

**Space Weather Highlights  
09 – 15 February 1998**

Solar activity was very low to low. Region 8156 (S24, L = 033, class/area Eki/360 on 15 February) grew steadily and produced occasional B-class subflares during most of the period. The region also produced an isolated C-class subflare at 15/0424UT that was associated with a 190 SFU Tenflare. A 120 SFU Tenflare occurred at 15/0102UT, but was not optically associated.

Solar wind data were received from the WIND spacecraft a few hours per day (no data were received during 11 - 12 February). Velocities ranged 330 - 470 km/sec. Densities were enhanced early 09 February, peaking around 35 p/cc, but were in the 05 - 08 p/cc during the rest of the period. Bz hovered about zero in the plus to minus 08 nT range (GSM). Solar sector orientation was mostly toward (phi angle near 315 degrees).

There were no significant proton enhancements observed at geosynchronous altitude.

The greater than 2 MeV electron flux at geosynchronous altitude was at moderate to high levels during 12 - 15 February.

The geomagnetic field was at quiet levels through most of the period. However, activity increased slightly during 11/1500 - 12/0300UT with unsettled to active levels detected at all latitudes.

**Space Weather Forecast  
18 February 1998 - 16 March 1998**

Solar activity is expected to be very low to low.

No significant proton enhancements are expected at geosynchronous altitude.

The greater than 2 MeV electron flux at geosynchronous altitude is expected to be at mostly normal levels.

The geomagnetic field is expected to be quiet to unsettled.



### *Daily Solar Data*

Date	Radio	Sun	Sunspot	X-ray	X-ray Flux			Flares				
	Flux 10.7 cm	spot No. ( $10^6$ hemi.)	Area ( $10^6$ hemi.)	Background	C	M	X	S	Optical 1	2	3	4
09 February	84	34	60	A4.7	0	0	0	0	0	0	0	0
10 February	84	62	110	A5.7	0	0	0	0	0	0	0	0
11 February	86	63	80	A4.3	0	0	0	3	0	0	0	0
12 February	91	67	220	A6.6	0	0	0	5	0	0	0	0
13 February	95	62	310	A7.9	0	0	0	1	0	0	0	0
14 February	105	88	390	B1.4	0	0	0	3	0	0	0	0
15 February	107	86	410	B3.7	4	0	0	8	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
09 February	1.6E+5	1.7E+4	3.8E+3		3.3E+5	
10 February	1.4E+5	1.8E+4	4.1E+3		1.1E+6	
11 February	2.1E+6	1.7E+4	3.9E+3		6.9E+6	
12 February	5.8E+5	1.8E+4	4.0E+3		7.6E+7	
13 February	4.2E+5	1.7E+4	4.3E+3		2.1E+8	
14 February	4.2E+5	1.7E+4	4.2E+3		2.7E+8	
15 February	2.7E+5	1.8E+4	4.3E+3		8.5E+7	

### *Daily Geomagnetic Data*

Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
09 February	7	3-2-1-2-2-2-2-1	13	2-2-0-3-5-3-2-1	8	3-2-1-2-3-2-2-1
10 February	6	3-1-2-2-1-1-1-1	11	2-2-4-2-4-2-0-0	8	3-1-3-3-2-2-1-2
11 February	10	3-2-1-1-3-3-2-3	27	3-2-1-4-6-5-3-3	13	3-3-1-2-3-4-3-3
12 February	8	4-1-1-2-1-2-2-1	19	3-2-2-5-5-3-2-1	8	4-1-2-3-2-2-2-1
13 February	5	2-2-2-1-1-1-2-1	15	1-0-5-3-4-3-1-2	6	2-2-3-2-2-1-2-1
14 February	4	0-0-2-1-0-1-2-3	4	0-0-2-2-1-1-2-1	5	1-0-2-1-1-1-2-3
15 February	3	3-1-0-1-0-0-0-0	2	2-1-0-2-0-0-0-0	3	2-2-0-1-0-0-1-1

