

Space Weather Highlights
09 – 16 February 2004

SWO PRF 1485
17 February 2004

Solar activity ranged from very low to low levels. The period began at low levels on 09 February with nine C-class flares originating from Region 554 (S08, L=305, class/area Dhc/310 on 09 February). The largest of these flares was a C9 at 1102 UTC. Region 554 reached 310 millionths on 09 February and developed a beta-gamma-delta magnetic configuration. However, the delta configuration was no longer apparent by 10 February, and decayed to a simple beta configuration by 11 February. Activity was at very low levels from 10 – 15 February. On 12 – 13 February, both GOES XRS and NOAA SXI imager observed no flares. Toward the end of the period, five small spot groups appeared on the disk, but as of yet have not produced any flares.

Solar wind data were available from the NASA Advanced Composition Explorer (ACE) spacecraft during most of the summary period. Late on 11 February, IMF total field increased to 15 nT and Bz decreased to -12 nT marking the beginning of a co-rotating interaction region (CIR). The CIR gave way to a coronal hole high speed stream on 12 February as solar wind speed increased to near 700 km/s. Solar wind decreased to near 630 km/s and remained there through 14 February. An increase in wind speed to near 800 km/s was observed on 15 February, before a steady decline began. The period ended with solar wind speed at 600 km/s and decreasing.

There were no greater than 10 MeV proton events at geosynchronous orbit during the summary period.

The greater than 2 MeV electron flux at geosynchronous orbit reached high levels on 09 February and again on 12 – 15 February.

The geomagnetic field ranged from quiet to major storm levels. Quiet to unsettled conditions were observed on 09 – 10 February. Isolated major storm levels were observed on 11 February due to the CIR and the onset of a large coronal hole. Activity remained at unsettled to minor storm levels on 12 February and decreased to active levels on 13 – 14 February. Unsettled to active condition dominated 15 February except for one period of isolated minor storm conditions due the increased solar wind speed.

Space Weather Outlook
18 February – 15 March 2004

Solar activity is expected to range from very low to moderate levels. Predominantly very low to low activity levels are expected from late February through early March. Mostly low level activity may return by mid March.

No greater than 10 MeV proton event are expected during the period.

The greater than 2 MeV electron flux at geosynchronous orbit is expected to reach high levels on 24 February – 05 March and again on 11 – 15 March, due to recurrent coronal holes.

Geomagnetic activity is expected to range from quiet to minor storm levels. A number of recurrent coronal hole high speed streams are expected between 22 February – 03 March, which will likely produce occasional active to minor storm periods with isolated major storm periods possible. A coronal hole high speed stream is due to return on 09 – 14 March and is expected to produce active to minor storm conditions.



Daily Solar Data

Date	Radio Flux 10.7 cm	Sun spot No.	Sunspot Area (10 ⁻⁶ hemi.)	X-ray Background	Flares							
					X-ray Flux			Optical				
					C	M	X	S	1	2	3	4
09 February	118	81	720	B3.0	9	0	0	4	0	0	0	0
10 February	117	78	520	B2.0	0	0	0	0	0	0	0	0
11 February	114	91	430	B1.9	0	0	0	0	0	0	0	0
12 February	112	65	420	B1.9	0	0	0	0	0	0	0	0
13 February	108	71	270	B1.7	0	0	0	0	0	0	0	0
14 February	104	64	210	B1.3	0	0	0	0	0	0	0	0
15 February	102	75	270	B1.1	0	0	0	0	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
	09 February	7.7E+5	1.3E+4	3.3E+3		1.1E+8
10 February	4.0E+5	1.4E+4	3.3E+3		1.9E+7	
11 February	6.1E+5	1.4E+4	3.3E+3		1.0E+7	
12 February	1.6E+6	1.4E+4	3.4E+3		1.4E+7	
13 February	2.8E+6	1.3E+4	3.4E+3		3.2E+8	
14 February	1.7E+6	1.2E+4	2.7E+3		5.0E+8	
15 February	1.4E+6	1.3E+4	2.8E+3		6.7E+8	

