

Space Weather Highlights

27 October 1997 - 02 November 1997

Solar activity was very low to low. Isolated B-class subflares occurred during most of the period. Region 8100 (S20, L = 352, class/area Eki/290 on 02 November) produced isolated C-class subflares and entered a period of significant growth on 02 November. Note: At issue time Region 8100 had produced an X2/2B flare following continued growth in area and magnetic complexity; details will follow in next week's issue.

Solar wind data were received from the WIND spacecraft a few hours per day. Velocities decreased from 550 - 330 km/sec during 27 - 29 October, then varied from 320 - 420 km/sec for the rest of the period. Solar wind particle densities varied from 03 - 15 p/cc during most of the period. Bz was in the minus 06 to plus 06 nT (GSM) range. Solar sector orientation was mostly toward (phi angle near 315 degrees) on 27 October shifting to away conditions (phi angle near 135 degrees) during 28 - 31 October. Mostly toward conditions were observed during the rest of the period.

No significant proton enhancements were observed at geosynchronous altitude during the summary period. However, a >10 MeV proton event was in progress at issue time. The event began at 04/0640UT and reached a maximum of 72 PFU at 04/1120UT. The proton event was due to an X-class flare from Region 8100. Details will be provided in next week's issue.

The greater than 2 MeV electron flux at geosynchronous altitude was at moderate to high levels.

The geomagnetic field ranged from quiet to minor storm levels during 27 - 28 October with isolated periods of major storm activity observed at high latitudes. Conditions declined to quiet to unsettled levels during 29 - 30 October. Quiet conditions were observed during the remainder of the period.

Space Weather Forecast

05 November 1997 - 01 December 1997

Solar activity is expected to range from low to moderate. M-class flare activity is possible through 11 November, given the presence of Region 8100. Activity is expected to decline to very low to low levels during 12 - 22 November. Low to moderate activity is expected for the remainder of the period with the return of (old) Region 8100.

Additional proton enhancements or events are possible should Region 8100 produce more major flare activity.

The greater than 2 MeV electron flux at geosynchronous altitude is expected to reach high levels during 06 - 12 November. Otherwise, normal to moderate fluxes are expected.

The geomagnetic field is expected to be quiet to unsettled through 05 November. Minor to major storm conditions are expected during 06 - 08 November with periods of severe storm activity possible at high latitudes. Unsettled to active conditions are expected during 09 - 11 November as the disturbance subsides. Quiet to unsettled levels are expected during most of the remainder of the period with the exception of 20 - 22 November when active levels should occur.



Daily Solar Data

Date	Radio	Sun	Sunspot	X-ray	X-ray Flux			Flares				
	Flux 10.7 cm	spot No. (10^6 hemi.)	Area	Background	C	M	X	S	1	2	3	4
27 October	84	44	140	A6.3	0	0	0	1	0	0	0	0
28 October	86	50	190	A6.5	2	0	0	1	1	0	0	0
29 October	87	41	210	A6.7	0	0	0	0	0	0	0	0
30 October	88	51	250	A8.6	0	0	0	2	0	0	0	0
31 October	91	55	290	A8.2	0	0	0	1	0	0	0	0
01 November	93	62	230	B1.4	0	0	0	2	0	0	0	0
02 November	98	74	340	A9.7	2	0	0	12	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
27 October	4.8E+5	1.6E+4	3.6E+3		3.0E+7	
28 October	9.1E+5	1.7E+4	4.3E+3		4.1E+7	
29 October	2.9E+5	1.8E+4	4.5E+3		9.5E+7	
30 October	3.1E+5	1.9E+4	4.9E+3		9.3E+7	
31 October	3.1E+5	1.9E+4	5.1E+3		1.2E+8	
01 November	3.9E+5	1.9E+4	5.1E+3		6.9E+7	
02 November	2.9E+5	1.9E+4	5.0E+3		3.8E+7	

Daily Geomagnetic Data

Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
27 October	15	5-3-3-2-1-1-3-3	9	3-3-4-0-0-2-2-2	15	4-4-4-2-1-2-3-3
28 October	11	3-3-2-2-2-2-3-3	*	3-1-2-3-*-2-1-1	13	4-3-2-3-3-3-3-3
29 October	8	3-2-3-2-1-1-1-2	9	1-2-5-3-0-1-0-1	10	3-3-4-3-2-2-2-2
30 October	5	1-0-2-2-2-1-2-2	8	0-0-2-5-1-1-0-1	10	2-0-3-4-3-2-2-3
31 October	5	2-2-1-0-1-1-1-1	0	0-0-0-0-0-1-0-0	4	2-1-1-0-1-2-1-1
01 November	9	1-4-3-2-2-1-2-1	1	0-2-0-0-0-0-1-1	8	0-4-3-2-1-2-2-1
02 November	2	0-1-0-0-0-1-1-1	0	0-0-0-0-0-0-0-0	3	1-0-0-0-1-2-2-0

