

Space Weather Highlights
27 November – 03 December 2006

SEC PRF 1631
05 December 2006

Solar activity was at very low to low levels during the period. Region 926 (S09, L = 138, class/area Hkx/260 on 26 November) was the most flare-productive region during the period, with occasional B-class and isolated C-class subflares. Note: New Region 930 (S06, L = 009, class/area Dko/350 on 05 December) rotated into view on 04 December and produced an X9 X-ray flare at 05/1035 UTC.

No greater than 10 MeV proton events were observed. Note: a greater than 10 MeV proton flux enhancement began at approximately 05/1530 UTC, associated with the X9 flare mentioned above.

The greater than 2 MeV electron flux at geosynchronous orbit was at high levels on 27 – 30 November.

Geomagnetic field activity was at quiet to unsettled levels during 27 – 28 November, with periods of active levels at high latitudes due to diminishing coronal hole high-speed stream effects. Activity subsided to mostly quiet levels on 29 November. Activity increased on 30 November with minor to major storm levels at all latitudes and brief severe storm levels at high latitudes. This disturbance appeared to be related to a solar sector boundary crossing. ACE data indicated a solar sector boundary crossing occurred on 30 November followed by a sustained period of southward IMF Bz (minimum – 10 nT at 30/0415) and increased total IMF field intensity (maximum 16 nT at 30/1530 UTC).

Space Weather Outlook
06 December – 01 January 2007

Solar activity is expected to be at moderate to high levels through 18 December with isolated major flare activity possible. Activity is expected to decrease to very low to low levels on 19 December with the departure of Region 930.

A greater than 10 MeV proton event is possible during 06 December. There remains a chance for another proton event until 19 December. No proton events are expected during the rest of the period.

The greater than 2 MeV electron flux at geosynchronous orbit is expected to be at high levels during 08 – 12 and 22 - 25 December.

The geomagnetic field is expected to be mostly quiet to unsettled for the majority of the forecast period. However, a recurrent coronal hole high-speed stream (HSS) is expected to affect the field during 07 - 08 December with active to major storm periods expected. Another recurrent HSS is expected to disturb the field during 20 - 22 December with active to minor storm conditions expected.



Daily Solar Data

Date	Radio Flux 10.7 cm	Sun spot No.	Sunspot Area (10 ⁻⁶ hemi.)	X-ray Background	Flares							
					X-ray Flux			Optical				
					C	M	X	S	1	2	3	4
27 November	82	30	280	A4.3	0	0	0	3	0	0	0	0
28 November	86	34	240	A4.9	0	0	0	0	0	0	0	0
29 November	85	33	330	A4.0	1	0	0	0	0	0	0	0
30 November	84	59	340	A2.6	0	0	0	0	0	0	0	0
01 December	84	58	310	A2.2	0	0	0	1	0	0	0	0
02 December	87	55	280	A9.5	3	0	0	5	0	0	0	0
03 December	87	46	260	A6.3	1	0	0	2	0	0	0	0

Daily Particle Data

Date	Proton Fluence (protons/cm ² -day-sr)			Electron Fluence (electrons/cm ² -day-sr)		
	>1 MeV	>10 MeV	>100 MeV	>.6 MeV	>2MeV	>4 MeV
	27 November	1.7E+6	1.6E+4	3.6E+3		2.5E+8
28 November	1.8E+6	1.7E+4	4.0E+3		3.8E+8	
29 November	1.3E+6	1.6E+4	3.6E+3		2.1E+8	
30 November	1.2E+7	1.7E+4	3.6E+3		1.8E+7	
01 December	5.6E+5	1.7E+4	3.8E+3		1.4E+7	
02 December	4.1E+5	1.7E+4	3.6E+3		2.2E+7	
03 December	3.7E+5	1.7E+4	3.9E+3		2.3E+7	

