

**Space Weather Highlights**  
**27 June – 04 July 2004**

**SWO PRF 1505**  
**06 Jul 2004**

Solar activity was very low to low. Region 635 (S12, L=056, class/area, Fkc/600 on 20 June) produced four C-class flares as it rotated around the west limb on 28 June. Activity dropped to very low levels on 29 June. Region 639 (N13, L=249, class/area, Cao/150 on 29 June) exhibited minor magnetic mixing during its growth phase in late June, but activity was limited to occasional B-class flares. Activity levels were low on 30 June as Region 640 (S07, L=254, class/area, Dao/050 on 29 June) produced a single C1 flare. Very low conditions were observed for the remainder of the summary period as just small simple sunspot groups populated the visible disk.

Solar wind data were available from the NASA Advanced Composition Explorer (ACE) spacecraft during most of the summary period. The period began with the solar wind speed near 350 km/s, but quickly increased during the latter half of the 28th as a coronal hole high speed stream rotated into a geoeffective position. By 29 June, solar wind speed ranged between 550 – 600 km/s. This high speed stream gradually declined to around 400 km/s by early on 04 July. IMF Bz underwent periods near –10 nT and +10 nT on 28 June. Bz was generally +5 to –5 nT from 29 June through 04 July.

There were no greater than 10 MeV proton events at geo-synchronous orbit during the summary period.

The greater than 2 MeV electron flux at geosynchronous orbit was at high levels from 30 June to 04 July.

The geomagnetic field ranged from quiet to active with minor storm periods observed at high latitudes. The period began with generally quiet to unsettled conditions, but became more disturbed late on the 28th following the onset of a high speed coronal hole stream. As the solar wind speed increased, the geomagnetic field responded with active periods at all latitudes and occasional minor storm periods at high latitudes. The geomagnetic field gradually returned to quiet to unsettled levels on 02 July as the high speed stream subsided.

**Space Weather Outlook**

**07 July – 02 August 2004**

Solar activity is expected to be at very low to low levels. Mostly very low conditions are expected through the early part of the forecast period. Old active regions (634 and 635) are expected to return on 10-12 July and boost activity levels to low. There is a chance for an isolated M-class flare from either of these regions.

No greater than 10 MeV proton events are expected.

The greater than 2 MeV electron flux at geosynchronous orbit is expected to reach high levels on 13 July and again on 26 – 29 July due to recurrent coronal hole high speed stream.

The geomagnetic field is expected to range from quiet to active levels with minor storm periods at high latitudes. Unsettled to active conditions with high latitude minor storm periods are possible on 12 July and 25-28 July as recurrent high speed coronal hole streams rotate into a geoeffective position.



### *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
28 June	89	45	140	B1.7	5	0	0	0	0	0	0	0
29 June	85	50	230	A7.3	0	0	0	0	0	0	0	0
30 June	82	42	120	A4.8	1	0	0	2	0	0	0	0
01 July	81	26	110	A3.9	0	0	0	0	0	0	0	0
02 July	81	33	110	A3.4	0	0	0	0	0	0	0	0
03 July	80	31	90	A3.5	0	0	0	0	0	0	0	0
04 July	79	37	50	A3.2	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)		
	>1MeV	>10MeV	>100MeV	>.6MeV	>2MeV	>4MeV
28 June	1.1E+5	1.3E+4	3.0E+3		7.0E+5	
29 June	3.4E+5	1.3E+4	2.8E+3		9.5E+5	
30 June	4.5E+5	1.3E+4	2.8E+3		6.0E+7	
01 July	5.4E+5	1.3E+4	3.0E+3		1.1E+8	
02 July	3.7E+5	1.3E+4	3.0E+3		1.4E+8	
03 July	2.5E+5	1.4E+4	3.0E+3		1.7E+8	
04 July	1.6E+5	1.4E+4	3.2E+3		1.0E+8	

