

Space Weather Highlights
03 - 09 Jan 2000

Solar activity was low throughout the period. Isolated C-class subflares occurred each day. The disk was populated by a number of small, simply-structured regions. One event of note was a long-duration C6 X-ray burst at 08/1645UT associated with a large eruptive prominence on the southeast limb.

Real-time solar wind data were available from the NASA Advanced Composition Explorer (ACE) spacecraft for most of the period. A coronal hole signature was evident during 03 - 06 January with wind speeds as high as 680 km/sec, low particle densities (01 to 05 p/cc), and frequent north/south fluctuations of IMF Bz in the plus 06 to minus 08 nT (GSM) range. Phi data indicated the coronal hole was of positive polarity. Solar wind flow characteristics were unremarkable during the rest of the period.

A slight enhancement in the greater than 10 MeV proton flux at geosynchronous orbit began near midday on 09 January. The enhancement may have been associated with the eruptive prominence observed on 08 January.

The greater than 2 MeV electron flux at geosynchronous orbit was at moderate to high levels throughout the period.

The geomagnetic field was mildly disturbed during 03 - 06 January with unsettled to active levels at middle latitudes and unsettled to major storm levels at high latitudes. The disturbance was due to recurrent coronal hole effects. Geomagnetic field activity declined to mostly quiet levels for the remainder of the period.

Space Weather Outlook
12 January - 07 February 2000

Solar activity is expected to range from low to moderate levels during most of the period. Occasional to frequent C-class flares and isolated M-class flares are likely throughout the period. In addition, there will be an increased chance for isolated major flare activity through 26 January with the expected return of old Region 8806 (N19, L = 115).

There will be an increased chance for a proton event at geosynchronous orbit through 26 January.

The greater than 2 MeV electron flux at geosynchronous orbit is expected to be at normal to moderate levels through 27 January. Fluxes are expected to increase to moderate to high levels during 28 - 31 January, then return to normal to moderate levels for the rest of the period.

Geomagnetic field activity is expected to be at quiet to unsettled levels through 26 January, barring an Earth-directed CME. Active to minor storm levels are expected during January 27 - February 02 due to recurrent coronal hole effects. Quiet to unsettled levels are expected for the balance of the period.



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
03 January	133	77	480	B3.6	2	0	0	2	0	0	0	0
04 January	135	102	460	B2.8	2	0	0	2	0	0	0	0
05 January	137	100	410	B3.2	3	0	0	0	0	0	0	0
06 January	145	145	530	B5.4	2	0	0	1	1	0	0	0
07 January	150	146	500	B4.1	8	0	0	9	0	0	0	0
08 January	155	106	460	B6.6	4	0	0	7	0	0	0	0
09 January	161	119	490	B6.3	4	0	0	5	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
03 January	9.0E+5	1.4E+4	2.9E+3		2.7E+8	
04 January	4.4E+5	1.2E+4	2.7E+3		2.3E+8	
05 January	3.6E+5	1.2E+4	2.8E+3		1.9E+8	
06 January	1.0E+6	1.2E+4	2.7E+3		1.4E+8	
07 January	1.1E+5	1.2E+4	2.6E+3		4.9E+7	
08 January	1.7E+5	1.3E+4	2.7E+3		7.0E+7	
09 January	6.2E+5	2.7E+4	2.9E+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
	03 January	10	3-3-3-2-2-1-3-1	19	3-2-4-5-4-3-2-2	13
04 January	9	2-2-2-3-2-2-2-3	28	0-1-3-6-6-4-2-3	12	1-2-3-3-4-3-2-3
05 January	13	3-3-3-3-2-2-3-3	29	2-3-3-5-4-6-4-3	15	3-3-3-3-3-3-3-4
06 January	15	2-3-1-4-4-4-2-1	39	2-2-1-5-7-6-3-3	17	2-3-1-3-5-4-3-3
07 January	7	3-2-1-2-1-2-2-2	12	2-3-1-4-3-3-2-2	8	3-2-1-3-2-2-2-2
08 January	3	2-0-1-2-1-2-0-0	6	1-0-0-3-3-3-0-0	6	1-1-2-3-2-2-2-1
09 January	1	2-0-0-0-0-1-0-0	0	0-0-0-1-0-0-0-0	3	1-0-0-0-1-1-1-2

