

**Space Weather Highlights  
12-18 January 1998**

Solar activity ranged from very low to moderate. Region 8131 (S23, L = 120, class/area Eai/340 on 15 January) produced a few C-class subflares while growing gradually during 12 - 14 January. Growth in the region accelerated on 15 January and the region produced an isolated M1/1F flare at 15/1438UT. Activity dropped to very low during the remaining days as Region 8131 entered a sustained period of decay.

Solar wind data were received from the WIND spacecraft a few hours per day. Solar wind data were not available for 17 - 18 January. Velocities ranged from 270 - 420 km/sec. Solar wind particle densities varied from 02 - 10 p/cc through 14 January. Densities increased to about 20 p/cc late on 15 January. Bz hovered around zero throughout 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 to moderate levels.

The geomagnetic field was mostly quiet during 12 - 15 January. Activity increased slightly during the latter half of 16 January with unsettled levels reported at all latitudes and brief active levels at high latitudes. The field declined to quiet levels on 17 January then increased to unsettled to active levels during 18/0600 - 1500UT before subsiding to quiet levels for the remainder of the period.

**Space Weather Forecast  
21 January 1998 - 16 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 be at normal levels during most of the period.

The geomagnetic field is expected to be quiet to unsettled.



### *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
12 January	96	60	200	B1.1	10	0	0	8	0	0	0	0
13 January	90	54	160	B2.5	1	0	0	1	0	0	0	0
14 January	94	43	190	B1.3	3	0	0	7	0	0	0	0
15 January	98	46	350	B3.6	5	1	0	6	1	0	0	0
16 January	98	88	350	B2.0	0	0	0	1	0	0	0	0
17 January	96	89	330	B1.5	0	0	0	2	0	0	0	0
18 January	95	67	270	B1.0	0	0	0	1	0	0	0	0

### *Daily Particle Data*

Date	Proton Fluence (protons/cm <sup>2</sup> -day-sr)			Electron Fluence (electrons/cm <sup>2</sup> -day-sr)		
	>1MeV	>10MeV	>100MeV	>.6MeV	>2MeV	>4MeV
12 January	4.6E+5	1.8E+4	4.8E+3		2.0E+7	
13 January	4.7E+5	1.8E+4	4.7E+3		1.7E+7	
14 January	3.9E+5	1.9E+4	4.6E+3		1.3E+7	
15 January	4.4E+5	1.9E+4	4.9E+3		1.4E+7	
16 January	5.3E+5	1.8E+4	4.4E+3		7.5E+6	
17 January	2.4E+5	1.7E+4	4.2E+3		3.7E+5	
18 January	1.4E+5	1.7E+4	4.1E+3		1.2E+5	

### *Daily Geomagnetic Data*

Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
12 January	5	1-2-2-2-1-1-2-1	*	0-0-3-2-*-0-0-0	4	1-1-2-2-1-1-2-0
13 January	5	1-0-1-1-2-3-2-1	2	0-0-0-2-2-1-0-0	3	0-0-1-1-2-2-2-0
14 January	3	2-1-1-2-1-0-0-1	2	0-0-0-3-0-0-0-0	4	2-0-0-3-3-1-0-0
15 January	2	0-0-1-2-1-1-0-1	1	0-0-1-2-0-0-0-0	3	0-0-1-2-1-1-1-1
16 January	5	1-0-0-1-2-2-2-3	13	0-3-0-2-4-4-3-2	8	1-1-0-1-2-3-3-3
17 January	4	1-1-2-0-1-1-2-1	6	1-1-1-2-2-3-1-1	5	1-1-2-1-1-2-2-2
18 January	6	0-1-3-1-3-2-1-0	19	0-1-5-3-6-1-1-0	9	1-1-3-3-4-2-2-1



