

**Space Weather Highlights**  
**07 - 13 June 2004**

**SWO PRF 1502**  
**15 Jun 2004**

Solar activity ranged from very low to moderate. New Region 634 (N12, L=074, class/area, Dao/120 on 13 June) rotated onto the disk on the 13th and produced the summary period's largest activity, an M1.0 at 13/1156 UTC. Prior to Region 634's appearance, numerous B and C-class flares were observed from behind the east limb near N12. This region was likely one of two primary source regions for a series of strong CMEs off the west limb in the first week of June. At the time of this writing, a second complex active region was rotating into view on the southeast limb near S08.

Solar wind data were available from the NASA Advanced Composition Explorer (ACE) spacecraft during most of the summary period. The period began with solar wind speed near 475 km/s and decayed slowly through 09 June. Early on 10 June, velocity increased briefly to near 550 km/s as a weak CME observed on 06 June passed the ACE spacecraft. Thereafter, speed decayed gradually and ended the summary period near 375 km/s. The IMF Bz did not vary much beyond +/- 7 nT through the entire period.

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 on 07 and 09 June.

The geomagnetic field was at mostly quiet to unsettled levels with one isolated active period midday on 09 June.

**Space Weather Outlook**  
**16 June - 12 July 2004**

Solar activity is expected to be at very low to low levels with isolated moderate activity possible from Region 634 and a second active region rotating into view on the southeast limb.

There is a slight chance for a greater than 10 MeV proton events during the first half of the forecast period.

The greater than 2 MeV electron flux at geosynchronous orbit is expected to reach high levels on 17 – 18 June, 27 – 29 June and 07 - 08 July, due to recurrent coronal hole high speed streams.

The geomagnetic field is expected to range from quiet to active levels. Unsettled to active conditions are possible on 16 – 17 June, 26 – 28 June, and 06 - 07 July as generally weak, recurrent coronal high speed 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
07 June	89	82	90	A6.9	0	0	0	1	0	0	0	0
08 June	86	72	130	A5.5	0	0	0	1	0	0	0	0
09 June	85	73	80	A4.7	0	0	0	0	0	0	0	0
10 June	83	50	190	A4.8	0	0	0	0	0	0	0	0
11 June	84	45	130	A3.7	0	0	0	0	0	0	0	0
12 June	88	28	90	B1.7	2	0	0	0	0	0	0	0
13 June	95	55	220	B3.2	1	1	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
07 June	2.0E+5	1.3E+4	3.0E+3		5.2E+7	
08 June	3.3E+5	1.3E+4	3.0E+3		2.8E+7	
09 June	4.0E+5	1.3E+4	3.0E+3		3.1E+7	
10 June	1.4E+5	1.3E+4	2.9E+3		1.5E+7	
11 June	1.3E+5	1.3E+4	2.6E+3		1.7E+7	
12 June	1.3E+5	1.3E+4	2.6E+3		2.4E+7	
13 June	2.4E+5	1.3E+4	2.8E+3		4.0E+7	

