

**Space Weather Highlights**  
**06 - 12 October 1997**

Solar activity was very low. Isolated B-class subflares occurred. Nonetheless, three interesting flares occurred. The first was a B9/SF flare at 09/1202UT from Region 8092 (N24, L = 271, class/area Bxo/010 on 07 October) and was associated with a Type II radio sweep. The region also produced a B4/SF flare at 11/0858UT, also associated with a Type II radio sweep. The third flare of interest was an optically unassociated, long-duration B2 X-ray flare with a weak Type II radio sweep. A coronal mass ejection was also associated with this flare, but did not appear to be Earth-directed.

Solar wind data were received from the WIND spacecraft a few hours per day. Velocities gradually increased from 320 - 450 km/sec through 10 October, then gradually declined to 350 km/sec during the remainder of the period. Densities generally ranged from 05 - 15 p/cc, but increased to peaks of 25 p/cc on 06 and 08 October. Another peak to 30 p/cc occurred on 10 October. Bz was mostly southward, ranging from minus 05 to minus 15 nT (GSM). Solar sector orientation was away (phi angle near 315 degrees) during 06 October shifting to mostly toward conditions (phi angle near 135 degrees) for the remainder of the summary period.

No significant proton enhancements were observed at geosynchronous altitude.

The greater than 2 MeV electron flux at geosynchronous altitude reached high levels during 09 - 10 October. Otherwise, fluxes were normal to moderate.

The geomagnetic field was mostly quiet during 06 - 07 October. Activity increased during 08 - 10 October with active to minor storm levels observed at all latitudes. Activity significantly increased during 10/2100 - 11/0600UT with minor to severe storm levels observed. Conditions declined to mostly quiet levels after 11/0900UT and remained so for the balance of the period.

**Space Weather Forecast**  
**15 October - 10 November 1997**

Solar activity is expected to range from very low to low.

No significant proton enhancements are expected at satellite altitudes.

The greater than 2 MeV electron flux at geosynchronous altitude is expected to be normal to moderate during most of the period.

The geomagnetic field is expected to be mostly quiet to unsettled.



### *Daily Solar Data*

Date	Radio Flux	Sun spot	Sunspot Area	X-ray Background	X-ray Flux			Flares				
	10.7 cm	No. (10 <sup>6</sup> hemi.)			C	M	X	S	1	2	3	4
06 October	84	24	20	A4.5	0	0	0	0	0	0	0	0
07 October	84	35	10	A4.6	0	0	0	0	0	0	0	0
08 October	83	17	10	A5.5	0	0	0	0	0	0	0	0
09 October	84	27	20	A4.4	0	0	0	1	0	0	0	0
10 October	84	44	40	A5.5	0	0	0	1	0	0	0	0
11 October	86	31	50	A3.9	0	0	0	1	0	0	0	0
12 October	89	60	90	A5.8	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
06 October	9.6E+5	1.8E+4	4.0E+3		1.1E+7	
07 October	1.5E+6	2.1E+4	3.7E+3		2.4E+6	
08 October	1.3E+6	1.9E+4	4.2E+3		1.2E+6	
09 October	9.9E+5	1.8E+4	4.4E+3		3.6E+7	
10 October	1.1E+6	1.7E+4	3.8E+3		2.2E+7	
11 October	9.6E+5	1.7E+4	3.7E+3		3.0E+6	
12 October	7.5E+5	1.7E+4	3.8E+3		9.9E+6	

### *Daily Geomagnetic Data*

Date	Middle Latitude		High Latitude		Estimated	
	Fredericksburg		College		Planetary	
	A	K-indices	A	K-indices	A	K-indices
06 October	3	1-0-0-1-0-1-2-2	0	0-0-0-0-0-1-1-0	3	0-0-0-0-0-1-2-2
07 October	8	2-2-2-1-2-2-2-3	9	1-0-2-3-4-3-1-1	7	1-1-2-2-2-2-2-3
08 October	12	1-1-3-2-4-3-2-3	14	0-0-4-5-4-1-1-2	14	0-1-4-3-4-3-2-3
09 October	19	4-4-4-2-3-3-3-3	17	2-3-5-5-2-2-1-1	19	4-4-5-5-4-2-3-2
10 October	25	3-3-4-3-2-3-4-6	13	2-3-3-4-0-2-3-3	27	2-4-5-3-3-3-4-6
11 October	22	6-5-4-2-1-1-1-2	8	3-3-4-2-0-0-0-0	26	6-6-4-2-1-2-1-1
12 October	6	1-3-2-2-2-1-1-1	8	0-1-2-5-1-1-0-0	7	1-3-2-2-2-2-2-2