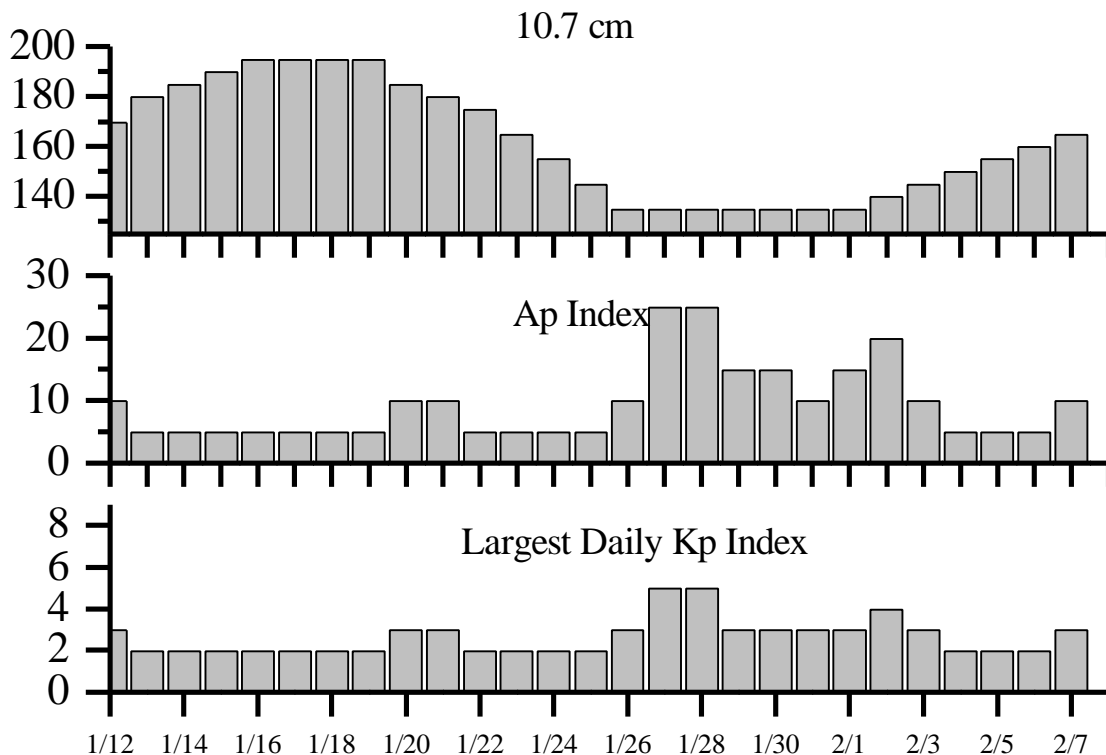


Alerts and Warnings Issued

<u>Date & Time of Issue (UT)</u>	<u>Type of Alert or Warning</u>	<u>Date & Time of Event (UT)</u>
03 Jan 0017	1 – 245 MHz Radio Burst	02 Jan
03 Jan 0044	>2MeV Electron Event @ ≥ 1000 pfu CONTINUED	01 Jan 0305
04 Jan 0037	>2MeV Electron Event @ ≥ 1000 pfu CONTINUED	01 Jan 0305
04 Jan 1202	K= 4 Observed	04 Jan 09 - 12
05 Jan 0015	>2MeV Electron Event @ ≥ 1000 pfu CONTINUED	01 Jan 0305
06 Jan 0020	1 – 245 MHz Radio Burst	05 Jan
06 Jan 0035	>2MeV Electron Event @ ≥ 1000 pfu CONTINUED	01 Jan 0305
06 Jan 1450	K= 5 Observed	06 Jan 12 - 15
06 Jan 1808	K= 4 Observed	06 Jan 15 - 18
07 Jan 0036	>2MeV Electron Event @ ≥ 1000 pfu CONTINUED	01 Jan 0305
08 Jan 0343	>2MeV Electron Event @ ≥ 1000 pfu CONTINUED	01 Jan 0305
09 Jan 0100	>2MeV Electron Event @ ≥ 1000 pfu CONTINUED	01 Jan 0305