### Daily Geomagnetic Data

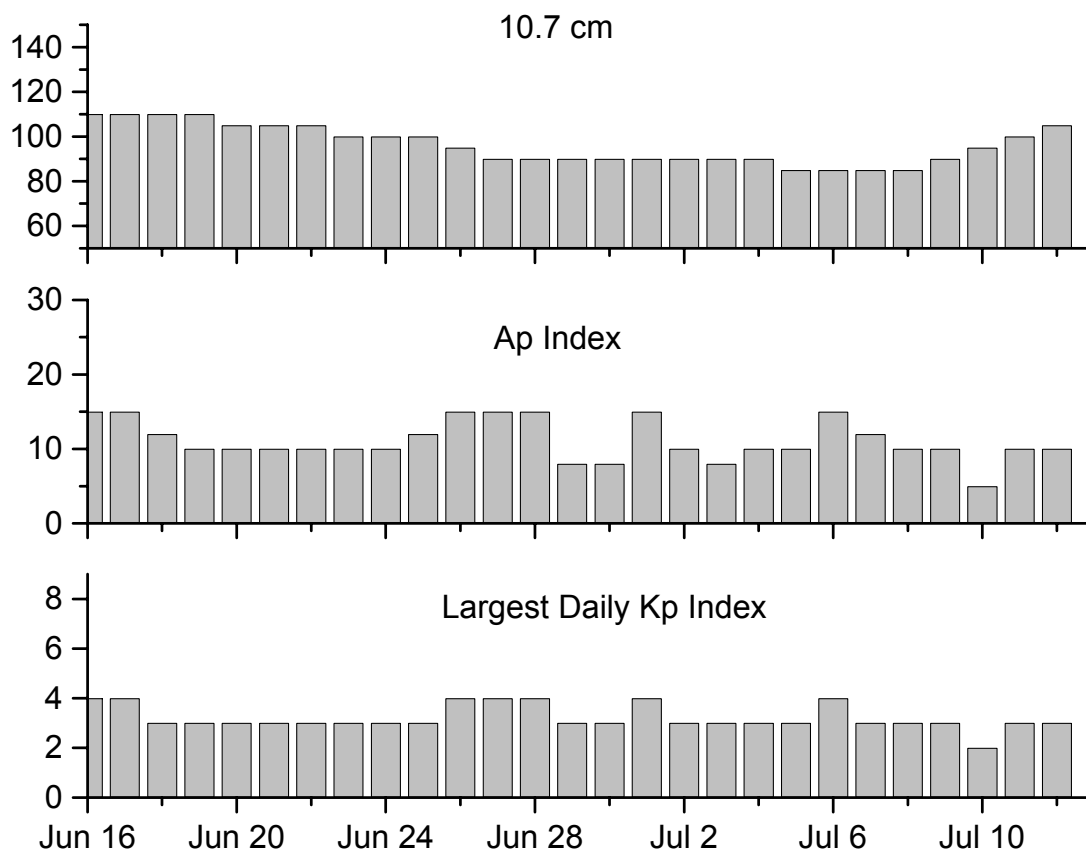
Date	Middle Latitude		High Latitude		Estimated	
	Fredericksburg		College		Planetary	
	A	K-indices	A	K-indices	A	K-indices
07 June	7	2-2-1-2-2-1-2-3	*	*_*_*_*_*_*_*_*_*_*	8	3-1-2-2-3-2-2-3
08 June	6	2-1-1-2-1-2-2-2	15	3-3-1-5-2-3-2-2	9	3-2-1-3-2-3-2-1
09 June	14	2-2-2-4-4-2-3-3	28	3-2-3-6-5-5-2-2	14	3-3-3-4-3-3-3-3
10 June	8	2-3-1-1-2-2-3-2	7	2-3-2-0-2-1-2-2	11	3-3-2-2-3-3-3-3
11 June	5	3-1-2-1-1-1-1-0	7	2-2-4-3-0-0-1-0	10	3-2-3-3-2-3-2-2
12 June	5	1-2-2-2-2-2-1-0	2	0-2-2-0-0-0-0-0	7	1-2-3-1-3-2-2-2
13 June	3	0-1-0-1-1-1-1-2	2	0-0-1-0-1-1-1-1	4	1-0-1-1-2-2-2-2

### Alerts and Warnings Issued

Date & Time of Issue	Type of Alert or Warning	Date & Time of Event UT
07 Jun 1243	ALERT: Electron 2MeV Integral Flux > 1000pfu	07 Jun 1230
08 Jun 0012	1 – 245 MHz Radio Burst	07 Jun
09 Jun 1119	ALERT: Geomagnetic K= 4	09 Jun 1118
09 Jun 1509	ALERT: Electron 2MeV Integral Flux > 1000pfu	09 Jun 1435