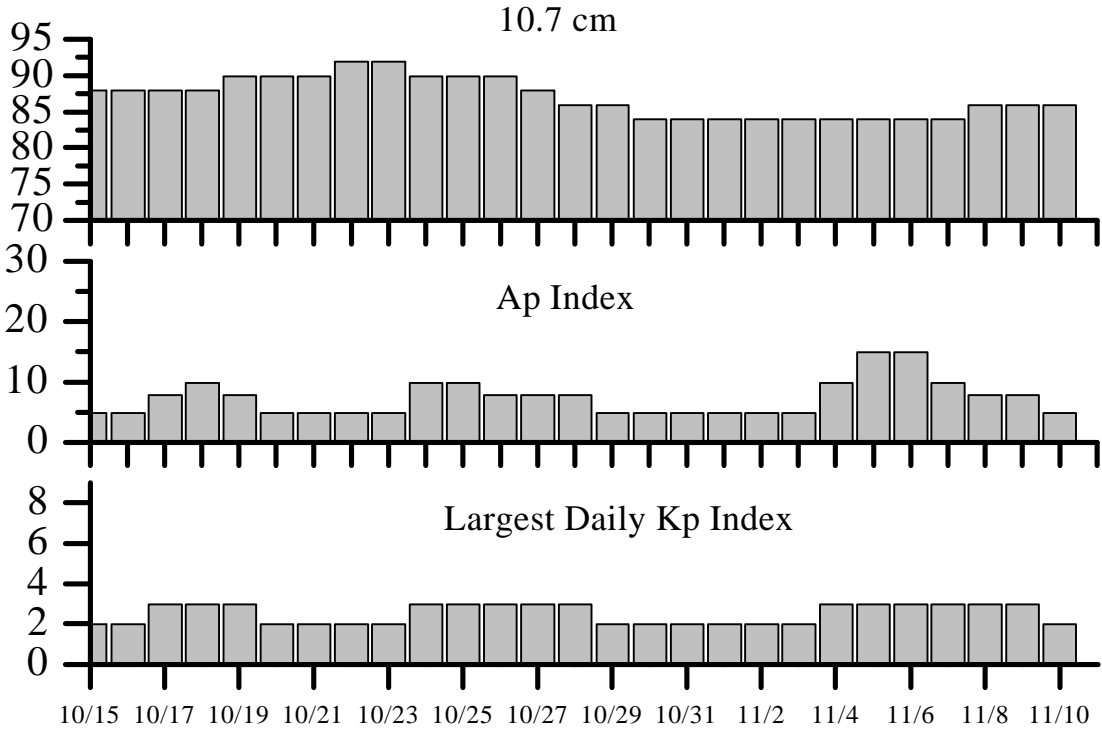


*Alerts and Warnings Issued*

Date and Time of Issue (UT)	Type of Alert or Warning	Date and Time of Event (UT)
08 Oct 0901	K = 4 observed	08 Oct 06-09
09 Oct 0308	K = 4 observed	09 Oct 00-03
09 Oct 0902	K= 5 observed	09 Oct 06-09
09 Oct 0905	A ≥ 20 observed	09 Oct 0904
09 Oct 1229	Type II Radio Emission	09 Oct 1159
09 Oct 1902	>2MeV Electron Event ≥1000pfu	09 Oct 1846
10 Oct 0559	K= 4 observed	10 Oct 03-06
10 Oct 1953	A ≥ 20 Watch	11 Oct
10 Oct 2112	K= 4 observed	10 Oct 18-21
10 Oct 2357	A ≥ 20 observed	11 Oct 0000
10 Oct 2358	K= 5 observed	10 Oct 21-00
11 Oct 0011	>2MeV Electron Event in Progress ≥ 1000pfu	10 Oct
11 Oct 0254	A ≥ 30 observed	11 Oct 0300
11 Oct 0256	K ≥ 6 observed	11 Oct 00-03