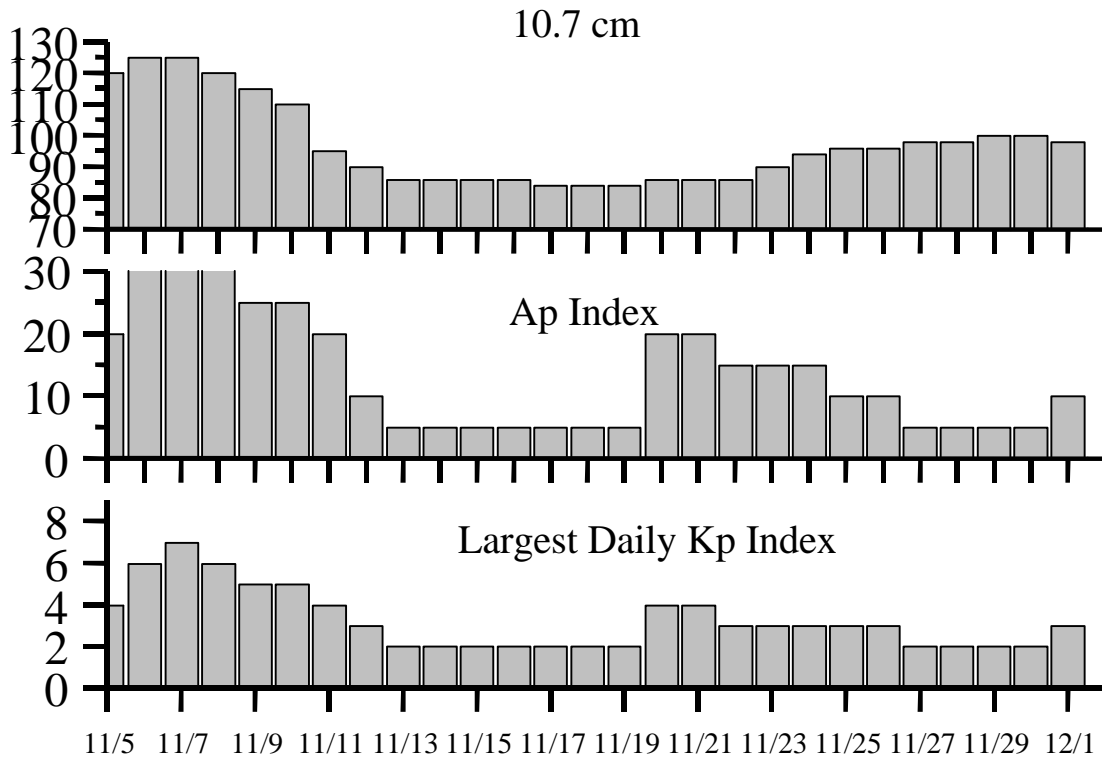


Alerts and Warnings Issued

Date and Time of Issue (UT)	Type of Alert or Warning	Date and Time of Event (UT)
27 Oct 0009	K = 4 observed	26 Oct 21-24
27 Oct 0305	K = 5 observed	27 Oct 00-03
28 Oct 0009	>2MeV Electron Event in Progress ≥ 1000 pfu	27 Oct
29 Oct 0008	>2MeV Electron Event in Progress ≥ 1000 pfu	28 Oct
30 Oct 0008	>2MeV Electron Event in Progress ≥ 1000 pfu	29 Oct
31 Oct 0006	>2MeV Electron Event in Progress ≥ 1000 pfu	30 Oct
01 Nov 0009	>2MeV Electron Event in Progress ≥ 1000 pfu	31 Oct
01 Nov 0612	K = 4 observed	01 Nov 03-06
02 Nov 0009	>2MeV Electron Event in Progress ≥ 1000 pfu	01 Nov



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
05 Nov	120	20	4	18 Nov	84	5	2
06	125	35	6	19	84	5	2
07	120	60	7	20	86	20	4
08	115	40	6	21	86	20	4
09	95	25	5	22	86	15	3
10	90	25	5	23	90	15	3
11	86	20	4	24	94	15	3
12	86	10	3	25	96	10	3
13	86	5	2	26	96	10	3
14	86	5	2	27	98	5	2
15	86	5	2	28	98	5	2
16	86	5	2	29	100	5	2
17	84	5	2	30	100	5	2
				01 Dec	98	10	3