Daily Geomagnetic Data

Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
	27 November	7	3-1-2-3-1-1-2-0	13	2-1-4-4-3-1-1-1	6
28 November	4	1-1-0-1-2-2-1-1	10	0-1-1-4-4-2-2-1	5	1-1-0-2-2-1-1-2
29 November	6	1-3-3-1-0-1-1-1		0-2-0-*-0-1-1-1	6	2-3-2-1-0-1-2-2
30 November	15	2-3-4-4-4-3-1-0	73	2-5-8-7-6-5-3-1	28	2-4-5-5-5-5-2-1
01 December	3	1-1-0-1-1-1-2-1		*-0-0-2-2-1-1-1	4	0-1-0-1-1-1-1-2
02 December	1	0-1-1-0-0-1-0-0	2	0-0-1-1-2-0-0-0	2	0-0-1-0-1-0-0-1
03 December	2	0-1-1-0-1-1-0-0	1	0-0-0-1-0-1-0-0	3	1-1-0-0-0-1-1-1

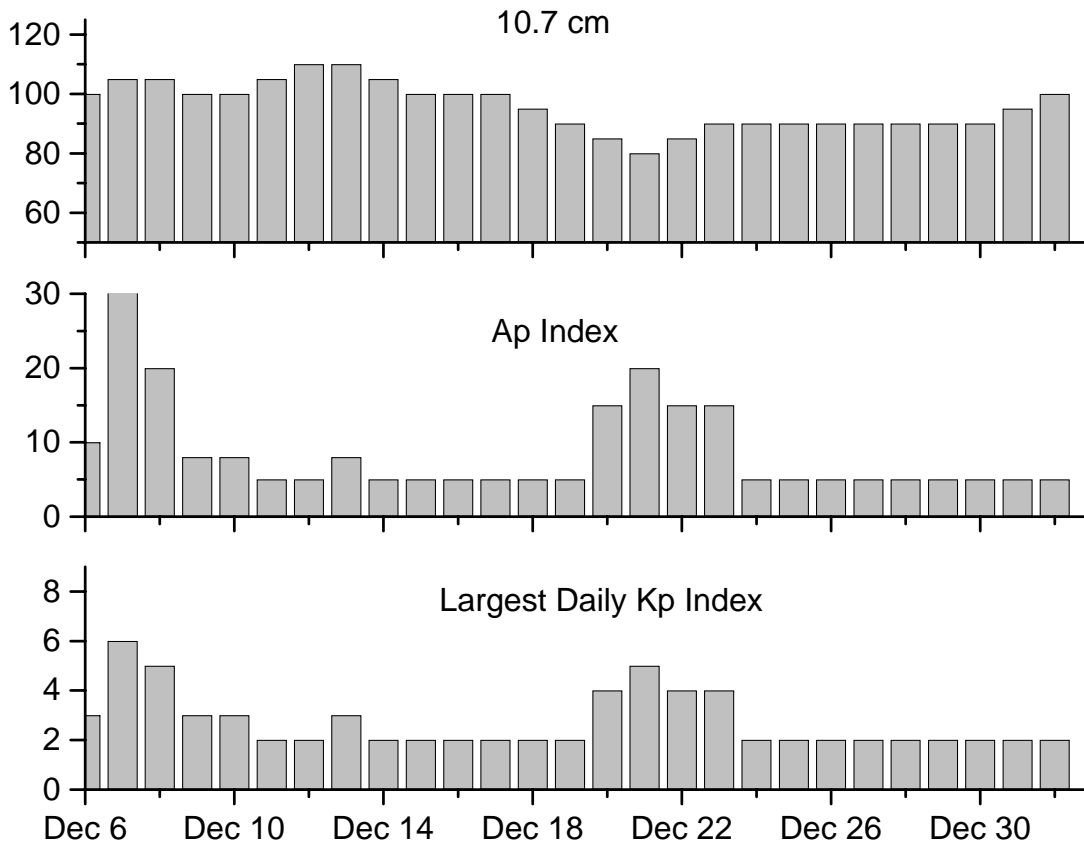


Alerts and Warnings Issued

Date & Time of Issue	Type of Alert or Warning	Date & Time of Event UTC
27 Nov 0840	ALERT: Electron 2MeV Integral Flux >1000pfu	27 Nov 0820
28 Nov 0523	ALERT: Electron 2MeV Integral Flux >1000pfu	28 Nov 0500
28 Nov 1735	ALERT: Type II Radio Emission	28 Nov 1502
29 Nov 0700	ALERT: Electron 2MeV Integral Flux >1000pfu	29 Nov 0625
30 Nov 0527	WARNING: Geomagnetic K=4	30 Nov 0530 - 1600
30 Nov 0601	ALERT: Geomagnetic K=4	30 Nov 0555
30 Nov 0901	WARNING: Geomagnetic K=5	30 Nov 0901 - 1200
30 Nov 1001	ALERT: Geomagnetic K=5	30 Nov 1000
30 Nov 1013	WARNING: Geomagnetic K=6	30 Nov 1015 - 1315
30 Nov 1029	ALERT: Geomagnetic K=6	30 Nov 1028
30 Nov 1155	EXTENDED WARNING: Geomagnetic K=5	30 Nov 0901 - 1600
30 Nov 1533	ALERT: Electron 2MeV Integral Flux >1000pfu	30 Nov 1510
30 Nov 1615	ALERT: Geomagnetic K=4	30 Nov 1614
30 Nov 1616	WARNING: Geomagnetic K=4	30 Nov 1616 - 2359



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
06 Dec	100	10	3	20 Dec	85	15	4
07	105	35	6	21	80	20	5
08	105	20	5	22	85	15	4
09	100	8	3	23	90	15	4
10	100	8	3	24	90	5	2
11	105	5	2	25	90	5	2
12	110	5	2	26	90	5	2
13	110	8	3	27	90	5	2
14	105	5	2	28	90	5	2
15	100	5	2	29	90	5	2
16	100	5	2	30	90	5	2
17	100	5	2	31	95	5	2
18	95	5	2	01 Jan	100	5	2
19	90	5	2				



Energetic Events

Date	Time		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	Begin	Time		Optical X-ray Class.	Imp/ Brtns	Location Lat CMD	Rgn