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
15 Oct	88	5	2	28 Oct	86	8	3
16	88	5	2	29	86	5	2
17	88	8	3	30	84	5	2
18	88	10	3	31	84	5	2
19	90	8	3	01 Nov	84	5	2
20	90	5	2	02	84	5	2
21	90	5	2	03	84	5	2
22	92	5	2	04	84	10	3
23	92	5	2	05	84	15	3
24	90	10	3	06	84	15	3
25	90	10	3	07	84	10	3
26	90	8	3	08	86	8	3
27	88	8	3	09	86	8	3
				10	86	5	2



### *Energetic Event*

Date	Time (UT)			X-ray		Optical Information			Peak		Sweep Freq	
	Begin	Max	$\frac{1}{2}$	Class	Integ Flux	Imp Brtns	Location		Radio Flux		Intensity	
			Max				Lat	CMD	245	2695	II	IV

**No Event Observed**

### *Flare List*

Date	Time			X-ray Class.	Imp / Brtns	Optical Location		Rgn #
	Begin	Max	End			Lat	CMD	
06 October	No Flares Observed							
07 October	1457	1512	1529	B2.2				
	1822	1825	1827	B1.1				
08 October	0201	0214	0224	B3.8				
	0240	0245	0253	B2.9				
09 October	1106	1112	1121	B3.5				
	1152	1153	A1215	B9.2	SF	N24E35	8092	
10 October	0139	0143	0147	B1.8				
	0349	0353	0411	B3.8	SF	N24E27	8092	
11 October	0850	0856	0914	B4.8	SF	N22E14	8092	
	2013	2021	2030	B2.3				
	2124	2134	2143	B3.2				
	2329	2335	2344	B6.5				
12 October	0602	0654	0842	B2.3				
	1608	1611	1613	B1.3				
	2351	2357	0010	B1.7				



## 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	4			
<i>Region 8090</i>																		
30 Sep	S27E69	347	0060	03	HSX	001	A											
01 Oct	S27E55	347	0060	02	HSX	001	A											
02 Oct	S27E41	348	0040	01	HSX	001	A	1				1						
03 Oct	S27E28	348	0030	01	HSX	001	A											
04 Oct	S27E15	348	0030	01	HSX	001	A											
05 Oct	S28E03	347	0010	01	HRX	001	A											
06 Oct	S28W10	347	0010	01	HRX	001	A											
07 Oct	S28W24	347	0000	00	AXX	001	A											
08 Oct	S28W37	347																
								1	0	0	1	0	0	0	0	0	0	0

Died on Disk.

Absolute heliographic longitude: 347

<i>Region 8091</i>																		
01 Oct	N22E72	330	0020	08	BXO	006	B											
02 Oct	N25E60	329	0040	08	CRO	005	B					1						
03 Oct	N25E47	329	0060	08	CSO	006	B					2						
04 Oct	N23E34	329	0040	07	CSO	005	B											
05 Oct	N23E21	329	0030	08	CSO	005	B					1						
06 Oct	N24E07	330	0010	06	BXO	003	B											
07 Oct	N24W09	332	0000	00	AXX	001	A											
08 Oct	N24W22	332																
09 Oct	N24W35	332																
10 Oct	N24W48	332																
11 Oct	N24W61	332																
12 Oct	N24W74	332																
								0	0	0	4	0	0	0	0	0	0	

Still on Disk.

Absolute heliographic longitude: 330

<i>Region 8092</i>																		
07 Oct	N24E57	266	0010	02	BXO	003	B											
08 Oct	N24E41	269	0010	04	BXO	007	B											
09 Oct	N25E28	269	0010	04	BXO	004	B					1						
10 Oct	N24E13	271	0000	02	AXX	002	A					1						
11 Oct	N24E00	271										1						
12 Oct	N27W08	265	0000	00	AXX	001	A											
								0	0	0	3	0	0	0	0	0	0	

Still on Disk.

