

Space Weather Highlights

19-25 January 1998

Solar activity ranged from very low to moderate. Region 8145 (N28, L = 265 class/area Bxo/030 on 25 January) produced an M1/1B flare at 25/2136UT. Modest discrete radio bursts were associated with the flare. Isolated B- and C-class subflares were observed during the rest of the period. A space-based coronagraph detected two partial-halo coronal mass ejections (CME) during the period. The first was associated with a filament disappearance early on 21 January. The second CME was associated with a long-duration C1/SF flare at 25/1512UT.

Solar wind data were received from the WIND spacecraft a few hours per day. Velocities increased from 280 - 470 km/sec during 20 January, then ranged from 350 - 450 km/sec for the rest of the period. Solar wind particle densities decreased from 30 - 05 p/cc during 19 - 20 January, then briefly increased to near 50 p/cc early on 21 January. Thereafter, densities ranged from 05 - 20 p/cc. Bz was northerly on 19 January, ranging from zero to plus 17 nT (GSM), then varied from plus to minus 13 nT during 20 - 21 January. Bz settled into a range of plus to minus 05 nT for the balance of the period. Solar sector orientation was not discernible.

There were no significant proton enhancements observed at geosynchronous altitude.

The greater than 2 MeV electron flux at geosynchronous altitude was at **normal levels**.

The geomagnetic field was quiet during through midday 20 January. A disturbance occurred after 20/1500UT and lasted until about midday on 21 January. Unsettled to active levels were observed during the disturbance. Activity subsided to quiet levels during 22 - 24 January. Activity increased to unsettled to active levels during 25/1800 - 2100UT, then declined to quiet to unsettled levels for the rest of the period.

Space Weather Forecast

28 January 1998 - 23 February 1998

Solar activity is expected to be very low to low. Isolated C-class 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 reach moderate to high levels during 31 January - 02 February. Thereafter, mostly normal fluxes are expected.

The geomagnetic field is expected to be quiet through 28 January. A geomagnetic disturbance is expected to occur during 29 - 30 January in response to the partial-halo CME observed on 25 January. Active to minor storm levels are expected during the disturbance. Mostly quiet conditions are expected during the rest of the period.



Daily Solar Data

Date	Radio Flux	Sun spot	Sunspot Area	X-ray Background	X-ray Flux			Flares				
	10.7 cm	No. (10 ⁶ hemi.)			C	M	X	S	1	2	3	4
19 January	94	88	90	B1.0	0	0	0	0	0	0	0	0
20 January	91	50	30	B1.0	1	0	0	0	0	0	0	0
21 January	91	25	10	A8.6	0	0	0	0	0	0	0	0
22 January	93	37	30	A7.4	0	0	0	3	0	0	0	0
23 January	97	57	100	B1.1	0	0	0	2	0	0	0	0
24 January	98	88	250	B1.4	0	0	0	0	0	0	0	0
25 January	108	104	350	B1.2	2	1	0	2	1	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
19 January	1.3E+5	1.8E+4	4.4E+3		9.7E+4	
20 January	1.1E+6	1.7E+4	3.8E+3		1.8E+5	
21 January	2.1E+5	1.7E+4	3.9E+3		4.5E+5	
22 January	2.8E+5	1.7E+4	4.0E+3		3.6E+5	
23 January	2.9E+5	1.7E+4	4.2E+3		2.6E+5	
24 January	4.1E+5	1.8E+4	4.3E+3		2.3E+5	
25 January	1.5E+6	1.7E+4	4.2E+3		7.1E+5	

