

Space Weather Highlights
01 February 2010 – 07 February 2010

SWO PRF 1797
09 February 2010

Solar activity began the period at very low levels with only a few low-level B-class events for 01-04 February. Beginning on 05 February, however, there was a steady increase in background levels and an increase of flare activity with 5 B-class events. Solar images indicated the emergence of new Region 1045 (N23, L=253, class/area Fkc/320 on 07 February) which was numbered on 06 February. This group emerged rapidly and increased activity levels to moderate on 06 February as it produced an M2/Sn flare at 06/1859 UTC and an M1 x-ray event at 06/2137 UTC (associated with a coronal mass ejection observed on the east limb), as well as five C-class events. The region continued to grow on 07 February and increased activity to high levels as it produced an M6/1n at 07/0234 UTC which was associated with a Tenflare (2695 MHz radio burst with peak flux of 170 solar flux units) and a halo coronal mass ejection. The estimated plane-of-sky speed for the halo CME was about 360 km/s.

No proton events were observed at geosynchronous orbit.

The greater than 2 MeV electron flux at geosynchronous orbit was at normal background levels from 01 February through 1530 UTC on 03 February. Flux levels increased to moderate levels until 1300 UTC on 06 February after which the flux returned to normal background levels.

The geomagnetic field was at mostly quiet to unsettled levels for 01-03 February, with a few isolated active intervals and one high-latitude minor storm interval from 1200-1500 UTC on 01 February. Geomagnetic activity was predominantly quiet for 04-07 February, with the exception of a brief unsettled to active interval from 1200-1800 UTC on 06 February.

Real-time solar wind observations from the ACE spacecraft showed an increase in solar wind velocity beginning late on 02 February which reached a peak around 580 km/s early on 03 February and slowly declined over 03-04 February. This signature was most likely associated with a small negative polarity coronal hole that was observed in the northern hemisphere of the Sun. An enhancement in the interplanetary magnetic field was observed beginning mid-day on 06 February and lasting about 8 hours, with Bt reaching a maximum around 9 nT, and Bz reaching values down to -8 nT.

Space Weather Outlook
10 February 2010 – 08 March 2010

Solar activity is expected to be low to moderate with a slight chance for a major flare as 1045 remains on the disk from 10-14 February. Activity levels should decrease to low to very low levels for 15-28 February but may increase to low to moderate levels for 01-08 March as old Regions 1045 and 1040 are due to return on 28 February and 01 March, respectively.

No proton events are expected at geosynchronous orbit.

The greater than 2 MeV electron flux at geosynchronous orbit is expected to be at normal levels through most of the period.

The geomagnetic field is expected to be unsettled with a chance for active periods for 10-14 February as a series of CME's associated with activity from Region 1045 may arrive and impact the Earth during this time frame. In addition there is a slight chance for minor storm periods on 12 February due to the expected arrival of the halo CME associated with the M6 event



mentioned previously. Quiet conditions are expected for 15 February, followed by quiet to unsettled levels due to a recurrent coronal hole on 16-17 February. Quiet levels should return and prevail for 18-28 February, followed by an increase to mostly unsettled levels on 01-02 March due to another recurrent coronal hole. Quiet levels should return for the remainder of the period from 03-08 March.



Daily Solar Data

Date	Radio	Sun	Sunspot	X-ray	Flares							
	Flux	spot	Area	Background	X-ray Flux			Optical				
	10.7 cm	No.	(10 ⁻⁶ hemi.)		C	M	X	S	1	2	3	4
01 February	75	16	70	A3.1	0	0	0	0	0	0	0	0
02 February	75	11	50	A3.4	0	0	0	0	0	0	0	0
03 February	74	11	50	A3.2	0	0	0	0	0	0	0	0
04 February	74	11	20	A2.3	0	0	0	0	0	0	0	0
05 February	78	22	30	A2.8	0	0	0	0	0	0	0	0
06 February	88	30	310	B1.1	5	2	0	5	0	0	0	0
07 February	90	51	360	B2.2	5	1	0	6	2	0	0	0

