

**Space Weather Highlights
30 November - 06 December 1998**

Solar activity was low throughout the period. Region 8395 (N19, L = 182, class/area Fao/480 on 28 November), producer of last week's major flare, slowly decayed and produced isolated C-class subflares. Region 8402 (N17, L = 117, class/area Eao/390 on 01 December) showed minor growth on 04 December and produced a few C-class subflares, then gradually simplified during the rest of the period. Spots were visible near the southeast limb on 06 December and signaled the return of old Region 8384, which produced two X-class flares during its previous rotation. By issue time the spots had been numbered as Region 8406 (S27, L = 031, class/area Cso/100 on 07 December), but did not appear impressive.

Solar wind data were available from the Advanced Composition Explorer (ACE) spacecraft during most of the period. Significant changes were detected during 30 November - 01 December following the passage of a weak interplanetary shock. Velocities increased from 340 - 470 km/sec early on 30 November while densities became enhanced with a peak of 40 p/cc recorded on 01 December. IMF Bz became more variable as well and ranged from plus to minus 12 nT (GSM). No significant wind changes were observed during the rest of the period.

No significant proton flux enhancements were detected at geosynchronous altitude.

The greater than 2 MeV electron flux at geosynchronous altitude was at normal to moderate levels through 04 December, then increased to moderate to high levels for the rest of the period.

The geomagnetic field became mildly disturbed during 30 November - 01 December beginning with a weak sudden impulse (12 nT) at 30/0512UT followed by brief, intermittent active to minor storm intervals during an otherwise quiet to unsettled period. Quiet to unsettled levels prevailed during the rest of the week, but with localized active to major storm periods detected at high latitudes.

**Space Weather Forecast
09 December 1998 - 04 January 1999**

Solar activity is expected to be low during most of the period with C-class flares expected daily. There is also a chance for isolated M-class flares sometime during the period.

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 moderate levels during most of the period.

The geomagnetic field is expected to be at quiet to unsettled levels, barring any Earth-directed CMEs.



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
30 November	163	186	930	B8.0	13	0	0	10	0	0	0	0
01 December	163	153	1340	B7.5	8	0	0	8	1	0	0	0
02 December	152	144	950	B6.0	3	0	0	7	0	0	0	0
03 December	153	136	830	B6.5	2	0	0	5	0	0	0	0
04 December	148	109	890	B5.4	4	0	0	2	0	0	0	0
05 December	142	91	960	B4.7	3	0	0	2	0	0	0	0
06 December	142	106	1040	B5.0	6	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
30 November	8.8E+5	1.5E+4	2.7E+3		3.5E+6	
01 December	4.7E+5	1.3E+4	2.6E+3		3.1E+6	
02 December	2.8E+5	1.5E+4	3.3E+3		3.9E+6	
03 December	2.4E+5	1.5E+4	3.1E+3		5.4E+6	
04 December	1.7E+5	1.4E+4	3.3E+3		4.9E+6	
05 December	4.6E+5	1.3E+4	3.2E+3		5.8E+7	
06 December	2.0E+5	1.5E+4	3.4E+3		1.0E+8	

Daily Geomagnetic Data

Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
	30 November	12	0-3-3-2-1-3-4-3	25	0-2-5-5-3-3-5-3	13
01 December	10	4-2-2-3-2-2-1-1	17	2-2-1-5-5-3-2-1	13	3-2-1-3-3-2-2-4
02 December	2	1-0-1-1-1-0-1-0	2	0-0-1-2-0-0-1-1	4	1-1-1-1-0-1-1-1
03 December	7	1-0-2-1-2-4-1-1	7	0-1-2-2-3-3-2-1	7	1-1-3-1-2-3-2-1
04 December	6	1-2-2-2-2-2-2-1	17	0-1-1-4-5-4-4-1	7	1-2-2-2-3-3-2-2
05 December	9	1-2-3-2-3-2-3-1	39	2-3-6-6-6-4-3-2	12	2-3-3-3-4-3-3-1
06 December	3	0-1-1-2-2-1-1-0	23	1-2-2-6-5-4-2-1	7	1-2-2-3-3-2-2-2