		Max	End				
27 November	0034	0037	0043	B1.0			926
	0105	0109	0114	B1.7			926
	0423	0427	0429	B1.8			926
	0426	0430	0437		Sf	N08E70	927
	0451	0456	0500		Sf	N08E70	927
	0735	0737	0744	B2.1	Sf	N08E68	927
	1112	1130	1140	B2.4			927
	1212	1218	1233	B1.4			927
	1854	1858	1900	B1.5			927
	28 November	1142	1147	1150	B1.2		
1217		1220	1222	B1.0			926
1258		1307	1330	B1.6			927
1451		1510	1530	B4.0			926
1902		1907	1914	B1.5			
2151		2154	2200	B1.0			
2348		2353	2357	B1.8			927
29 November	0443	0450	0501	B1.6			927
	1025	1034	1051	B1.7			926
	1504	1518	1531	C1.0			927
	2337	2341	2348	B1.0			
30 November	0055	0103	0106	B1.8			927
	0135	0140	0147	B1.9			927
	0152	0233	0244	B4.2			927
01 December	0817	0824	0830	B1.1			
	2243	2243	2251	B5.0	Sf	S09W06	926
02 December	0022	0049	0053	C1.0	Sf	N09E04	926
	0704	0713	0727	C1.0	Sf	S09W10	926
	0959	1000	1003	B1.7	Sf	N08E01	927
	1438	1504	1528	B3.4			926
	1546	1607	1624	B5.9			926
	1727	1727	1747	B7.2	Sf	S11W16	926
	2202	2202	2222	C1.1	Sf	S09W18	926



Flare List-Continued

Date	Time			Optical	Imp / Brtns	Location Lat CMD	Rgn
	Begin	Max	End	X-ray Class.			
03 December	0227	0231	0235	B1.2			926
	0321	0324	0337	C1.2	Sf	S08W22	926
	0823	0827	0830	B1.3			926
	0838	0843	0856	B1.8			926
	0859	0901	0910	B3.6	Sf	S09W24	926
03 December	1300	1330	1355	B1.4			
	1627	1630	1633	B1.1			
	1658	1729	1759	B5.8			926
	2052	2058	2100	B1.4			926
	2133	2136	2139	B1.5			926

Region Summary

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

Region 926

25 Nov S08E73	140	0260	04	Hkx	002	A											
26 Nov S08E60	140	0160	04	Hkx	002	A											
27 Nov S08E47	140	0250	10	Cko	006	B											
28 Nov S10E35	139	0170	09	Cao	006	B											
29 Nov S10E19	141	0210	08	Cao	005	B											
30 Nov S10E09	138	0200	11	Eao	012	B											
01 Dec S09W04	138	0170	10	Dai	013	B								1			
02 Dec S09W18	140	0200	11	Eac	018	Bg	3							4			
03 Dec S10W25	133	0180	11	Eao	011	Bg	1							2			
							4	0	0	7	0	0	0	0	0		

Still on Disk.

