

## **Space Weather Highlights**

### **04 – 10 June 2007**

**SEC PRF 1658**  
**12 June 2007**

Solar activity ranged from low to high levels. High activity occurred on 04 June due to an M8/3b flare at 04/0513 UTC from Region 960 (S07, L = 176, class/area Fkc/540 on 03 June). Region 960 began a gradual decay phase on 04 June which continued through the rest of the period. Activity dropped to low levels during 05 – 08 June with isolated C-class flares from Region 960, the largest of which was a C9/2f at 06/1722 UTC. Activity increased to moderate levels on 09 June by virtue of an M1/2f flare at 09/1348 UTC from Region 960. Activity decreased to low levels on 10 June with isolated B- and C-class flares from Region 960.

No proton events were observed at geosynchronous orbit.

The greater than 2 MeV electron flux at geosynchronous orbit reached high levels during 04 – 08 June.

Geomagnetic field activity was at quiet to unsettled levels during most of the period, though brief active intervals were observed at middle and high latitudes on 04 June and 09 – 10 June, respectively. ACE data indicated increased velocities on 04 June along with increased IMF variability. Velocities reached a peak of 576 km/sec at 04/1246 UTC while IMF total field intensity peaked at 04/1146 UTC (peak 9 nT) and IMF Bz decreased to a minimum of -5 nT at 04/1405 UTC. ACE data also indicated a solar sector boundary change (away (+) to toward (-)) occurred on 08 June associated with a minor increase in wind velocities (peak 463 km/sec at 09/2312 UTC), a brief increase in proton densities (peak 23 p/cc at 08/0037 UTC); increased IMF total field intensity (peak 10 nT at 09/0518 UTC), and periods of southward IMF Bz (minimum of -7 nT at 09/0834 UTC).

## **Space Weather Outlook**

### **13 June – 09 July 2007**

Solar activity is expected to be at very low to low levels. C-class flares are expected during 13 – 14 June and 28 June – 09 July.

No proton events are expected at geosynchronous orbit.

The greater than 2 MeV electron flux at geosynchronous orbit is expected to reach high levels during 17 June and 20 June – 05 July.

Quiet to active conditions are expected during 14 – 15 June as a recurrent coronal hole high-speed stream affects the field. Quiet to unsettled conditions are expected during 15 – 18 June. Activity is expected to increase to unsettled to minor storm levels during 19 – 22 June with major storm levels possible on 19 June due to a recurrent coronal hole high-speed stream. Activity is expected to decrease to mostly quiet levels during 23 – 29 June. Quiet to active conditions are expected during 30 June – 01 July as another recurrent coronal hole high-speed stream affects the field. Mostly quiet levels are expected for the remainder of the period.



### 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
04 June	86	58	490	B1.0	0	1	0	3	1	0	1	0
05 June	81	63	440	A8.0	2	0	0	7	1	0	0	0
06 June	85	47	290	A8.0	2	0	0	0	0	1	0	0
07 June	86	59	300	A7.0	2	0	0	2	0	0	0	0
08 June	84	51	250	A7.0	5	0	0	3	0	0	0	0
09 June	79	19	150	A4.2	0	1	0	0	0	1	0	0
10 June	76	14	130	A2.5	1	0	0	3	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
04 June	2.0E+6	1.8E+4	4.0E+3		5.1E+7	
05 June	1.8E+6	1.9E+4	4.2E+3		7.7E+7	
06 June	2.0E+6	1.8E+4	4.3E+3		9.0E+7	
07 June	2.7E+6	1.9E+4	4.6E+3		1.1E+8	
08 June	3.0E+6	1.8E+4	3.9E+3		3.1E+7	
09 June	1.1E+6	1.8E+4	3.9E+3		4.2E+6	
10 June	1.1E+6	1.8E+4	3.9E+3		9.4E+6	

### Daily Geomagnetic Data

Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
04 June	8	3-3-1-1-2-2-2-1	5	2-3-1-1-1-1-2-0	8	3-3-1-1-2-3-2-2
05 June	2	0-0-0-0-1-1-1-1	0	0-0-1-0-0-0-0-0	3	1-0-0-0-1-1-0-1
06 June	2	0-1-0-0-2-1-0-1	0	0-1-0-0-0-0-0-0	2	0-0-0-0-1-1-0-1
07 June	1	0-0-0-1-1-0-0-1	2	1-1-0-0-0-1-1-1	3	1-0-0-0-1-1-2-1
08 June	7	3-2-2-0-2-2-2-1	6	2-3-2-0-1-2-2-1	8	3-3-1-1-2-2-2-2
09 June	5	1-1-2-2-2-1-1-2	12	1-2-3-4-4-2-1-1	8	1-1-2-2-3-1-2-2
10 June	6	3-1-3-1-1-0-1-1	9	3-2-4-3-1-1-1-0	8	3-2-3-2-1-1-2-1