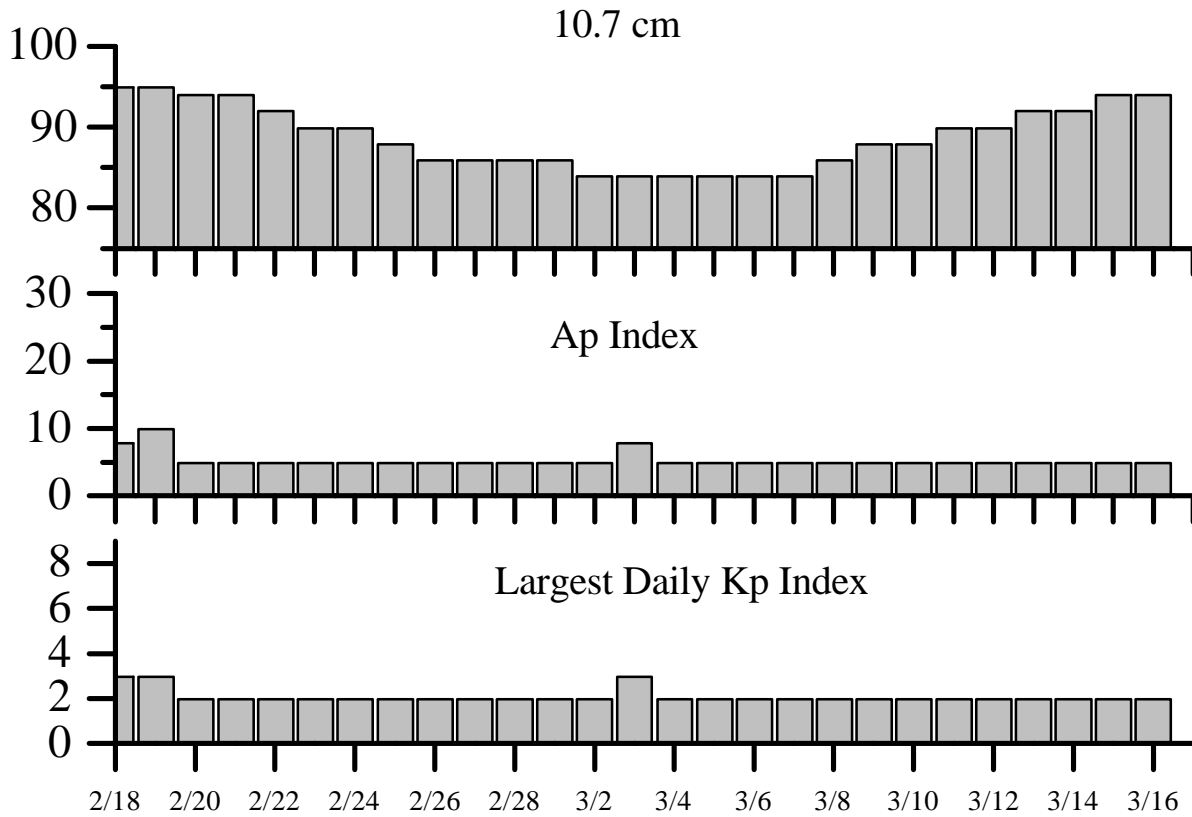


*Alerts and Warnings Issued*

Date and Time of Issue (UT)	Type of Alert or Warning	Date and Time of Event (UT)
09 Feb 1339	Stratwarm Alert Exists Monday	
10 Feb 1339	Stratwarm Alert Exists Tuesday	
11 Feb 1339	Stratwarm Alert Exists Wednesday	
12 Feb 1339	Stratwarm Alert Exists Thursday	
12 Feb 1735	>2 MeV Electron Event $\geq 1000$ pfu	12 Feb 1722
13 Feb 1339	Stratwarm Alert Exists Friday	
14 Feb 0016	>2 MeV Electron Event in Progress $\geq 1000$ pfu	13 Feb
14 Feb 1158	Stratwarm Alert Ends Saturday	
15 Feb 0008	>2 MeV Electron Event in Progress $\geq 1000$ pfu	14 Feb
15 Feb 0030	1-245MHz Radio Noise Storm	14 Feb
15 Feb 0207	2695MHz Radio Burst 120 s.f.u.	15 Feb 0102
15 Feb 0437	2695MHz Radio Burst 190 s.f.u.	15 Feb 0425



