	1805	1808	1813	B3.1			904
20 August	1814	1817	1819	B4.1			904
	2113	2119	2123	C2.2			904
	0104	0108	0111	B3.3			904
	0708	0735	0754	B6.8			904
	1124	1344	1426	C1.5			
	1627	1632	1634	C2.9			904
	1847	1850	1854	B3.6			



**Flare List – continued.**

Date	Time			Optical	Imp / Brtns	Location Lat CMD	Rgn
	Begin	Max	End	X-ray Class.			
20 August	1946	1952	1958	B9.9			904
	2107	2109	2111	C4.3	Sf	S13W69	904
	2153	2201	2207	B5.9			904
	2242	2247	2252	B5.4			
	2332	2337	2340	B5.5			

**Region Summary**

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

*Region 903*

08 Aug	S09E56	154	0040	04	Cro	002	B											
09 Aug	S09E43	154	0030	05	Bxo	004	B											
10 Aug	S09E29	155	0010	06	Bxo	006	B											
11 Aug	S12E14	157	0010	02	Bxo	003	B											
12 Aug	S12E01	157	0000	00		000												
13 Aug	S12W12	157	0000	00		000												
14 Aug	S08W26	157	0010	01	Axx	001	A											
15 Aug	S08W39	157	0000	00		000												
16 Aug	S08W52	157	0000	00		000												
17 Aug	S08W65	157	0000	00		000												
18 Aug	S08W78	157	0000	00		000												
										0	0	0	0	0	0	0	0	0

Crossed West Limb.

Absolute heliographic longitude: 157

*Region 904*

09 Aug	S14E76	121	0080	03	Hax	001	A											
10 Aug	S13E63	121	0300	10	Ekc	011	Bg	1			7							
11 Aug	S13E51	120	0640	13	Ekc	016	Bg	4			1							
12 Aug	S13E38	120	0750	14	Eki	017	Bg											
13 Aug	S13E25	119	0680	15	Eko	016	Bg											
14 Aug	S13E11	120	0690	14	Eki	024	Bg											
15 Aug	S14W03	121	0700	15	Eki	022	Bg											
16 Aug	S12W15	120	0600	16	Fko	019	Bg	2			1							
17 Aug	S13W28	120	0590	16	Fko	016	Bg	1										
18 Aug	S13W42	120	0590	16	Fko	019	Bg											
19 Aug	S14W54	120	0540	17	Fko	011	B	1										
20 Aug	S14W72	124	0520	09	Cko	005	B	2			1							
										11	0	0	10	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 121

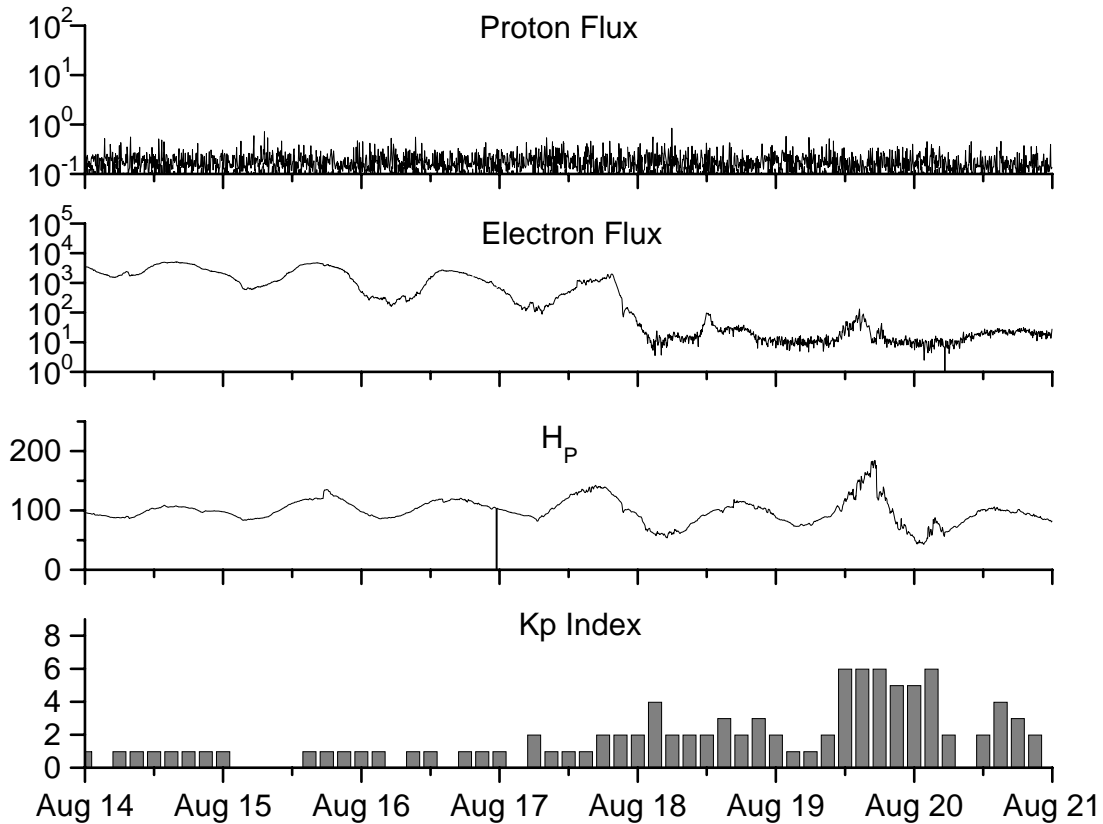


**Recent Solar Indices (preliminary)  
of the observed monthly mean values**

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>									
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	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			76.6		6	
March	21.3	10.8	0.51			75.5		8	
April	55.2	30.2	0.55			89.0		11	
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	