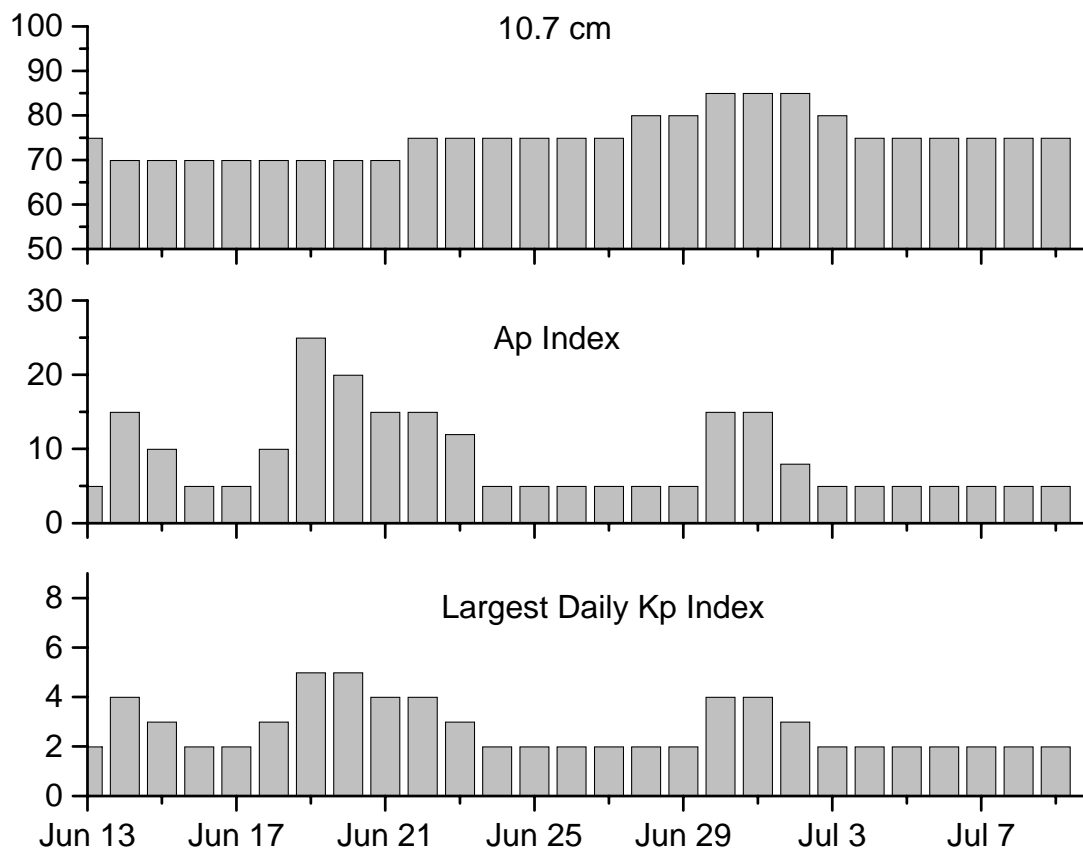


### *Alerts and Warnings Issued*

Date & Time of Issue	Type of Alert or Warning	Date & Time of Event UTC
04 Jun 0442	WARNING: Geomagnetic K=4	04 Jun 0443 - 1600
04 Jun 0512	ALERT: X-Ray Flux >M5	04 Jun 0512
04 Jun 0524	SUMMARY: X-ray Event >X1	04 Jun 0513
04 Jun 0534	SUMMARY: 10cm Radio Burst	04 Jun 0513
04 Jun 1507	ALERT: Electron 2MeV Integral Flux >1000pfu	04 Jun 1445
04 Jun 1556	EXTENDED WARNING: Geomagnetic K=4	04 Jun 0443 - 2359
04 Jun 1734	ALERT: Geomagnetic K=4	04 Jun 1730
05 Jun 1300	ALERT: Electron 2MeV Integral Flux >1000pfu	05 Jun 1225
06 Jun 1122	ALERT: Electron 2MeV Integral Flux >1000pfu	06 Jun 1100
07 Jun 0940	ALERT: Electron 2MeV Integral Flux >1000pfu	07 Jun 0835
08 Jun 1623	ALERT: Electron 2MeV Integral Flux >1000pfu	08 Jun 1600



# *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
13 June	75	5	2	27 June	75	5	2
14	70	15	4	28	80	5	2
15	70	10	3	29	80	5	2
16	70	5	2	30	85	15	4
17	70	5	2	01 July	85	15	4
18	70	10	3	02	85	8	3
19	70	25	5	03	80	5	2
20	70	20	5	04	75	5	2
21	70	15	4	05	75	5	2
22	75	15	4	06	75	5	2
23	75	12	3	07	75	5	2
24	75	5	2	08	75	5	2
25	75	5	2	09	75	5	2
26	75	5	2				



### ***Energetic Events***

Date	Time		X-ray		Optical Information				Peak		Sweep Freq	
	$\frac{1}{2}$		Integ		Imp/	Location		Rgn	Radio Flux		Intensity	
	Begin	Max	Max	Class	Flux	Brtns	Lat CMD	#	245	2695	II	IV
04 Jun 07	0506	0513	0516	M8.9	.022	3b	S07E51	960	130			
09 Jun 07	1330	1348	1405	M1.0	.014	2f	S10W23	960				