Absolute heliographic longitude: 271



***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 8093</i>																						
09 Oct	N32E41	256	0010	05	BXO	003	B															
10 Oct	N31E27	257	0030	06	CRO	005	B															
11 Oct	N31E14	257	0040	06	CRO	006	B															
12 Oct	N31E01	256	0060	07	DSO	009	B															
Still on Disk.																						
Absolute heliographic longitude: 256																						
<i>Region 8094</i>																						
10 Oct	N23W24	308	0010	04	BXO	007	B															
11 Oct	N21W37	308	0010	05	BXO	005	B															
12 Oct	N20W50	307	0020	06	BXO	008	B															
Still on Disk.																						
Absolute heliographic longitude: 308																						
<i>Region 8095</i>																						
12 Oct	N33E42	215	0010	03	BXO	002	B															
Still on Disk.																						
Absolute heliographic longitude: 215																						



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

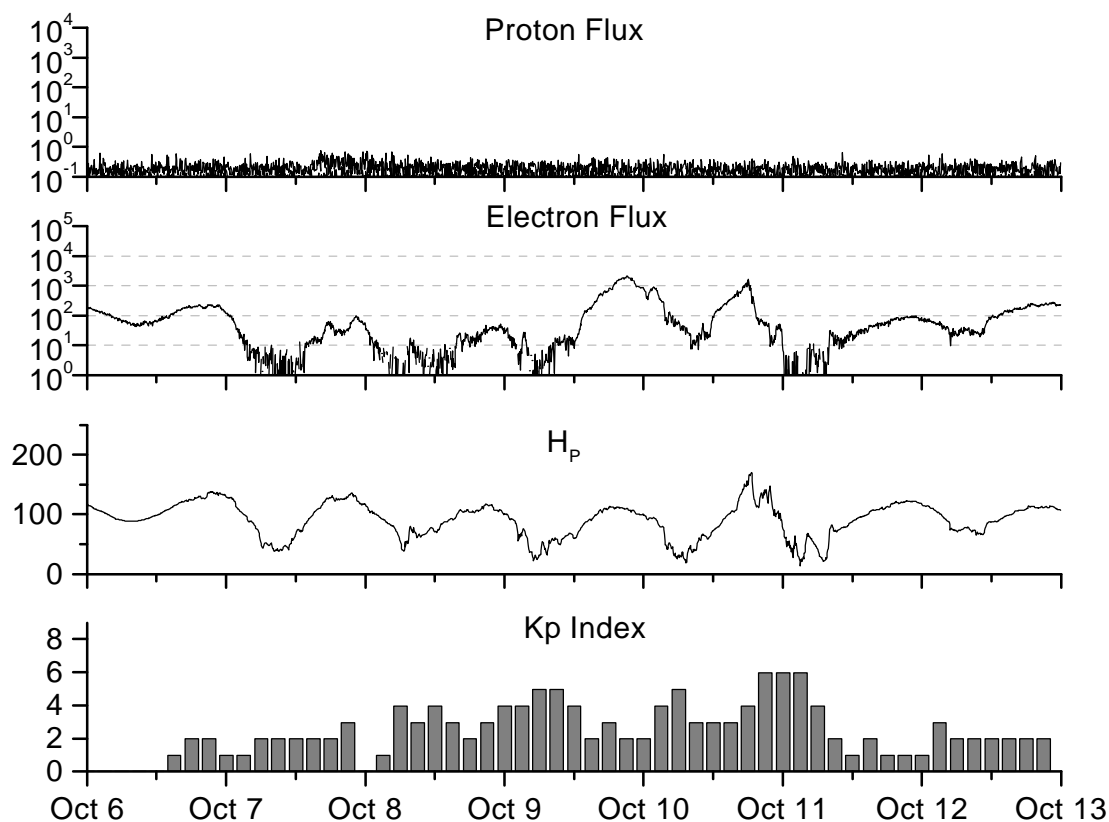
Month	Sunspot Numbers					Radio Flux		Geomagnetic	
	Observed values		Ratio	Smooth values		**Penticton	Smooth	Planetary	Smooth
	SWO	RI	RI/SWO	SWO	RI	10.7 cm	Value	Ap	Value
<b>1995</b>									
October	31.6	21.1	0.67	19.7	12.1	77.9	73.8	16	11.5
November	15.7	09.0	0.57	18.5	11.4	74.2	73.2	09	10.8
December	16.2	10.0	0.62	17.6	10.8	72.6	72.8	09	10.0
<b>1996</b>									
January	17.6	11.5	0.65	16.8	10.4	74.5	72.4	09	09.8
February	09.1	04.4	0.48	16.2	10.1	71.5	72.2	10	09.8
March	12.1	09.2	0.76	15.4	09.7	70.7	72.1	11	09.9
April	08.5	04.8	0.56	13.6	08.5	69.3	71.6	11	09.7
May	11.8	05.5	0.47	12.9	08.0	70.1	71.4	07	09.5
June	18.8	11.8	0.63	13.5	08.5	69.6	71.8	05	09.4
July	13.2	08.2	0.62	13.4	08.4*	71.2	72.0	07	09.3
August	20.5	14.4	0.70	13.1	08.3*	72.4	72.1	09	09.4
September	02.9	01.6	0.55	13.3	08.5*	69.4	72.3	15	09.3
October	02.3	00.9	0.39	14.0	08.9*	69.2	72.6	13	09.1
November	26.7	17.9	0.67	15.4	09.9*	78.7	73.0	08	09.1
December	21.1	13.3	0.63	16.2	10.5*	77.8	73.3	07	09.3
<b>1997</b>									
January	09.0	06.5*	0.72*	16.5	10.6*	74.0	73.4	09	09.3*
February	11.3	07.6*	0.67*	17.4	11.2*	73.8	73.7	11	09.2*
March	14.4	08.8*	0.61*	20.4	13.7*	73.5	75.1*	08	09.0*
April	24.5	15.8*	0.64*			74.5		10	
May	28.6	18.5*	0.65*			74.6		08	
June	22.1	13.1*	0.59*			71.7		07	
July	17.0	10.5*	0.62*			71.1		06*	
August	36.7	24.7*	0.67*			79.0		08*	
September	58.2	51.3*	0.88*			96.2*		10*	