Daily Geomagnetic Data

Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
	09 February	3	1-0-1-0-2-1-2-1	9	1-0-4-2-3-2-2-2	8
10 February	5	2-1-1-2-1-2-1-1	9	2-1-2-4-3-2-0-1	9	2-2-2-3-3-3-2-1
11 February	12	2-0-0-3-4-3-4-2	57	0-0-1-6-6-7-7-3	26	2-1-1-4-5-6-5-2
12 February	16	2-3-3-3-4-3-3-3	44	3-4-6-5-5-6-4-4	28	3-4-5-5-4-4-4-3
13 February	16	3-4-2-3-3-3-3-3	50	3-4-6-6-6-6-4-3	21	4-4-4-4-4-3-3-3
14 February	12	3-2-1-2-3-3-3-3	39	3-3-2-6-6-6-4-3	18	3-3-3-4-4-4-4-3
15 February	13	4-3-2-3-2-3-2-2	37	3-4-5-6-3-6-3-3	18	4-4-3-5-3-3-3-2

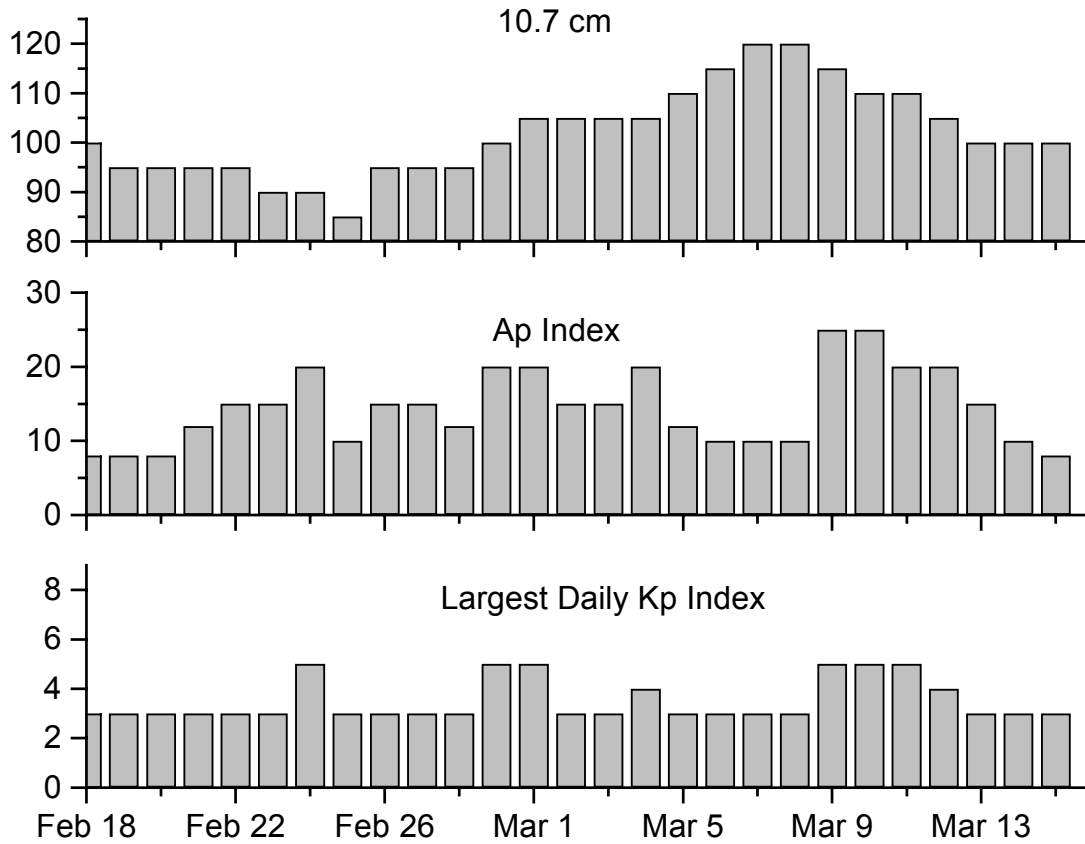


Alerts and Warnings Issued

<u>Date & Time of Issue</u>	<u>Type of Alert or Warning</u>	<u>Date & Time of Event UT</u>
09 Feb 0010	4 – 245 MHz Radio Bursts	08 Feb
09 Feb 0535	ALERT: Electron 2MeV Integral Flux > 1000pfu	09 Feb 0520
11 Feb 0022	3 – 245 MHz Radio Bursts	10 Feb
11 Feb 1155	WARNING: Geomagnetic K= 4	11 Feb 1155 – 1700
11 Feb 1255	ALERT: Geomagnetic K= 4	11 Feb 1255
11 Feb 1439	ALERT: Geomagnetic K= 5	11 Feb 1435
11 Feb 1623	WARNING: Geomagnetic K= 5	11 Feb 1625 – 2359
11 Feb 1626	ALERT: Geomagnetic K= 5	11 Feb 1626
11 Feb 2355	WARNING: Geomagnetic K= 4	11 Feb 2356 – 12/1500
12 Feb 0012	7 – 245 MHz Radio Bursts	11 Feb
12 Feb 0012	245 MHz Noise Storm	11 Feb
12 Feb 1500	EXTENDED WARNING: Geomagnetic K= 4	11 Feb 2356 – 13/1600
12 Feb 2046	ALERT: Electron 2MeV Integral Flux > 1000pfu	12 Feb 2025