### ***Flare List***

Date	Time			Optical X-ray Class.	Imp / Brtns	Location Lat CMD	Rgn
	Begin	Max	End				
04 June	0216	0220	0234	B1.5			
	0320	0326	0334	B2.2			
	0358	0359	0359	B2.2	Sf	S04E47	960
	0443	0445	0456	B5.0	1f	S05E50	960
	0505	0514	0642	M8.9	3b	S07E51	960
	0653	0711	0731	B5.6	Sf	S09E45	960
	0827	0830	0851	B2.7	Sf	S06E49	960
	0941	0945	0949	B8.6			
	1158	1202	1206	B2.7			
	1306	1309	1314	B1.6			
	1404	1412	1419	B4.1			
	1555	1603	1610	B5.5			
	1641	1644	1646	B2.0			
	1732	1735	1737	B2.2			
	1847	1851	1854	B2.5			
	1920	1926	1931	B1.6			
	1939	1945	1954	B2.9			
	2052	2056	2058	B2.1			
	2108	2111	2115	B1.7			
	2118	2126	2131	B3.7			
	2332	2336	2342	B1.3			
05 June	0401	0406	0409		Sf	S07E36	960
	0415	0423	0429	C1.2			
	B0416	U0419	A0433		Sf	S07E33	960
	0501	0502	0504	B1.6	Sf	S05E27	960
	0506	0506	0518		Sf	S05E27	960
	0519	0520	0523		Sf	S09E37	960
	0524	0525	0527		Sf	S08E32	960
	0923	0927	0930	B4.7	Sf	S10E32	960
	1204	1207	1209	B2.0			
	1556	1612	1641	C6.6	1f	S07E30	960
	1726	1731	1733	B3.2			
	2320	2330	2340	B1.6			



**Flare List-Continued**

Date	Time			Optical	Imp / Brtns	Location Lat CMD	Rgn
	Begin	Max	End	X-ray Class.			
06 June	0348	0353	0356	B1.5			
	0428	0434	0443	B2.8			
	1321	1329	1333	B3.1			
	1719	1722	1809	C9.7	2f	S07E16	960
	2255	2306	2311	B2.0			
	2313	2328	2331	C1.7			
07 June	0018	0045	0049	B7.6			
	0133	0140	0146	B6.6			
	0347	0348	0350		Sf	S07E09	960
	0622	0644	0650	C3.9			
	0831	0835	0837	B4.9			
	1010	1052	1107	C1.1			
08 June	1713	1721	1730	B9.7	Sf	S07E02	960
	0131	0138	0143	C1.6			
	0338	0342	0352	B1.7			
	0410	0421	0425	C2.3			
	0457	0501	0515	C1.4	Sf	S08W05	960
	0733	0741	0749	B3.2			
	0822	0846	0900	C2.9			
	0903	0905	0908		Sf	S07W07	960
	1042	1048	1055	B3.8			
	1207	1212	1215	B5.3			
09 June	1233	1238	1244	B7.6			
	1333	1344	1349	B3.1			
	1422	1445	1456	C1.5	Sf	S06W12	960
	1700	1708	1718	B4.5			
	1845	1857	1913	B4.3			
	2208	2225	2235	B2.6			
	2321	2325	2328	B2.2			
	0929	0941	0948	B8.6			
	1336	1348	1407	M1.0	2f	S10W23	960
	2335	2352	0004	B6.6			
10 June	0506	0512	0520	B1.6			
	0721	0727	0735	B1.9			
	0931	0934	0937	B1.0			
	0945	0951	0956	B1.4			
	1110	1110	1116	C1.9	Sf	S11W40	960
	1836	1836	1839	B1.1	Sf	S08W44	960
	2348	0027	0049	B8.1			
	2351	2355	0005		Sf	S07W45	960



### Region Summary

Region Summary														
Location			Sunspot Characteristics											
Date	Helio		Flares											
	( ° Lat ° CMD)	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 958

29 May	S13E62	231	0030	01	Axx	001	A								
30 May	S13E49	231	0030	01	Hax	002	A								
31 May	S13E35	232	0000	01	Axx	001	A								
01 Jun	S13E22	232	0010	05	Bxo	004	B								
02 Jun	S12E13	227	0010	01	Hsx	001	A								
03 Jun	S09W03	230	0010	02	Bxo	002	B								
04 Jun	S09W16	230													
05 Jun	S12W26	227	0030	03	Bxo	004	B								
06 Jun	S13W40	228	0010	04	Bxo	003	B								
07 Jun	S12W54	227	0000	00	Axx	001	A								
08 Jun	S12W67	227	0000	00	Axx	001	A								
09 Jun	S12W80	227													
10 Jun	S12W93	227													

0 0 0 0 0 0 0 0

Still on Disk.