\*Preliminary estimates.

The lowest smoothed sunspot indices number for Cycle 21, RI = 12.3, occurred September 1986. The highest smoothed sunspot number for Cycle 22, RI=158.5, occurred July 1989. \*\* From June 1991 onward, 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 06 October 1997*

*Protons* plot contains the five minute averaged integral proton flux (protons/  $\text{cm}^2$ -sec-sr) as measured by GOES-9 (W135) for each of three energy thresholds: greater than 10, 50, and 100 MeV.

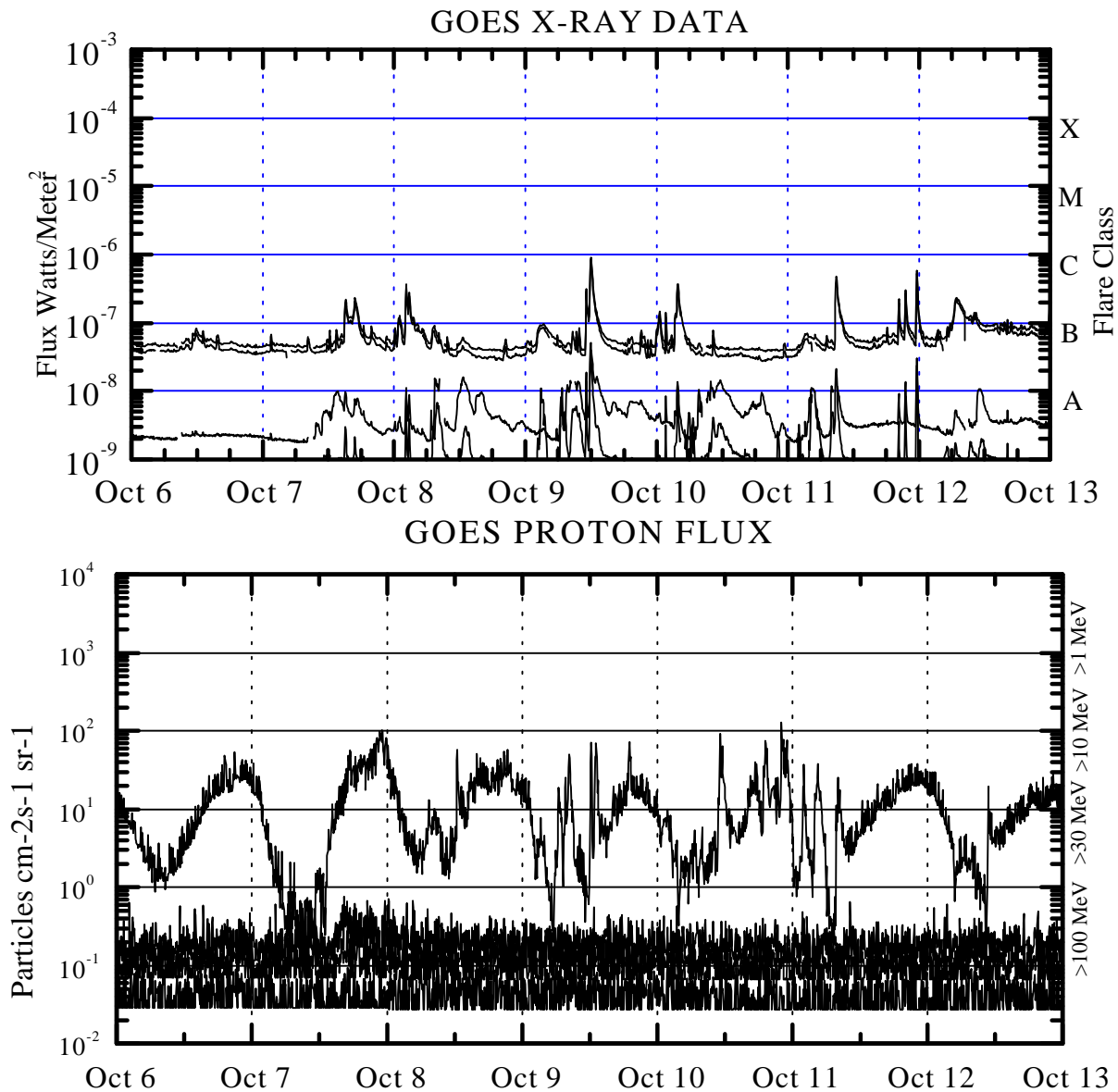
*Electrons* plot contains the five minute averaged integral electron flux (electrons/  $\text{cm}^2$ -sec-sr) with energies greater than 2 MeV at GOES-9.