Absolute heliographic longitude: 138

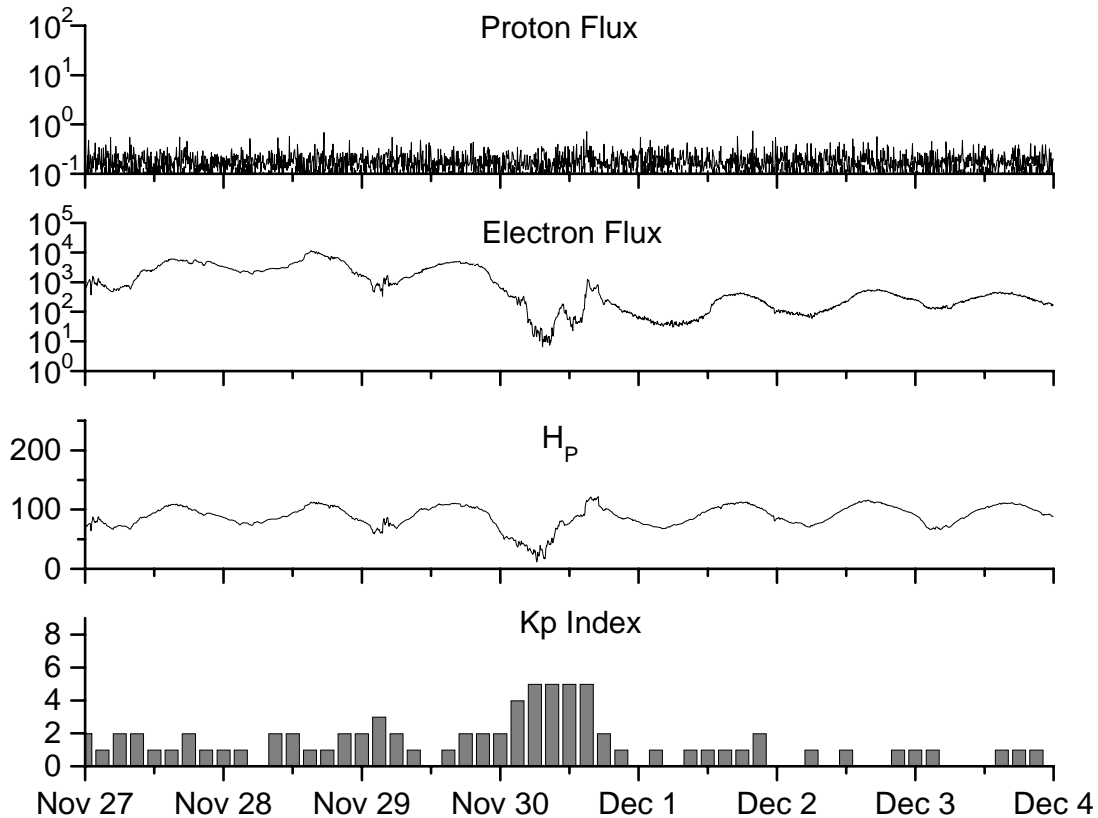


**Recent Solar Indices (preliminary)
of the observed monthly mean values**

Month	Sunspot Numbers			Radio Flux		Geomagnetic			
	Observed values SEC	Ratio RI	Ratio RI/SEC	Smooth values SEC	Smooth values RI	*Penticton 10.7 cm	Smooth Value	Planetary Ap	Smooth Value
2004									
December	34.7	17.9	0.52	58.8	35.3	94.6	101.3	11	14.8
2005									
January	52.0	31.3	0.60	57.3	34.7	102.4	100.3	22	14.7
February	45.4	29.1	0.64	56.4	34.0	97.3	98.5	11	14.6
March	41.0	24.8	0.60	55.8	33.6	90.0	97.2	12	15.3
April	41.5	24.4	0.59	52.6	31.7	85.9	95.5	12	15.7
May	65.4	42.6	0.65	48.3	29.0	99.5	93.2	20	14.8