Absolute heliographic longitude: 230

#### Region 959

01 Jun	S12E49	205	0010	04	Bxo	002	B								
02 Jun	S12E36	204	0030	04	Cso	002	B								
03 Jun	S10E27	200	0020	04	Bxo	003	B								
04 Jun	S10E11	203	0010	01	Axx	001	A								
05 Jun	S11W04	205													
06 Jun	S11W17	205													
07 Jun	S11W31	204	0030	05	Bxi	009	B								
08 Jun	S10W44	204	0010	06	Bxo	005	B								
09 Jun	S10W57	204													
10 Jun	S10W70	204													

0 0 0 0 0 0 0 0

Still on Disk.

Absolute heliographic longitude: 205



### *Region Summary-Continued*

Location			Sunspot Characteristics												
			Flares					X-ray			Optical				
Date	( ° Lat ° CMD)	Helio Lon	Area (10 <sup>-6</sup> hemi)	Extent (helio)	Spot Class	Spot Count	Mag Class	C	M	X	S	1	2	3	4
<i>Region 960</i>															
01 Jun	S06E73	181	0320	10	Dki	005	B	1	3		2				
02 Jun	S07E62	178	0480	16	Fkc	012	Bgd		1		1				
03 Jun	S09E50	177	0540	16	Fkc	023	Bgd		2		2				
04 Jun	S08E38	176	0480	16	Fkc	037	Bgd		1		3	1		1	
05 Jun	S07E24	177	0410	15	Ekc	039	Bgd	1			7	1			
06 Jun	S07E11	177	0280	15	Esi	024	Bg	1					1		
07 Jun	S07W03	176	0270	14	Esi	019	Bg				2				
08 Jun	S08W17	177	0240	12	Esc	015	B	2			3				
09 Jun	S06W32	179	0150	10	Dao	009	B		1				1		
10 Jun	S05W46	180	0130	08	Dso	004	B	1			3				
								6	8	0	23	2	2	1	0

Still on Disk.