*H<sub>p</sub>* plot contains the five minute averaged magnetic field H component in nanoteslas (nT) as measured by GOES-9. 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 USAF 55<sup>th</sup> Space Weather Squadron) 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. 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 a more localized phenomena and the measurements generally are applicable to within a few degrees of longitude of the measuring satellite.



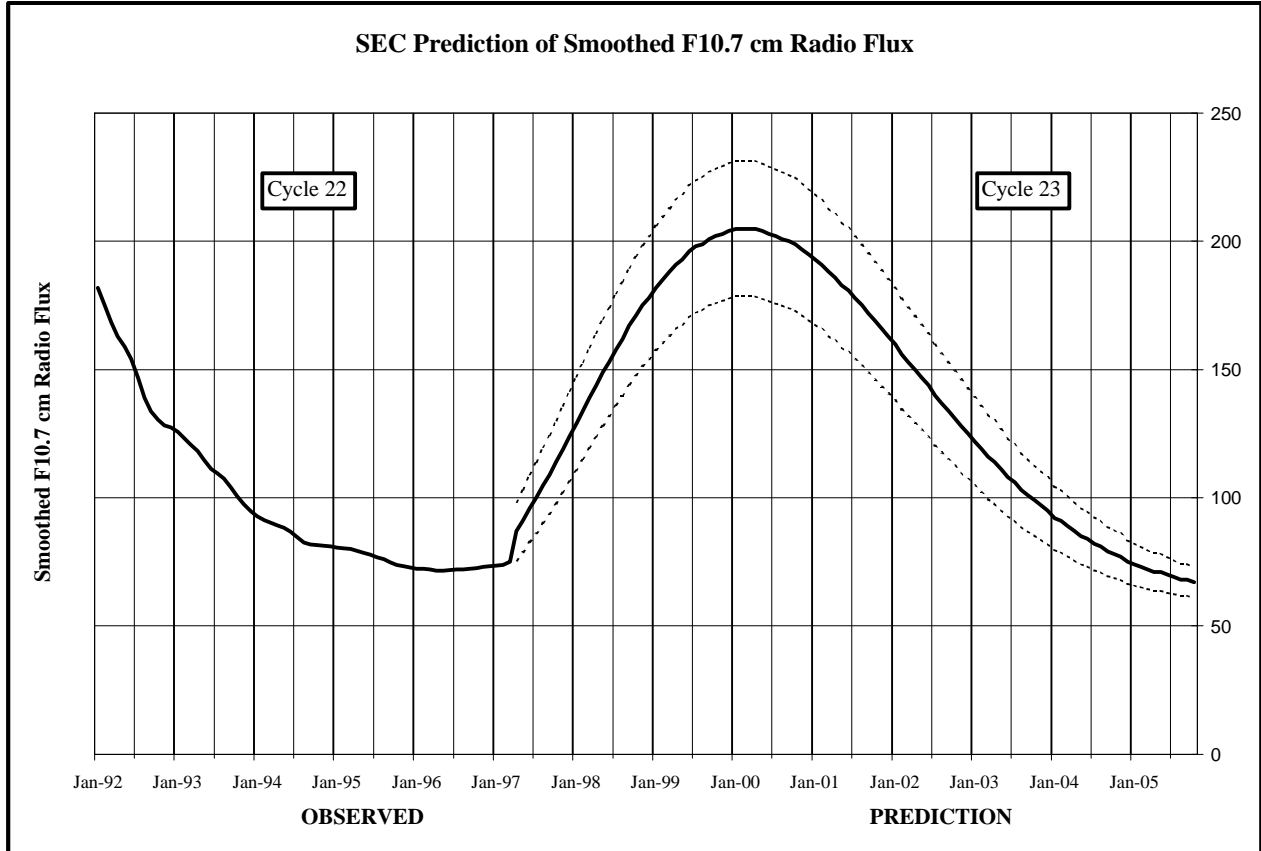


*Weekly GOES Satellite X-ray and Proton Plots*

Proton plot contains the five minute averaged integral proton flux (protons/cm<sup>2</sup>-sec-sr) as measured by GOES-9 (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.

X-ray plot contains five minute averaged x-ray flux (watts/m<sup>2</sup>) as measured by GOES 8 and 9 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.