Daily Geomagnetic Data

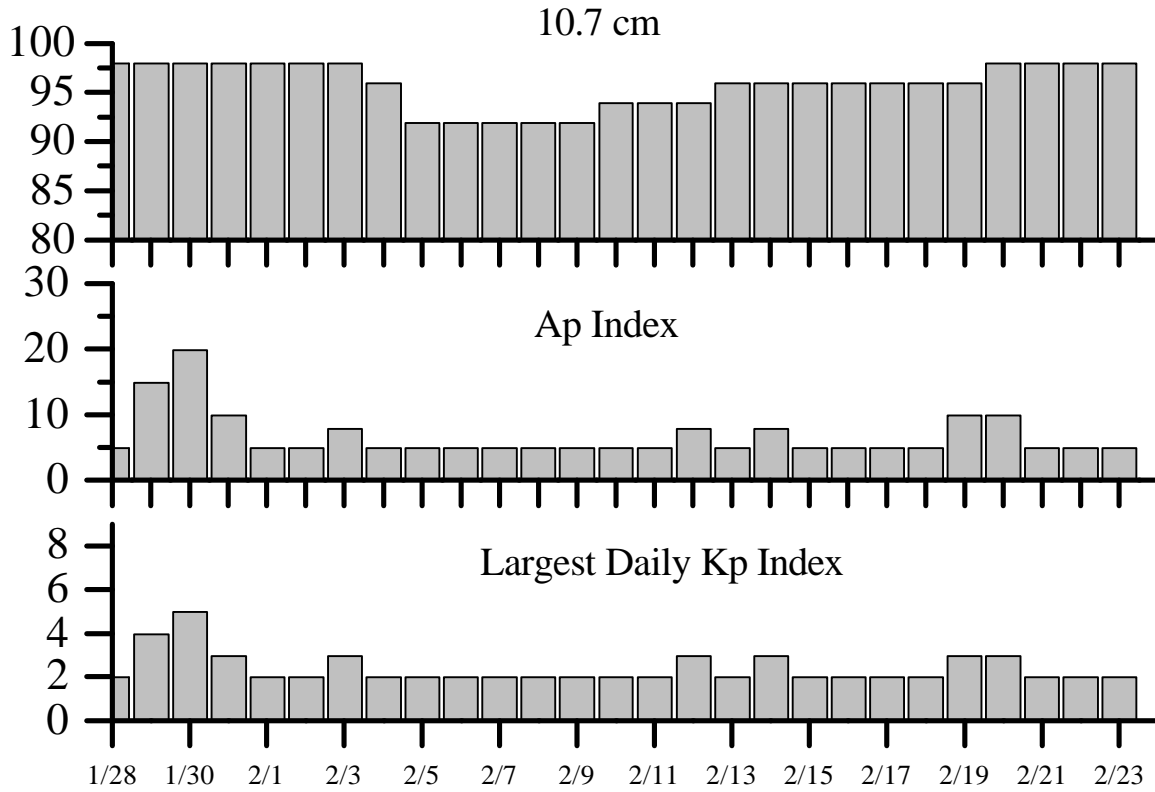
Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
19 January	4	1-0-1-1-2-2-2-1	2	0-0-0-2-1-0-1-1	4	0-0-1-1-2-1-2-1
20 January	8	1-3-1-1-2-3-2-2	16	1-1-1-2-4-5-4-2	11	1-3-1-1-2-4-3-3
21 January	6	3-2-3-1-1-0-1-1	7	2-3-4-1-0-0-0-0	8	3-2-4-1-1-1-1-1
22 January	3	1-0-0-0-1-1-2-2	3	0-0-0-0-1-2-2-2	4	1-0-0-0-1-2-2-2
23 January	3	1-1-1-1-1-1-0-1	5	0-1-2-2-3-0-*-*	3	0-1-1-2-2-1-1-1
24 January	2	0-1-1-1-1-0-1-1		*-*-*-*-*-*-*	4	0-1-2-1-1-2-2-2
25 January	7	2-4-0-1-2-2-2-1		*-*-*-*-*-*-*	9	1-4-1-0-2-3-3-1