*Alerts and Warnings Issued*

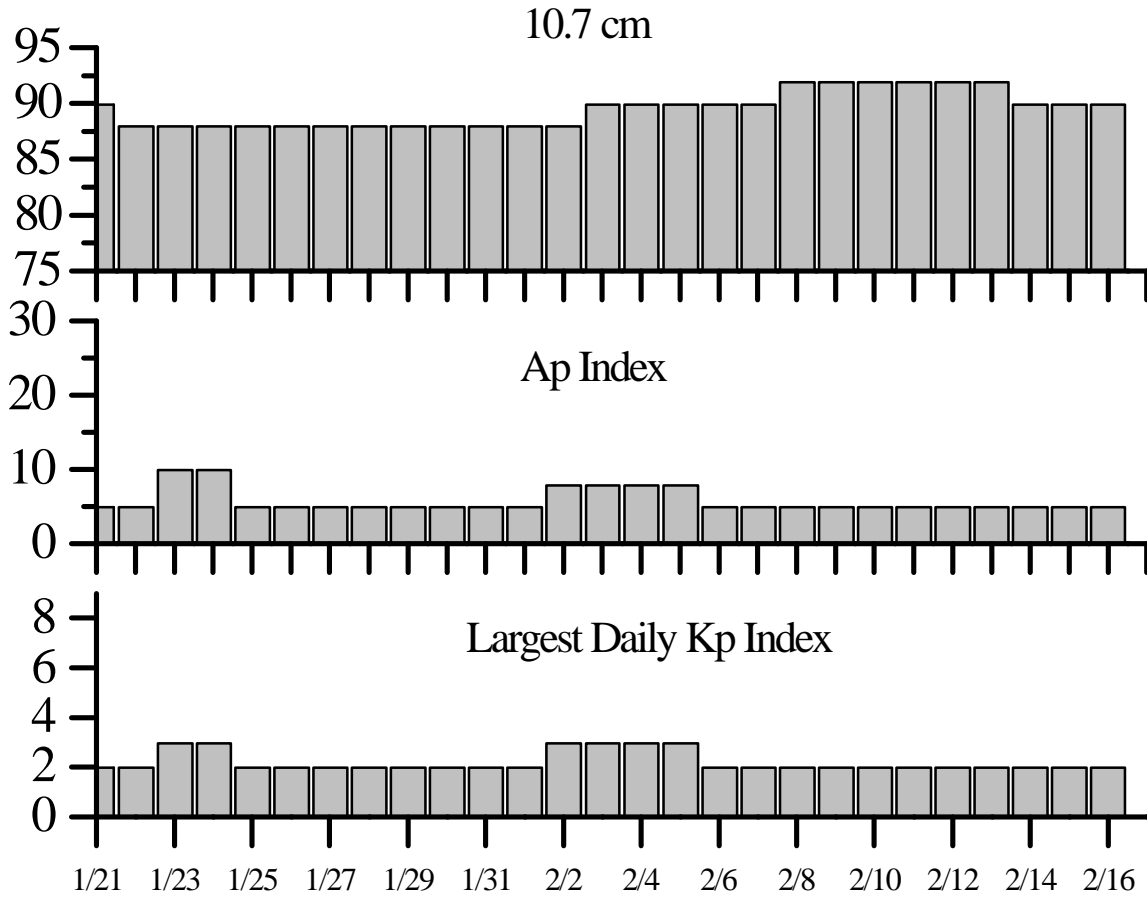
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Date and Time of Issue (UT)	Type of Alert or Warning	Date and Time of Event (UT)
12 Jan 1313	Stratwarm Alert Exists Monday	
13 Jan 1333	Stratwarm Alert Exists Tuesday	
14 Jan 1453	Stratwarm Alert Ends Wednesday	
17 Jan 0048	245 MHz Radio Noise Storm	16 Jan
18 Jan 0028	1-245 MHz Radio Burst	17 Jan
18 Jan 0028	245 MHz Radio Noise Storm	17 Jan
18 Jan 1503	K= 4 Observed	18 Jan 12-15

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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
21 Jan	90	5	2	04 Feb	90	8	5
22	88	5	2	05	90	8	5
23	88	10	3	06	90	8	2
24	88	10	3	07	90	5	2
25	88	5	2	08	92	5	2
26	88	5	2	09	92	5	2
27	88	5	2	10	92	5	2
28	88	5	2	11	92	5	2
29	88	5	2	12	92	8	2
30	88	5	2	13	92	5	2
31	88	5	2	14	92	8	2
01 Feb	88	8	3	15	90	5	2
02	88	8	3	16	90	5	2
03	90	8	3				