Energetic Event

Date	Time (UT)		X-ray		Optical Information			Peak		Sweep Freq		
	Begin	Max	½ Max	Class	Integ Flux	Imp Brtns	Location		Radio Flux		Intensity	
							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	
27 October	0242	0247	0254	B1.5				
	0321	0326	0330	B2.0				
	0345	0357	0408	B1.7				
	1151	1151	1156		SF	N21E46	8099	
	1418	1421	1426	B1.2				
	1512	1517	1521	B1.5				
	2122	2142	2157	B2.0				
28 October	0138	0207	0224	B2.6				
	0334	0337	0347	C2.8	SN	S28E68	8100	
	0736	0742	0746	B1.6				
	0838	0846	0853	B3.2				
	1255	1258	1316	C5.9	1F	S22E61	8100	
	1348	1351	1353	B1.2				
	2009	2014	2023	B1.3				
29 October	2317	2320	2325	B1.0				
	0414	0417	0421	B1.0				
	0701	0705	0708	B1.2				
	1021	1025	1027	B1.0				
30 October	2303	2309	2320	B1.7				
	0056	0101	0109	B3.5				
	0234	0238	0301	B2.0				
	0441	0444	0446	B1.4				
	0814	0821	0832	B1.9				
	1102	1113	1124	B4.4				
	1329	1333	1335	B2.0				
	1433	1437	1439	B2.5				
	1520	1520	1532	B6.7	SF	S20E34	8100	
1609	1609	1614	B3.3	SF	S19E33	8100		
31 October	1859	1902	1905	B2.3				
	2021	2026	2030	B2.7				
	1938	1939	1943	B4.4	SF	S20E16	8100	
	01 November	0111	0115	0124	B8.7	SF	S19E10	8100
0457		0503	0513	B4.4	SF	S19E08	8100	
1232		1235	1237	B1.2				
1248		1252	1254	B2.6				
1602		1606	1609	B2.2				
1825		1829	1832	B2.5				



Flare List – continued.

Date	Time			X-ray Class.	Optical		Rgn #
	Begin	Max	End		Imp / Brtns	Location Lat CMD	
01 November	2229	2233	2237	B2.6			
02 November	0226	0230	0234	B1.7			
	0238	0241	0243	B2.3			
	0302	0304	0311	C2.3	SB	S20E01	8100
	0443	0446	0448	B1.7			
	0725	0728	0731	B1.7			
	0922	0923	0927		SF	S15W10	8100
	1131	1132	1135	B2.7	SF	S17W06	8100
	1657	1700	1702	B1.8			
	1743	1743	1746	B2.7	SF	S20W07	8100
	1825	1834	1839	B8.0	SF	S20W08	8100
	1902	1907	1913		SF	S20W09	8100
	2022	2022	2026		SF	S22W10	8100
	2046	2048	2101	C2.2	SF	S18W11	8100
	2102	2106	2115		SF	S15W16	8100
	2117	2120	2130		SF	S20W09	8100
	2253	2254	2311	B6.2	SF	S20W10	8100
	2326	2334	2342	B5.5	SF	S19W13	8100

Region Summary

Date	Location		Sunspot Characteristics					Flares									
	Helio		Area (10 ⁻⁶ hemi)	Extent (helio)	Spot Class	Spot Count	Mag Class	X-ray			Optical						
	(° Lat ° CMD)	Lon						C	M	X	S	1	2	3	4		
<i>Region 8097</i>																	
15 Oct	N18E77	141	0060	02	HSX	002	A										
16 Oct	N16E69	136	0060	08	CSO	002	B				1						
17 Oct	N17E57	135	0080	08	CSO	003	B										
18 Oct	N17E43	135	0060	08	CSO	003	B										
19 Oct	N17E26	138	0030	02	HSX	001	A										
20 Oct	N16E13	138	0040	02	HSX	001	A										
21 Oct	N16W01	139	0040	03	CRO	004	B	1			1						
22 Oct	N16W14	139	0010	02	BXO	003	B										
23 Oct	N16W27	139															
24 Oct	N16W40	139															
25 Oct	N16W53	139															
26 Oct	N16W66	139															
27 Oct	N16W79	139															
28 Oct	N16W92	139															
								1	0	0	2	0	0	0	0	0	0

Crossed West Limb.

Absolute heliographic longitude: 139



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 8098</i>																							
24 Oct	S26W03	101	0000	00	AXX	001	A																
25 Oct	S26W16	101																					
26 Oct	S26W29	101																					
27 Oct	S23W43	102	0010	03	BXO	003	B																
28 Oct	S23W57	103	0000	00	AXX	001	A																
29 Oct	S23W70	103																					
30 Oct	S23W83	103																					
													0	0	0	0	0	0	0	0	0	0	0

Crossed West Limb.