### *Daily Geomagnetic Data*

Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
	28 June	11	2-4-1-2-2-1-3-3		1-1-0-1-1-0-0-*	13
29 June	15	3-3-3-2-2-4-3-3	29	5-5-4-4-5-3-3-2	20	4-4-4-3-3-3-4-3
30 June	8	3-2-3-2-2-1-2-2	21	3-2-5-4-4-2-2-4	10	3-2-3-3-3-2-3-2
01 July	9	2-2-3-2-2-1-3-2	24	2-3-5-6-3-3-2-2	13	3-3-3-3-3-3-3-2
02 July	8	2-2-1-2-2-1-3-3	6	2-2-1-1-3-1-1-1	9	2-3-2-2-3-2-2-3
03 July	5	2-1-1-1-1-2-2-1	10	2-2-3-3-4-1-1-1	9	2-1-2-3-3-3-3-1
04 July	4	1-1-1-1-1-1-1-2	8	2-2-2-4-1-1-1-1	6	2-2-2-2-1-2-2-2

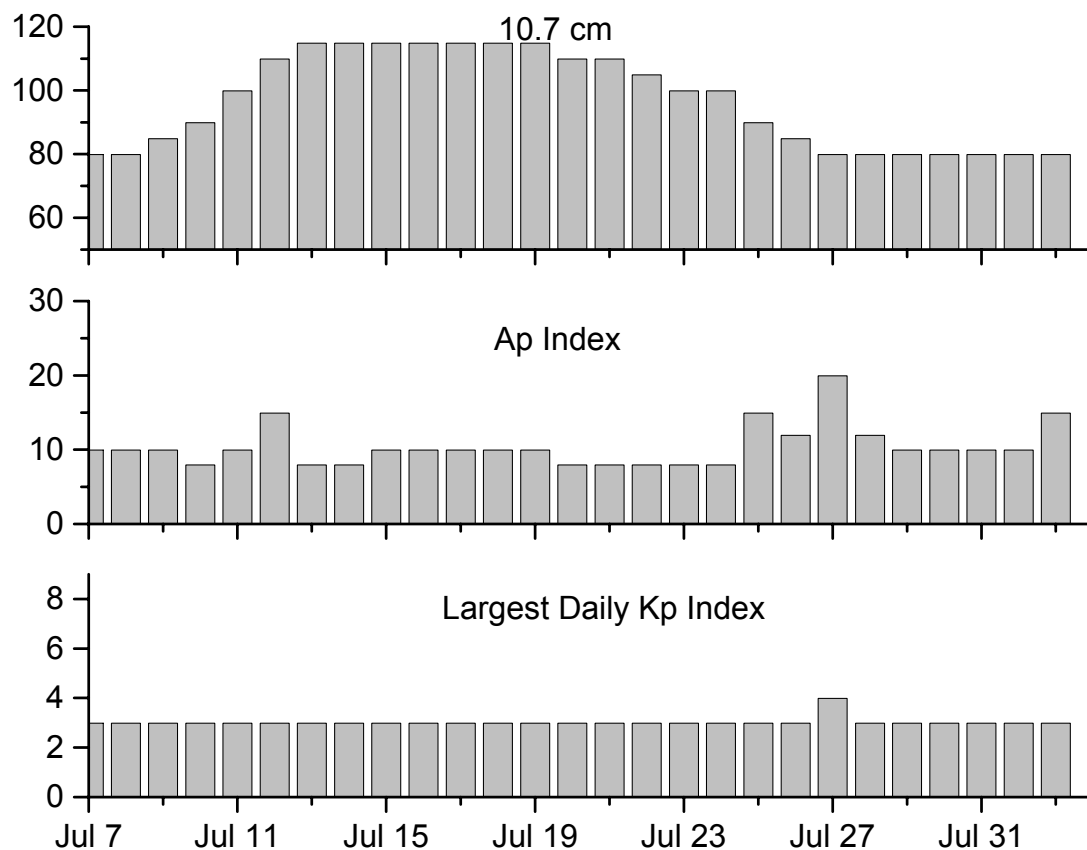


### *Alerts and Warnings Issued*

<u>Date &amp; Time of Issue</u>	<u>Type of Alert or Warning</u>	<u>Date &amp; Time of Event UT</u>
28 Jun 0336	WARNING: Geomagnetic K= 4	28 Jun 0337 – 1500
28 Jun 0411	ALERT: Geomagnetic K= 4	28 Jun 0408
28 Jun 2330	WARNING: Geomagnetic K= 4	28 Jun 2330 – 29/1500
28 Jun 2337	ALERT: Geomagnetic K-index of 4	28 Jun 2335
29 Jun 0840	WARNING: Geomagnetic K= 5	29 Jun 0841 – 1000
29 Jun 2308	WARNING: Geomagnetic K= 4	29 Jun 2310 – 30/1500
29 Jun 2315	ALERT: Geomagnetic K= 4	29 Jun 2313
30 Jun 1345	ALERT: Electron 2MeV Integral Flux $\geq$ 1000pfu	30 Jun 1315
01 Jul 0748	WARNING: Geomagnetic K= 4	01 Jul 0748 – 1500
01 Jul 0754	ALERT: Geomagnetic K= 4	01 Jul 0754
01 Jul 1205	ALERT: Electron 2MeV Integral Flux $\geq$ 1000pfu	01 Jul 1145
02 Jul 1011	ALERT: Electron 2MeV Integral Flux $\geq$ 1000pfu	02 Jul 0955
03 Jul 0951	ALERT: Electron 2MeV Integral Flux $\geq$ 1000pfu	03 Jul 0935
04 Jul 1203	ALERT: Electron 2MeV Integral Flux $\geq$ 1000pfu	04 Jul 1140



### 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
07 Jul	80	10	3	21 Jul	110	8	3
08 Jul	80	10	3	22 Jul	105	8	3
09 Jul	85	10	3	23 Jul	100	8	3
10 Jul	90	8	3	24 Jul	100	8	3
11 Jul	100	10	3	25 Jul	90	15	3
12 Jul	110	15	3	26 Jul	85	12	3
13 Jul	115	8	3	27 Jul	80	20	4
14 Jul	115	8	3	28 Jul	80	12	3
15 Jul	115	10	3	29 Jul	80	10	3
16 Jul	115	10	3	30 Jul	80	10	3