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
12 Jan	170	10	3	26 Jan	135	10	3
13	180	5	2	27	135	25	5
14	185	5	2	28	135	25	5
15	190	5	2	29	135	15	3
16	195	5	2	30	135	15	3
17	195	5	2	31	135	10	3
18	195	5	2	01 Feb	135	15	3
19	195	5	2	02	140	20	4
20	185	10	3	03	145	10	3
21	180	10	3	04	150	5	2
22	175	5	2	05	155	5	2
23	165	5	2	06	160	5	2
24	155	5	2	07	165	10	3
25	145	5	2				



Energetic Events

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

No Events Observed

Flare List

Date	Time			X-ray Class.	Imp / Brtns	Optical		Rgn #
	Begin	Max	End			Location	Lat CMD	
03 January	0416	0419	0456	C1.3	SF	N08E34		8815
	0557	0559	0606		SF			N27W52
	1910	1916	1922		C1.2			
	2308	2313	2320		B6.2			
04 January	0310	0356	0455	B9.2				
	0618	0638	0645	B7.2				
	0959	1004	1012	B4.8				
	1112	U1112	1121	C2.0	SF	N38W44		8810
05 January	1428	U1428	1448	C1.1	SF	N35W46		8810
	0117	0136	0146	C2.4				
	0407	0415	0420	C1.0				
06 January	1958	2200	2312	C1.7				
	0648	0650	0721	C5.8	1N	N24W35		8816
	1112	1119	1128	B9.3				
	1559	1602	1604	B6.0				
	1850	1854	1903	B9.6				
07 January	2215	2223	2232	C1.6				
	2250	2251	2253		SF	N20W43		8816
	0928	0932	0943	C1.1	SF	N09W31		8819
	1122	1128	1133	C3.2				
	B1150	U1150	A1206		SF	N09W32		8819
	1259	1303	1323	C1.2				
	1354	1355	1410	C1.1	SF	N09W33		8819
	1513	1516	1534	C1.1	SF	N09W33		8819
	1523	1526	1528	B9.9				
	1551	1552	1555		SF	N09W33		8819
	1558	1559	1604		SF	N10W35		8819
	1653	1653	1702		SF	N09W34		8819
	1738	1739	1748	C5.6	SF	N09W35		8819
1859	1904	1908	C2.9	SF	N09W38		8819	
2221	2227	2232	C2.3					



Flare List-continued

Date	Time			X-ray Class.	Imp / Brtns	Optical	Rgn #
	Begin	Max	End			Location Lat CMD	
08 January	0406	0410	0425	C2.0	SF	N08W38	8819
	0832	0832	0835		SF	S10E81	
	1022	1022	1026	C1.2	SF	S11E77	
	1647	1649	1654	C6.0	SF	S11E75	
	1654	1655	1703		SF	N09W47	
	2151	2152	2155	SF	S11E71		
09 January	2225	2231	2252	C1.1	SF	N27E53	8821
	0818	0826	0833	C3.2	SF	N10W55	8819
	B0820	U0828	0838		SF	N12W47	8815
	1858	1903	1907	C1.5			
	2028	2036	2056		SF	S11E71	8824
	2035	2038	2052	C2.4	SF	N29E46	8821
	2156	2157	2208		SF	S13E72	
	2336	2340	2345	C1.4			

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</i>	<i>8809</i>														
24 Dec	N21E67	032	0010	06	BXO	003	B										
25 Dec	N21E54	032	0030	06	CSO	006	B										
26 Dec	N21E41	032	0030	07	BXO	007	B										
27 Dec	N22E27	033	0040	07	DAO	007	B										
28 Dec	N22E15	032	0040	06	DAO	004	B										
29 Dec	N22E02	031	0030	08	CRO	006	B										
30 Dec	N24W08	028	0000	06	BXO	003	B										
31 Dec	N24W20	027	0000	06	BXO	002	B										
01 Jan	N24W33	027															
02 Jan	N24W46	027															
03 Jan	N24W59	027															
04 Jan	N24W72	027															
05 Jan	N24W85	027															

Crossed West Limb.