13 Feb 0020	2– 245 MHz Radio Bursts	12 Feb
13 Feb 0020	245 MHz Noise Storm	12 Feb
13 Feb 0521	ALERT: Geomagnetic K= 5	13 Feb 0510
13 Feb 0528	ALERT: Electron 2MeV Integral Flux > 1000pfu	13 Feb 0510
13 Feb 1556	EXTENDED WARNING: Geomagnetic K= 4	11 Feb 2356 – 13/2359
13 Feb 2354	EXTENDED WARNING: Geomagnetic K= 4	11 Feb 2356 – 14/1500
14 Feb 0053	4 – 245 MHz Radio Bursts	13 Feb
14 Feb 0053	245 MHz Noise Storm	13 Feb
14 Feb 0517	ALERT: Electron 2MeV Integral Flux > 1000pfu	14 Feb 0500
14 Feb 1454	EXTENDED WARNING: Geomagnetic K= 4	11 Feb 2356 – 14/2359
14 Feb 2348	EXTENDED WARNING: Geomagnetic K= 4	11 Feb 2356 – 15/1600
15 Feb 0031	5 – 245 MHz Radio Bursts	14 Feb
15 Feb 0031	245 MHz Noise Storm	14 Feb
15 Feb 0235	ALERT: Geomagnetic K= 5	15 Feb 0231
15 Feb 0537	ALERT: Electron 2MeV Integral Flux > 1000pfu	15 Feb 0500
15 Feb 1535	EXTENDED WARNING: Geomagnetic K= 4	11 Feb 2356 – 15/2359
15 Feb 2354	EXTENDED WARNING: Geomagnetic K= 4	11 Feb 2356 – 16/1600



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	100	8	3	03 Mar	105	15	3
19	95	8	3	04	105	20	4
20	95	8	3	05	110	12	3
21	95	12	3	06	115	10	3
22	95	15	3	07	120	10	3
23	90	15	3	08	120	10	3
24	90	20	5	09	115	25	5
25	85	10	3	10	110	25	5
26	95	15	3	11	110	20	5
27	95	15	3	12	105	20	4
28	95	12	3	13	100	15	3
29	100	20	5	14	100	10	3
01 Mar	105	20	5	15	100	8	3
02	105	15	3				