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
18 Feb	95	8	3	04	84	5	2
19	95	10	3	05	84	5	2
20	94	5	2	06	84	5	2
21	94	5	2	07	84	5	2
22	92	5	2	08	86	5	2
23	90	5	2	09	88	5	2
24	90	5	2	10	88	5	2
25	88	5	2	11	90	5	2
26	86	5	2	12	90	5	2
27	86	5	2	13	92	5	2
28	86	5	2	14	92	5	2
01 Mar	86	5	2	15	94	5	2
02	84	5	2	16	94	5	2
03	84	8	3				



***Energetic Events***

Date	Time (UT)		X-ray		Optical Information			Peak		Sweep Freq		
	Begin	Max	½ Max	Class	Integ Flux	Imp Brtns	Location		Radio Flux		Intensity	
							Lat	CMD	245	2695	II	IV

**No Events Observed**

***Flare List***

Date	Time			X-ray Class.	Optical		Rgn #
	Begin	Max	End		Imp / Brtns	Location Lat CMD	
09 February	0437	0443	0446	B1.9			
	1510	1515	1521	B1.5			
	1546	1549	1551	B1.0			
	1739	1747	1757	B1.2			
	2034	2043	2054	B4.3			
10 February	0126	0141	0150	B1.1			
	1742	1746	1752	B1.1			
11 February	0237	0241	0247	B1.1			
	0730	0731	0733		SF	S29E60	8156
	1054	1057	1100	B1.0			
	1108	1111	1113	B1.0			
	1616	1616	1619		SF	S27E61	8156
	1917	1923	1935	B2.4			
12 February	2232	2236	2240	B1.0			
	2341	2344	2346		SF	S29E51	8156
	0407	0412	0416		SF	S29E49	8156
	0416	0418	0421		SF	S29E49	8156
	0429	0433	0436	B1.3			
	0447	0500	0505	B1.8			
	0550	0554	0557	B2.1			
	0755	0802	0807	B4.8			
	0823	0847	0854	B4.1			
	0903	0907	0912	B3.6			
	1230	1234	1237	B1.7			
	1416	1419	1421	B2.7			
	1449	1453	1459		SF	S27E46	8156
	1505	1509	1514	B1.9			
	1616	1624	1632	B3.3			
1736	1742	1745	B1.6				
1828	1829	1834	B1.8	SF	S25E47	8156	
1924	1925	1928	B2.2	SF	S25E45	8156	
2158	2206	2218	B3.7				
13 February	0242	0249	0301	B1.7			
	0347	0357	0405	B1.2			
	0536	0536	0542	B2.9	SF	S22E40	8156
	1143	1146	1151	B1.4			



*Flare List – continued.*

Date	Time			X-ray Class.	Optical		Rgn #
	Begin	Max	End		Imp / Brtns	Location Lat CMD	
14 February	0326	0333	0341	B2.8			
	0510	0513	0515	B2.2			
	0915	0918	0920	B3.1			
	0931	0938	0944	B8.5	SF	S24E23	8156
	0945	0951	1001		SF	S24E25	8156
	1019	1026	A1029		SF	S22E26	8156
	1238	1243	1254	B2.5			
	1600	1609	1617	B2.6			
	1717	1726	1744	B3.8			
	1955	2002	2007	B4.6			
	2129	2226	2240	B8.3			
15 February	0100	0107	0114	B8.3			
	0253	0257	0302	B8.3			
	0418	0423	0440	C1.3	SF	S24E14	8156
	0538	0539	0601		SF	S23E12	8156
	0711	0713	0724	C1.0	SF	S24E14	8156
	0735	0736	0745	B8.1	SF	S23E13	8156
	0827	0830	0844		SF	S27E10	8156
	0944	0944	0952		SF	S27E10	8156
	1030	1033	1059	B5.8	SF	S27E09	8156
	1137	1145	1209	C1.7	SF	S26E08	8156
	1434	1441	1456	B4.5			
	1705	1709	1712	B2.9			
	1814	1818	1823	B3.9			
1823	1829	1833	C1.8				



## Region Summary

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

### *Region 8149*

02 Feb	N25E70	139
03 Feb	N25E57	139
04 Feb	N25E44	139
05 Feb	N25E31	139
06 Feb	N25E18	139
07 Feb	N25E05	139
08 Feb	N25W08	139
09 Feb	N25W21	139
10 Feb	N25W34	139
11 Feb	N25W47	139

0 0 0 0 0 0 0 0

Died on Disk.