Absolute heliographic longitude: 031

0 0 0 1 0 0 0 0



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

Region 8810

24 Dec	N35E75	024	0030	01	HSX	001	A													
25 Dec	N36E64	022	0150	13	ESO	005	B												2	
26 Dec	N36E54	019	0350	15	EKO	008	B	1											2	
27 Dec	N38E44	016	0410	17	FKO	011	B													
28 Dec	N38E32	015	0400	17	FKO	011	B												2	
29 Dec	N37E19	014	0350	16	FKO	017	B													
30 Dec	N37E06	014	0320	16	FAO	016	B	1											1	
31 Dec	N38W05	012	0330	16	FAO	016	B													
01 Jan	N38W18	012	0270	16	FAO	011	B													
02 Jan	N37W29	011	0180	15	EAO	007	B													
03 Jan	N38W42	011	0160	15	ESO	004	B													
04 Jan	N38W51	007	0170	16	FSO	003	B	2											2	
05 Jan	N38W65	007	0140	15	ESO	003	B													
06 Jan	N38W78	007	0120	16	FSO	003	B													
07 Jan	N38W83	359	0040	02	HAX	002	A													
								4	0	0	9	0	0	0	0	0				

Crossed West Limb.

Absolute heliographic longitude: 012

Region 8812

29 Dec	S28W21	054	0010	05	BXO	003	B												1	
30 Dec	S28W35	055	0000	00	AXX	001	A													
31 Dec	S27W47	054	0000	00	AXX	001	A													
01 Jan	S27W60	054																		
02 Jan	S27W73	054																		
03 Jan	S27W86	054																		
								0	0	0	1	0	0	0	0	0				

Crossed West Limb.

Absolute heliographic longitude: 054



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 8813

29 Dec	S15E64	329	0040	06	DRO	005	B												
30 Dec	S17E50	330	0040	08	DRO	004	B												
31 Dec	S17E38	329	0040	08	DRO	008	B												
01 Jan	S17E21	333	0050	07	DSO	006	B												
02 Jan	S16E08	334	0060	08	DAO	007	B	1				2							
03 Jan	S16W07	336	0130	08	DAO	014	B												
04 Jan	S16W20	335	0140	08	DSO	012	B												
05 Jan	S15W32	334	0120	07	DSO	006	B												
06 Jan	S16W47	336	0130	07	DSO	007	B												
07 Jan	S16W62	338	0100	05	CSO	007	B												
08 Jan	S15W75	338	0120	02	HAX	001	A												
09 Jan	S15W87	336	0050	03	HSX	001	A												
											1	0	0	2	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 336

Region 8814

29 Dec	N11E73	320	0100	04	HSX	002	A												
30 Dec	N10E60	320	0110	03	HAX	002	A												
31 Dec	N10E47	320	0130	03	HAX	002	A												
01 Jan	N10E34	320	0180	03	HHX	003	A					1							
02 Jan	N10E21	321	0150	03	HAX	003	A												
03 Jan	N11E08	321	0140	04	CAO	004	B												
04 Jan	N12W06	321	0100	03	HAX	002	A												
05 Jan	N11W19	321	0090	05	CSO	005	B												
06 Jan	N12W33	322	0080	05	CSO	004	B												
07 Jan	N11W47	323	0060	03	HSX	003	A												
08 Jan	N11W60	323	0040	04	CSO	006	B												
09 Jan	N11W72	321	0000	00	AXX	001	A												
											0	0	0	1	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 321



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 8815

31 Dec	N10E61	306	0030	05	CRO	002	B											
01 Jan	N10E48	306	0040	08	CRO	009	B											
02 Jan	N08E35	307	0070	08	CAO	012	B											
03 Jan	N10E22	307	0050	08	CAO	015	B	1				1						
04 Jan	N10E11	304	0020	05	BXO	014	B											
05 Jan	N11W02	304	0010	02	HRX	003	A											
06 Jan	N10W17	306	0020	07	BXO	010	B											
07 Jan	N12W33	309	0000	04	BXO	003	B											
08 Jan	N12W46	309																
09 Jan	N12W59	309										1						
								1	0	0	0	2	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 304