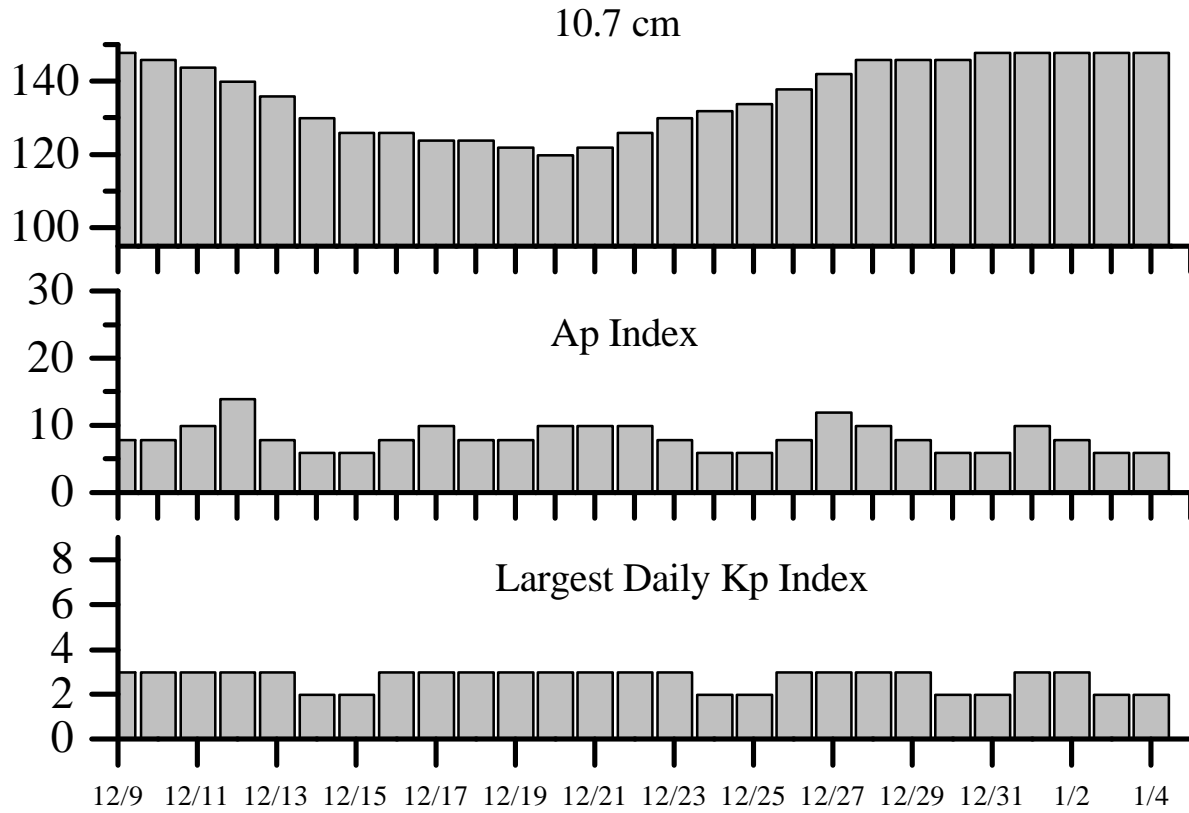


Alerts and Warnings Issued

Date and Time of Issue (UT)	Type of Alert or Warning	Date and Time of Event (UT)
30 Nov 0528	Sudden Impulse observed 12 nT	30 Nov 0512
30 Nov 2110	K= 4 Observed	30 Nov 18 - 21
01 Dec 1825	10cm Radio Burst 200 F.U.	01 Dec 1806
04 Dec 00	245 MHz Burst	03 Dec
05 Dec 1507	K= 4 Observed	05 Dec 12 - 15
05 Dec 1546	>2MeV Electron Event ≥ 1000 pfu	05 Dec 1515
06 Dec 0037	11-245 MHz Bursts	05 Dec
06 Dec 0037	245 MHz Radio Noise Storm	05 Dec
06 Dec 1200	>2MeV Electron Event ≥ 1000 pfu Continued	05 Dec 1515
06 Dec 1315	Stratwarm Alert Exists	05 Dec