Absolute heliographic longitude: 139

### *Region 8151*

03 Feb	S24E75	120	0030	02	CSO	002	B
04 Feb	S24E61	121	0060	03	CSO	002	B
05 Feb	S22E49	120	0060	02	HSX	004	A
06 Feb	S23E38	118	0060	02	HSX	002	A
07 Feb	S21E24	119	0030	02	HSX	001	A
08 Feb	S22E11	119	0040	02	HSX	001	A
09 Feb	S22W02	118	0040	01	HRX	001	A
10 Feb	S24W14	117	0050	02	HSX	001	A
11 Feb	S24W26	116	0020	01	HSX	001	A
12 Feb	S24W40	117	0000	01	AXX	001	A
13 Feb	S24W52	116	0000	00	AXX	001	A
14 Feb	S24W67	117	0000	00	AXX	001	A
15 Feb	S22W80	117	0000	00	AXX	001	A

0 0 0 0 0 0 0 0

Still on Disk.

Absolute heliographic longitude: 118



**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 8153</i>																
08 Feb	S40E38	092	0010	03	BXO	002	B									
09 Feb	S39E27	089	0020	04	BXO	002	B									
10 Feb	S39E16	087	0020	07	BXO	003	B									
11 Feb	S39E02	088	0000	00	AXX	001	A									
12 Feb	S39W13	090	0000	00	AXX	001	A									
13 Feb	S39W26	090														
14 Feb	S39W39	090														
15 Feb	S39W52	090														

0 0 0 0 0 0 0 0

Still on Disk.

Absolute heliographic longitude: 088

*Region 8154*

09 Feb	S24E29	087	0000	00	AXX	001	A
10 Feb	S24E15	088	0000	00	AXX	001	A
11 Feb	S23E02	088					
12 Feb	S23W11	088					
13 Feb	S23W24	088					
14 Feb	S23W37	088					
15 Feb	S23W50	088					

0 0 0 0 0 0 0 0

Still on Disk.

Absolute heliographic longitude: 88

*Region 8155*

10 Feb	S14E05	098	0020	03	BXO	004	B
11 Feb	S14W09	099					
12 Feb	S14W22	099					
13 Feb	S14W35	099					

0 0 0 0 0 0 0 0

Died on Disk.

Absolute heliographic longitude: 098

*Region 8156*

10 Feb	S24E71	032	0020	04	BXO	003	B
11 Feb	S24E57	033	0040	07	CSO	006	B
12 Feb	S25E43	034	0210	09	DSO	011	B
13 Feb	S25E30	034	0300	11	EAI	016	B
14 Feb	S24E16	034	0360	11	EKI	029	B
15 Feb	S25E04	033	0380	11	ESI	026	B

3 8  
3 0 0 20 0 0 0 0

Still on Disk.

Absolute heliographic longitude: 033





**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

*Region 8157*

11 Feb	N27E66	024	0010	03	BXO	003	B											
12 Feb	N27E54	023	0000	00	AXX	001	A											
13 Feb	N26E41	023	0000	00	AXX	001	A											
14 Feb	N28E28	022	0000	00	AXX	001	A											
15 Feb	N28E15	022																
										0	0	0	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 022

*Region 8158*

11 Feb	S19E77	013	0010	03	BXO	002	B											
12 Feb	S19E62	015	0010	03	BXO	003	B											
13 Feb	S19E50	014	0010	04	BXO	004	B											
14 Feb	S20E36	014	0020	04	CSO	004	B											
15 Feb	S21E23	014	0010	05	BXO	004	B											
										0	0	0	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 014

*Region 8159*

14 Feb	N33E41	009	0010	03	BXO	003	B											
15 Feb	N30E29	008	0010	06	BXO	003	B											
										0	0	0	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 008

