

Space Weather Highlights
26 October - 01 November 1998

Solar activity ranged from very low to low. Isolated B- and C-class subflares were detected, none of which were associated with significant radio emission.

Real-time solar wind data were available from the Advanced Composition Explorer (ACE) spacecraft during most of the period. Solar sector orientation shifted from away (ϕ angle near 135 degrees) to toward (ϕ angle near 315 degrees) on 27 October. The shift was accompanied by increased velocities during 27 - 30 October (460 - 660 km/sec) and a brief particle density enhancement (peak 17 p/cc on 27 October). Bz became slightly more variable as well and ranged from minus 08 nT to plus 10 nT (GSM) during 27 - 29 October.

There were no significant proton enhancements detected at geosynchronous altitude.

The greater than 2 MeV electron flux at geosynchronous altitude declined to normal to moderate levels on 28 October, but otherwise continued at moderate to high levels.

The geomagnetic field was at quiet to unsettled levels during most of the period.

Space Weather Forecast
04 November - 30 November 1998

Solar activity is expected to be low during most of the period with a fair chance for isolated, low-level M-class flares. No major flare activity is expected.

No significant proton enhancements are expected at geosynchronous altitude.

The greater than 2 MeV electron flux at geosynchronous altitude is expected to be at normal to high levels. High levels are expected to occur around 16 - 20 November.

The geomagnetic field is expected to be active around 15 - 17 November due to recurrent coronal hole effects. Otherwise, quiet to unsettled levels are expected.



Daily Solar Data

Date	Radio Flux 10.7 cm	Sun spot No. (10^6 hemi.)	Sunspot Area	X-ray Background	Flares							
					X-ray Flux			Optical				
					C	M	X	S	1	2	3	4
26 October	104	50	90	B3.0	3	0	0	1	0	0	0	0
27 October	103	17	40	B2.1	0	0	0	0	0	0	0	0
28 October	108	33	100	B1.5	3	0	0	2	0	0	0	0
29 October	110	81	330	B2.3	1	0	0	0	0	0	0	0
30 October	112	81	360	B2.1	0	0	0	0	0	0	0	0
31 October	119	71	310	B2.0	0	0	0	0	0	0	0	0
01 November	121	79	320	B2.7	1	0	0	4	0	0	0	0

Daily Particle Data

Date	Proton Fluence (protons/cm ² -day-sr)			Electron Fluence (electrons/cm ² -day-sr)		
	>1MeV	>10MeV	>100MeV	>.6MeV	>2MeV	>4MeV
26 October	1.3E+5	1.6E+4	3.5E+3		1.7E+8	
27 October	8.5E+5	1.6E+4	3.9E+3		4.4E+8	
28 October	4.3E+5	1.6E+4	3.7E+3		3.1E+7	
29 October	5.4E+5	1.6E+4	3.8E+3		6.1E+7	
30 October	5.5E+5	1.7E+4	4.0E+3		6.9E+7	
31 October	6.5E+5	1.7E+4	3.8E+3		7.2E+7	
01 November	6.9E+5	1.7E+4	4.1E+3		6.6E+7	

Daily Geomagnetic Data

Date	Middle Latitude		High Latitude		Estimated	
	Fredericksburg		College		Planetary	
	A	K-indices	A	K-indices	A	K-indices
26 October	3	1-2-2-1-1-0-0-1	10	1-0-4-5-0-0-1-0	7	1-2-2-3-2-2-2-3
27 October	7	1-1-2-2-2-2-2-3	11	0-0-2-2-5-1-2-3	6	1-1-1-0-2-2-2-3
28 October	8	2-3-2-2-2-2-2-2	10	3-1-4-3-2-1-2-1	12	2-3-3-3-2-3-3-3
29 October	8	3-1-2-2-3-2-1-2	14	3-1-2-3-5-3-2-1	8	3-1-2-2-3-3-2-3
30 October	4	3-2-1-1-0-0-0-0	18	4-5-2-3-5-0-0-0	5	2-2-2-1-1-1-1-2
31 October	4	1-1-0-0-1-1-3-1	2	0-0-0-1-0-0-2-1	5	0-1-0-1-1-1-3-2
01 November	2	1-1-0-0-0-1-1-1	*	1-0-*-0-1-3-0	3	1-1-0-0-0-1-2-2