Energetic Events

Date	Time		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	0056	0101	0110	C1.6			554
	0145	0150	0154	C1.7			554
	0254	0307	0318	C1.7			554
	0356	0400	0402	B7.8			554
	0407	0411	0414	B9.1			554
	0549	0550	0556	C5.5	Sf	S12E62	554
	0557	0557	0602		Sf	S12E63	554
	0602	0604	0609		Sf	S12E62	554
	0738	0743	0749	B5.5			554
	0938	0946	0951	C4.3			554
	1051	1102	1112	C9.6			554
	1247	1300	1306	C2.7			554
	1356	1403	1414	C5.6			554
	1508	1508	1514	C1.9	Sf	S09E57	554
	1522	1526	1532	B7.7			554
	1546	1550	1553	B5.8			554
	1737	1742	1746	B9.9			554
	1908	1912	1915	B8.2			554
	2132	2135	2143	B6.4			554
	2256	2304	2328	B7.3			554
10 February	0518	0525	0531	B6.7			555
	0946	0950	0953	B3.6			554
	0959	1005	1015	B9.7			554
	1412	1421	1426	B4.9			551
	1528	1533	1541	B5.6			551
11 February	0057	0104	0108	B7.1			549
	0148	0155	0202	B5.6			549
	0414	0417	0419	B3.7			549
	0525	0530	0533	B5.1			551
	1523	1529	1536	B6.0			551
1749	1754	1757	B3.2			555	
12 February	No Flares Observed						
13 February	No Flares Observed						
14 February	1133	1137	1139	B3.7			551
15 February	1717	1723	1732	B2.2			551



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 549</i>																	
31 Jan	N13E70	046	0090	08	Dso	003	B	1									
01 Feb	N14E57	046	0180	11	Eao	005	B	2				2					
02 Feb	N14E41	049	0240	11	Eai	020	B										
03 Feb	N14E30	046	0220	11	Eai	018	B	1									
04 Feb	N14E17	046	0200	12	Eao	014	B										
05 Feb	N14E04	046	0120	12	Eao	026	B	1				1					
06 Feb	N14W09	046	0070	12	Eao	020	B										
07 Feb	N14W22	046	0090	12	Eac	022	B										
08 Feb	N13W36	046	0080	12	Esc	015	B										
09 Feb	N13W49	046	0060	09	Dso	009	B										
10 Feb	N13W62	046	0030	05	Bxo	003	B										
11 Feb	N12W79	050	0010	01	Axx	001	A										
12 Feb	N12W92	050	0000	00		000											
								5	0	0	3	0	0	0	0	0	

Crossed West Limb.

Absolute heliographic longitude: 046

Region 551

02 Feb	S06E64	026	0040	02	Hax	001	A										
03 Feb	S05E51	025	0050	06	Cao	003	B	4									
04 Feb	S06E39	024	0110	09	Dao	008	B										
05 Feb	S06E26	024	0220	08	Dko	021	B										
06 Feb	S06E13	024	0260	10	Dao	021	Bg										
07 Feb	S06W00	024	0300	09	Dao	026	Bg										
08 Feb	S06W14	024	0370	12	Eko	023	Bg										
09 Feb	S06W27	024	0330	12	Eki	023	Bg										
10 Feb	S08W41	025	0210	11	Eso	020	B										
11 Feb	S08W55	026	0130	11	Eao	014	B										
12 Feb	S08W68	026	0090	07	Dso	005	B										
13 Feb	S07W79	024	0050	02	Hxx	002	A										
								4	0	0	0	0	0	0	0	0	

Crossed West Limb.