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
02 Dec	148	8	3	16 Dec	130	8	3
03	146	8	3	17	132	6	2
04	144	10	3	18	134	6	2
05	140	14	3	19	138	8	3
06	136	8	3	20	142	12	3
07	130	6	2	21	146	10	3
08	126	6	2	22	146	8	3
09	126	8	3	23	146	6	2
10	124	10	3	24	148	6	2
11	124	8	3	25	148	10	3
12	122	8	3	26	148	8	3
13	120	10	3	27	148	6	2
14	122	10	3	28	148	6	2
15	126	10	3				



Energetic Events

Date	Time (UT)		X-ray		Optical Information			Peak		Sweep Freq	
	Begin	Max	Class	Integ Flux	Imp Brtns	Location Lat CMD	Rgn #	Radio Flux		Intensity	
								245	2695	II	IV

No Events Observed

Flare List

Date	Time			X-ray Class.	Imp / Brtns	Optical Location		Rgn #
	Begin	Max	End			Lat	CMD	
30 November	0026	0027	0035		SF	N30W84		8396
	0042	0053	0058	C2.5	SF	N22E30		8395
	0556	0558	0602		SF	N22E27		8395
	0557	0558	0602	C2.5	SF	N26W83		8396
	0645	0656	0709	C1.7	SF	S22W31		8392
	0649	0651	0715		SF	N17E32		8395
	0717	0717	0729		SF	N24E24		8395
	0747	0756	0759	C1.3				
	0936	0938	0941	C1.8	SF	S22W33		8392
	1012	1016	1020	C3.7				
	1114	1123	1156	C3.6				
	1237	1242	1250	C1.7				
	1450	1454	1456	C2.0				
	1526	1536	1553	C4.9				
	1854	1900	1906	C1.6				
	2005	2013	2024	C2.1				
	2114	2115	2118		SF	N17E72		8397
	2253	2300	2314	C3.5	SF	N16E70		8397
	01 December	0409	0411	0416		SF	S23W44	
0526		0529	0532	C1.0	SF	N22E14		8395
0649		0649	0654	C1.2	SF	N22E13		8395
B1120		U1120	A1132	C2.1	SF	N22E09		8395
1315		1321	1331	C1.1				
1622		1623	1632	C1.3	SF	N15E58		8397
1632		1633	1637		SF	N16E57		8397
1721		1727	1742	C1.2				
1807		1809	1854	C5.0	1F	N21W01		8395
1810		1812	1821		SF	N17E67		8402
1822	1824	1850		SF	N18E68		8402	
2043	2050	2100	C2.0					



Flare List-continued

Date	Time			X-ray Class.	Optical		Rgn #
	Begin	Max	End		Imp / Brtns	Location Lat CMD	
02 December	0110	0114	0119	C1.2	SF	N23W05	8395
	0722	0728	0752		SF	N21W05	8395
	0755	0756	0805		SF	N21W10	8395
	0906	0910	0918	C1.3	SF	N17E59	8402
	1227	1236	1305	B9.6			
	B1521	U1521	A1528		SF	N16W14	8395
	1624	1625	1638		SF	N19E53	8402
02 December	1702	1704	1724		SF	N16W14	8395
	1844	1849	1851	C1.1			
03 December	0439	0440	0443	C1.0	SF	N14E34	8397
	1204	1205	1237	C2.0	SF	N19W25	8395
	2019	2019	2025		SF	N12W15	8401
	2115	2119	2125		SF	N14E43	8402
	2211	2219	2235		SF	N20E38	8402
04 December	0111	0116	0120	C1.3			
	0249	0253	0300	C1.0			
	1105	1106	1115	C1.3	SF	N15E25	8402
	1223	1227	1230	B8.5			
	B1714	U1715	1737	C1.8	SF	N27W24	8399
05 December	0433	0437	0439	C1.0			
	1801	1803	1806	C1.5	SF	S19W78	8393
	1819	1820	1832		SF	N29W41	8399
	2317	2324	2335	C1.2			
06 December	0004	0008	0013	C1.2			
	0255	0300	0306	B9.3			
	0333	0339	0345	C1.6			
	0738	0750	0804	C1.6			
	1442	1442	1446	C1.0	SF	N19E02	8402
	1515	1516	1518		SF	N22W60	8398
	1601	1610	1631	C1.2	SF	S16E68	8397
	1904	1906	1909		SF	N14E01	8402
	2343	2352	0001	C1.6			