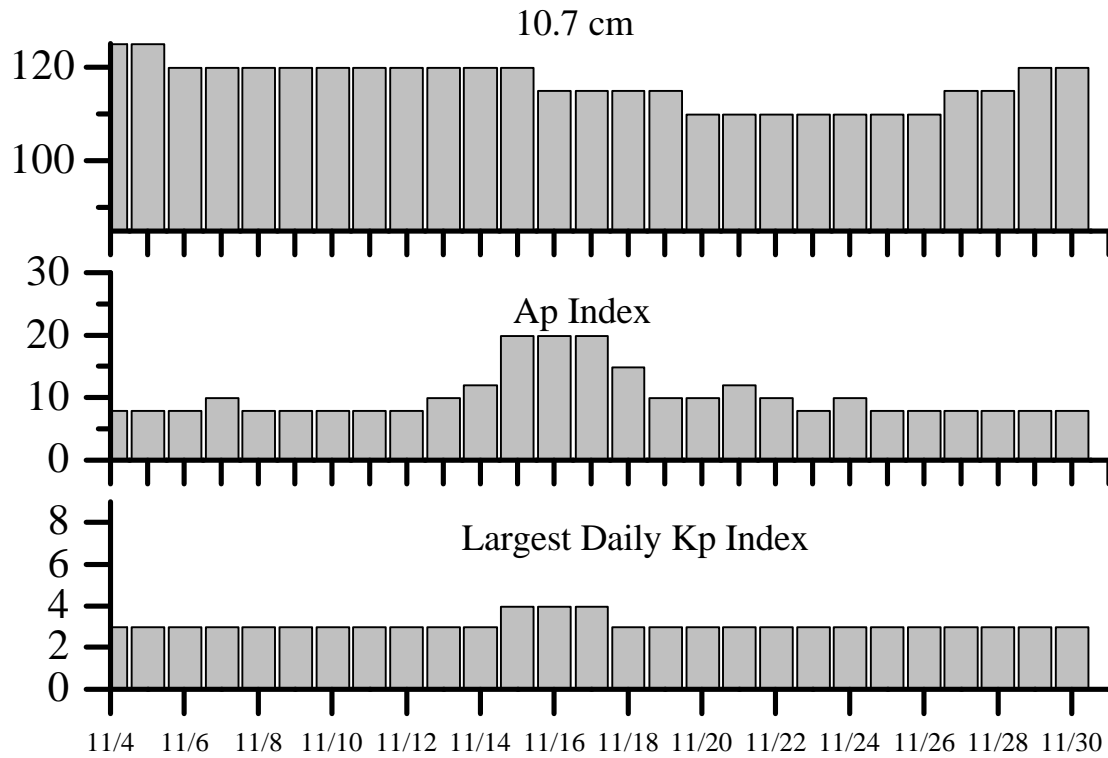


Alerts and Warnings Issued

Date and Time of Issue (UT)	Type of Alert or Warning	Date and Time of Event (UT)
26 Oct 0013	1-245 MHz Radio Burst	25 Oct
26 Oct 1203	CONTINUED >2MeV Electron Event \geq 1000pfu	21 Oct 0805
27 Oct 1200	CONTINUED >2MeV Electron Event \geq 1000pfu	21 Oct 0805
28 Oct 1204	CONTINUED >2MeV Electron Event \geq 1000pfu	21 Oct 0805
29 Oct 0042	1-245 MHz Radio Burst	28 Oct
29 Oct 1451	>2MeV Electron Event \geq 1000pfu	29 Oct 1420
30 Oct 1202	CONTINUED >2MeV Electron Event \geq 1000pfu	29 Oct 1420
31 Oct 1201	CONTINUED >2MeV Electron Event \geq 1000pfu	29 Oct 1420
01 Nov 1201	CONTINUED >2MeV Electron Event \geq 1000pfu	29 Oct 1420



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
04 Nov	125	8	3	17	115	20	4
05	125	8	3	18	115	15	3
06	120	8	3	19	115	10	3
07	120	10	3	20	110	10	3
08	120	8	3	21	110	12	3
09	120	8	3	22	110	10	3
10	120	8	3	23	110	8	3
11	120	8	3	24	110	10	3
12	120	8	3	25	110	8	3
13	120	10	3	26	110	8	3
14	120	12	3	27	115	8	3
15	120	20	4	28	115	8	3
16	115	20	4	29	120	8	3
				30	120	8	3



Energetic Events

Date	Time (UT)		X-ray		Optical Information			Peak		Sweep Freq		
	Begin	Max	Max	Class	Flux	Imp Brtns	Location Lat CMD	Rgn #	Radio Flux		Intensity	
									245	2695	II	IV
<i>No Events Observed</i>												

Flare List

Date	Time			X-ray Class.	Imp / Brtns	Optical		Rgn #
	Begin	Max	End			Location Lat CMD		
26 October	0214	0219	0223	B7.4				
	0326	0332	0338	B4.1				
	0341	0349	0401	B7.8				
	0450	0456	0458	C1.7				
	0505	0508	0512	C1.0				
	0815	0819	0825	B6.2				
27 October	1830	1830	1838	C2.0	SF	N17E49	8369	
	0759	0803	0817	B2.7				
	2116	2119	2123	B2.3				
	2142	2148	2200	B4.1				
28 October	0102	0105	0108	B2.8				
	0211	0216	0232	C1.6	SF	N17E30	8369	
	0301	0302	0304	B5.2	SF	N17E30	8369	
	0517	0528	0535	C1.1				
29 October	1313	1319	1324	C2.3				
	1737	1801	1833	B7.1				
	0111	0115	0120	B7.3				
30 October	0434	0440	0445	C1.0				
	2234	2239	2244	B5.0				
31 October	1859	1916	2141	B6.4				
01 November	0235	0246	0308	C1.6				
	0730	0733	0736	B3.2				
	0929	0933	0936	B3.3				
	B1201	U1202	1217	B6.6	SF	N17E43	8375	
	1220	1220	1259		SF	N16E44	8375	
	1321	1322	1327	B5.2	SF	S25E25	8373	
	1626	1636	1702	B8.6				
	1846	1851	1856	B8.1				