***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
15 Jan	1428	1438	1447	M1.0	.007	1F	S22W33		8131				

***Flare List***

Date	Time			X-ray Class.	Imp / Brtns	Optical		Rgn #
	Begin	Max	End			Location	Lat CMD	
12 January	0043	0052	0101	B6.0				
	0140	0145	0159	B4.2				
	0211	0222	0235	C4.5	SF	S26E12	8131	
	0308	0314	0318	B5.0				
	0321	0341	0356	C2.0				
	0440	0453	0502	C4.4				
	0629	0638	0643	C1.2				
	0752	0758	0804	C1.1				
	0826	0837	0845	C2.5				
	0904	0907	0909	B6.0				
	B1144	U1148	A1156	C3.8	SF	S24E10	8131	
	1451	1455	1456		SF	S23E07	8131	
	1502	1519	1529	C3.2	SF	S24E07	8131	
	1606	1611	1613		SF	S23E06	8131	
	1634	1640	1642		SF	S23E05	8131	
	1702	1706	1707		SF	S25W01	8131	
	1937	2007	2028	C1.0				
	2105	2105	2109	C1.3	SF	S23E03	8131	
	13 January	0156	0158	0211	B9.3	SF	S24E01	8131
0331		0343	0354	B9.3				
0559		0605	0615	B6.1				
1007		1016	1045	C1.3				
1301		1306	1311	B3.3				
1400		1409	1413	B2.0				
1621		1624	1631	B1.9				
1828		1838	1844	B4.0				
1921		1924	1927	B1.8				
2057		2101	2106	B1.8				
14 January	2201	2213	2221	B1.9				
	2306	2309	2311	B1.7				
	2352	2358	0012	B2.6				
	0319	0324	0332	B2.1				
	0514	0518	0527	B2.4				
	0729	0735	0746	B3.4				
	0756	0759	0801	B5.5				
	0816	0820	0823	B6.9				
0850	0850	0855	B7.4	SF	S24W16	8131		



*Flare List- continued.*

Date	Time			X-ray Class.	Optical		Rgn #
	Begin	Max	End		Imp / Brtns	Location Lat CMD	
14 January	1019	1022	1028	B4.2			
	1052	1102	1123	B2.4			
	1150	1152	1156		SF	S24W19	8131
	1244	1254	1259	B5.3			
	1311	1312	1325	C1.2	SF	S23W20	8131
	1540	1600	1626	C4.1	SF	S26W18	8131
	1844	1846	1851		SF	S22W21	8131
	2027	2036	2041	C2.3	SF	S22W23	8131
	2157	2158	2202	B5.0	SF	S22W23	8131
	2221	2224	2229	B7.0			
	15 January	0109	0118	0136	C1.1		
0610		0624	0646	B3.5			
0818		0825	0833	B4.4			
0933		1001	1015	C6.8	SF	S24W29	8131
B1128		U1128	A1141		SF	S22W30	8131
1159		1217	1226	C1.1			
1305		1309	1350	C1.4	SF	S23W32	8131
B1437		1440	1457	M1.0	1F	S22W33	8131
1754		1759	1805		SF	S22W34	8131
1849		1850	1911		SF	S22W35	8131
1932		1935	1938	B6.4			
1959		2000	2005	C1.1	SF	S22W34	8131
2228		2232	2236	B4.0			
2237		2243	2247	B8.6			
2337		2345	2348	B3.5			
16 January	0020	0025	0033	B5.1			
	0253	0257	0303	B2.5			
	0438	0444	0447	B5.4			
	1020	1031	1035	B2.9			
	1219	1220	1224		SF	S22W41	8131
	1409	1412	1429	B2.4			
17 January	0109	0112	0125		SF	S19W50	8131
	0159	0159	0204	B3.5	SF	S19W49	8131
	0751	0755	0758	B3.8			
	1106	1113	1120	B4.0			
	2244	2306	2315	B4.8			
18 January	1042	1111	1115	B2.8			
	1151	1153	1215	B3.4	SF	N17W44	8136



## Region Summary

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

### Region 8131

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												
10 1 0 26 1 0 0 0																			

Still on Disk.

Absolute heliographic longitude: 120

### Region 8132

11 Jan	S18E03	135	0010	03	BXO	002	B												
12 Jan	S19W11	135	0010	04	BXO	004	B												
13 Jan	S19W25	136	0010	05	BXO	003	B												
14 Jan	S19W38	136																	
15 Jan	S19W51	136																	
16 Jan	S19W64	136																	
17 Jan	S19W77	136																	
18 Jan	S19W90	136																	
0 0 0 0 0 0 0 0																			

Still on Disk.

Absolute heliographic longitude: 135

### Region 8133

11 Jan	N04E24	114	0010	00	AXX	002	A												
12 Jan	N04E11	114																	
13 Jan	N04W02	114																	
14 Jan	N04W15	114																	
15 Jan	N04W28	114																	
0 0 0 0 0 0 0 0																			

Died on Disk.

Absolute heliographic longitude: 114



**Region Summary- continued.**

Date	Location		Sunspot Characteristics				Flares														
	( ° Lat ° CMD)	Helio	Area (10 <sup>6</sup> hemi)	Extent (helio)	Spot Class	Spot Count	Mag Class	X-ray			Optical										
		Lon						C	M	X	S	1	2	3	4						
<i>Region 8134</i>																					
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																			
												0	0	0	0	0	0	0	0	0	

Still on Disk.