## 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
16 Jun	110	15	4	30 Jun	90	8	3
17	110	15	4	01 Jul	90	15	4
18	110	12	3	02	90	10	3
19	110	10	3	03	90	8	3
20	105	10	3	04	90	10	3
21	105	10	3	05	85	10	3
22	105	10	3	06	85	15	4
23	100	10	3	07	85	12	3
24	100	10	3	08	85	10	3
25	100	12	3	09	90	10	3
26	95	15	4	10	95	5	2
27	90	15	4	11	100	10	3
28	90	15	4	12	105	10	3
29	90	8	3				



***Energetic Events***

Date	Time			X-ray		Optical Information			Peak		Sweep Freq	
	Begin	Max	½ Max	Class	Flux	Imp/ Brtns	Location		Radio Flux		Intensity	
							Lat	CMD	245	2695	II	IV
13 Jun 04	1127	1156	1215	M1.0	.020							

***Flare List***

Date	Time			X-ray Class.	Imp / Brtns	Optical Location Lat CMD	Rgn
	Begin	Max	End				
07 June	0026	0041	0101		Sf	S18W43	621
	0236	0255	0308	B5.0			
	2010	2015	2020	B1.3			
	2348	2352	2354	B2.1			
08 June	1038	1049	1056	B2.0	Sf	S16W66	621
	1844	1847	1853	B8.0			621
	2325	2328	2331	B1.0			621
09 June	1700	1714	1740	B2.8			621
10 June	0256	0312	0341	B4.0			621
11 June	1953	2011	2036	B2.1			
12 June	0724	0738	0750	B8.9			
	1236	1239	1242	B2.2			
	1831	1834	1836	B3.8			
	1837	1841	1843	C1.9			
	1940	1943	1945	C1.1			
	1949	1953	1959	B8.5			
13 June	0238	0242	0247	B8.9			634
	0427	0444	0452	C4.1			634
	1127	1156	1215	M1.0			634
	1615	1618	1620	B5.1			
	2032	2036	2039	B9.9			
	2307	2316	2322	B6.9			
	2352	2356	0001	B5.8			



### 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 621

29 May	S14E62	284	0110	07	Dai	005	B										
30 May	S15E51	282	0140	06	Dac	014	B										
31 May	S15E38	282	0100	08	Dai	016	B										
01 Jun	S16E25	281	0070	09	Dso	018	B										
02 Jun	S14E12	281	0060	07	Dao	019	Bg										
03 Jun	S14W01	281	0090	08	Dai	030	B										
04 Jun	S14W15	282	0050	07	Csi	021	B										
05 Jun	S14W28	282	0030	08	Cao	011	B										
06 Jun	S14W41	282	0020	05	Cso	007	B	1									
07 Jun	S14W57	283	0010	08	Bxo	005	B				1						
08 Jun	S14W70	283	0020	02	Axx	002	A				1						
09 Jun	S15W85	285															
									1	0	0	2	0	0	0	0	0

Crossed West Limb.

Absolute heliographic longitude: 281

#### Region 622

30 May	S12E72	261	0080	02	Hax	003	A										
31 May	S12E58	262	0030	02	Hax	003	A										
01 Jun	S12E46	260	0030	02	Cao	002	B										
02 Jun	S12E32	261	0050	02	Cao	002	B										
03 Jun	S09E20	260	0010	02	Axx	003	A										
04 Jun	S10E07	260															
05 Jun	S10W06	260															
06 Jun	S10W19	260															
07 Jun	S10W32	260															
08 Jun	S10W45	260															
09 Jun	S11W59	259	0010	03	Bxo	004	B										
10 Jun	S11W72	259	0030	04	Cso	003	B										
11 Jun	S11W86	260	0020	04	Bxo	004	B										
									0	0	0	0	0	0	0	0	0

Crossed West Limb.