Region Summary

Date	Location		Sunspot Characteristics				Flares														
	° Lat ° CMD	Helio	Area (10 ⁶ hemi)	Extent (helio)	Spot Class	Spot Count	Mag Class	X-ray			Optical										
		Lon						C	M	X	S	1	2	3	4						
<i>Region 8362</i>																					
15 Oct	N20E73	007	0040	02	HSX	001	A														
16 Oct	N18E58	008	0030	01	HSX	001	A														
17 Oct	N20E46	007	0030	01	HRX	002	A														
18 Oct	N19E33	007	0010	01	AXX	001	A														
19 Oct	N20E20	007	0010	01	HRX	001	A														
20 Oct	N18E06	008	0010	05	BXO	003	B														
21 Oct	N18W08	008	0010	06	BXO	005	B														
22 Oct	N18W21	008																			
23 Oct	N18W34	008																			
24 Oct	N18W47	008																			
25 Oct	N18W60	008																			
26 Oct	N18W73	008																			
27 Oct	N18W86	008																			

0 0 0 0 0 0 0 0

Crossed West Limb.

Absolute heliographic longitude: 008

Region 8363

15 Oct	N26E47	033	0020	04	BXO	005	B													
16 Oct	N24E31	035	0040	05	DSO	007	B													
17 Oct	N25E17	036	0100	07	DAO	014	B													
18 Oct	N25E05	035	0110	08	DAO	011	B													
19 Oct	N25W10	037	0080	08	DAO	016	B													
20 Oct	N25W22	036	0030	08	CSO	010	B													
21 Oct	N24W36	036	0030	08	BXO	005	B													
22 Oct	N25W49	036	0010	07	DRO	004	B													
23 Oct	N25W62	036	0000	00	AXX	001	A													
24 Oct	N18W69	030																		
25 Oct	N18W82	030																		

0 0 0 0 0 0 0 0

Crossed West Limb.

Absolute heliographic longitude: 035



Region Summary-continued

Date	Location		Sunspot Characteristics				Flares														
	(° Lat ° CMD)	Helio	Area (10 ⁶ hemi)	Extent (helio)	Spot Class	Spot Count	Mag Class	X-ray			Optical										
		Lon						C	M	X	S	1	2	3	4						
<i>Region 8364</i>																					
17 Oct	N18E24	029	0010	04	BXO	004	B														
18 Oct	N19E13	027	0030	06	CRO	005	B														
19 Oct	N19W02	029	0010	05	BXO	004	B							1							
20 Oct	N19W16	030	0000	05	BXO	003	B														
21 Oct	N18W27	027	0010	06	BXO	004	B														
22 Oct	N18W40	027																			
23 Oct	N18W53	027																			
24 Oct	N18W66	027																			
25 Oct	N18W79	027																			
26 Oct	N18W92	027																			
														0	0	0	1	0	0	0	0

Crossed West Limb.

Absolute heliographic longitude: 029

<i>Region 8366</i>																					
18 Oct	S16E35	005	0000	00	AXX	001	A														
19 Oct	S16E71	316																			
20 Oct	S16E58	316																			
21 Oct	S16E45	316																			
22 Oct	S16E32	316																			
23 Oct	S16E19	316	0020	05	CRO	007	B														
24 Oct	S11W43	004	0020	06	CRO	003	B														
25 Oct	S12W54	002	0010	00	AXX	001	A	1						1							
26 Oct	S09W66	001	0010	01	HSX	001	A														
27 Oct	S09W79	001																			
														1	0	0	1	0	0	0	0

Crossed West Limb.

Absolute heliographic longitude: 316

<i>Region 8367</i>																					
21 Oct	N16E00	000	0040	06	CRO	005	B														
22 Oct	N17W14	001	0090	08	DSO	012	B														
23 Oct	N17W27	001	0040	08	CAO	010	B														
24 Oct	N17W42	003	0020	06	BXO	004	B														
25 Oct	N17W55	003																			
26 Oct	N17W64	359	0000	00	AXX	001	A														
27 Oct	N17W77	359																			
														0	0	0	0	0	0	0	0

Died on Disk.

Absolute heliographic longitude: 000



Region Summary-continued

Date	Location		Sunspot Characteristics					Flares						
	(° Lat ° CMD)	Helio	Area (10 ⁶ hemi)	Extent (helio)	Spot Class	Spot Count	Mag Class	X-ray			Optical			
		Lon						C	M	X	S	1	2	3

Region 8368

25 Oct	N26W24	345																		
26 Oct	N26W37	345																		
27 Oct	N26W50	345																		
28 Oct	N26W63	345																		
29 Oct	N26W76	345																		
30 Oct	N26W89	345																		
																				0 0 0 0 0 0 0 0

Crossed West Limb.