Absolute heliographic longitude: 101

<i>Region 8099</i>																							
25 Oct	N20E64	021	0020	04	CRO	003	B																
26 Oct	N19E52	020	0030	06	CSO	004	B																
27 Oct	N19E37	022	0050	07	CSO	006	B						1										
28 Oct	N19E23	023	0060	09	CSO	010	B																
29 Oct	N20E11	021	0010	10	BXO	006	B																
30 Oct	N20W03	022	0030	11	CRO	009	BG																
31 Oct	N18W17	023	0030	12	CRO	008	BG																
01 Nov	N18W35	028	0010	07	BXO	003	B																
02 Nov	N18W51	031	0000	01	AXX	001	A																
													0	0	0	1	0	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 22

<i>Region 8100</i>																							
27 Oct	S21E67	352	0080	09	CSO	005	B																
28 Oct	S20E55	351	0130	09	CAO	009	B	2				1	1										
29 Oct	S21E44	348	0200	10	DAO	015	B																
30 Oct	S19E30	349	0220	10	DAO	022	B						2										
31 Oct	S20E15	351	0260	11	EKI	016	B						1										
01 Nov	S19E01	352	0210	11	EAI	027	BG						2										
02 Nov	S19W12	352	0290	14	EKI	036	BG	2					12										
													4	0	0	18	1	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 352



Region Summary- continued.

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

Region 8101

31 Oct	S19W70	076	0000	00	AXX	001	A										
01 Nov	S18W83	076	0010	01	BXO	002	B										
									0	0	0	0	0	0	0	0	0

Crossed West Limb.

Absolute heliographic longitude: 76

Region 8102

02 Nov	N30E12	328	0050	04	CAO	007	B										
									0	0	0	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 328



**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
1995									
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
1996									
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
1997									
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*	24.0	16.7*	74.5	76.8*	10	08.6*
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*	
October	33.6	23.3*	0.69*			85.0*		10*	

*Preliminary estimates.

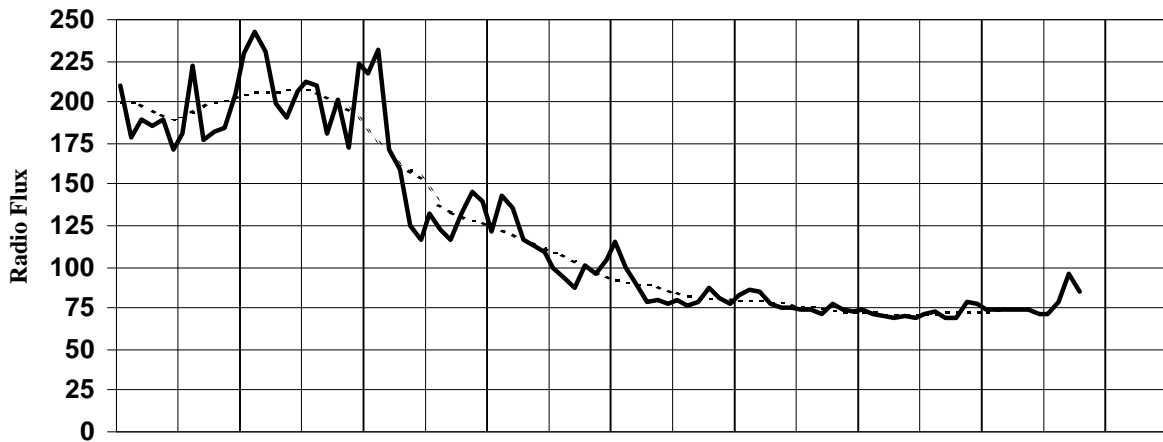
October 1996 has been selected as the start of Solar Cycle 23.

The highest smoothed sunspot number for Solar Cycle 22, RI=158.5 occurred in July 1989.