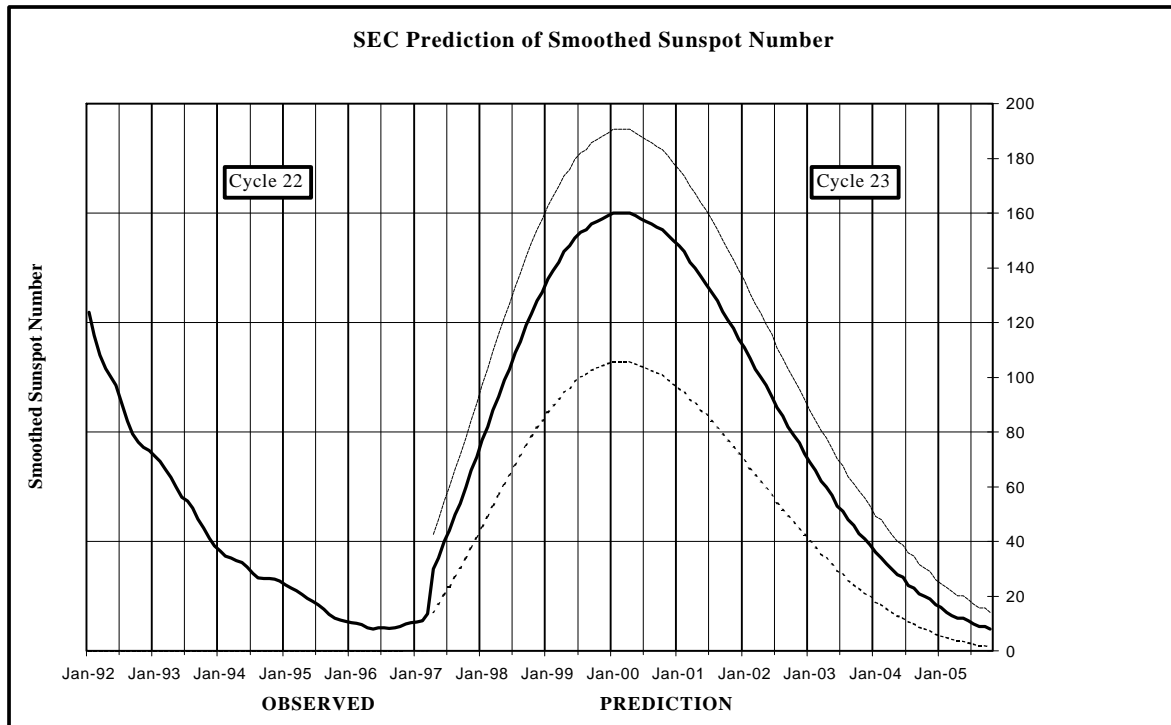




### SEC Prediction of Smoothed F10.7cm Radio Flux

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1996	72 (***)	72 (***)	72 (***)	72 (***)	71 (***)	72 (***)	72 (***)	72 (***)	72 (***)	73 (***)	73 (***)	73 (***)
1997	73 (***)	74 (***)	75 (***)	87 (11)	91 (12)	96 (13)	100 (14)	105 (15)	109 (15)	114 (16)	119 (17)	124 (18)
1998	129 (18)	134 (19)	139 (20)	144 (20)	149 (21)	153 (21)	158 (22)	162 (22)	167 (23)	171 (23)	175 (23)	178 (24)
1999	182 (24)	185 (25)	188 (25)	191 (25)	193 (25)	196 (26)	198 (26)	199 (26)	201 (27)	202 (27)	203 (28)	204 (28)
2000	205 (30)	205 (30)	205 (30)	205 (30)	204 (30)	203 (28)	202 (27)	201 (27)	200 (26)	199 (26)	197 (26)	195 (26)
2001	193 (25)	292 (25)	188 (25)	186 (25)	183 (24)	181 (24)	178 (24)	175 (24)	172 (23)	169 (23)	166 (23)	163 (22)
2002	160 (22)	156 (22)	153 (21)	150 (21)	147 (21)	144 (21)	140 (20)	137 (20)	134 (19)	131 (19)	128 (18)	125 (18)
2003	122 (17)	119 (17)	116 (17)	114 (16)	111 (16)	108 (15)	106 (15)	103 (14)	101 (14)	99 (14)	97 (13)	95 (13)
2004	92 (12)	91 (12)	89 (12)	87 (11)	85 (11)	84 (11)	82 (10)	81 (10)	79 (10)	78 (9)	77 (9)	75 (9)
2005	74 (8)	73 (8)	72 (8)	71 (7)	71 (7)	70 (7)	69 (7)	68 (6)	68 (6)	67 (6)	** (***)	** (***)