Absolute heliographic longitude: 345

Region 8369

25 Oct	N17E59	249	0050	06	DSO	004	B													2
26 Oct	N17E45	250	0070	07	DAO	006	B	1												1
27 Oct	N18E31	250	0040	08	CAO	007	B													
28 Oct	N20E23	245	0090	17	FSO	009	B	1												2
29 Oct	N19E05	250	0050	07	CSO	005	B													
30 Oct	N18W12	254	0050	03	CSO	005	B													
31 Oct	N18W25	254	0030	03	CSO	003	B													
01 Nov	N18W39	254	0010	01	AXX	001	A													
																				2 0 0 5 0 0 0 0

Still on Disk.

Absolute heliographic longitude: 250

Region 8370

25 Oct	S31W67	015	0010	02	BXO	002	B													
26 Oct	S28W76	011	0010	02	AXX	002	A													
27 Oct	S28W89	011																		
																				0 0 0 0 0 0 0 0

Crossed West Limb.

Absolute heliographic longitude: 15

Region 8371

28 Oct	S21E36	232	0010	04	BXO	004	B													
29 Oct	S21E22	233	0020	04	CRO	003	B													
30 Oct	S22E05	237	0000	00	AXX	001	A													
31 Oct	S22W08	237																		
01 Nov	S21W18	233	0000	00	AXX	001	A													
																				0 0 0 0 0 0 0 0

Still on Disk.

Absolute heliographic longitude: 237



Region Summary-continued

Date	Location		Sunspot Characteristics				Flares											
	(° Lat ° CMD)	Helio	Area (10 ⁶ hemi)	Extent (helio)	Spot Class	Spot Count	Mag Class	X-ray			Optical							
		Lon						C	M	X	S	1	2	3	4			
<i>Region 8372</i>																		
29 Oct	N21E17	238	0010	06	BXO	007	B											
30 Oct	N21E04	238	0010	03	BXO	006	B											
31 Oct	N21W09	238	0010	04	BXO	006	B											
01 Nov	N21W23	238	0010	05	BXO	004	B											
																		0 0 0 0 0 0 0 0
Still on Disk.																		
Absolute heliographic longitude: 238																		
<i>Region 8373</i>																		
29 Oct	S24E57	198	0000	01	AXX	002	A											
30 Oct	S24E43	199	0010	02	BXO	002	B											
31 Oct	S24E29	200	0010	06	BXO	003	B											
01 Nov	S26E20	195	0010	04	BXO	004	B											
																		1
																		0 0 0 1 0 0 0 0
Still on Disk.																		
Absolute heliographic longitude: 195																		
<i>Region 8374</i>																		
29 Oct	S18E67	188	0060	02	HAX	001	A											
30 Oct	S18E51	191	0040	02	HSX	002	A											
31 Oct	S18E39	190	0010	03	BXO	003	B											
01 Nov	S18E25	190	0010	02	AXX	003	A											
																		0 0 0 0 0 0 0 0
Still on Disk.																		
Absolute heliographic longitude: 190																		
<i>Region 8375</i>																		
29 Oct	N18E71	184	0190	05	CSO	003	B											
30 Oct	N17E58	184	0250	09	CHO	005	B											
31 Oct	N17E45	184	0250	08	CKO	006	B											
01 Nov	N17E32	183	0280	08	CHO	006	B											
																		2
																		0 0 0 2 0 0 0 0
Still on Disk.																		
Absolute heliographic longitude: 183																		