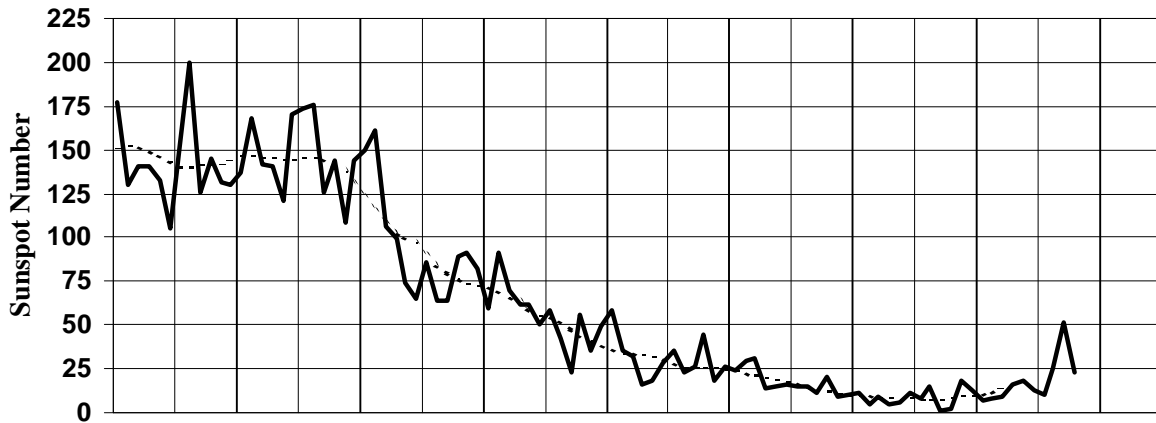
The highest smoothed 10.7cm Radio Flux value for Solar Cycle 22, of 213.1, occurred in June 1989.



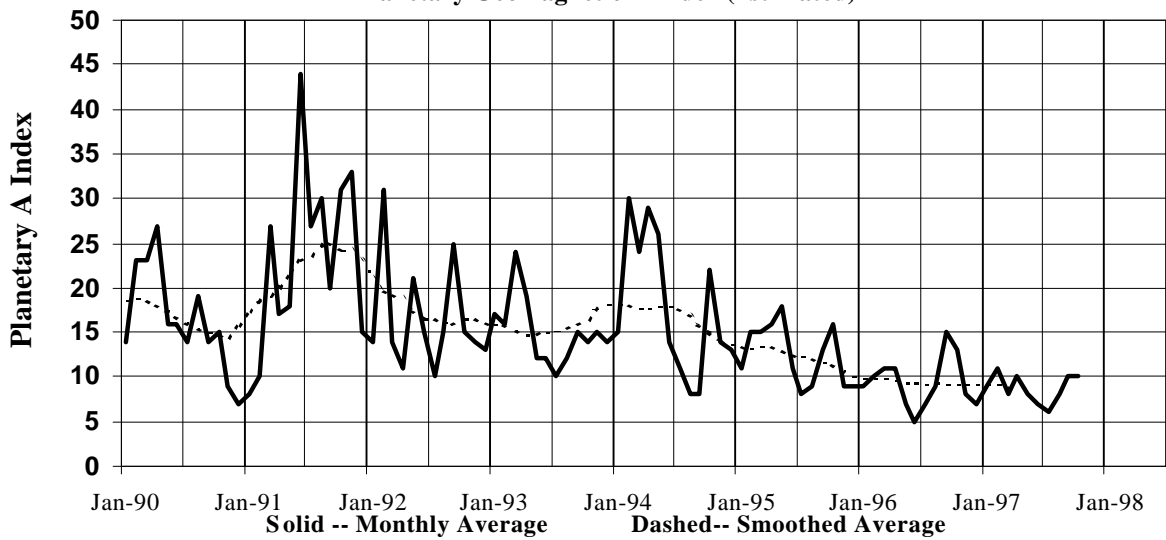
Penticton (DRAO) Radio Flux 2800MHz (10.7cm)