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			80.1		8	
July	22.6	12.2	0.54			75.8		7	
August	22.8	12.9	0.57			79.0		9	
September	25.2	14.5	0.58			77.8		8	
October	15.7	10.4	0.66			74.3		7	
November	31.5	21.5	0.68			86.4		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 27 November 2006*

Protons plot contains the five-minute averaged integral proton flux (protons/cm²-sec -sr) as measured by GOES-11 (W135) for each of three energy thresholds: greater than 10, 50, and 100 MeV.

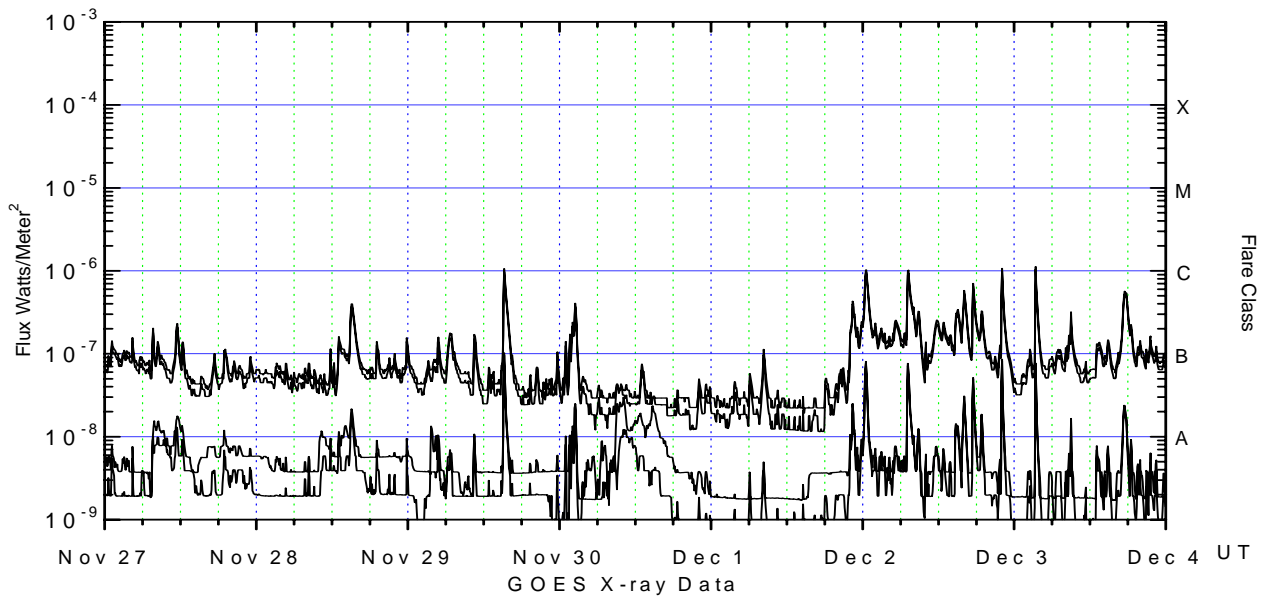
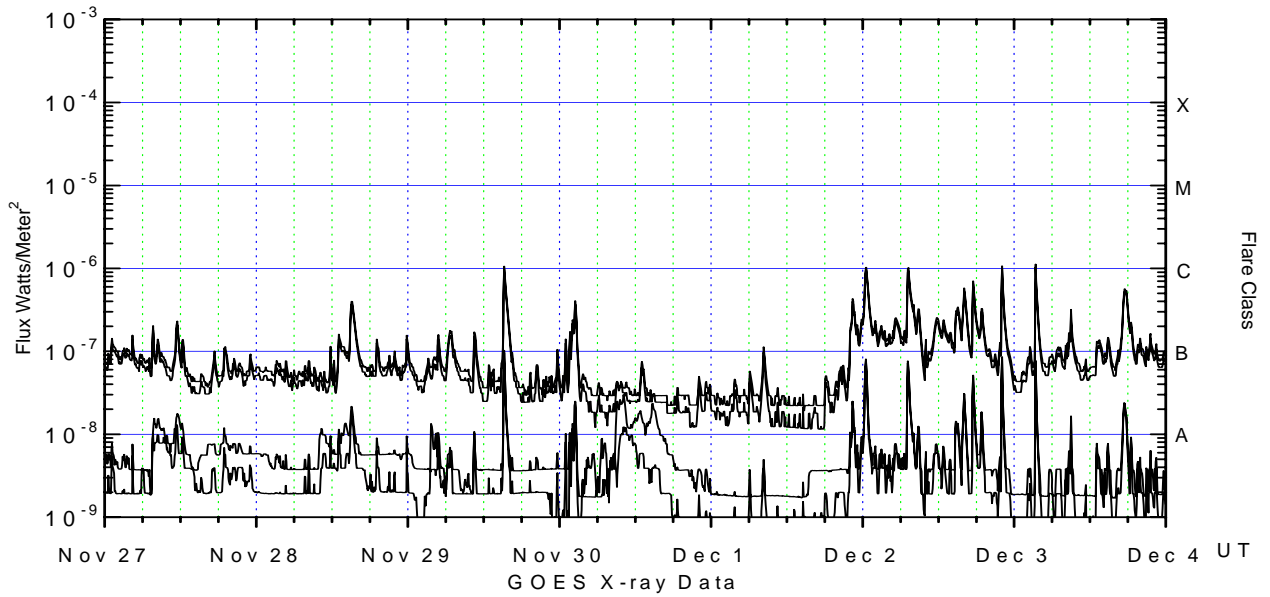
Electrons plot contains the five-minute averaged integral electron flux (electrons/cm²-sec -sr) with energies greater than 2 MeV at GOES-12 (W075).