Alerts and Warnings Issued

Date and Time of Issue (UT)	Type of Alert or Warning	Date and Time of Event (UT)
19 Jan 0826	Type II Radio Emission	19 Jan 0659
20 Jan 0600	K= 4 Observed	20 Jan 03-06
20 Jan 1816	K= 4 Observed	20 Jan 15-18
25 Jan 0603	K= 4 Observed	25 Jan 03-06
25 Jan 0015	1- 245 MHz Burst	24 Jan



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
28 Jan	98	5	2	11 Feb	94	5	2
29	98	15	4	12	96	8	3
30	98	20	5	13	96	8	3
31	98	10	3	14	96	5	2
01 Feb	98	5	2	15	96	5	2
02	98	5	2	16	96	5	2
03	98	8	2	17	96	5	2
04	96	5	2	18	96	5	2
05	92	5	2	19	96	10	3
06	92	5	2	20	98	10	3
07	92	5	2	21	98	5	2
08	92	5	2	22	98	5	2
09	94	5	2	23	98	5	2
10	94	5	2				



Energetic Events

Date	Time (UT)			X-ray		Optical Information			Peak		Sweep Freq		
	Begin	Max	½	Class	Integ	Imp Brtns	Location		Rgn #	Radio Flux		Intensity	
			Max		Flux		Lat	CMD		245	2695	II	IV
25 Jan	2126	2136	2143	M1.3	.008	1B	N22E53		8145	53	41		

Flare List

Date	Time			X-ray Class.	Optical		Rgn #	
	Begin	Max	End		Imp / Brtns	Location Lat CMD		
19 January	0500	0505	0508	B2.4				
	0707	0711	0714	B3.0				
	0850	0854	0858	B2.5				
	1338	1341	1344	B2.5				
	1346	1351	1356	B3.9				
20 January	1932	1940	1946	C1.5				
21 January	0734	0740	0746	B5.0				
	0905	0914	0930	B3.8				
	1707	1710	1714	B1.1				
22 January	2242	2245	2251	B1.7				
	0133	0138	0146	B3.1				
	0226	0231	0237	B3.7				
	0310	0314	0317	B1.5				
	0415	0418	0420	B1.0				
	0428	0436	0453	B2.4				
	0517	0521	0528	B1.3				
	0610	0613	0616	B1.2				
	0846	0855	0900	B1.8				
	1017	1022	1029	B3.6				
	1519	1524	1527	B2.1				
		1930	1933	1939		SF	S36E74	8143
		2027	2028	2042		SF	S37E77	8143
		2101	2106	2108		SF	S38E73	8143
		2324	2328	2334	B2.1			
	2358	0004	0017	B2.3				
23 January	0045	0052	0100	B2.5				
	0110	0111	0115		SF	S37E73	8143	
	0359	0400	0404	B4.9	SF	S36E65	8143	
	0602	0605	0607	B2.8				
	0903	0908	0914	B1.8				
	1647	1651	1653	B2.3				
	2046	2052	2057	B4.4				
24 January	No Flares Observed							
25 January	0406	0413	0418	B3.7				
	0438	0444	0452	B2.1				
	0532	0536	0543	B1.7				



Flare List- continued.

Date	Time			X-ray Class.	Imp / Brtns	Optical		Rgn #
	Begin	Max	End			Location Lat CMD		
25 January	1011	1014	1016	B2.6				
	1530	1530	1536	C1.1	SF	N21E25		
	1943	1943	1952	C2.8	SF	S18W39	8142	
	2128	2132	2158	M1.3	1B	N22E53	8145	

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 8131</i>																		
10 Jan	S26E19	132	0010	02	BXO	004	B					1							
11 Jan	S24E10	128	0020	11	BXO	006	B												
12 Jan	S23E04	120	0190	09	DRI	025	BG	4				8							
13 Jan	S22W10	121	0150	09	DSI	020	BG					1							
14 Jan	S22W22	120	0180	10	DSI	021	BG	3				7							
15 Jan	S23W35	120	0340	11	EAI	024	BG	3	1			6	1						
16 Jan	S24W49	121	0290	11	EKI	018	BG					1							
17 Jan	S23W61	120	0230	11	DKO	010	BG					2							
18 Jan	S23W74	119	0180	09	CAO	005	B												
19 Jan	S24W88	120	0050	10	BXO	004	B												
												10	1	0	26	1	0	0	0

Crossed West Limb.