Region 8816

04 Jan	N23W15	330	0020	03	CRO	006	B											
05 Jan	N23W29	331	0010	04	BXO	004	B											
06 Jan	N20W43	332	0050	06	DSO	007	B	1				1	1					
07 Jan	N20W57	333	0100	07	DAO	006	B											
08 Jan	N20W70	333	0110	08	DAO	003	B											
09 Jan	N20W83	332	0060	08	DAO	003	B											
								1	0	0	0	1	1	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 330

Region 8817

04 Jan	N24E10	305	0010	04	CRO	005	B											
05 Jan	N25W03	305	0030	06	CSO	007	B											
06 Jan	N24W17	306	0020	05	BXO	007	B											
07 Jan	N24W32	308	0000	03	BXO	003	B											
08 Jan	N24W45	308																
09 Jan	N24W58	308																
								0	0	0	0	0	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 305



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 8818

05 Jan	S10W33	335	0010	03	BXO	002	B											
06 Jan	S11W46	335	0010	03	BXO	002	B											
07 Jan	S11W59	335																
08 Jan	S11W72	335																
09 Jan	S11W85	335																
												0	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 335

Region 8819

06 Jan	N10W25	314	0000	03	BXO	003	B											
07 Jan	N09W40	316	0050	05	CAO	011	B	5			9							
08 Jan	N10W52	315	0010	06	BXO	010	B	1			2							
09 Jan	N10W65	314	0030	08	CRO	006	B	1			1							
								7	0	0	12	0	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 314

Region 8820

06 Jan	S16E71	218	0050	02	HAX	001	A											
07 Jan	S15E59	217	0060	07	CAO	006	B											
08 Jan	S15E46	217	0060	01	HSX	001	A											
09 Jan	S16E33	216	0050	05	CSO	003	B											
												0	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 216

Region 8821

06 Jan	N25E80	209	0050	02	HSX	001	A											
07 Jan	N26E62	214	0080	02	HSX	001	A											
08 Jan	N26E51	212	0100	02	HSX	001	A	1			1							
09 Jan	N26E40	209	0120	05	CAO	004	B	1			1							
								2	0	0	2	0	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 209

Region 8822

07 Jan	N16E03	273	0010	03	BXO	004	B											
08 Jan	N16W10	273	0020	04	CSO	003	B											
09 Jan	N16W24	273	0030	06	CRO	002	B											
												0	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 273



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 8823

08 Jan	S31E63	200	0000	01	AXX	001	A											
09 Jan	S32E51	198	0030	01	HRX	002	A											
										0	0	0	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 198

Region 8824

09 Jan	S13E75	174	0120	11	EAO	007	B											

Still on Disk.