Absolute heliographic longitude: 176



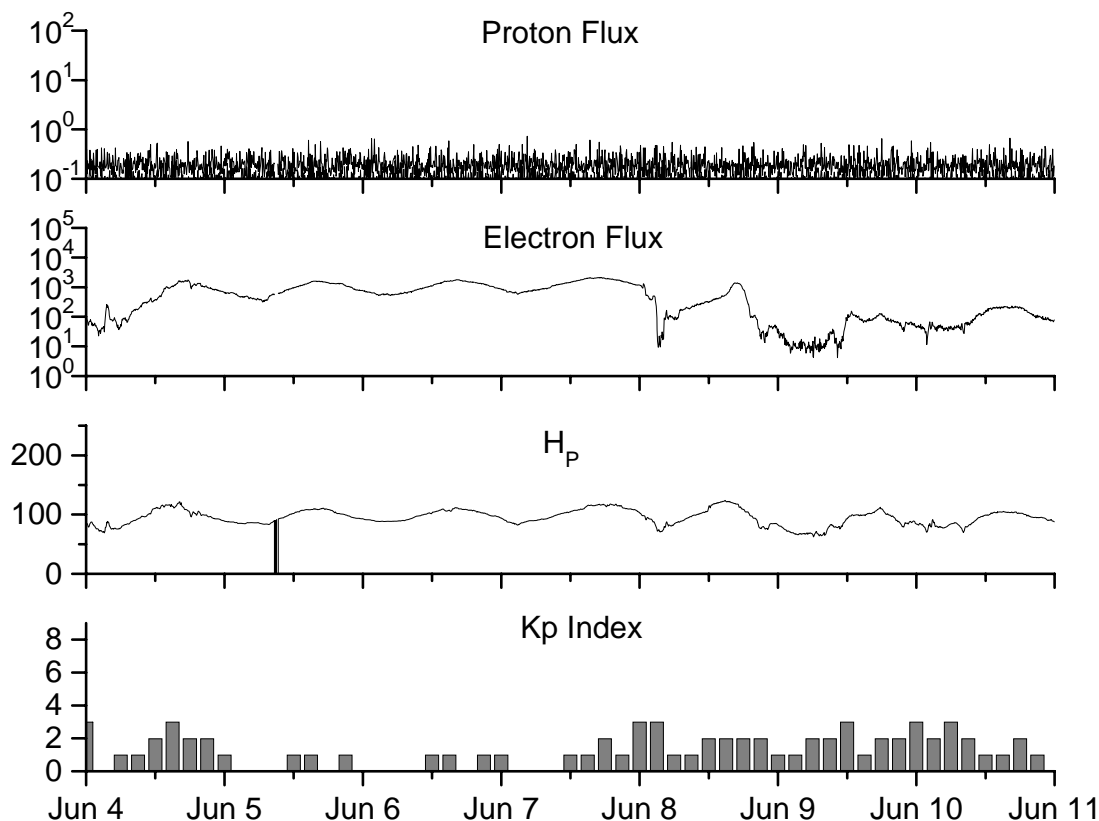


**Recent Solar Indices (preliminary)  
of the observed monthly mean values**

Month	Sunspot Numbers			Radio Flux		Geomagnetic			
	Observed values	Ratio	Smooth values	*Penticton	Smooth	Planetary	Smooth		
	SEC	RI	RI/SEC	SEC	RI	10.7 cm	Value	Ap	Value
2005									
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
2006									
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	30.7	17.3	81.0	80.8	8	7.9
June	37.7	13.9	0.37	28.9	16.3	80.1	80.6	9	8.3
July	22.6	12.2	0.54	27.2	15.3	75.8	80.3	7	8.7
August	22.8	12.9	0.57	27.6	15.6	79.0	80.3	9	8.7
September	25.2	14.5	0.58	27.7	15.6	77.8	80.2	8	8.7
October	15.7	10.4	0.66	25.2	14.2	74.3	79.4	8	8.6
November	31.5	21.5	0.68	22.3	12.7	86.4	78.5	9	8.5
December	22.2	13.6	0.61			84.3		15	
2007									
January	26.6	16.9	0.64			83.5		6	
February	17.2	10.6	0.62			77.8		6	
March	9.7	4.8	0.49			72.3		7	
April	6.9	3.7	0.54			72.4		9	
May	19.4	11.7	0.60			74.5		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 04 June 2007*

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.

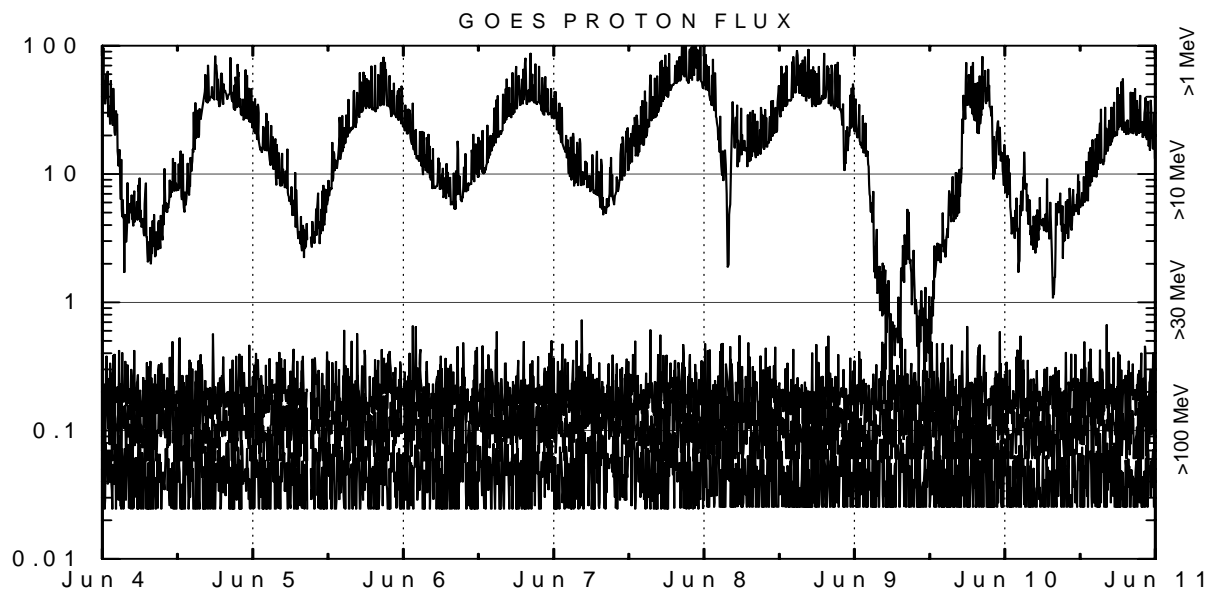
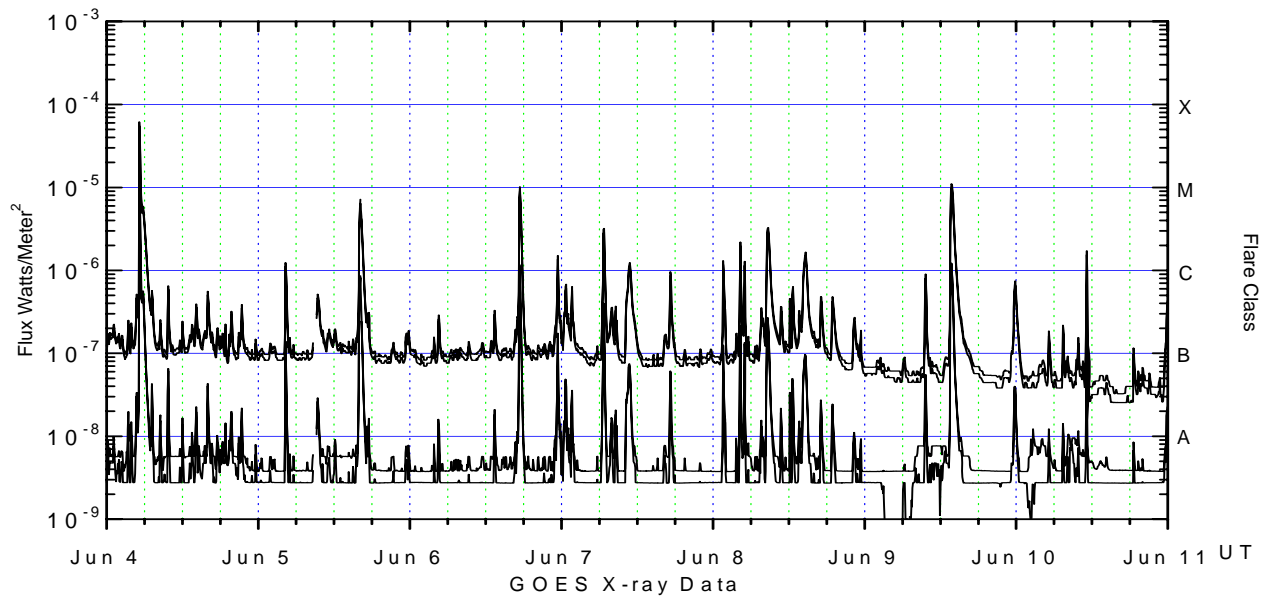
Electrons plot contains the five-minute averaged integral electron flux (electrons/cm<sup>2</sup>-sec-sr) with energies greater than 2 MeV at GOES-12 (W075).