Daily Particle Data

Date	Proton Fluence (protons/cm ² -day-sr)			Electron Fluence (electrons/cm ² -day-sr)		
	>1 MeV	>10 MeV	>100 MeV	>.6 MeV	>2MeV	>4 MeV
01 February	5.3e+05	2.0e+04	4.4e+03		2.7e+05	
02 February	5.9e+05	1.9e+04	4.2e+03		1.5e+06	
03 February	1.2e+06	1.9e+04	4.0e+03		1.0e+07	
04 February	6.4e+05	2.0e+04	4.2e+03		2.5e+07	
05 February	6.4e+05	2.0e+04	4.4e+03		2.2e+07	
06 February	6.4e+05	1.9e+04	4.2e+03		8.5e+06	
07 February	9.8e+05	2.0e+04	4.2e+03		1.2e+06	

Daily Geomagnetic Data

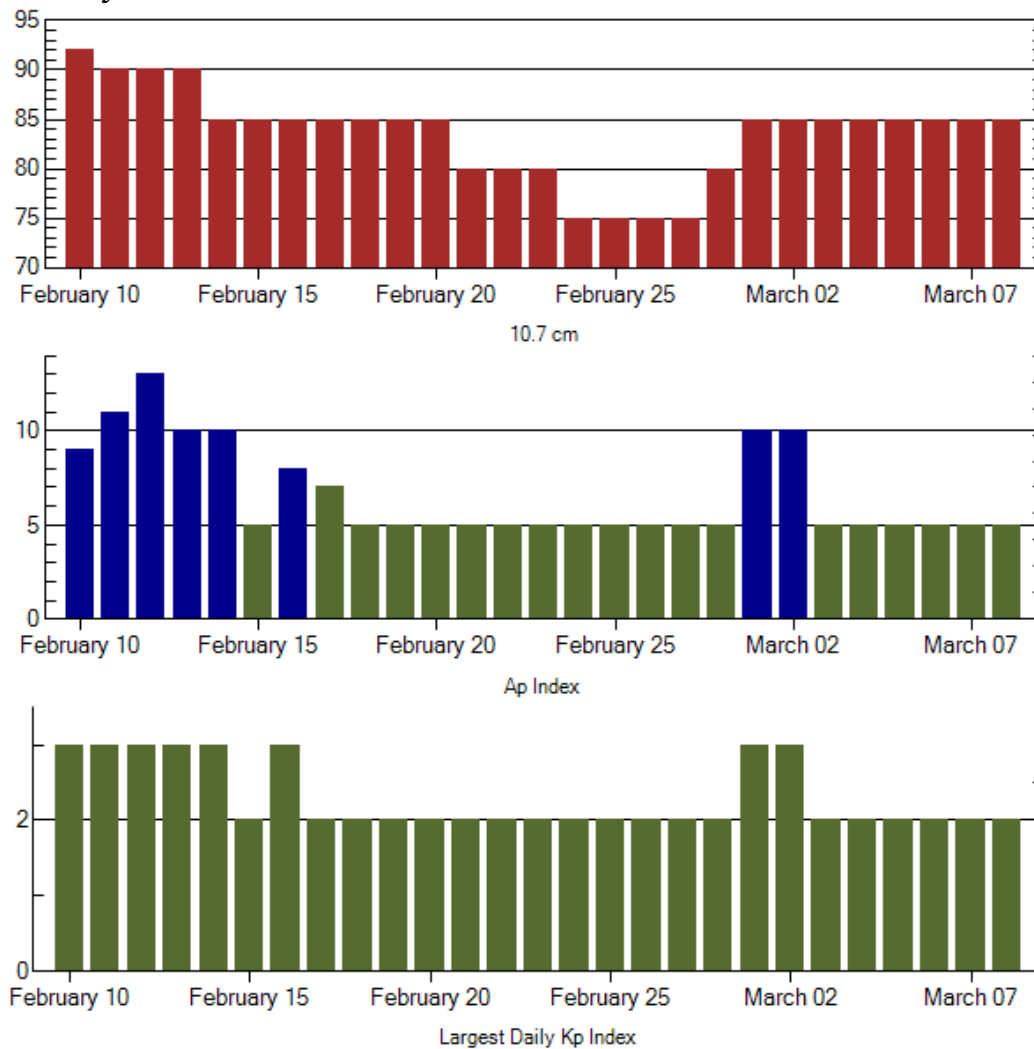
Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
01 February	7	1-0-2-1-3-2-1-3	11	0-0-1-3-5-3-2-1	6	1-1-1-1-2-2-1-3
02 February	7	3-2-1-1-1-1-1-3	10	1-2-1-3-3-3-1-3	9	3-2-1-2-2-2-1-4
03 February	7	3-0-3-2-2-2-1-1	18	4-0-4-4-4-4-1-1	9	3-1-3-3-3-2-2-1
04 February	2	2-1-0-0-1-0-0-1	0	0-0-0-0-0-0-0-0	2	2-1-0-0-0-1-1-1
05 February	0	0-1-0-0-0-0-0-0	1	0-0-0-1-1-0-0-0	3	0-0-0-0-1-2-1-1
06 February	2	0-0-0-0-1-2-1-0	8	0-0-0-1-4-4-1-0	4	0-0-0-0-2-3-1-1
07 February	2	0-0-0-0-0-1-2-2	1	0-0-0-1-0-0-1-1	3	1-0-0-0-0-1-1-2