SEC Prediction of Smoothed Sunspot Number												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1996	10 (***)	10 (***)	10 (***)	9 (***)	8 (***)	9 (***)	9 (***)	8 (***)	9 (***)	9 (***)	10 (***)	11 (***)
1997	11 (***)	11 (***)	14 (***)	30 (13)	34 (14)	40 (15)	44 (16)	50 (17)	54 (18)	60 (19)	66 (20)	71 (20)
1998	77 (21)	82 (22)	88 (22)	93 (23)	99 (24)	103 (24)	109 (25)	113 (25)	119 (26)	123 (26)	128 (27)	131 (27)
1999	136 (27)	139 (28)	142 (28)	146 (29)	148 (29)	151 (29)	153 (29)	154 (29)	156 (29)	157 (29)	158 (29)	159 (29)
2000	160 (30)	160 (30)	160 (30)	160 (30)	159 (29)	158 (29)	157 (29)	156 (29)	155 (29)	154 (29)	152 (29)	150 (28)
2001	148 (28)	146 (28)	142 (28)	140 (27)	137 (27)	134 (27)	131 (27)	128 (26)	124 (26)	121 (26)	118 (25)	114 (25)
2002	111 (24)	107 (24)	103 (24)	100 (23)	97 (23)	93 (22)	89 (22)	86 (21)	82 (21)	79 (21)	76 (20)	72 (20)
2003	69 (19)	66 (19)	62 (18)	60 (18)	57 (17)	53 (17)	51 (17)	48 (16)	46 (16)	43 (15)	41 (15)	39 (14)
2004	36 (14)	34 (14)	32 (13)	30 (13)	28 (12)	27 (12)	24 (11)	23 (11)	21 (11)	20 (10)	19 (10)	17 (9)
2005	16 (9)	14 (9)	13 (8)	12 (8)	12 (8)	11 (8)	10 (7)	9 (7)	9 (7)	8 (6)	** (***)	** (***)