$H_P$  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.

Kp 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 Kp 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 Kp 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

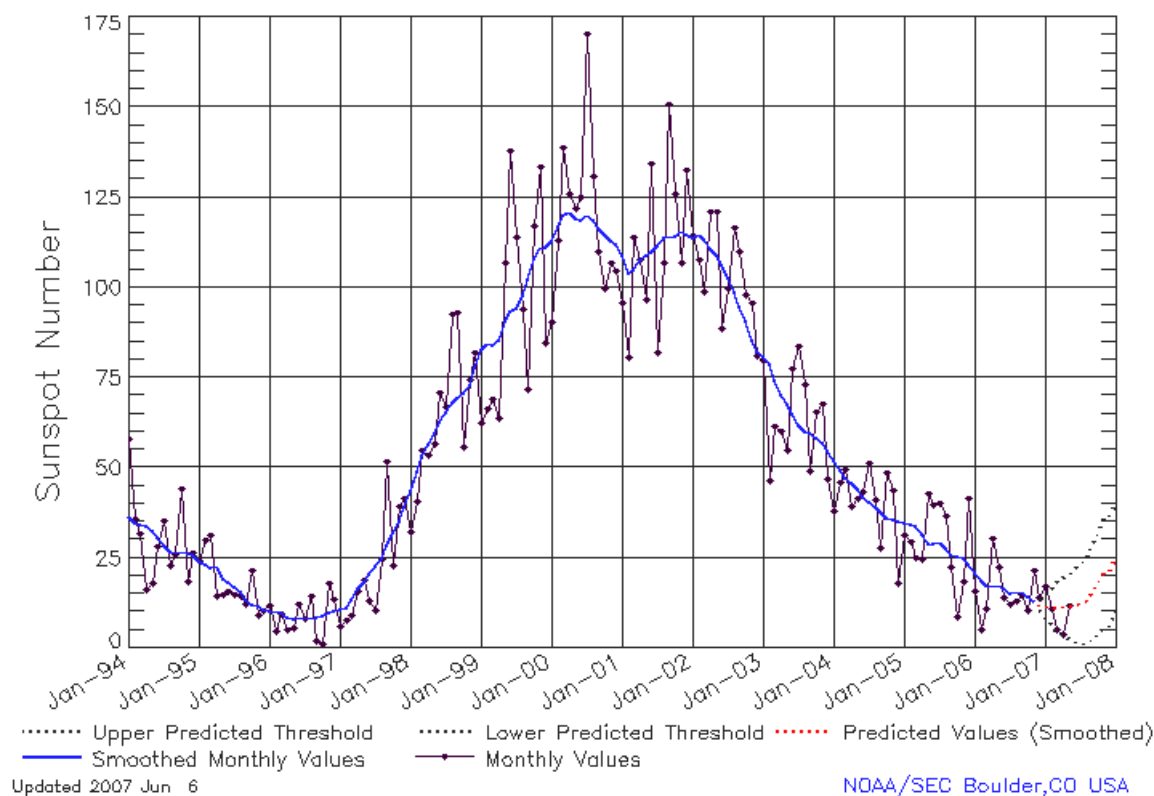
X-ray plot contains five-minute averaged x-ray flux (watts/m<sup>2</sup>) as measured by GOES 10 (W060) and GOES 11 (W135) in two wavelength bands, .05 - .4 and .1 - .8 nm. The letters A, B, C, M and X refer to x-ray event levels for the .1 - .8 nm band.

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.