Alerts and Warnings Issued

Date & Time of Issue	Type of Alert or Warning	Date & Time of Event UTC
02 Feb 2255	WARNING: Geomagnetic K = 4	02 Feb 2256 - 03/0000
02 Feb 2306	ALERT: Geomagnetic K = 4	02 Feb 2305
03 Feb 0019	WARNING: Geomagnetic K = 4	03 Feb 0020 - 1600
07 Feb 0234	ALERT: X-ray Flux exceeded M5	07 Feb 0233
07 Feb 0300	SUMMARY: X-ray Event exceeded M5	07 Feb 0220 - 0239
07 Feb 0312	SUMMARY: 10cm Radio Burst	07 Feb 0233 - 0240
07 Feb 0312	ALERT: Type IV Radio Emission	07 Feb 0230



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
10 Feb	92	9	3	24 Feb	75	5	2
11	90	11	3	25	75	5	2
12	90	13	3	26	75	5	2
13	90	10	3	27	75	5	2
14	85	10	3	28	80	5	2
15	85	5	2	01 Mar	85	10	3
16	85	8	3	02	85	10	3
17	85	7	2	03	85	5	2
18	85	5	2	04	85	5	2
19	85	5	2	05	85	5	2
20	85	5	2	06	85	5	2
21	80	5	2	07	85	5	2
22	80	5	2	08	85	5	2
23	80	5	2				



Energetic Events

Date	Time			X-ray		Optical Information			Peak		Sweep Freq	
	½			Integ		Imp/	Location	Rgn	Radio Flux		Intensity	
	Begin	Max	Max	Class	Flux	Brtns	Lat CMD	#	245	2695	II	IV
06 Feb	1847	1859	1909	M2.9	0.026	SN	N21E17	1045	420			
06 Feb	2131	2137	2142	M1.3	0.007							
07 Feb	0220	0234	0239	M6.4	0.038	1N	N21E10	1045	570	170		