Absolute heliographic longitude: 260



**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

*Region 624*

01 Jun	S09E64	242	0030	01	Hsx	001	A
02 Jun	S08E51	242	0040	01	Hsx	001	A
03 Jun	S07E38	242	0020	02	Cao	002	B
04 Jun	S08E24	243	0010	01	Axx	002	A
05 Jun	S08E11	243	0010	02	Axx	002	A
06 Jun	S08W02	243	0010	02	Axx	002	A
07 Jun	S08W18	243	0000	01	Axx	001	A
08 Jun	S08W31	243					

0 0 0 0 0 0 0 0

Still on Disk.

Absolute heliographic longitude: 243

*Region 626*

05 Jun	N05W06	260	0020	03	Cso	003	B
06 Jun	N05W19	260	0010	02	Axx	002	A
07 Jun	N05W32	260					
08 Jun	N05W45	260					

0 0 0 0 0 0 0 0

Crossed West Limb.

Absolute heliographic longitude: 260

*Region 627*

05 Jun	S08E30	224	0020	02	Hax	003	A
06 Jun	S08E17	224	0020	06	Cso	009	B
07 Jun	S08E04	222	0050	07	Dao	010	B
08 Jun	S08W09	222	0060	07	Dao	010	B
09 Jun	S09W22	222	0030	06	Bxo	006	B
10 Jun	S09W35	222					

0 0 0 0 0 0 0 0

Still on Disk.

Absolute heliographic longitude: 222

*Region 628*

07 Jun	S09E13	213	0010	03	Bxo	002	B
08 Jun	S09E00	213	0030	03	Cao	008	B
09 Jun	S09W11	211	0010	03	Bxo	002	B

0 0 0 0 0 0 0 0

Still on Disk.

Absolute heliographic longitude: 213



**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

*Region 629*

07 Jun	S04E22	204	0010	04	Bxo	002	B											
08 Jun	S04E09	204	0010	01	Hsx	001	A											
09 Jun	S04W03	203	0020	03	Bxo	007	B											
10 Jun	S05W17	204	0020	04	Cao	002	B											
11 Jun	S05W30	204																
12 Jun	S05W43	204																
13 Jun	S05W56	204																
										0	0	0	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 203

*Region 630*

07 Jun	N13E56	170	0010	01	Axx	002	A											
08 Jun	N13E43	170	0010	01	Axx	001	A											
09 Jun	N14E30	170																
										0	0	0	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 170

*Region 631*

09 Jun	S11E42	158	0010	03	Bxo	004	B											
10 Jun	S10E29	158	0040	05	Cao	004	B											
11 Jun	S10E15	159	0030	06	Dso	010	B											
12 Jun	S10E02	158	0020	05	Cso	006	B											
13 Jun	S10W10	157	0020	04	Cao	005	B											
										0	0	0	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 158

*Region 632*

10 Jun	S12E66	121	0100	02	Hax	001	A											
11 Jun	S11E53	121	0080	02	Hax	001	A											
12 Jun	S11E38	122	0070	02	Hsx	002	A											
13 Jun	S11E26	121	0070	02	Hsx	001	A											
										0	0	0	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 121



***Region Summary - continued.***

Date	Location		Sunspot Characteristics				Flares							
	( ° 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

*Region 633*

13 Jun S05E37 110 0010 02 Axx 002 A

0 0 0 0 0 0 0 0

Still on Disk.

Absolute heliographic longitude: 110

*Region 634*

13 Jun N12E73 074 0120 07 Dao 007 B

1 1  
1 1 0 0 0 0 0 0

Still on Disk.