17 Jul	115	10	3	31 Jul	80	10	3
18 Jul	115	10	3	01 Aug	80	10	3
19 Jul	115	10	3	02 Aug	80	15	3
20 Jul	110	8	3				



### *Energetic Events*

Date	Time		X-ray	Optical Information			Peak		Sweep Freq	
	Begin	Max	Integ	Imp/	Location	Rgn	Radio Flux		Intensity	
			Class	Flux	Brtns	Lat	CMD	#	245	2695

*No Events Observed*

### *Flare List*

Date	Time			X-ray Class.	Optical		Rgn
	Begin	Max	End		Imp / Brtns	Location Lat CMD	
28 June	0007	0012	0018	B8.3			635
	0039	0045	0051	B5.2			635
	0134	0141	0156	C1.3			635
	0315	0324	0335	C1.8			635
	0409	0417	0422	C2.8			635
	0556	0616	0629	C1.1			
	0805	0809	0812	B4.5			635
	0913	0916	0920	B3.5			635
	1033	1039	1045	B5.0			635
	1154	1212	1228	C1.6			635
	1553	1556	1600	B4.2			635
	1928	1932	1935	B4.3			639
	2221	2224	2228	B2.2			635
	2315	2320	2324	B5.3			639
29 June	0831	0836	0841	B2.2			
	1102	1122	1146	B2.6			639
	1333	1337	1341	B1.1			
	1413	1420	1424	B6.7			639
	1810	1825	1840	B7.5			639
30 June	2008	2012	2017	B1.3			639
	0723	0723	0728	B2.2	Sf	S08E40	640
	1148	1156	1201	B2.7			640
	1431	1435	1448	C1.3	Sf	S10E36	640
	1525	1608	1634	B2.3			
01 July	2203	2206	2210	B1.1			
	1150	1154	1158	B1.2			
02 July	1430	1435	1438	B3.7			
	1742	1746	1749	B2.6			
	2311	2314	2316	B1.0			
03 July	<i>No Flares Observed</i>						
04 July	0706	0711	0723	B1.6			
	0825	0831	0837	B1.1			
	1503	1520	1536	B4.5			641



### Region Summary

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 636

20 Jun	S10E30	025	0050	05	Cao	007	B											
21 Jun	S10E17	025	0050	07	Dso	009	B											
22 Jun	S10E04	025	0010	07	Bxo	005	B											
23 Jun	S10W11	025	0010	05	Bxo	004	B											
24 Jun	S10W24	025	0010	04	Bxo	006	B											
25 Jun	S09W36	024	0010	03	Bxo	003	B											
26 Jun	S16W49	024	0000	00	Axx	001	A											
27 Jun	S16W62	024																
28 Jun	S16W75	024																
29 Jun	S16W88	024																
0 0 0 0 0 0 0 0 0																		

Crossed West Limb.