*Region 8160*

15 Feb	N23E36	001	0010	03	BXO	002	B											
										0	0	0	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 001



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

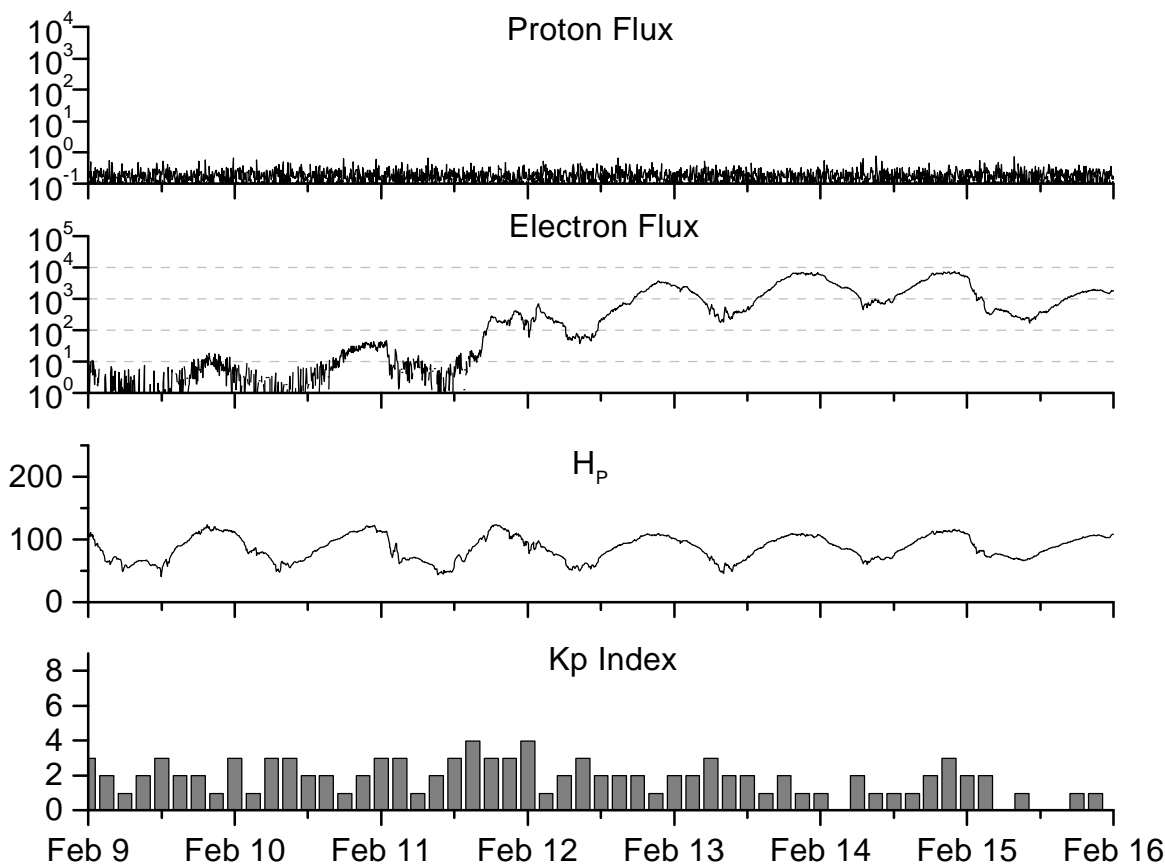
Month	Sunspot Numbers					Radio Flux		Geomagnetic	
	Observed values SWO	RI	Ratio RI/SWO	Smooth values SWO	RI	**Penticton 10.7 cm	Smooth Value	Planetary Ap	Smooth Value
<b>1996</b>									
February	09.1	04.4	0.48	16.2	10.1	71.5	72.2	10	09.8
March	12.1	09.2	0.76	15.4	09.7	72.7	72.1	11	09.9
April	08.5	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*	32.4	22.7*	71.1	81.8*	06*	08.4*
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*	
<b>1998</b>									
January	51.8	32.3*	0.62*			93.5*		07*	

\*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 09 February 1998*

*Protons* 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 three energy thresholds: greater than 10, 50, and 100 MeV.