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

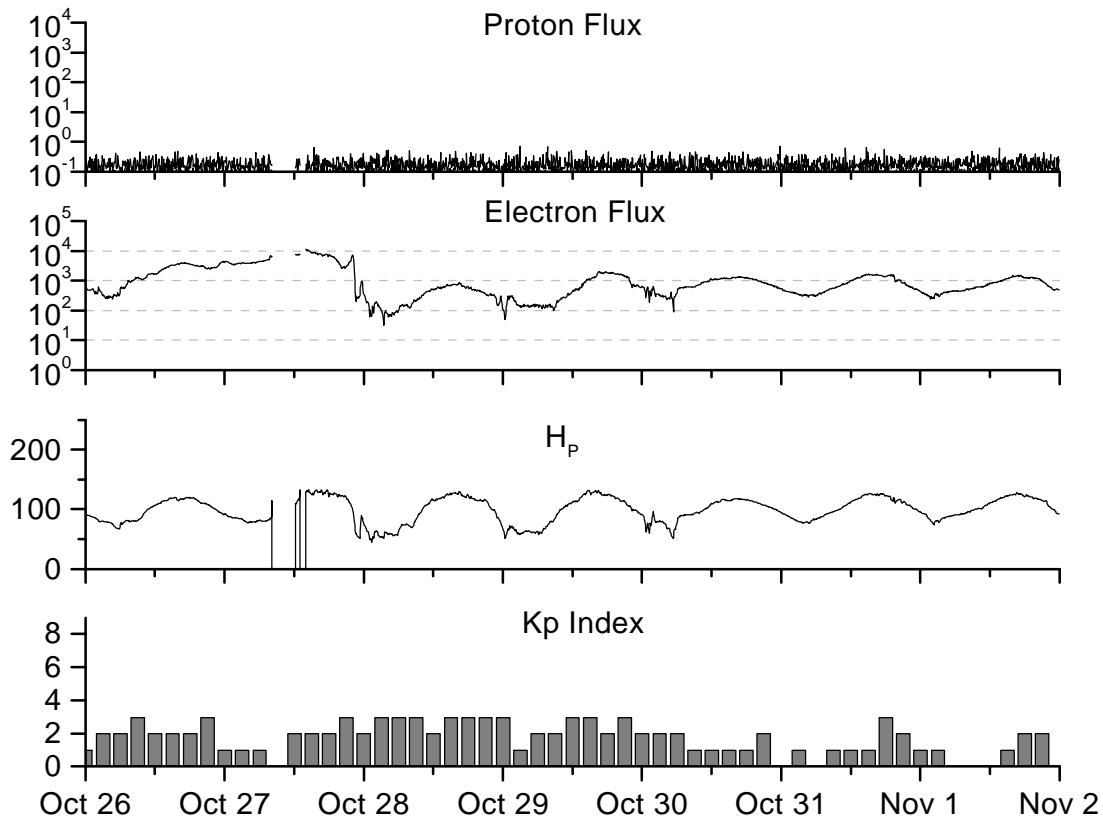
Month	Sunspot Numbers			Radio Flux		Geomagnetic			
	Observed values SWO	Ratio RI	Smooth values RI/SWO	Smooth values SWO	Smooth values RI	**Penticton 10.7 cm	Smooth Value	Planetary Ap	Smooth Value
1996									
November	26.7	17.9	0.67	15.4	09.8	78.7	73.0	08	09.1
December	21.1	13.3	0.63	16.2	10.4	77.8	73.3	07	09.3
1997									
January	09.0	05.7	0.63	16.5	10.5	74.0	73.4	09	09.3
February	11.3	07.6	0.67	17.4	11.0	73.8	73.7	11	09.2
March	14.4	08.7	0.60	20.4	13.5	73.5	75.1	08	08.9
April	24.5	15.5	0.63	24.0	16.5	74.5	76.8	10	08.6
May	28.6	18.5	0.65	26.4	18.3	74.6	78.4	08	08.6
June	22.1	12.7	0.57	29.0	20.3	71.7	80.1	07	08.6
July	17.0	10.4	0.61	32.4	22.6	71.1	81.8	06	08.5
August	36.7	24.4	0.66	35.9	25.0	79.0	83.4	07	08.3
September	52.8	51.3	0.88	40.5	28.3	96.2	85.7	10	08.4
October	33.6	22.8	0.68	45.4	31.8	84.9	88.6	11	08.6
November	53.5	39.0	0.73	49.3	35.0	99.5	91.3	11	09.0
December	57.9	41.2	0.71	54.2	39.0*	98.8	94.2*	05	09.5
1998									
January	51.8	31.9	0.62	60.6	43.7*	93.4	97.5*	08	09.9*
February	54.4	40.3	0.74	67.4	48.8*	93.4	101.7*	08	10.5*
March	81.8	54.8	0.67	73.3	53.4*	109.1	105.8*	13	11.2*
April	73.6	53.4	0.73	77.7	56.5*	108.3	109.1*	10	11.4*
May	74.3	56.3	0.76			106.7		18	
June	93.6	70.7*	0.76*			108.4*		10	
July	98.3	66.2*	0.67*			114.0*		11*	
August	118.6	91.7*	0.77*			136.0*		18*	
September	119.0	92.9*	0.78*			138.4*		14*	
October	77.0	55.6*	0.72*			121.9*		13*	

*Preliminary estimates.

The lowest smoothed sunspot indices number for Cycle 22, RI = 8.0, occurred in May 1996. 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 26 October 1998*

Protons plot contains the five-minute averaged integral proton flux (protons/ $\text{cm}^2\text{-sec-sr}$) as measured by GOES-8 (W75) for each of three energy thresholds: greater than 10, 50, and 100 MeV.