**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 August 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).

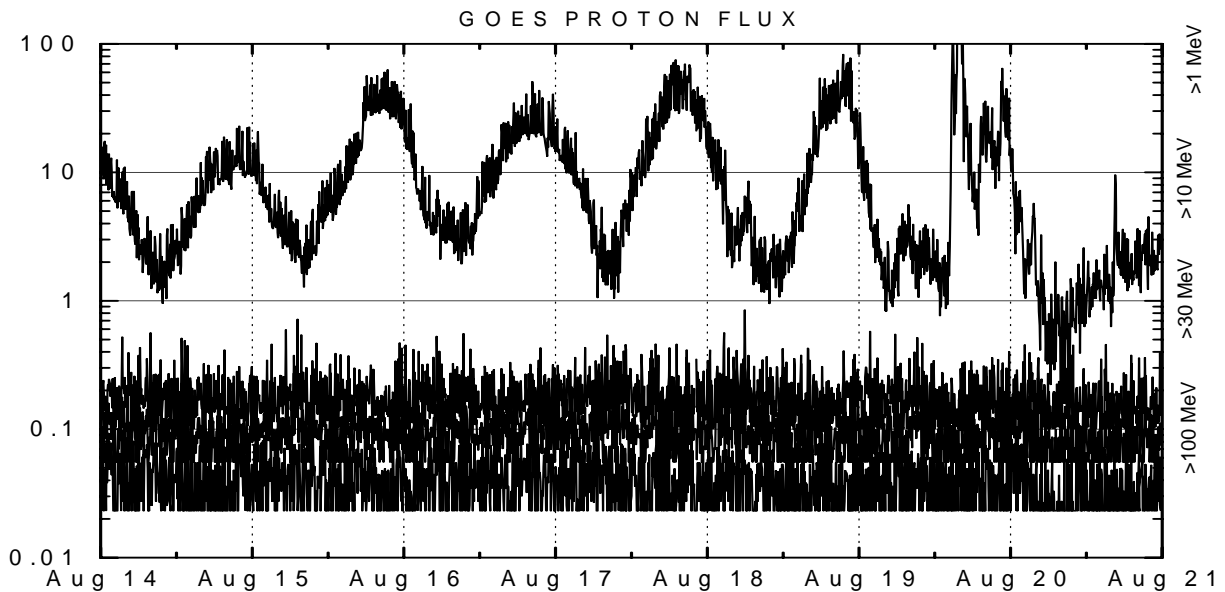
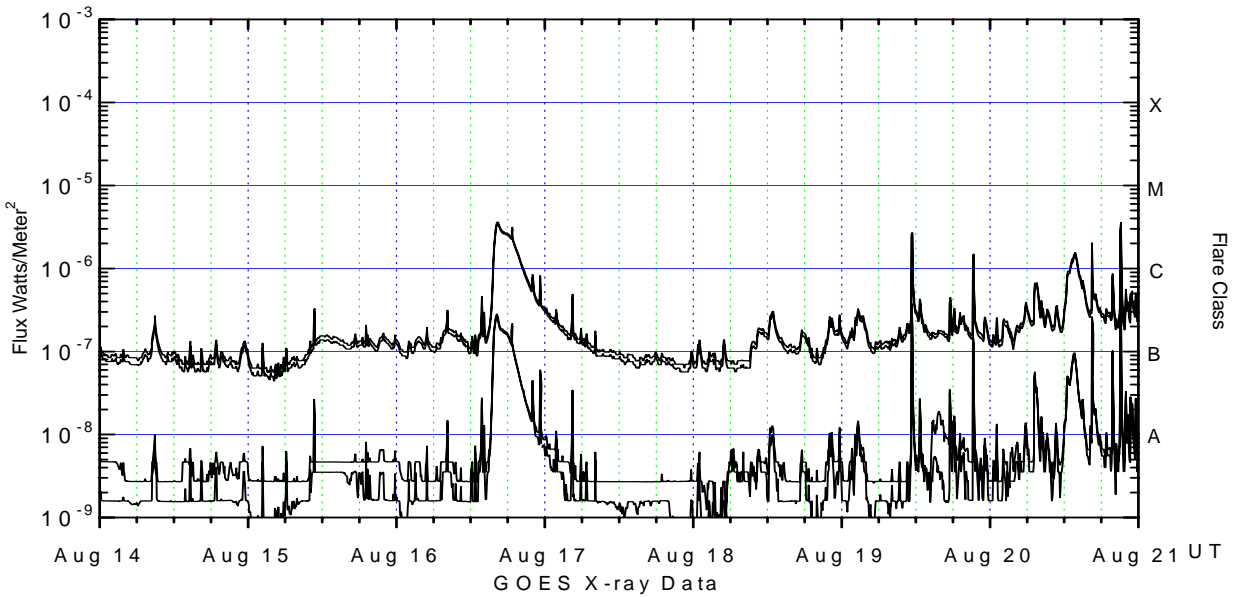
*H<sub>p</sub>* plot contains the five minute averaged magnetic field H - component in nanoteslas (nT) as measured by GOES-12. The H component is parallel to the spin axis of the satellite, which is nearly parallel to the Earth's rotation axis.

*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.