Absolute heliographic longitude: 074



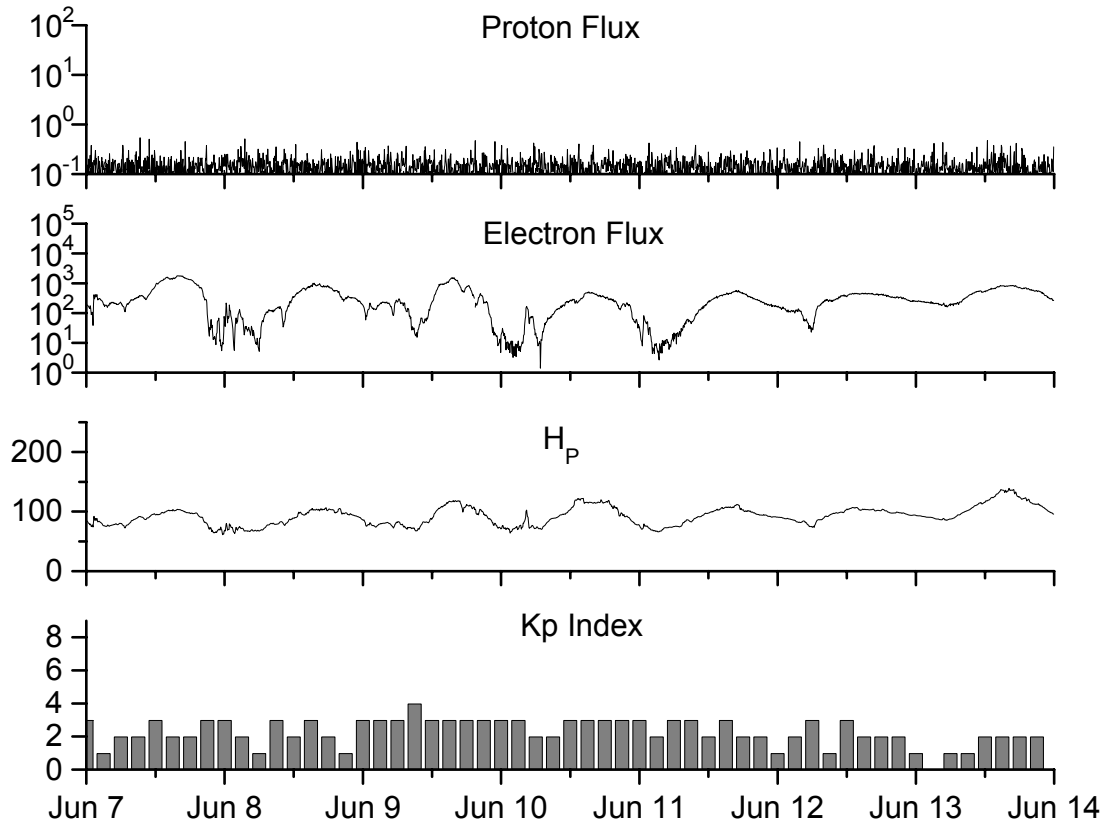


**Recent Solar Indices (preliminary)  
of the observed monthly mean values**

Month	Sunspot Numbers			Radio Flux		Geomagnetic			
	Observed SWO	values RI	Ratio RI/SWO	Smooth SWO	values RI	*Penticton 10.7 cm	Smooth Value	Planetary Ap	Smooth Value
<b>2002</b>									
June	146.0	88.3	0.60	179.9	106.3	148.7	183.0	11	13.5
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	