# ISES Solar Cycle Sunspot Number Progression Data Through 31 May 07



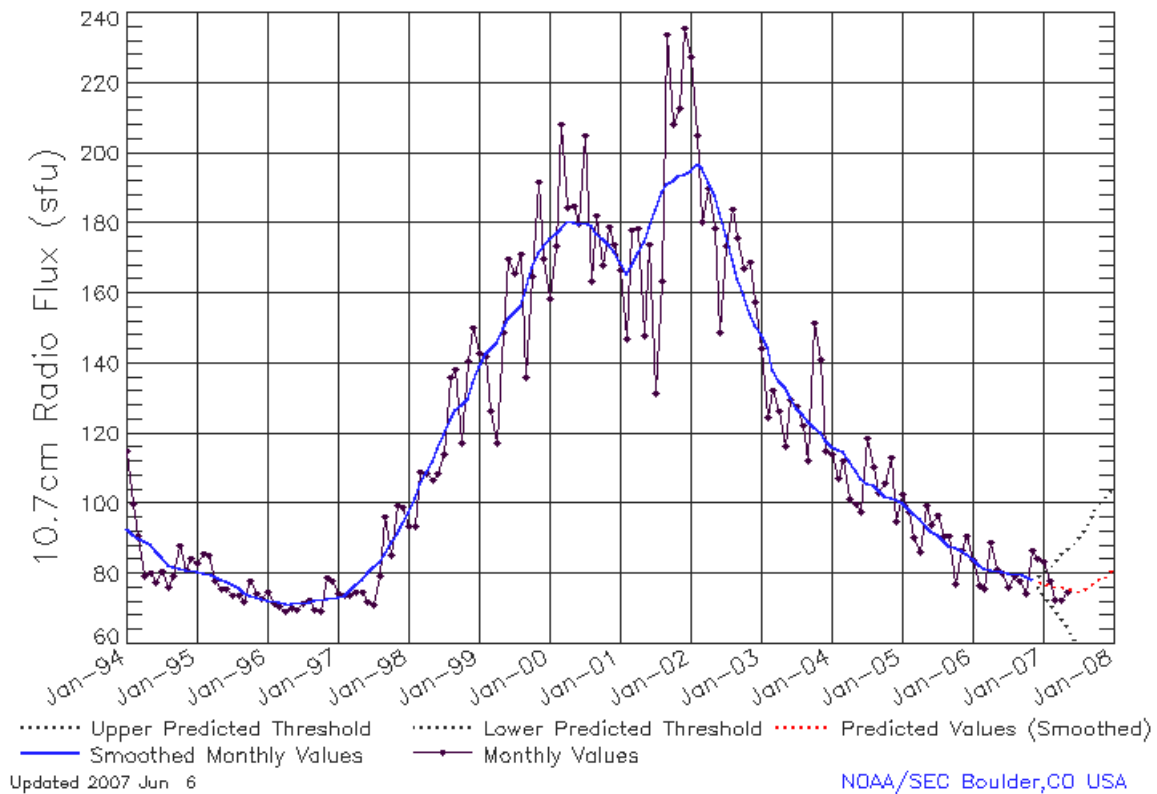
## SEC Prediction of Smoothed Sunspot Number

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1998	44	49	53	57	59	63	66	68	70	71	73	78
	(**)	(**)	(**)	(**)	(**)	(**)	(**)	(**)	(**)	(**)	(**)	(**)
1999	83	85	84	86	91	93	94	98	102	108	111	111
	(**)	(**)	(**)	(**)	(**)	(**)	(**)	(**)	(**)	(**)	(**)	(**)
2000	113	117	120	121	119	119	120	119	116	115	113	112
	(**)	(**)	(**)	(**)	(**)	(**)	(**)	(**)	(**)	(**)	(**)	(**)
2001	109	104	105	108	109	110	112	114	114	114	116	115
	(**)	(**)	(**)	(**)	(**)	(**)	(**)	(**)	(**)	(**)	(**)	(**)
2002	114	115	113	111	109	106	103	99	95	91	85	82
	(**)	(**)	(**)	(**)	(**)	(**)	(**)	(**)	(**)	(**)	(**)	(**)
2003	81	79	74	70	68	65	62	60	60	58	57	55
	(**)	(**)	(**)	(**)	(**)	(**)	(**)	(**)	(**)	(**)	(**)	(**)
2004	52	49	47	46	44	42	40	39	38	36	35	35
	(**)	(**)	(**)	(**)	(**)	(**)	(**)	(**)	(**)	(**)	(**)	(**)
2005	35	34	34	32	29	29	29	28	26	26	25	23
	(**)	(**)	(**)	(**)	(**)	(**)	(**)	(**)	(**)	(**)	(**)	(**)
2006	21	19	17	17	17	16	15	16	16	14	13	12
	(**)	(**)	(**)	(**)	(**)	(**)	(**)	(**)	(**)	(**)	(**)	(1)
2007	12	12	11	12	12	12	12	14	16	18	21	21
	(3)	(5)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(15)