Absolute heliographic longitude:025

#### Region 637

21 Jun	N08E63	339	0000	01	Axx	001	A											
22 Jun	N08E50	339	0010	04	Bxo	004	B											
23 Jun	N08E37	337	0010	03	Bxo	004	B											
24 Jun	N08E24	337	0020	05	Bxi	010	B											
25 Jun	N08E11	337	0030	09	Dso	012	B											1
26 Jun	N09W03	338	0020	08	Bxo	011	B											
27 Jun	N08W16	338	0030	05	Bxo	013	B	1										1
28 Jun	N09W31	339	0030	08	Bxo	009	B											
29 Jun	N08W45	340	0030	10	Bxo	008	B											
30 Jun	N08W58	340	0000	01	Axx	001	A											
01 Jul	N08W71	340																
1 0 0 2 0 0 0 0 0																		

Crossed West Limb.

Absolute heliographic longitude:338

#### Region 638

26 Jun	N07E22	313	0010	01	Axx	002	A											
27 Jun	N07E09	313																
28 Jun	N07W04	313																
29 Jun	N07W17	313																
30 Jun	N07W30	313																
01 Jul	N07W43	313																
0 0 0 0 0 0 0 0 0																		

Still on Disk.

Absolute heliographic longitude:313



**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	4							
<i>Region 639</i>																						
27 Jun	N11E73	261	0010	00		000	B															
28 Jun	N13E60	248	0070	05	Dao	004	B															
29 Jun	N13E46	249	0150	08	Cao	008	B															
30 Jun	N09E31	251	0100	08	Cao	007	B															
01 Jul	N10E19	250	0050	07	Cso	004	B															
02 Jul	N09E06	250	0090	08	Cao	008	B															
03 Jul	N08W10	253	0060	02	Hsx	004	A															
04 Jul	N09W20	248	0040	07	Dao	010	B															
																				0 0 0 0 0 0 0 0		
Still on Disk.																						
Absolute heliographic longitude:250																						
<i>Region 640</i>																						
27 Jun	S09E68	256	0040	01	Axx	002	B															
28 Jun	S07E56	252	0040	04	Dao	002	B															
29 Jun	S07E41	254	0050	04	Dao	004	B															
30 Jun	S08E28	254	0020	05	Cso	004	B	1				2										
01 Jul	S09E15	254	0060	04	Cso	002	B															
02 Jul	S09E02	254	0020	05	Dso	005	B															
03 Jul	S09W13	256	0030	06	Bxo	007	B															
04 Jul	S10W25	253	0010	05	Bxo	007	B															
																				1 0 0 2 0 0 0 0		
Still on Disk.																						
Absolute heliographic longitude:254																						
<i>Region 641</i>																						
04 Jul	N14E54	174																				
																				0 0 0 0 0 0 0 0		
Still on Disk.																						
Absolute heliographic longitude:174																						