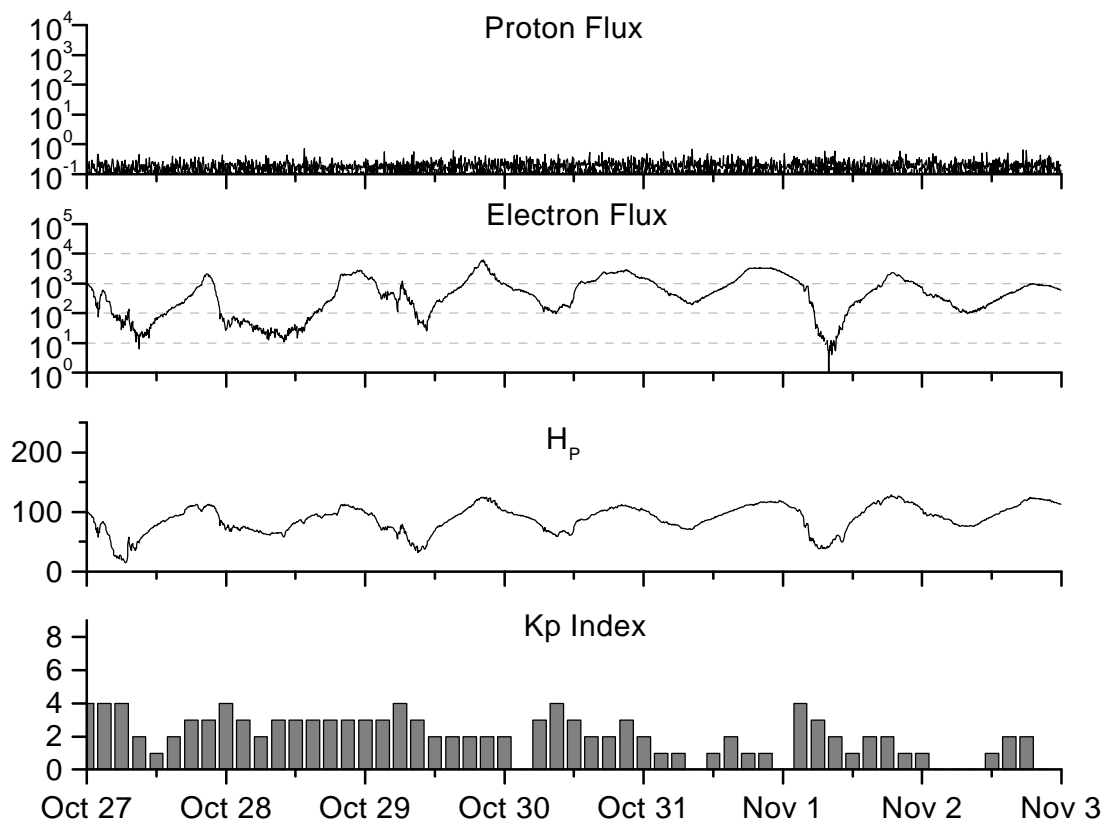


International Sunspot Number



Planetary Geomagnetic A Index (Estimated)





Weekly Geosynchronous Satellite Environment Summary

Week Beginning 27 October 1997

Protons plot contains the five-minute averaged integral proton flux (protons/ 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/ cm^2 -sec-sr) with energies greater than 2 MeV at GOES-9.

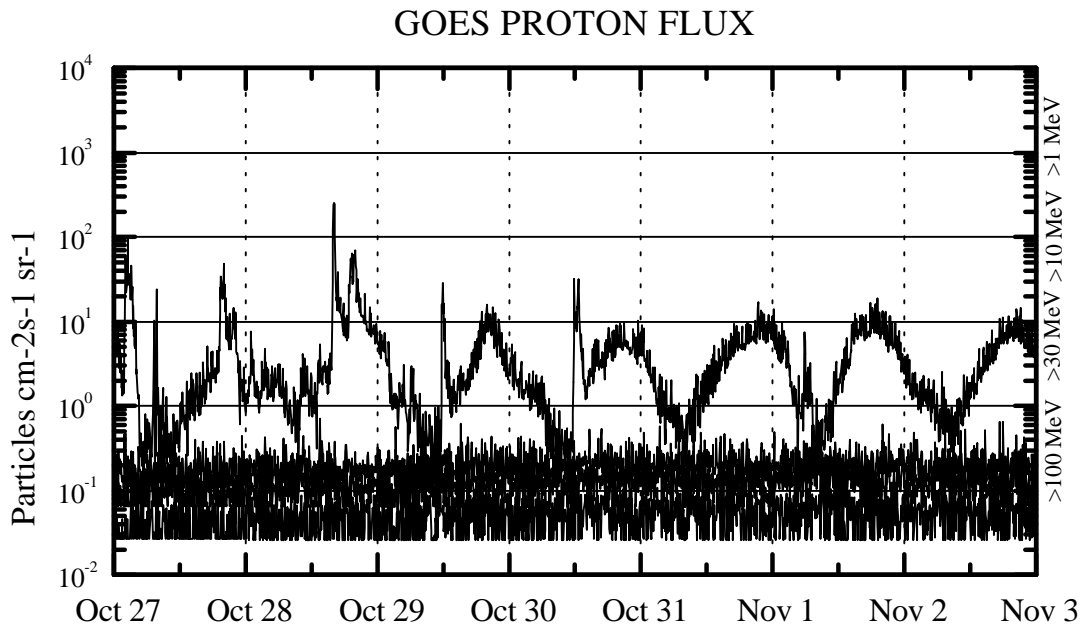
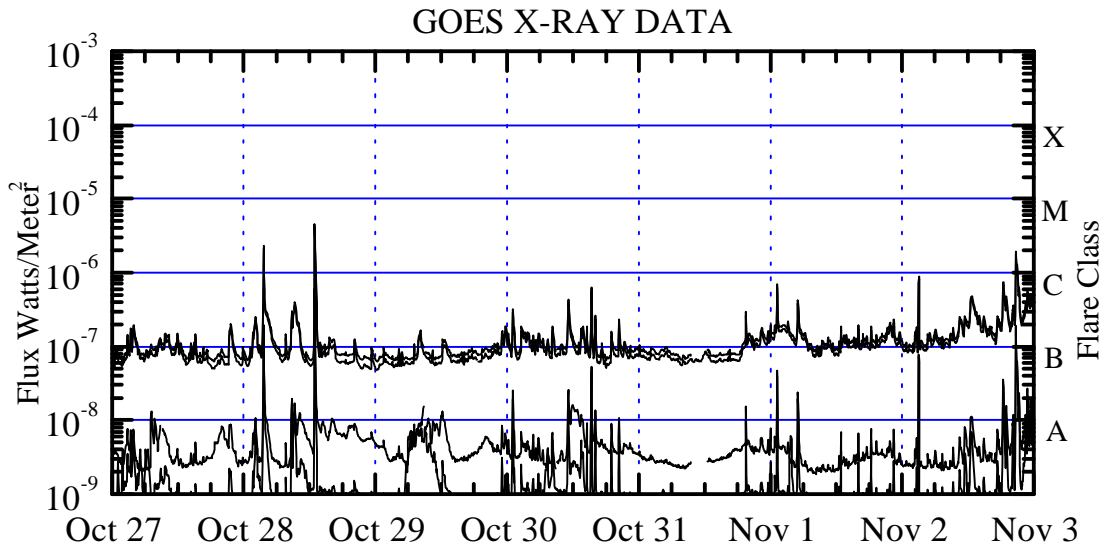
H_p plot contains the five minute averaged magnetic field H component in nanoteslas (nT) as measured by GOES-9. The H component is parallel to the spin axis of the satellite, which is nearly parallel to the Earth's rotation axis.