# ISES Solar Cycle F10.7cm Radio Flux Progression

Data Through 31 May 07



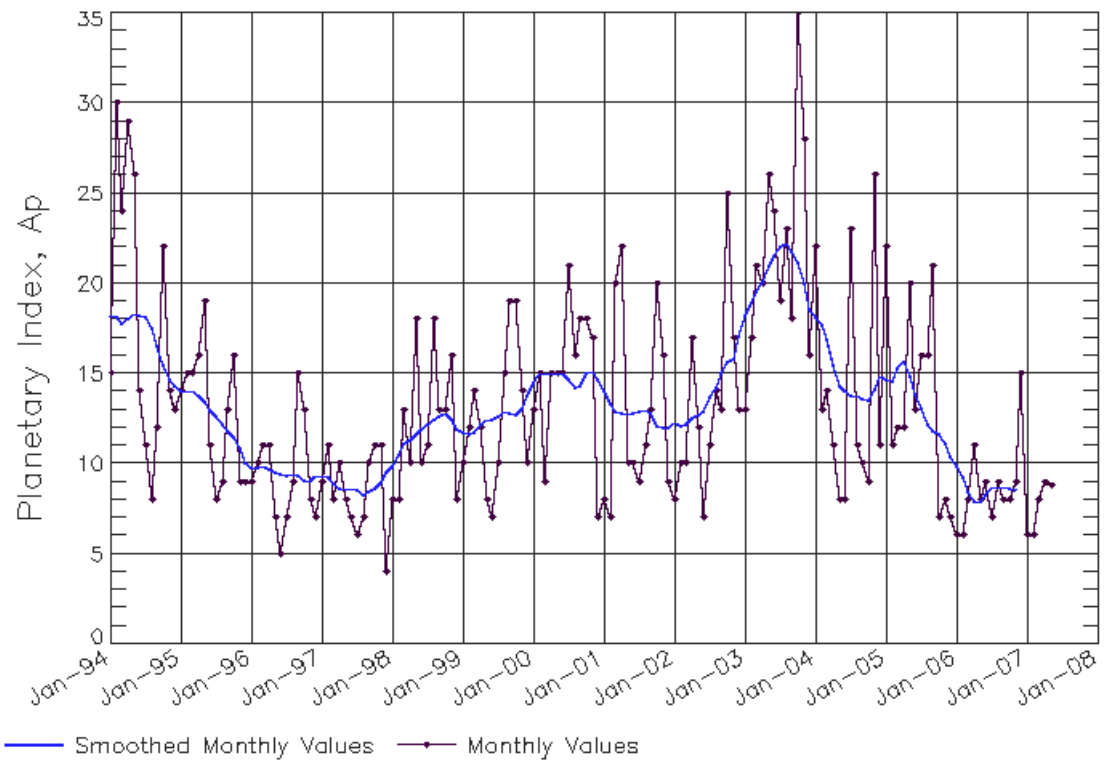
## SEC Prediction of Smoothed F10.7cm Radio Flux

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1998	98	102	106	109	112	116	120	124	127	128	130	134
	(**)	(**)	(**)	(**)	(**)	(**)	(**)	(**)	(**)	(**)	(**)	(**)
1999	139	143	144	146	150	153	154	156	161	167	172	173
	(**)	(**)	(**)	(**)	(**)	(**)	(**)	(**)	(**)	(**)	(**)	(**)
2000	176	177	178	181	180	180	180	179	177	176	174	172
	(**)	(**)	(**)	(**)	(**)	(**)	(**)	(**)	(**)	(**)	(**)	(**)
2001	169	166	168	172	175	179	184	189	191	192	194	194
	(**)	(**)	(**)	(**)	(**)	(**)	(**)	(**)	(**)	(**)	(**)	(**)
2002	195	197	196	192	188	183	176	170	164	159	154	151
	(**)	(**)	(**)	(**)	(**)	(**)	(**)	(**)	(**)	(**)	(**)	(**)
2003	148	145	138	135	133	130	127	125	124	122	120	118
	(**)	(**)	(**)	(**)	(**)	(**)	(**)	(**)	(**)	(**)	(**)	(**)
2004	116	116	115	112	109	107	106	105	104	102	102	101
	(**)	(**)	(**)	(**)	(**)	(**)	(**)	(**)	(**)	(**)	(**)	(**)
2005	100	99	97	96	93	92	91	89	88	87	87	85
	(**)	(**)	(**)	(**)	(**)	(**)	(**)	(**)	(**)	(**)	(**)	(**)
2006	84	83	82	81	81	81	80	80	80	79	79	<b>78</b>
	(**)	(**)	(**)	(**)	(**)	(**)	(**)	(**)	(**)	(**)	(**)	(1)
2007	<b>77</b>	<b>77</b>	<b>77</b>	<b>76</b>	<b>76</b>	<b>76</b>	<b>75</b>	<b>76</b>	<b>76</b>	<b>78</b>	<b>80</b>	<b>80</b>
	(3)	(5)	(7)	(9)	(13)	(13)	(14)	(14)	(13)	(12)	(11)	(10)



# ISES Solar Cycle Ap Progression

Data Through 31 May 07



Updated 2007 Jun 6

NOAA/SEC Boulder, CO USA



# Severe Storm ( $A_p \geq 100$ ) Geomagnetic Conditions



Space  
Environment  
Center

Comparison of Cycles  
at current month in cycle