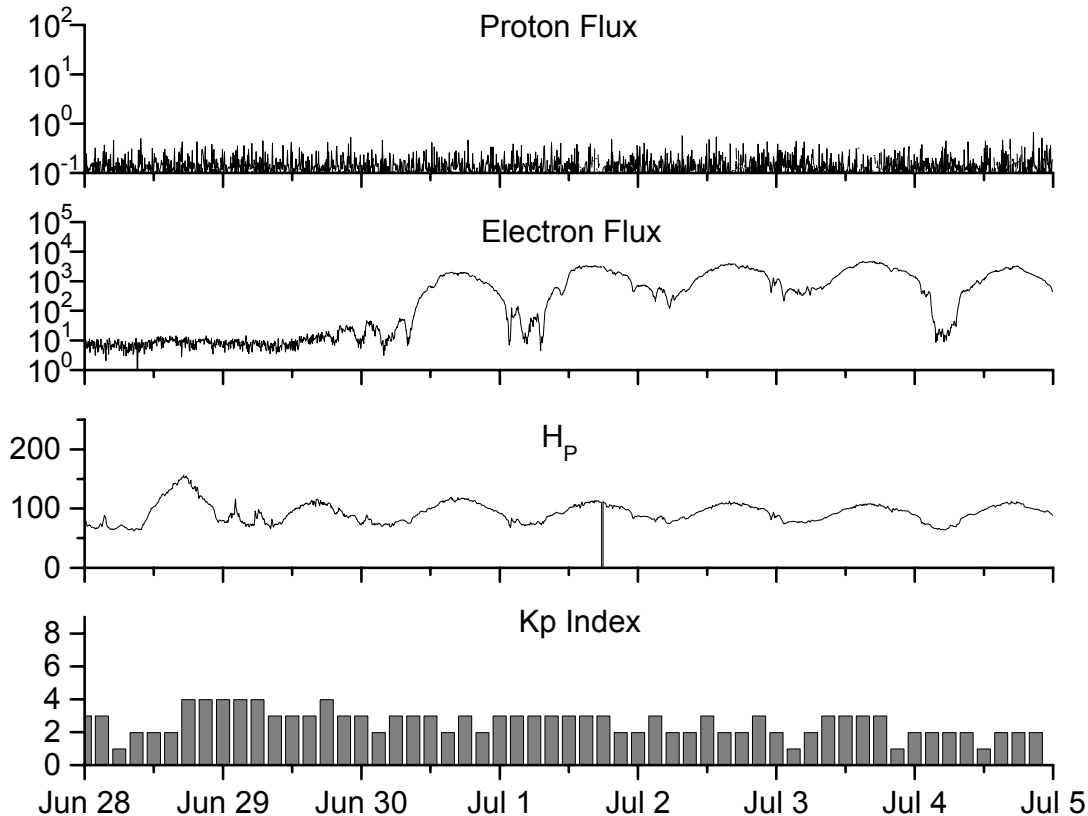
**Recent Solar Indices (preliminary)  
of the observed monthly mean values**

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>2002</b>									
July	183.5	99.6	0.54	175.4	102.7	173.5	176.3	11	13.7
August	191.0	116.4	0.61	169.2	98.7	183.9	169.5	16	14.2
September	206.4	109.6	0.53	163.4	94.6	175.8	164.1	14	15.0
October	153.9	97.5	0.63	158.8	90.5	167.0	159.4	23	15.6
November	159.8	95.5	0.60	150.9	85.2	168.7	154.8	16	16.3
December	147.9	80.8	0.55	144.6	82.1	158.6	150.9	13	17.0
<b>2003</b>									
January	149.3	79.7	0.53	141.7	81.0	144.0	149.2	13	18.2
February	87.0	46.0	0.53	136.4	78.5	124.5	144.7	17	18.9
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	136.3	20	20.0
May	89.6	55.2	0.62	118.3	67.8	129.3	135.0	26	21.0
June	118.4	77.4	0.65	113.6	65.2	129.4	132.6	24	21.8
July	132.8	85.0	0.64	106.9	62.0	127.8	129.5	20	22.3
August	114.3	72.7	0.64	102.8	60.3	122.1	127.5	23	22.4
September	82.6	48.8	0.59	100.7	59.8	112.3	126.0	19	21.9
October	118.9	65.6	0.55	96.6	58.4	153.1	124.1	32	21.1
November	118.9	67.2	0.57	93.6	57.0	153.1	121.8	31	20.0
December	75.4	47.0	0.62			115.1		18	
<b>2004</b>									
January	62.3	37.2	0.60			114.1		20	
February	75.6	46.0	0.61			107.0		13	
March	81.0	48.9	0.60			112.2		12	
April	59.3	39.3	0.66			101.3		10	
May	77.3	41.5	0.54			99.7		9	
June	78.9	43.2	0.55			99.7		9	

**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 28 June 2004*

*Protons* plot contains the five-minute averaged integral proton flux (protons/cm<sup>2</sup>-sec-sr) as measured by GOES-11 (W98) for each of three energy thresholds: greater than 10, 50, and 100 MeV.