Absolute heliographic longitude: 120

Region 8134

11 Jan	N15E73	065	0000	00	AXX	001	A
12 Jan	N16E61	063	0000	01	AXX	001	A
13 Jan	N16E48	063					
14 Jan	N16E35	063					
15 Jan	N16E22	063					
16 Jan	N16E09	063					
17 Jan	N16W04	063					
18 Jan	N16W17	063					
19 Jan	N16W30	063					

0 0 0 0 0 0 0 0 0

Died on Disk.

Absolute heliographic longitude: 063



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 8135</i>																				
13 Jan	S17E69	042	0000	00	AXX	001	A													
14 Jan	S17E56	042	0010	05	BXO	002	B													
15 Jan	S16E43	042	0010	06	BXO	002	B													
16 Jan	S17E26	046	0000	00	AXX	001	A													
17 Jan	S18E15	044	0020	05	BXO	006	B													
18 Jan	S18E03	042	0010	01	AXX	002	A													
19 Jan	S18W09	041	0020	04	BXO	004	B													
20 Jan	S17W21	040	0010	03	BXO	003	B													
21 Jan	S18W36	042	0000	02	BXO	002	B													
22 Jan	S18W49	042																		

0 0 0 0 0 0 0 0

Died on Disk.

Absolute heliographic longitude: 042

<i>Region 8136</i>																				
16 Jan	N15W24	096	0030	05	CRO	010	B													
17 Jan	N15W37	095	0030	06	CRO	004	B													
18 Jan	N16W51	096	0030	04	BXO	003	B													
19 Jan	N15W67	099	0000	00	AXX	001	A													
20 Jan	N15W80	099																		

0 0 0 1 0 0 0 0

Crossed West Limb.

Absolute heliographic longitude: 096

<i>Region 8137</i>																				
16 Jan	S16E10	062	0010	04	BXO	005	B													
17 Jan	S15W02	061	0010	02	BXO	002	B													
18 Jan	S15W15	061																		
19 Jan	S15W28	061																		
20 Jan	S15W41	061																		
21 Jan	S15W54	061																		
22 Jan	S15W67	061																		

0 0 0 0 0 0 0 0

Died on Disk.

Absolute heliographic longitude: 061



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 8138</i>																															
16 Jan	S44W49	121	0020	04	BXO	004	B																								
17 Jan	S43W61	120	0030	06	CSO	004	B																								
18 Jan	S42W76	121	0030	06	BXO	002	B																								
19 Jan	S43W86	118	0010	04	BXO	002	B																								
												0	0	0	0	0	0	0	0	0	0	0									
Crossed West Limb.																															
Absolute heliographic longitude: 121																															
<i>Region 8139</i>																															
17 Jan	N14E37	022	0010	03	AXX	003	A																								
18 Jan	N13E24	021	0020	03	BXO	005	B																								
19 Jan	N14E12	020	0010	03	BXO	005	B																								
20 Jan	N14W02	021	0010	01	BXO	003	B																								
21 Jan	N19W10	016																													
22 Jan	N19W23	016																													
23 Jan	N19W36	016																													
24 Jan	N19W49	016																													
25 Jan	N19W62	016																													
												0	0	0	0	0	0	0	0	0	0	0									
Still on Disk.																															
Absolute heliographic longitude: 021																															
<i>Region 8140</i>																															
19 Jan	S14W61	093	0000	00	AXX	001	A																								
20 Jan	S14W75	094	0000	00	AXX	001	A																								
												0	0	0	0	0	0	0	0	0	0	0									
Died on Disk.																															
Absolute heliographic longitude: 093																															
<i>Region 8141</i>																															
19 Jan	N26E48	344	0000	00	AXX	001	A																								
20 Jan	N25E36	343	0010	05	BXO	003	B																								
21 Jan	N26E22	344	0010	05	BXO	003	B																								
22 Jan	N26E06	347	0010	00	AXX	001	A																								
23 Jan	N26W07	346	0000	00	AXX	001	A																								
24 Jan	N25W20	346	0000	00	AXX	001	A																								
25 Jan	N26W34	347	0000	00	AXX	001	A																								
												0	0	0	0	0	0	0	0	0	0	0									
Still on Disk.																															
Absolute heliographic longitude: 347																															