Absolute heliographic longitude: 024



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 555

09 Feb	S14E72	285	0020	01	Hax	001	A										
10 Feb	S14E58	286	0030	01	Hsx	001	A										
11 Feb	S14E45	286	0020	01	Hax	001	A										
12 Feb	S14E32	286	0010	01	Axx	001	A										
13 Feb	S14E19	286															
14 Feb	S14E06	286															
15 Feb	S14W07	286															

0 0 0 0 0 0 0 0

Still on Disk.

Absolute heliographic longitude: 286

Region 556

11 Feb	N16E22	309	0030	05	Cao	010	B										
12 Feb	N16E06	312	0030	08	Bxi	012	B										
13 Feb	N16W04	309	0020	06	Cso	007	B										
14 Feb	N17W19	310	0010	05	Cso	006	B										
15 Feb	N16W37	315	0020	02	Bxo	002	B										

0 0 0 0 0 0 0 0

Still on Disk.

Absolute heliographic longitude: 309

Region 557

13 Feb	S11W32	337	0030	03	Cao	006	B										
14 Feb	S11W45	337															
15 Feb	S11W58	337															

0 0 0 0 0 0 0 0

Still on Disk.

Absolute heliographic longitude: 337

Region 558

13 Feb	S15E36	269	0020	04	Cso	002	B										
14 Feb	S16E21	270	0010	01	Hrx	001	A										
15 Feb	S16E07	271	0010	01	Axx	001	A										

0 0 0 0 0 0 0 0

Still on Disk.

Absolute heliographic longitude: 271



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 559</i>																						
14 Feb	N07W42	333	0020	04	Cso	009	B															
15 Feb	N08W56	334	0060	04	Dso	004	B															
								0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Still on Disk.																						
Absolute heliographic longitude: 333																						
<i>Region 560</i>																						
15 Feb	S16E30	248	0020	01	Axx	001	A															
								0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Still on Disk.																						
Absolute heliographic longitude: 248																						
<i>Region 561</i>																						
15 Feb	N02E64	214	0030	02	Hrx	001	A															
								0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Still on Disk.																						
Absolute heliographic longitude: 214																						