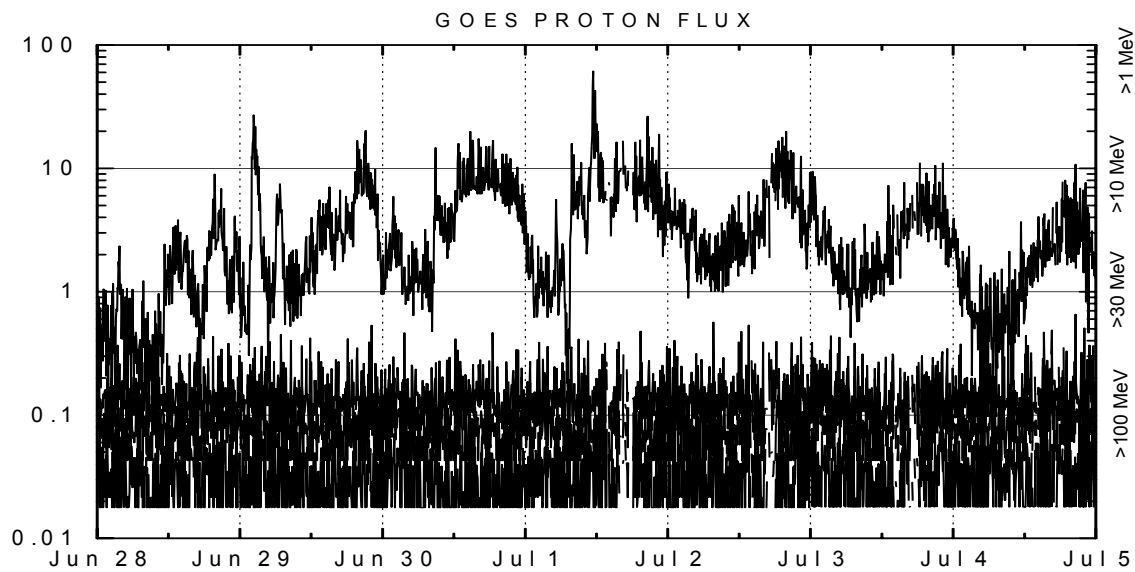
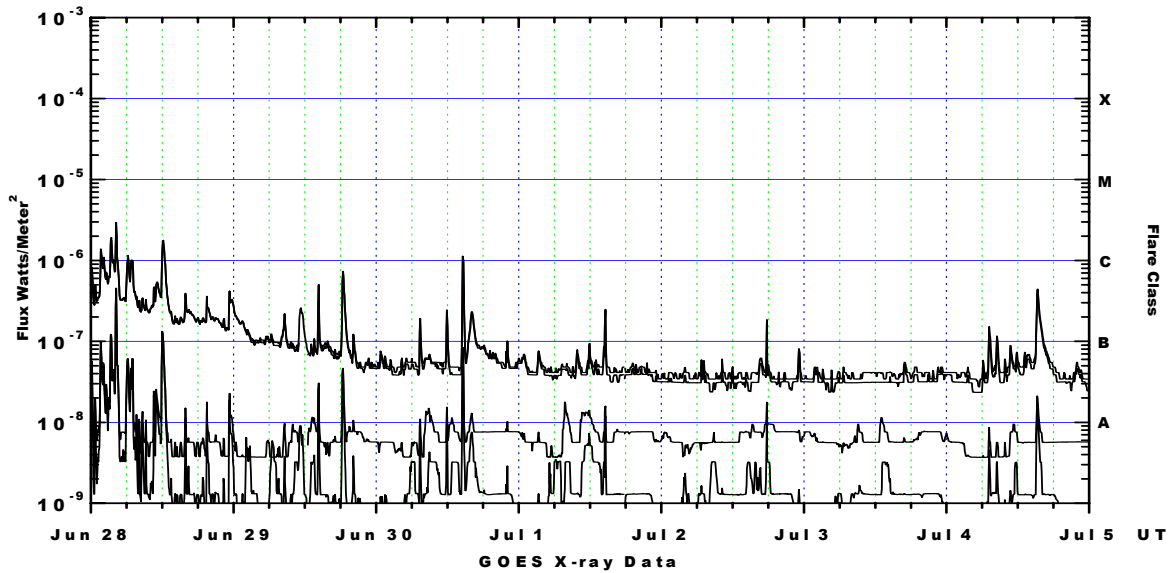
*Electrons* plot contains the five-minute averaged integral electron flux (electrons/cm<sup>2</sup>-sec-sr) with energies greater than 2 MeV at GOES-12 (W75).

*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 Heartland, UK. These data are made available through cooperation from the Geological Survey of Canada (GSC) 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<sub>p</sub> 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 (W98) 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.