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 8142</i>																					
22 Jan	S21E07	346	0010	03	BXO	005	B														
23 Jan	S21W06	345	0020	04	CRO	007	B														
24 Jan	S21W20	346	0050	07	DSI	010	B														
25 Jan	S21W35	348	0090	07	CAO	008	B	1				1									
								1	0	0	0	1	0	0	0	0	0	0	0	0	
Still on Disk.																					
Absolute heliographic longitude: 345																					
<i>Region 8143</i>																					
22 Jan	S35E72	281	0010	00	AXX	001	A					3									
23 Jan	S35E59	280	0080	07	CAO	008	B					2									
24 Jan	S34E47	279	0180	14	CAO	010	B														
25 Jan	S35E36	277	0200	15	ESO	014	BG														
								0	0	0	0	5	0	0	0	0	0	0	0	0	
Still on Disk.																					
Absolute heliographic longitude: 277																					
<i>Region 8144</i>																					
23 Jan	N12E64	275	0000	00	AXX	001	A														
24 Jan	N13E49	277	0000	00	AXX	001	A														
25 Jan	N13E37	276	0010	04	BXO	002	B														
								0	0	0	0	0	0	0	0	0	0	0	0	0	
Still on Disk.																					
Absolute heliographic longitude: 276																					



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 8145</i>																	
24 Jan	N28E59	267	0020	04	BXO	005	B										
25 Jan	N29E48	265	0030	06	BXO	003	B	1				1					
								0	1	0	0	0	1	0	0	0	0
Still on Disk.																	
Absolute heliographic longitude: 265																	
<i>Region 8146</i>																	
24 Jan	N15E62	264	0000	00	AXX	001	A										
25 Jan	N15E49	264	0020	06	BXO	005	B										
								0	0	0	0	0	0	0	0	0	0
Still on Disk.																	
Absolute heliographic longitude: 264																	
<i>Region 8147</i>																	
25 Jan	S23E02	311	0000	00	AXX	001	A										
								0	0	0	0	0	0	0	0	0	0
Still on Disk.																	
Absolute heliographic longitude: 311																	