Absolute heliographic longitude: 063

<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														
												0	0	0	0	0	0	0	0	0	

Still 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														
												1									
												0	0	0	1	0	0	0	0	0	

Still on Disk.

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																			
												0	0	0	0	0	0	0	0	0	

Still on Disk.

Absolute heliographic longitude: 061







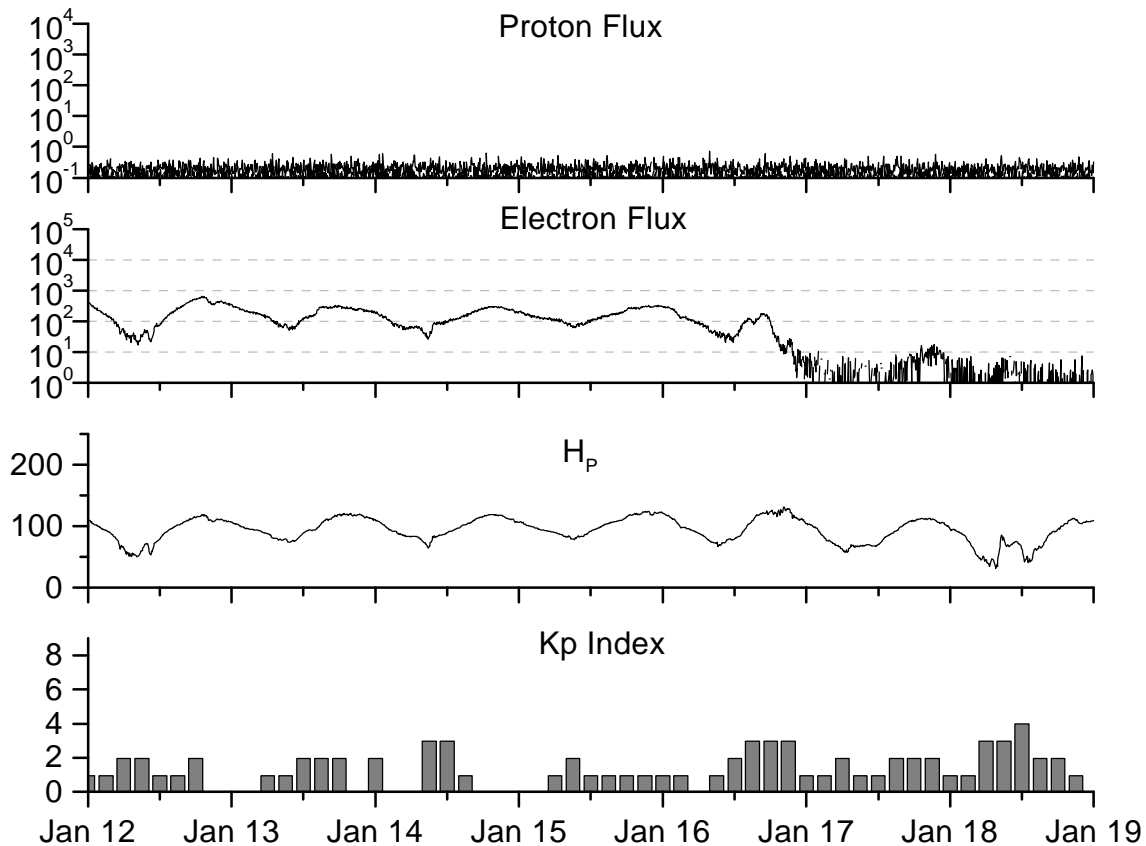
**Recent Solar Indices (preliminary)  
of the observed monthly mean values**

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
<b>1996</b>									
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
<b>1997</b>									
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 12 January 1998*

*Protons* plot contains the five-minute averaged integral proton flux (protons/  $\text{cm}^2$ -sec-sr) as measured by GOES-9 (W135) for each of three energy thresholds: greater than 10, 50, and 100 MeV.