K_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.



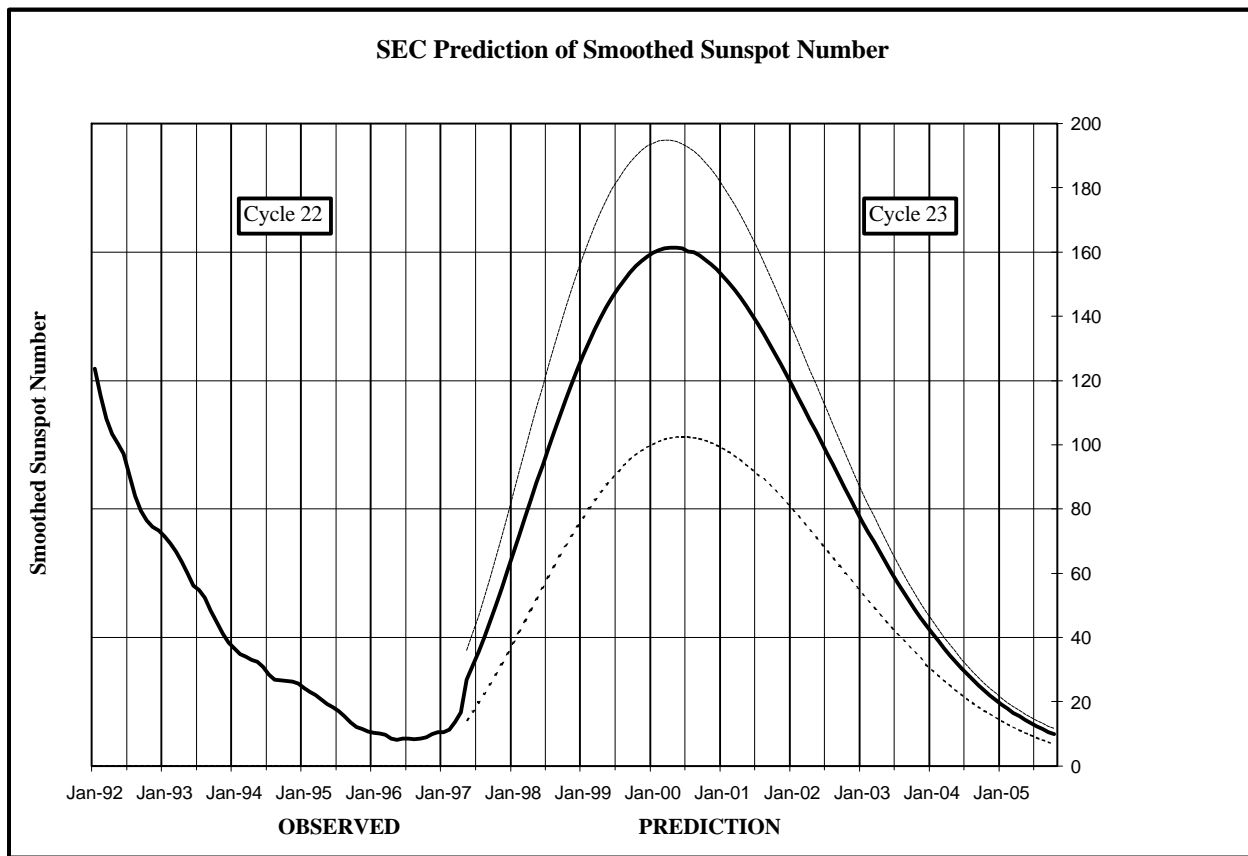


Weekly GOES Satellite X-ray and Proton Plots

Proton plot contains the five minute averaged integral proton flux (protons/cm²-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/cm²-sec-sr) at greater than 10 MeV.