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 8392</i>																							
21 Nov	S22E74	239	0090	03	HSX	002	A																
22 Nov	S23E59	241	0030	05	CSO	002	B																
23 Nov	S22E48	238	0040	06	CAO	004	B														1		
24 Nov	S25E34	239	0030	05	CSO	003	B																
25 Nov	S23E21	239	0020	06	CRO	005	B	1					3										
26 Nov	S23E08	239	0020	07	BXO	009	B	3					3										
27 Nov	S23W05	239	0010	05	CRO	005	B		1				2							1			
28 Nov	S22W20	240	0020	03	BXO	002	B																
29 Nov	S22W33	240																					
30 Nov	S22W46	240						2					2										
01 Dec	S22W59	240												1									
02 Dec	S22W72	240																					
03 Dec	S22W85	240																					
								6	1	0		11	1	1	0	0							

Crossed West Limb.

Absolute heliographic longitude: 239

Region 8393

23 Nov	S18E71	215	0140	05	DSO	002	B														
24 Nov	S19E68	205	0320	18	FSI	012	B	1					2								
25 Nov	S19E50	210	0430	17	FHO	028	BG	1					5								
26 Nov	S19E38	209	0420	16	FSO	031	BG	1					2								
27 Nov	S19E24	210	0310	17	FAI	028	BG	1					1								
28 Nov	S18E12	208	0290	16	FSO	026	BG														
29 Nov	S18W03	210	0280	17	FAO	031	B														
30 Nov	S18W16	210	0150	17	CSO	018	B														
01 Dec	S17W31	212	0150	14	CSO	013	B														
02 Dec	S16W45	213	0100	13	CAO	005	B														
03 Dec	S15W64	219	0090	02	HSX	002	A														
04 Dec	S15W78	219	0070	02	HAX	001	A														
05 Dec	S16W97	225	0010	01	HSX	001	A	1					1								
								5	0	0		11	0	0	0	0	0				

Crossed West Limb.

Absolute heliographic longitude: 210



Region Summary-continued

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

Region 8395

24 Nov	N17E77	196	0040	03	HSX	001	A	1					1				
25 Nov	N17E68	192	0330	18	FAO	009	B	2					3				
26 Nov	N17E56	191	0360	25	FKO	019	BG	2					3	1			
27 Nov	N19E44	190	0470	29	FAI	018	BG	2					3				
28 Nov	N20E33	187	0480	30	FAO	026	BG			1	4					1	
29 Nov	N22E21	186	0440	37	FAO	044	BG	1					4				
30 Nov	N22E11	183	0350	31	FAI	055	BG	1					4				
01 Dec	N20W01	182	0340	17	FAI	029	BG	4					3	1			
02 Dec	N20W17	185	0200	15	EAO	022	BG	1					5				
03 Dec	N18W27	182	0200	19	FAI	021	BG	1					1				
04 Dec	N20W40	181	0220	17	FSO	011	B										
05 Dec	N19W49	177	0140	02	HAX	003	A										
06 Dec	N20W59	174	0140	04	HAX	004	B										
										15	0	1	30	3	0	1	0

Still on Disk.