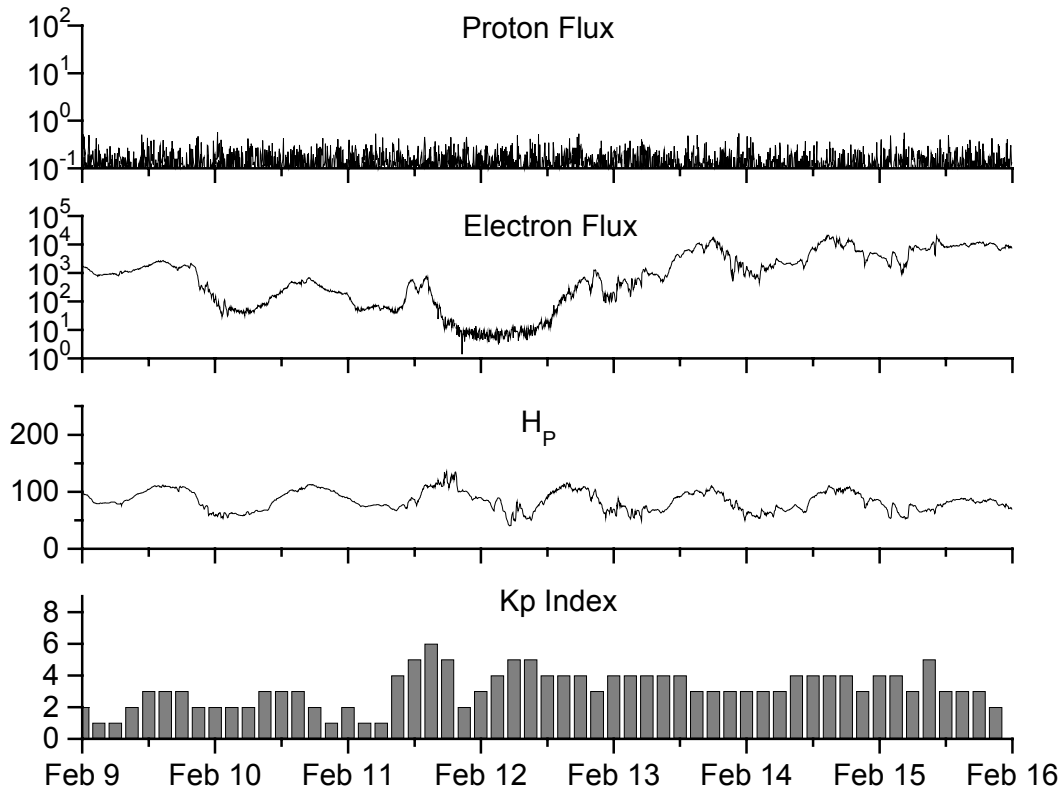


**Recent Solar Indices (preliminary)
of the observed monthly mean values**

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
2002									
February	194.5	107.4	0.55	188.6	114.7	205.0	197.2	10	12.8
March	153.1	98.4	0.64	188.9	113.3	180.3	195.7	10	12.9
April	194.9	120.7	0.62	186.2	110.5	189.8	191.5	15	13.2
May	204.1	120.8	0.59	183.6	108.9	178.4	188.0	15	13.3
June	146.0	88.3	0.60	179.9	106.3	148.7	183.0	11	13.5
July	183.5	99.6	0.54	175.4	102.7	173.5	176.3	11	13.7
August	191.0	116.4	0.61	169.2	98.7	183.9	169.5	16	14.2
September	206.4	109.6	0.53	163.4	94.6	175.8	164.1	14	15.0
October	153.9	97.5	0.63	158.8	90.5	167.0	159.4	23	15.6
November	159.8	95.5	0.60	150.9	85.2	168.7	154.8	16	16.3
December	147.9	80.8	0.55	144.6	82.1	158.6	150.9	13	17.0
2003									
January	149.3	79.7	0.53	141.7	81.0	144.0	149.2	13	18.2
February	87.0	46.0	0.53	136.4	78.5	124.5	144.7	17	18.9
March	119.7	61.1	0.51	128.1	74.2	132.2	139.5	21	19.4
April	119.7	60.0	0.50	121.5	70.3	126.3	136.3	20	20.0
May	89.6	55.2	0.62	118.3	67.8	129.3	135.0	26	21.0
June	118.4	77.4	0.65	113.6	65.2	129.4	132.6	24	21.8
July	132.8	85.0	0.64	106.9	62.0	127.8	129.5	20	22.3
August	114.3	72.7	0.64			122.1		23	
September	82.6	48.8	0.59			112.3		19	
October	118.9	65.6	0.55			153.1		32	
November	118.9	67.2	0.57			153.1		31	
December	75.4	47.0	0.62			115.1		18	
2004									
January	62.3	37.2	0.60			114.1		20	

NOTE: All smoothed values after September 2002 and monthly values after March 2003 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 23, RI= 120.8, occurred April 2000. *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 09 February 2004