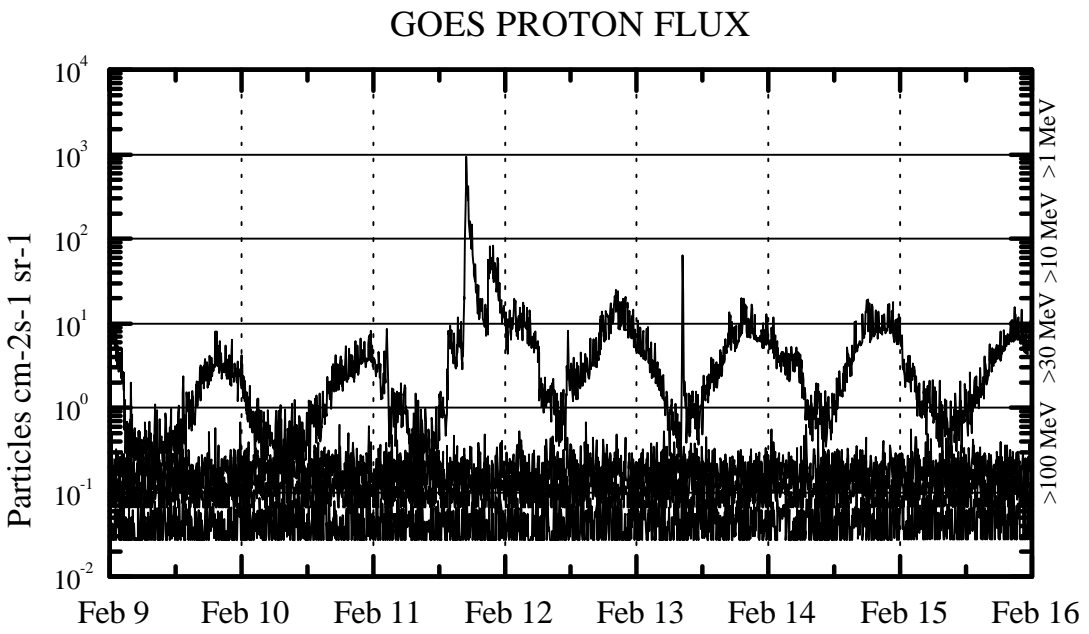
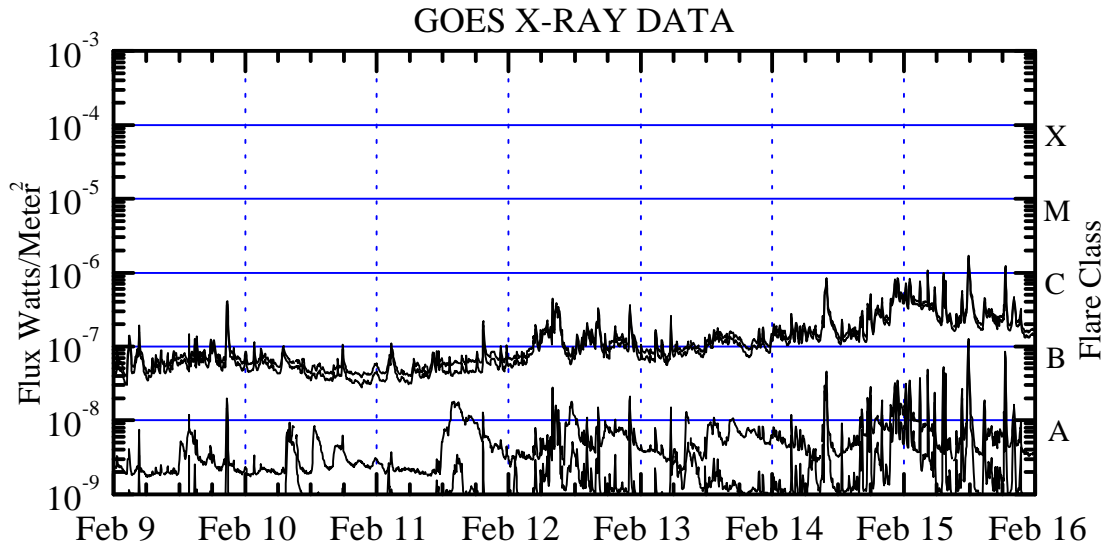
*Electrons* plot contains the five-minute averaged integral electron flux (electrons/ cm<sup>2</sup>-sec-sr) with energies greater than 2 MeV at GOES-9.

*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>p</sub>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/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.