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.

K_p 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 K_p 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 K_p 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

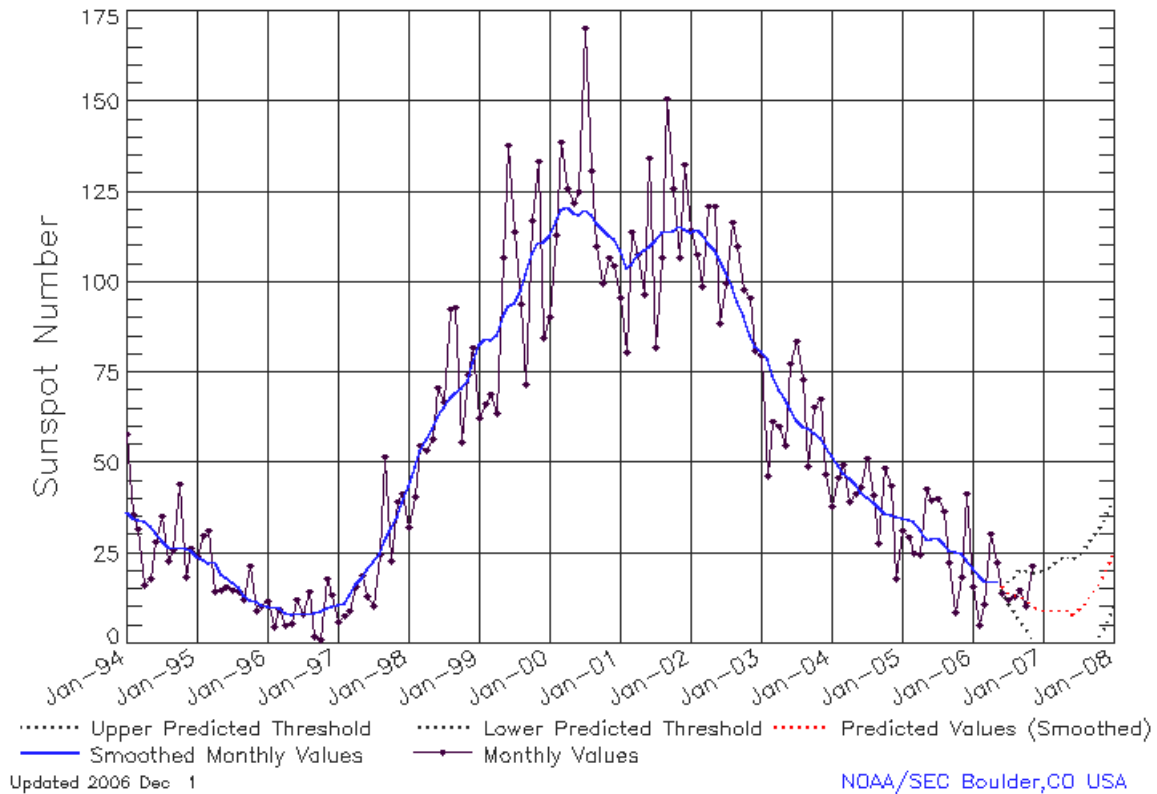
X-ray plot contains five-minute averaged x-ray flux (watts/m²) as measured by GOES 12 (W075) and GOES 11 (W135) in two wavelength bands, .05 - .4 and .1 - .8 nm. The letters A, B, C, M and X refer to x-ray event levels for the .1 - .8 nm band.