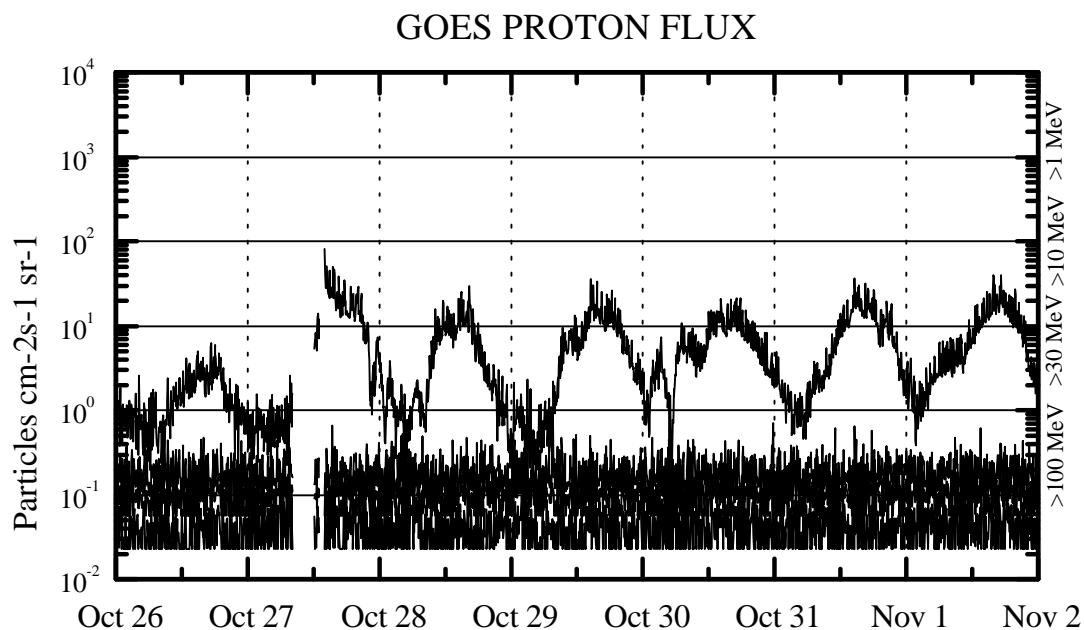
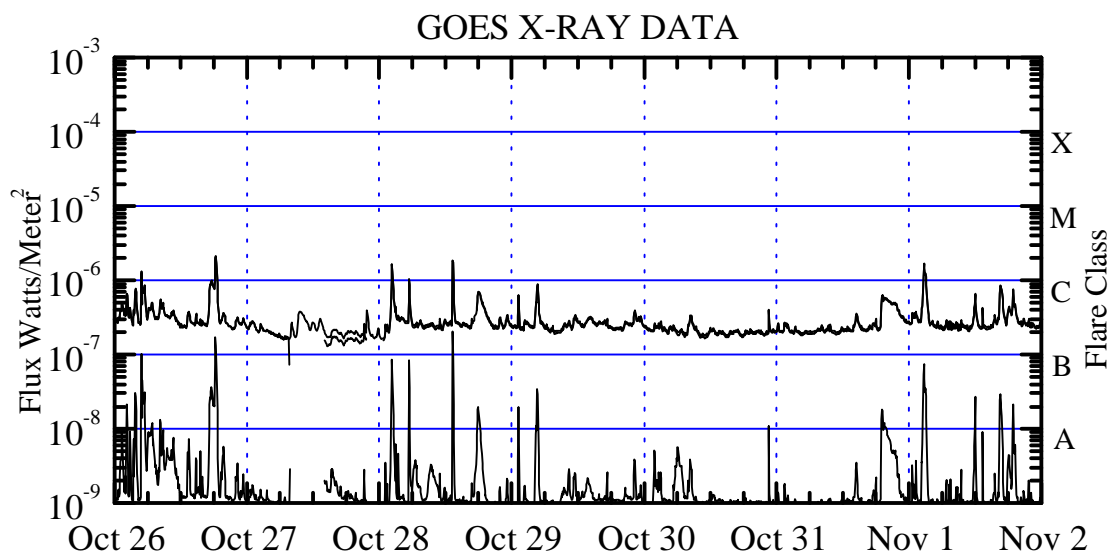
Electrons plot contains the five-minute averaged integral electron flux (electrons/ $\text{cm}^2\text{-sec-sr}$) with energies greater than 2 MeV at GOES-8.

H_p plot contains the five minute averaged magnetic field H component in nanoteslas (nT) as measured by GOES-8. The H component is parallel to the spin axis of the satellite, which is nearly parallel to the Earth's rotation axis.

K_p plot contains the estimated planetary 3-hour K-index (derived by the USAF 55th 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 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_p 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_p are "global" parameters that are applicable to a first order approximation over large areas. H_p is subject to a more localized phenomena and the measurements generally are applicable to within a few degrees of longitude of the measuring satellite.