Absolute heliographic longitude: 174

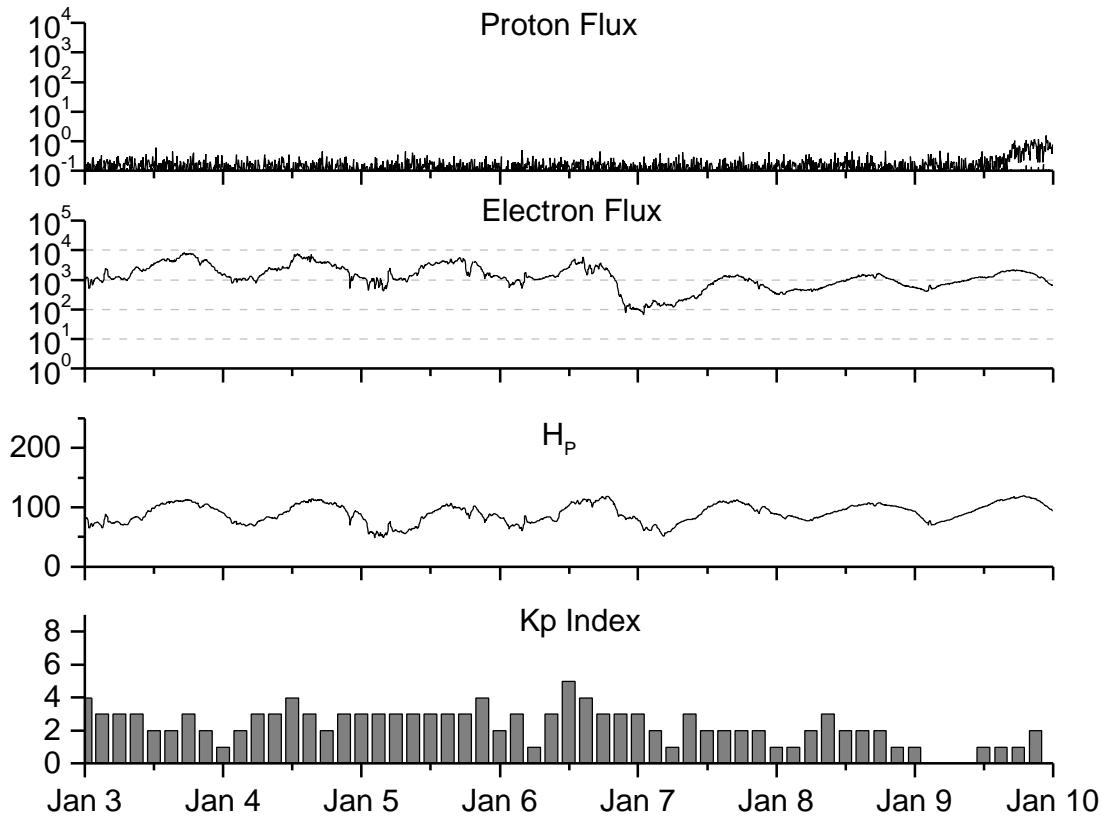


**Recent Solar Indices (preliminary)
of the observed monthly mean values**

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
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	11.1
April	73.6	53.4	0.73	77.7	56.5	108.3	109.1	10	11.3
May	74.3	56.3	0.76	81.4	59.3	106.7	112.4	18	11.6
June	93.6	70.7	0.76	85.9	62.4	108.4	116.2	10	11.9
July	98.3	66.2	0.67	90.3	65.4	114.0	120.3	11	12.2
August	118.6	91.7	0.77	93.7	67.8	136.0	124.1	18	12.4
September	119.0	92.9	0.78	96.1	69.4	138.4	126.8	13	12.5
October	77.0	55.5	0.72	97.7	70.5	117.3	127.9	13	12.5
November	99.5	74.0	0.74	101.3	73.0	140.2	130.0	16	12.3
December	120.8	81.9	0.69	108.8	77.9	150.1	134.3	08	11.9
1999									
January	94.3	62.4	0.66	116.5	82.6	142.6	139.0	10	11.7
February	93.4	66.3	0.71	120.2	84.6	142.0	142.6	12	11.6
March	100.5	68.8	0.68	120.5	83.8	126.3	144.0	14	11.6
April	092.9	063.9	0.69	123.8	85.4	117.2	145.8	12	12.1
May	140.5	106.3	0.76	131.7	90.4	148.6	150.0	08	12.1
June	208.3	137.4	0.66	136.0	93.0	169.8	152.9	07	12.0
July	169.2	113.5	0.67			165.6		10	
August	136.1	93.7	0.69			170.8		15	
September	107.4	70.9	0.66			135.7		18	
October	167.7	116.4	0.69			164.9		18	
November	199.3	132.7	0.67			191.7		12	
December	123.5	86.4	0.70			169.8		09	

NOTE: All smoothed values after January 1998 and monthly values after September 1998 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 22, RI= 158.5, occurred July 1989. * 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 03 January 1999

Protons plot contains the five-minute averaged integral proton flux (protons/cm²-sec -sr) as measured by GOES-8 (W75) for each of three energy thresholds: greater than 10, 50, and 100 MeV.