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



ISES Solar Cycle Sunspot Number Progression

Data Through 30 Nov 06



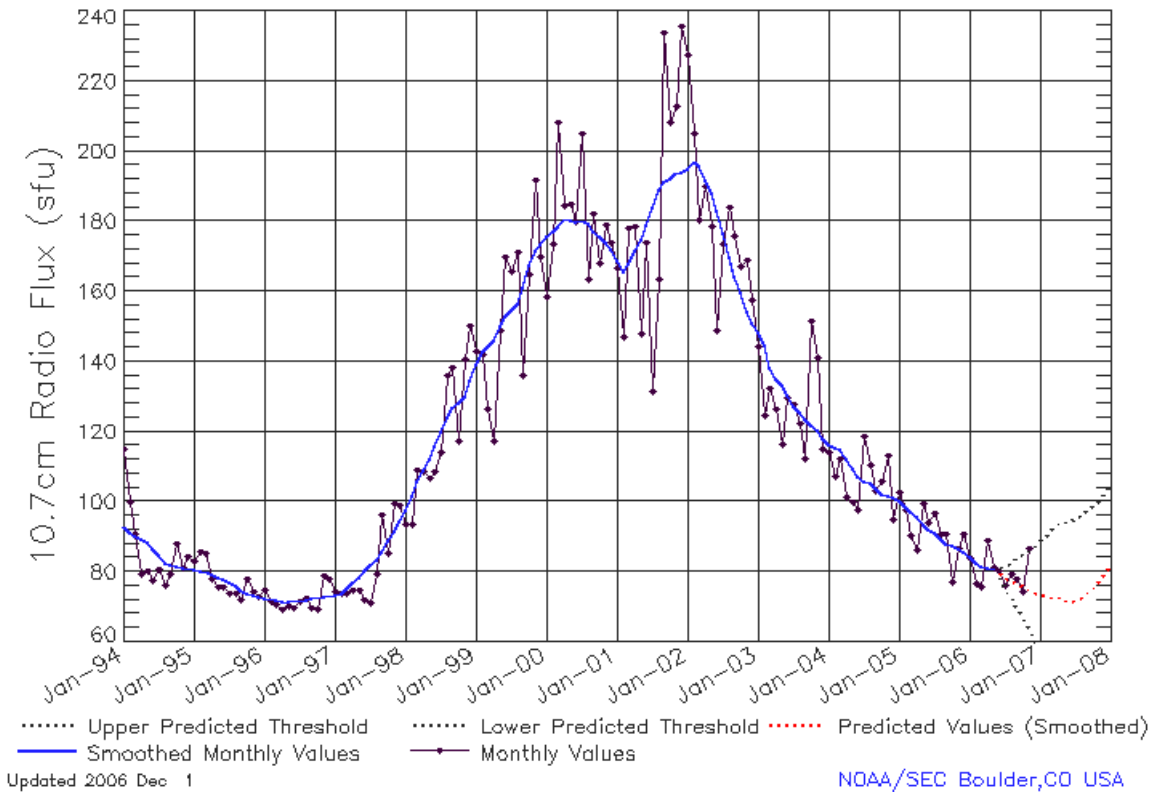
SEC Prediction of Smoothed Sunspot Number