Absolute heliographic longitude: 182

Region 8396

26 Nov	N28W45	292	0030	04	CRO	006	B						1				
27 Nov	N26W59	293	0080	06	DAO	007	B										
28 Nov	N26W72	292	0080	08	CSO	005	B						1				
29 Nov	N27W84	291	0140	07	DAO	007	B						3				
30 Nov	N28W95	289	0010	06	BXO	003	B	1					2				
										1	0	0	7	0	0	0	0

Crossed West Limb.

Absolute heliographic longitude: 292

Region 8397

29 Nov	N15E70	137	0130	09	DSO	004	B						2				
30 Nov	N15E64	130	0300	20	FKO	009	B	1					2				
01 Dec	N14E46	135	0310	12	EAO	008	B	1					2				
02 Dec	N15E32	136	0240	12	EAO	010	B										
03 Dec	N14E19	135	0200	11	EAO	007	B	1					1				
04 Dec	N14E06	135	0260	11	CHO	008	B										
05 Dec	N15W08	136	0210	03	HAX	001	A										
06 Dec	N16W24	139	0210	04	HAX	003	A	1					1				
										4	0	0	8	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 135



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 8398

30 Nov	N18W05	199	0060	07	CAO	012	B												
01 Dec	N18W15	196	0070	07	CAO	008	B												
02 Dec	N18W28	196	0020	08	CAO	010	B												
03 Dec	N18W40	195	0020	04	BXO	007	B												
04 Dec	N18W52	193	0010	04	BXO	004	B												
05 Dec	N17W60	188	0160	04	CSO	002	B												
06 Dec	N18W72	187	0200	03	HSX	001	A						1						
													0	0	0	1	0	0	0

Still on Disk.

Absolute heliographic longitude: 199

Region 8399

30 Nov	N30E23	171	0040	08	BXO	004	B												
01 Dec	N24E09	172	0060	05	BXO	005	B												
02 Dec	N26W04	172	0010	06	BXO	003	B												
03 Dec	N29W22	177	0000	01	AXX	001	A												
04 Dec	N29W35	177						1					1						
05 Dec	N29W48	177											1						
06 Dec	N29W61	177																	
													1	0	0	2	0	0	0

Still on Disk.

Absolute heliographic longitude: 172

Region 8400

30 Nov	S18E08	186	0010	02	BXO	002	B												
01 Dec	S18W07	188	0010	01	AXX	001	A												
02 Dec	S18W21	189	0000	00	AXX	001	A												
03 Dec	S18W34	189																	
04 Dec	S18W47	189																	
05 Dec	S18W60	189																	
06 Dec	S18W73	189																	
													0	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 188



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 8401

30 Nov	N12E27	167	0010	01	BXO	003	B											
01 Dec	N12E16	165	0010	05	BXO	003	B											
02 Dec	N12E01	167	0010	02	BXO	004	B											
03 Dec	N12W13	168	0030	04	BXO	005	B				1							
04 Dec	N10W26	167	0030	05	CRO	004	B											
05 Dec	N11W40	168	0020	06	BXO	003	B											
06 Dec	N11W53	168																
											0	0	0	1	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 167

Region 8402

01 Dec	N17E64	117	0390	15	EAO	006	B	1			2							
02 Dec	N18E53	115	0370	21	FAO	009	B	1			2							
03 Dec	N18E39	115	0270	16	FAO	012	B				2							
04 Dec	N16E26	115	0270	16	FKO	010	B	1			1							
05 Dec	N16E10	118	0360	11	EKO	010	B											
06 Dec	N16W02	117	0250	09	DKO	012	B	1			2							
											4	0	0	9	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 117

Region 8403

03 Dec	N20E50	104	0020	02	HSX	001	A											
04 Dec	N19E38	103	0030	01	HSX	001	A											
05 Dec	N19E26	102	0060	02	HSX	001	A											
06 Dec	N19E15	100	0050	05	CSO	004	B											
											0	0	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 100