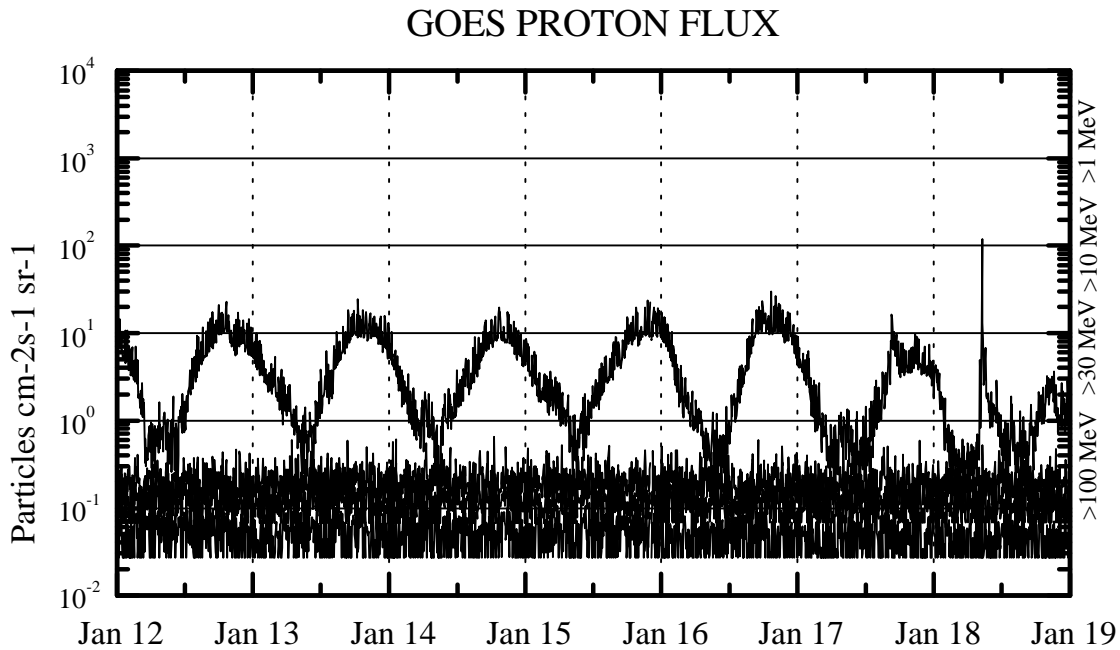
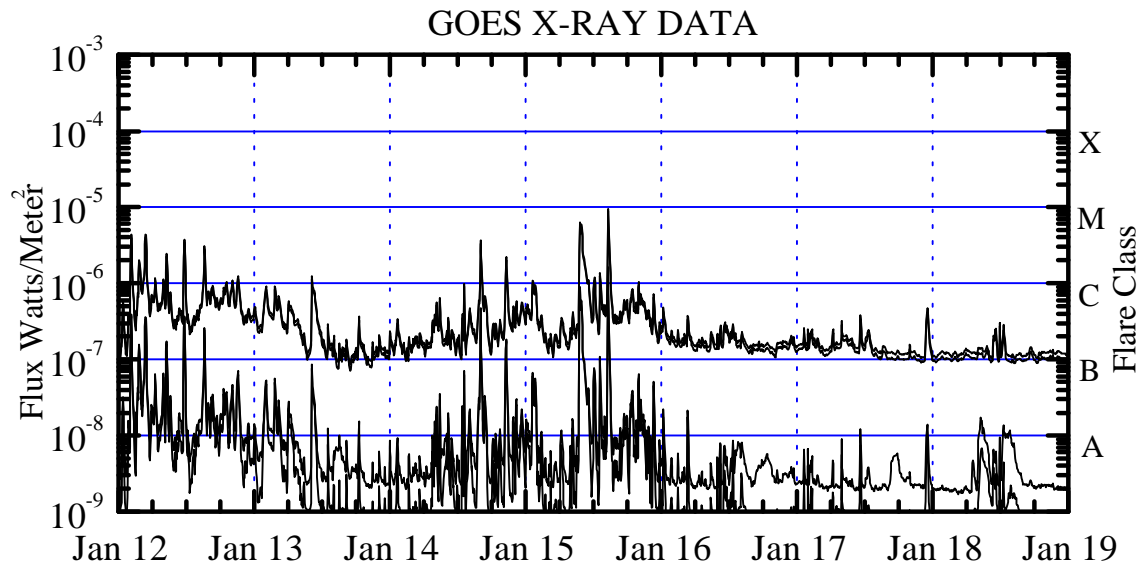
*Electrons* plot contains the five-minute averaged integral electron flux (electrons/  $\text{cm}^2$ -sec-sr) with energies greater than 2 MeV at GOES-9.

*H<sub>p</sub>* 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<sub>p</sub>* plot contains the estimated planetary 3-hour K-index (derived by the USAF 55<sup>th</sup> 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<sub>p</sub> 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<sub>p</sub> are "global" parameters that are applicable to a first order approximation over large areas. H<sub>parallel</sub> 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/cm<sup>2</sup>-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/cm<sup>2</sup>-sec-sr) at greater than 10 MeV.

X-ray plot contains five minute averaged x-ray flux (watts/m<sup>2</sup>) 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.