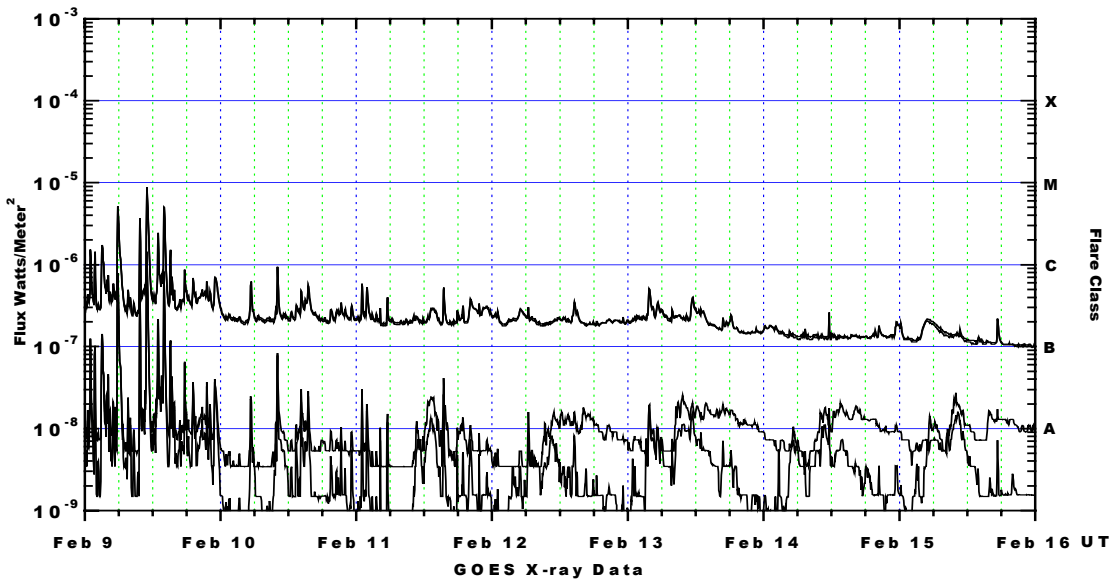
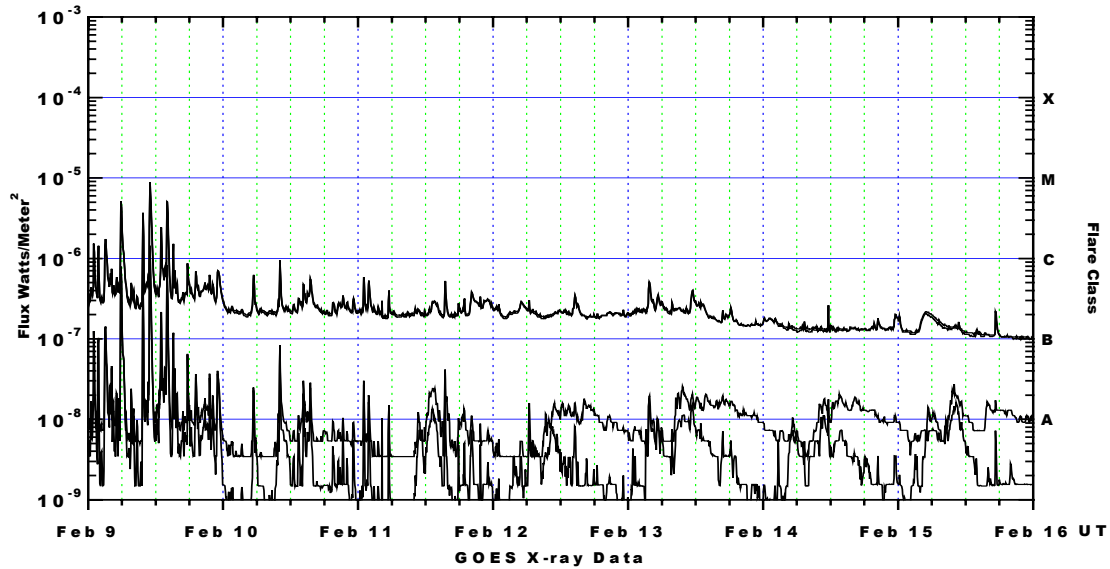
Protons plot contains the five-minute averaged integral proton flux (protons/cm²-sec-sr) as measured by GOES-11 (W113) for each of three energy thresholds: greater than 10, 50, and 100 MeV.

Electrons plot contains the five-minute averaged integral electron flux (electrons/cm²-sec-sr) with energies greater than 2 MeV at GOES-12.

H_p plot contains the five minute averaged magnetic field H - component in nanoteslas (nT) as measured by GOES-12. 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 Air Force Weather Agency) 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 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 12 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-11 (W113) 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.