Region 8404

06 Dec	S22E02	113	0080	07	DSO	009	B											
											0	0	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 113

Region 8405

06 Dec	S16E64	051	0110	04	CSO	003	B											
											0	0	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 051



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

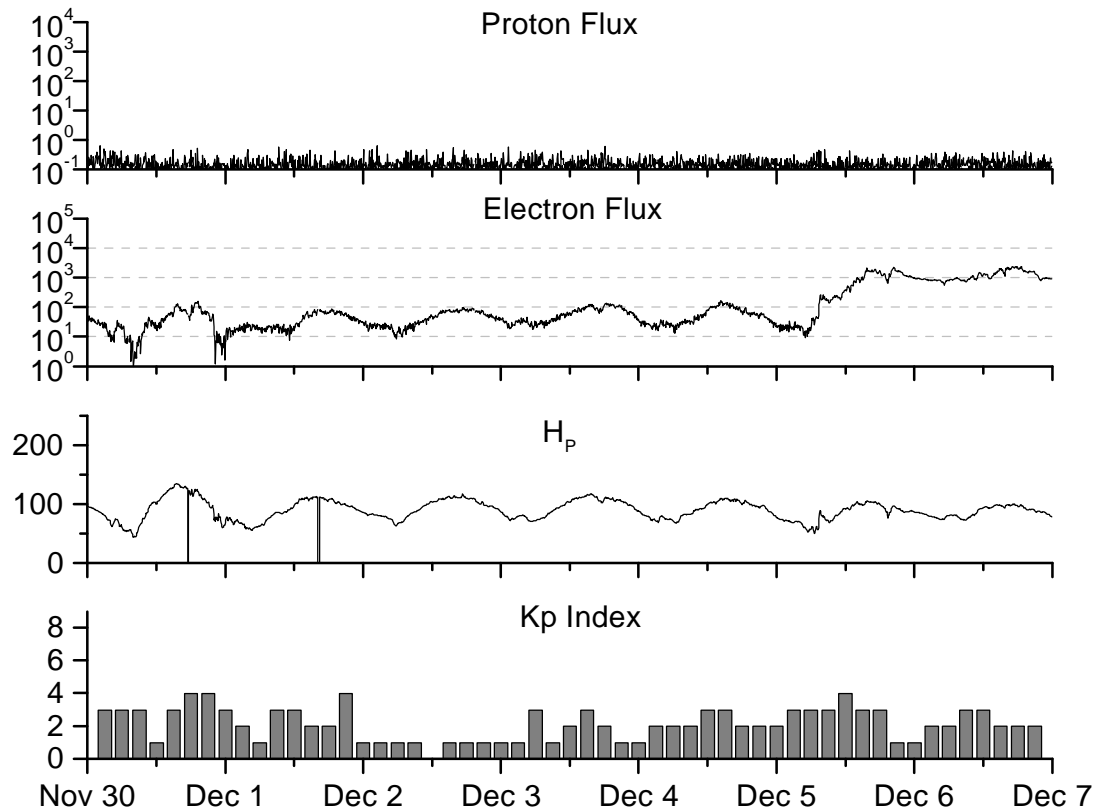
Month	Sunspot Numbers			Radio Flux		Geomagnetic			
	Observed values SWO	Ratio RI	Ratio RI/SWO	Smooth values SWO	Smooth values RI	**Penticton 10.7 cm	Smooth Value	Planetary Ap	Smooth Value
1996									
December	21.1	13.3	0.63	16.2	10.4	77.8	73.3	07	09.3
1997									
January	09.0	05.7	0.63	16.5	10.5	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*	
November	99.5	73.6*	0.74*			140.2*		16*	