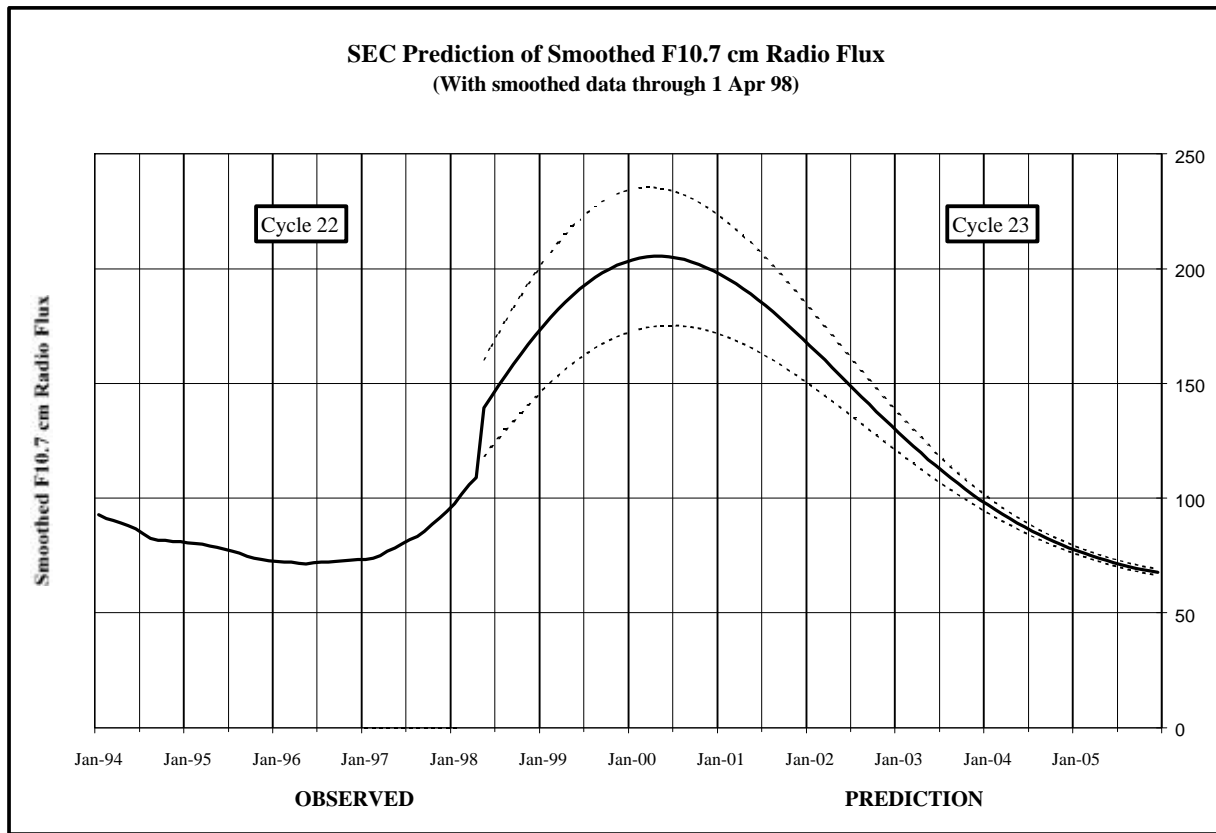


Weekly GOES Satellite X-ray and Proton Plots

X-ray plot contains five minute averaged x-ray flux (watts/m²) as measured by GOES 8 and 10 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.

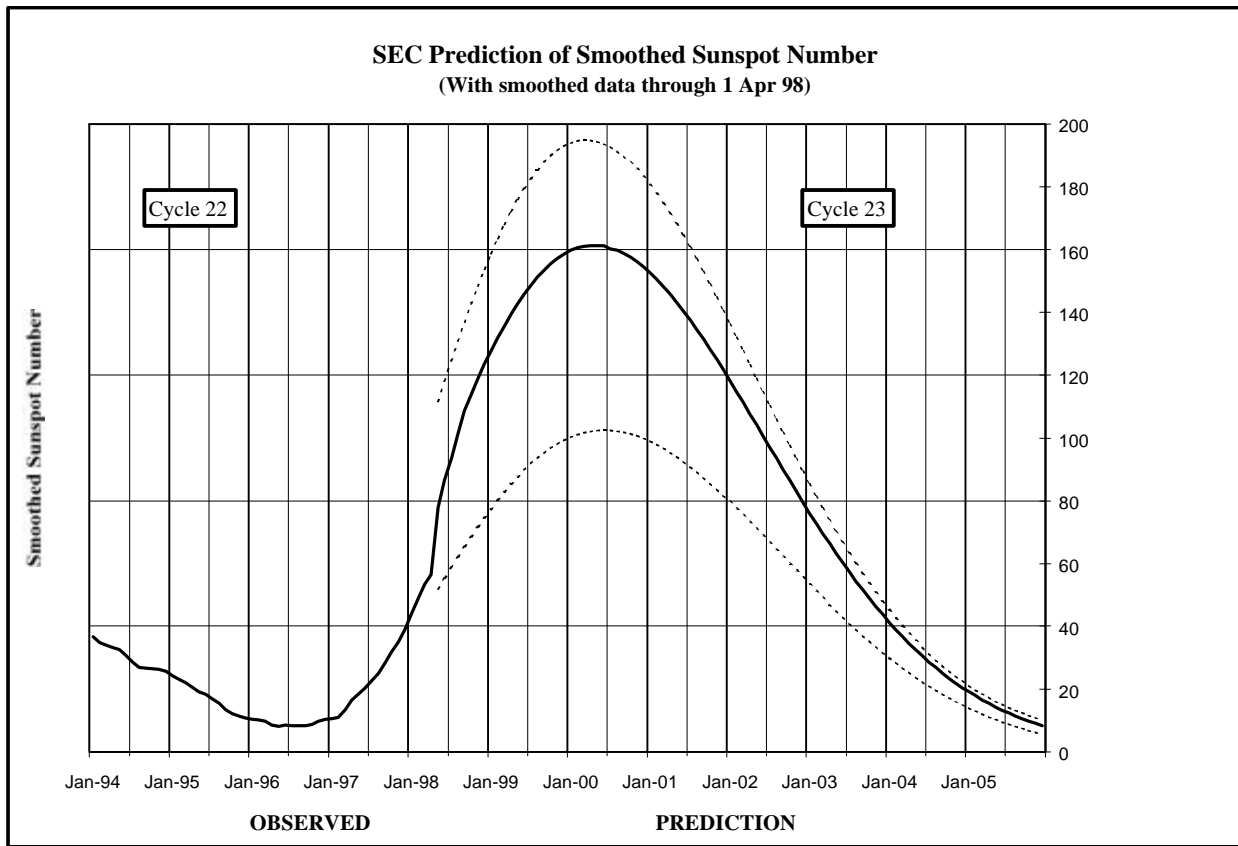
Proton plot contains the five minute averaged integral proton flux (protons/cm²-sec-sr) as measured by GOES-8 (W75) for each of the energy thresholds: >1, >10, >30 and >100 MeV. P10 event threshold is 10 pfu (protons/cm²-sec-sr) at greater than 10 MeV.