**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 07 June 2004*

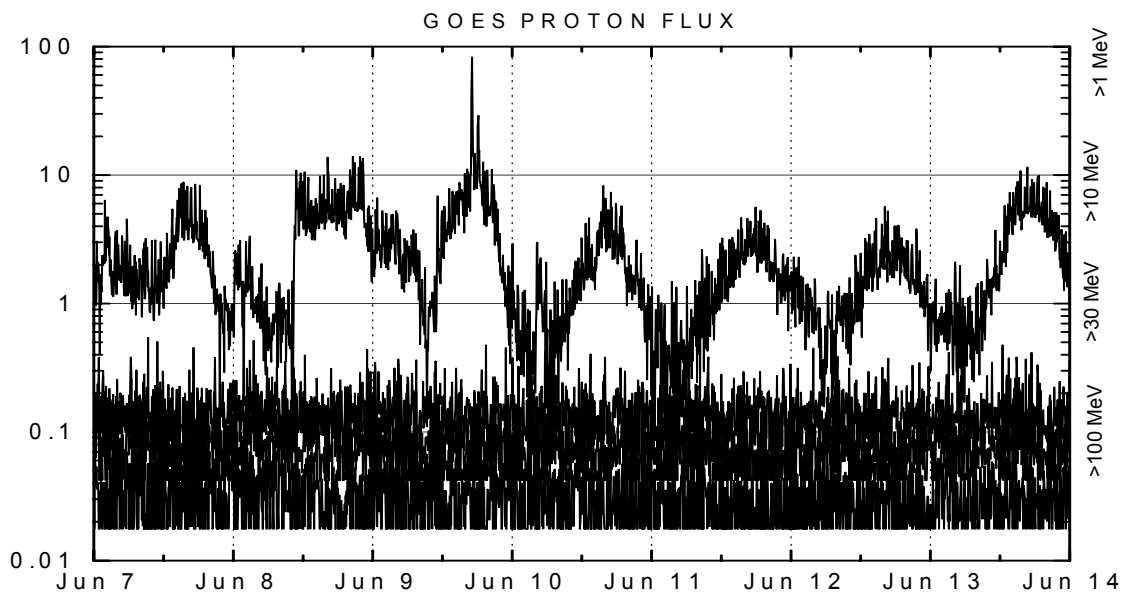
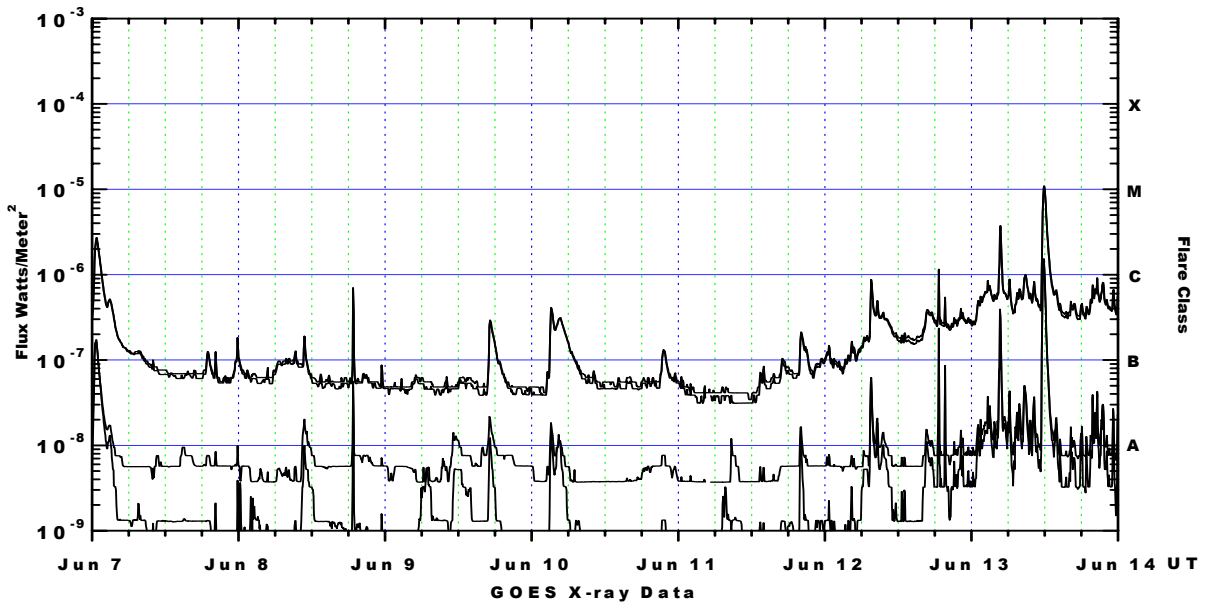
*Protons* plot contains the five-minute averaged integral proton flux (protons/cm<sup>2</sup>-sec-sr) as measured by GOES-11 (W98) for each of three energy thresholds: greater than 10, 50, and 100 MeV. *Electrons* plot contains the five-minute averaged integral electron flux (electrons/cm<sup>2</sup>-sec-sr)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