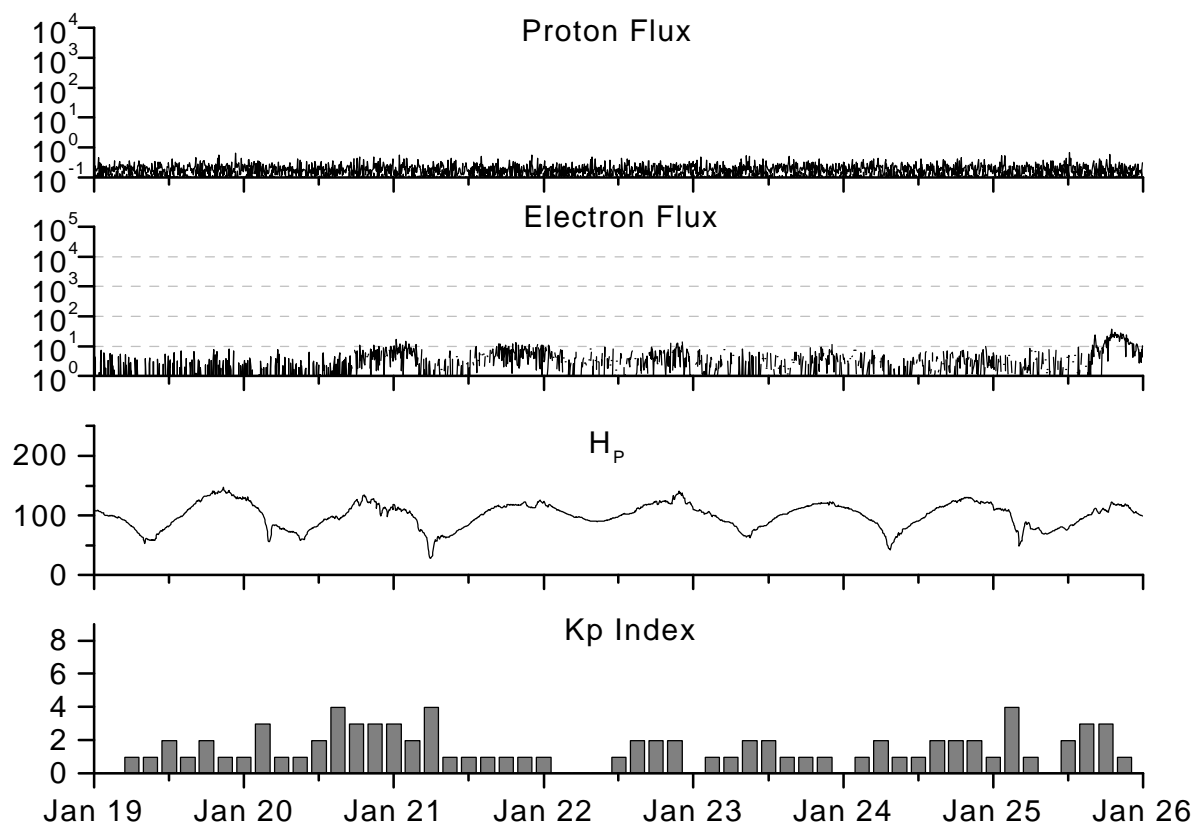
**Recent Solar Indices (preliminary)
of the observed monthly mean values**

Month	Sunspot Numbers				Radio Flux		Geomagnetic		
	Observed SWO	values RI	Ratio RI/SWO	Smooth SWO	values RI	Penticton 10.7 cm	Smooth Value	Planetary Ap	Smooth Value
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	72.7	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	72.1	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	08.4	69.4	72.3	15	09.3
October	02.3	00.9	0.39	14.0	08.8	69.2	72.6	13	09.1
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	09.0*
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	18.4*	74.6	78.4*	08	08.6*
June	22.1	12.7	0.57	29.0	20.4*	71.7	80.1*	07	08.6*
July	17.0	10.5*	0.62*			71.1		06*	
August	36.7	24.7*	0.67*			79.0		08*	
September	52.8	51.3*	0.88*			96.2*		10*	
October	33.6	23.3*	0.69*			85.0*		10*	
November	53.5	39.3*	0.73*			99.5*		10*	
December	57.9	41.5*	0.72*			98.8*		05*	

*Preliminary estimates.

The lowest smoothed sunspot number for Cycle 22, RI = 8.0, occurred May 1996. The highest smoothed sunspot number for Cycle 22, RI=158.5, occurred July 1989. October 1996 has been selected as the start of Solar Cycle 23. 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 19 January 1998

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.