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 (***)	77 (***)	78 (***)	80 (***)	82 (***)	83 (***)	86 (***)	89 (***)	91 (***)	94 (***)
1998	98 (***)	102 (***)	106 (***)	109 (***)	139 (21)	144 (21)	149 (22)	154 (22)	158 (23)	163 (23)	167 (23)	171 (24)
1999	175 (24)	179 (25)	182 (25)	186 (25)	189 (25)	191 (26)	194 (26)	196 (26)	198 (27)	200 (27)	202 (28)	203 (28)
2000	204 (30)	205 (30)	205 (30)	205 (30)	205 (30)	205 (28)	205 (27)	204 (27)	203 (26)	202 (26)	201 (26)	199 (26)
2001	197 (25)	195 (25)	193 (25)	191 (25)	189 (24)	186 (24)	184 (24)	181 (24)	178 (23)	175 (23)	173 (23)	170 (22)
2002	166 (22)	163 (22)	160 (21)	157 (21)	154 (21)	151 (21)	147 (20)	144 (20)	141 (19)	138 (19)	135 (18)	132 (18)
2003	129 (17)	126 (17)	123 (17)	120 (16)	117 (16)	114 (15)	112 (15)	109 (15)	106 (14)	104 (14)	102 (14)	99 (13)
2004	97 (13)	95 (13)	93 (12)	91 (12)	89 (11)	87 (10)	86 (9)	84 (9)	83 (8)	81 (7)	80 (9)	78 (9)
2005	77 (8)	76 (8)	75 (8)	74 (7)	73 (7)	72 (7)	71 (7)	70 (6)	70 (6)	69 (2)	68 (2)	68 (2)





SEC Prediction of Smoothed Sunspot Number

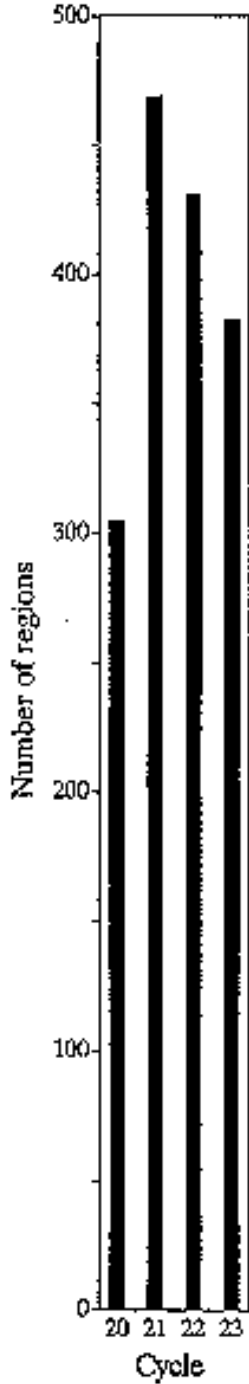
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1996	10 (***)	10 (***)	10 (***)	9 (***)	8 (***)	9 (***)	9 (***)	8 (***)	9 (***)	9 (***)	10 (***)	11 (***)
1997	11 (***)	11 (***)	14 (***)	17 (***)	18 (***)	20 (***)	23 (***)	25 (***)	29 (***)	32 (***)	35 (***)	34 (***)
1998	44 (***)	49 (***)	53 (***)	57 (***)	78 (24)	87 (24)	94 (25)	101 (25)	109 (26)	114 (26)	119 (27)	124 (27)
1999	128 (27)	132 (28)	136 (28)	139 (29)	143 (29)	146 (29)	149 (29)	151 (29)	154 (29)	156 (29)	157 (29)	159 (29)
2000	160 (30)	161 (30)	161 (30)	161 (30)	161 (29)	161 (29)	160 (29)	160 (29)	159 (29)	158 (29)	156 (29)	155 (28)
2001	153 (28)	151 (28)	148 (28)	146 (27)	143 (27)	141 (27)	138 (27)	135 (26)	132 (26)	128 (26)	125 (25)	122 (25)
2002	119 (24)	115 (24)	111 (24)	108 (23)	104 (23)	101 (22)	97 (22)	94 (21)	90 (21)	86 (21)	83 (20)	80 (20)
2003	76 (19)	73 (19)	70 (18)	66 (18)	63 (17)	60 (17)	57 (17)	54 (16)	52 (16)	49 (15)	46 (15)	44 (14)
2004	41 (14)	39 (14)	37 (13)	35 (13)	32 (12)	31 (12)	29 (11)	27 (11)	25 (11)	23 (10)	22 (10)	20 (9)
2005	19 (9)	18 (9)	17 (8)	15 (8)	14 (8)	13 (8)	12 (7)	11 (7)	11 (7)	10 (6)	9 (5)	8 (4)





Space
Environment
Center

Comparison of Cycles
at current month in cycle



Active Regions

October 1998
(Month 25)



Preliminary data