X-ray plot contains five minute averaged x-ray flux (watts/m²) 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.



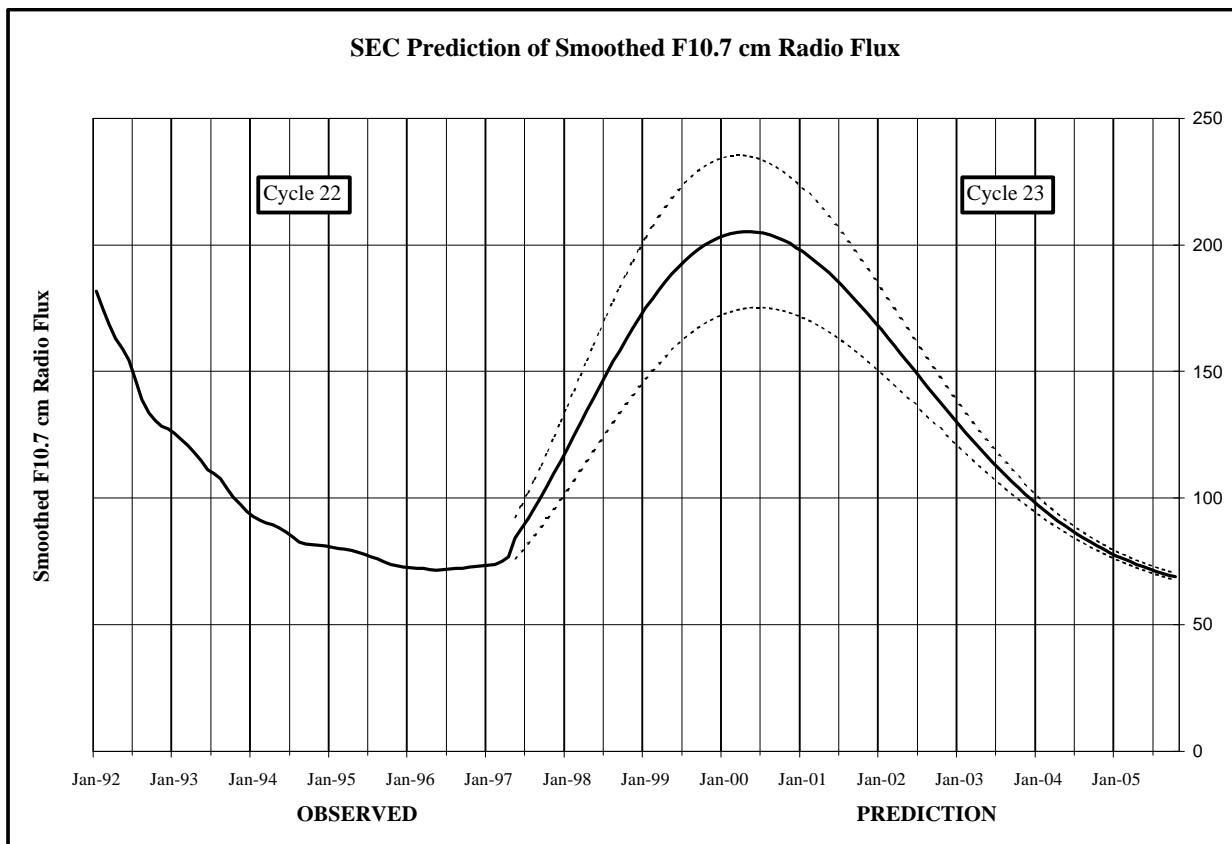


SEC Prediction of Smoothed Sunspot Number

	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 (***)	27 (14)	31 (15)	36 (16)	40 (17)	45 (18)	50 (19)	55 (20)	61 (20)
1998	66 (21)	72 (22)	77 (22)	83 (23)	88 (24)	94 (24)	99 (25)	104 (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)



SEC Prediction of Smoothed F10.7 cm Radio Flux



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 (***)	84 (8)	88 (9)	92 (15)	96 (15)	101 (15)	105 (16)	110 (17)	115 (18)
1998	120 (18)	125 (19)	130 (20)	134 (20)	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)