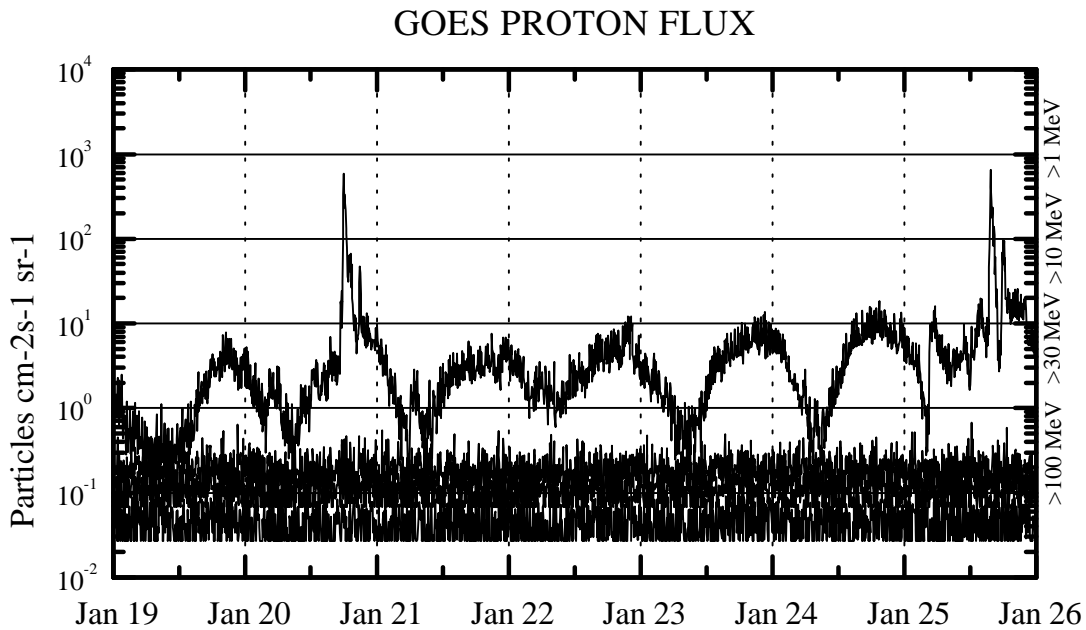
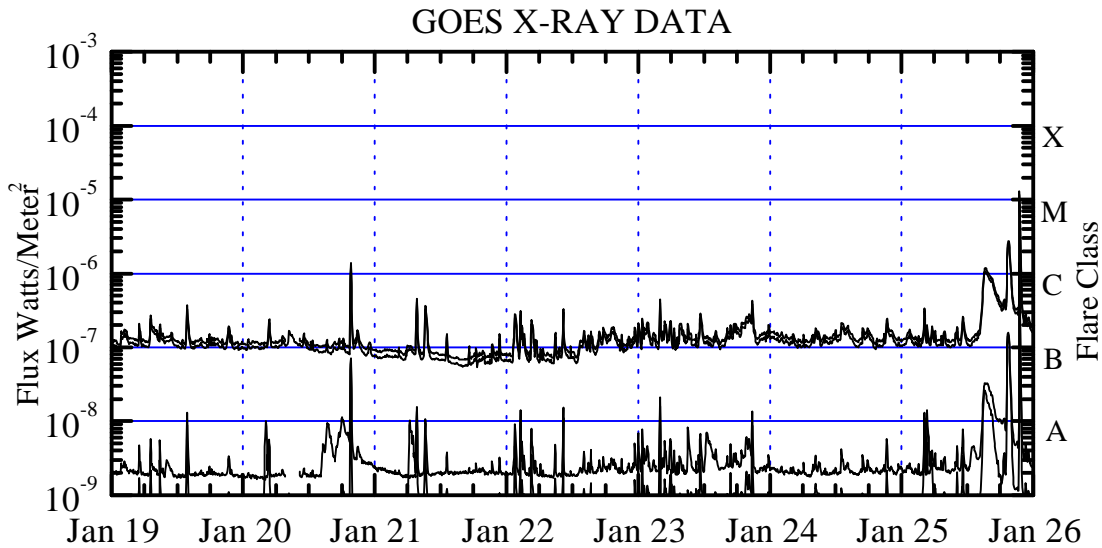
Electrons plot contains the five-minute averaged integral electron flux (electrons/ cm^2 -sec-sr) with energies greater than 2 MeV at GOES-9.

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.

Kp 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 Kp 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 Kp are "global" parameters that are applicable to a first order approximation over large areas. H_{parallel} 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.