	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	15	13	12	12	11	9	9
	(***)	(***)	(***)	(***)	(***)	(1)	(3)	(5)	(7)	(8)	(9)	(10)
2007	8	8	8	8	7	8	10	11	13	16	18	21
	(11)	(12)	(13)	(14)	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)



ISES Solar Cycle F10.7cm Radio Flux Progression

Data Through 30 Nov 06



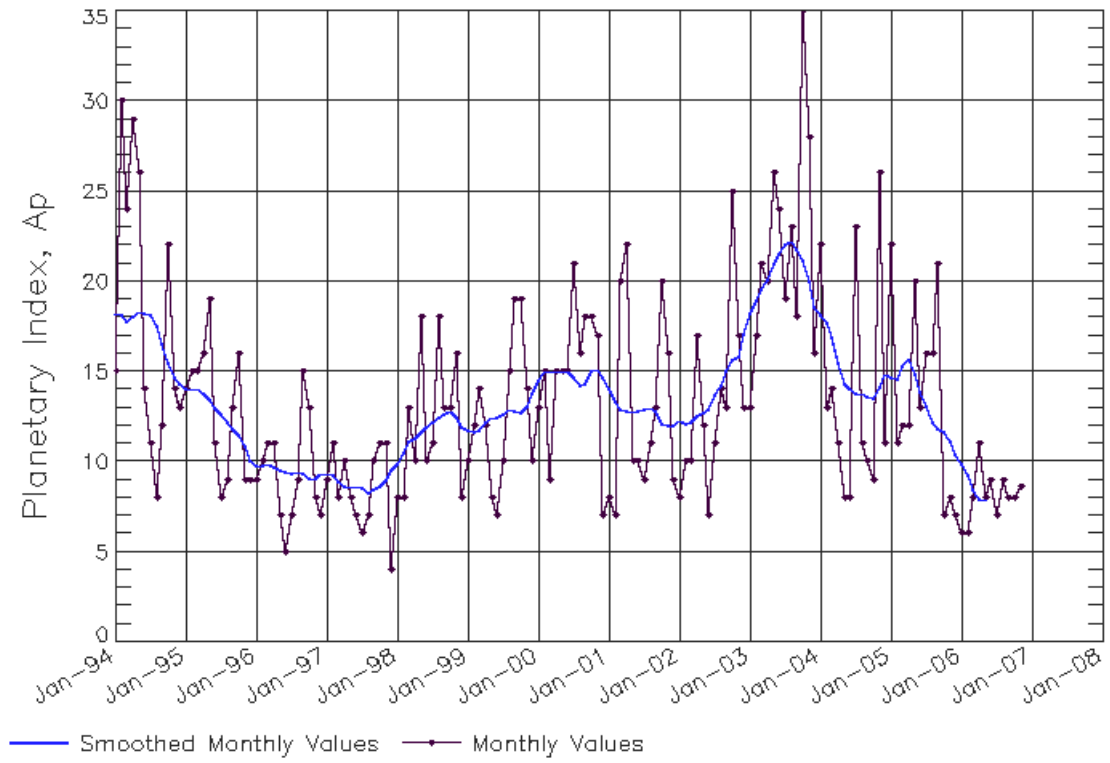
SEC Prediction of Smoothed F10.7cm Radio Flux

	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	80	79	77	76	76	75	74	73
	(***)	(***)	(***)	(***)	(***)	(1)	(3)	(5)	(7)	(9)	(13)	(13)
2007	72	72	71	71	71	71	72	73	74	76	77	79
	(14)	(14)	(13)	(12)	(11)	(10)	(10)	(10)	(10)	(10)	(10)	(11)



ISES Solar Cycle Ap Progression

Data Through 30 Nov 06



Updated 2006 Dec 1

[NOAA/SEC Boulder, CO USA](#)