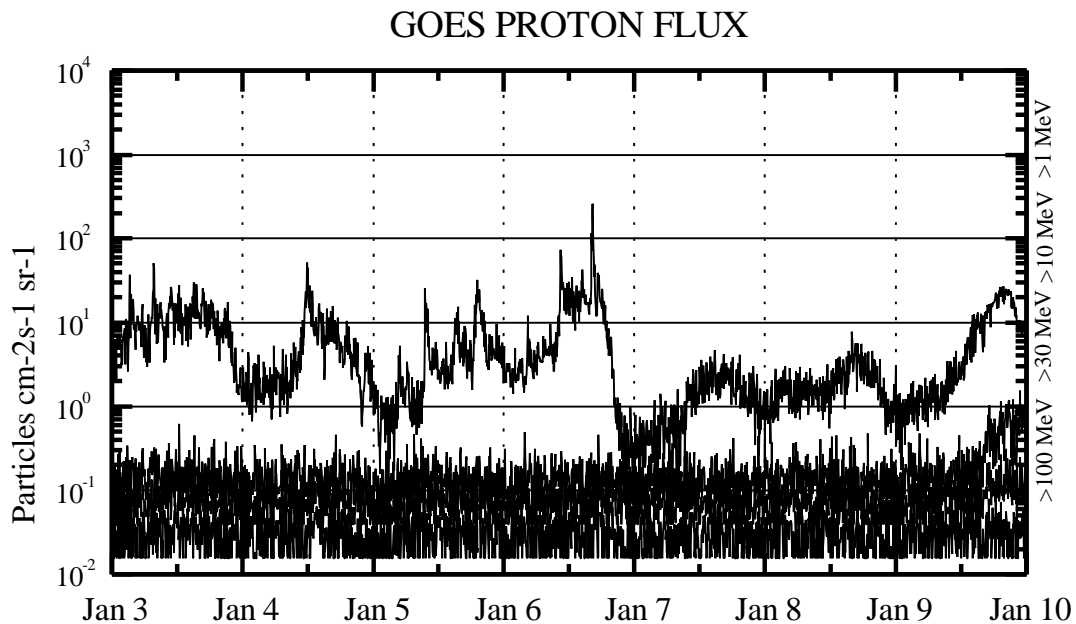
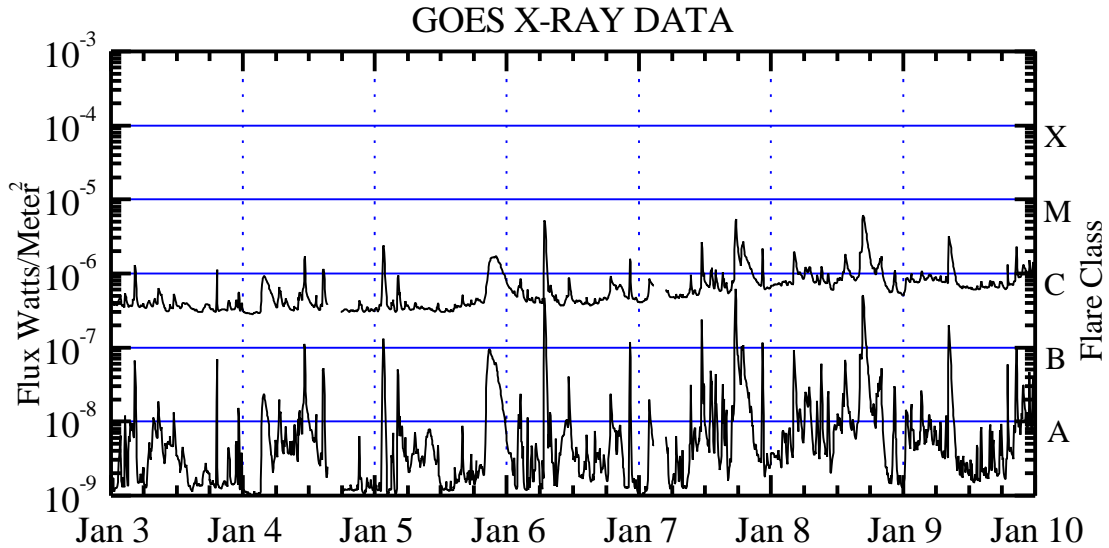
Electrons plot contains the five-minute averaged integral electron flux (electrons/cm²-sec -sr) with energies greater than 2 MeV at GOES-8.

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_{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 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.