*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 30 November 1998

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

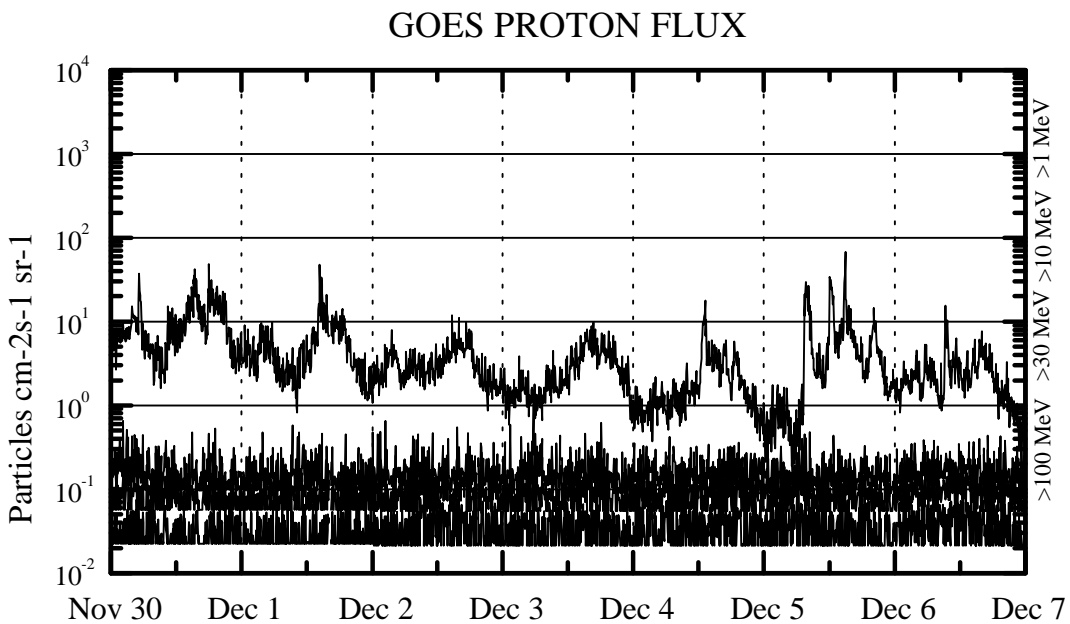
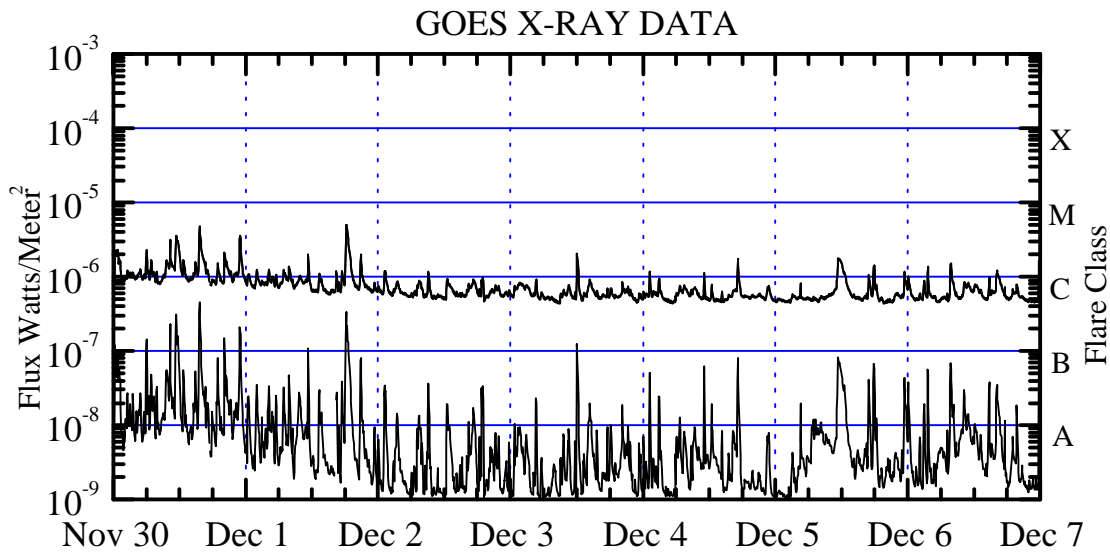
Electrons plot contains the five-minute averaged integral electron flux (electrons/ cm^2 -sec-sr) with energies greater than 2 MeV at GOES-8.

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.