Flare List

Date	Time			X-ray Class.	Imp / Brtns	Optical		Rgn
	Begin	Max	End			Location Lat CMD		
01 February	0535	0553	0601	B3.4				
02 February	No Flares Observed							
03 February	0418	0521	0621	B1.5				
04 February	No Flares Observed							
05 February	1328	1338	1352	B2.5				
	1855	1903	1910	B3.6				
	2235	2241	2253	B1.3				
	2308	2317	2326	B2.8				
	2336	2339	2341	B1.5				
06 February	0125	0129	0135	B1.1				
	0659	0704	0709	C4.0				
	0822	0829	0832	B2.8				
	0942	0945	0948	B1.7				
	1034	1048	1101	C1.0				
	1401	1436	1510	B9.0				
	1534	1536	1600	C3.4	SF	N21E17		1045
	1619	1626	1637		SF	N22E18		1045
	1806	1813	1831	B6.2				
	1852	1903	1933	M2.9	SN	N21E17		1045
07 February	2131	2137	2142	M1.3				
	2229	2229	2236	C2.2	SF	N22E12		1045
	2249	2259	A2323	C2.7	SF	N22E15		1045
	0159	0204	0212		SF	N20E09		1045
	0222	0232	0303	M6.4	1N	N21E10		1045
	0325	0329	0333	C1.1				
	0439	0452	0516	C9.9	1F	N20E07		1045
	0621	0632	0635		SF	N21E08		1045
	0647	0648	0651	B6.3	SF	N21E08		1045
	0801	0804	0809	B7.4	SF	N21E07		1045
	0853	0856	0858	B3.5				
	0918	0924	0929	B3.5				
	0944	1001	1039	B3.4				
	1333	1337	1339	B7.1				
	1833	1835	1844	B8.3	SF	N22E04		1045
	2113	2116	2155	C4.2	SF	N22E02		1045



Flare List - continued

Date	Time			X-ray Class.	Imp / Brtns	Optical	Rgn
	Begin	Max	End			Location Lat CMD	
07 February	2131	2139	2145	C4.2			
	2228	2231	2233	C1.0			

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	4
Region 1041															
19 Jan	S27E90	52						5	2			1			
20 Jan	S25E77	52	60	10	CSO	6	B	9	4			6			
21 Jan	S24E61	55	190	11	CAO	7	B	3				2			
22 Jan	S25E50	52	200	14	ESO	7	B								
23 Jan	S24E35	54	190	11	EAI	9	B								
24 Jan	S24E23	53	170	9	DSI	7	B								
25 Jan	S25E12	52	50	11	CAI	11	B								
26 Jan	S24W03	53	60	4	DSO	7	B								
27 Jan	S25W16	53	40	4	CSO	5	B								
28 Jan	S26W32	55	30	2	HSX	3	A								
29 Jan	S27W42	52	20	2	BXO	2	B								
30 Jan	S27W58	55	10	1	AXX	1	A								
31 Jan	S27W71	55													
01 Feb	S27W84	55													
								17	6	0		9	0	0	0

17 6 0 9 0 0 0 0

Crossed West Limb.

Absolute heliographic longitude: 53



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	
Region 1043																
30 Jan	N27E35	322	40	3	BXO	4	B					1				
31 Jan	N25E24	320	60	5	DSO	4	B					2				
01 Feb	N25E10	321	70	7	CSO	6	B									
02 Feb	N25W05	322	50	1	HSX	1	A									
03 Feb	N25W18	322	50	6	HSX	1	A									
04 Feb	N26W33	324	20	1	HSX	1	A									
05 Feb	N24W50	328	20	1	HAX	1	A									
06 Feb	N25W62	327	20	1	AXX	1	A									
07 Feb	N23W73	325	10	1	AXX	1	A									
								0	0	0		3	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 322

<i>Region 1044</i>															
05 Feb	N18W36	314	10	1	AXX	1	A								
06 Feb	N18W49	314													
07 Feb	N18W62	314													
								0	0	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 314

<i>Region 1045</i>															
06 Feb	N24E15	250	290	8	DKC	9	BG	3	2		5				
07 Feb	N23W01	253	320	19	FKC	18	BG	3	1		6	2			
								6	3	0	11	2	0	0	0

Still on Disk.

Absolute heliographic longitude: 253

<i>Region 1046</i>															
07 Feb	N25E65	187	30	4	BXO	2	B								
								0	0	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 187



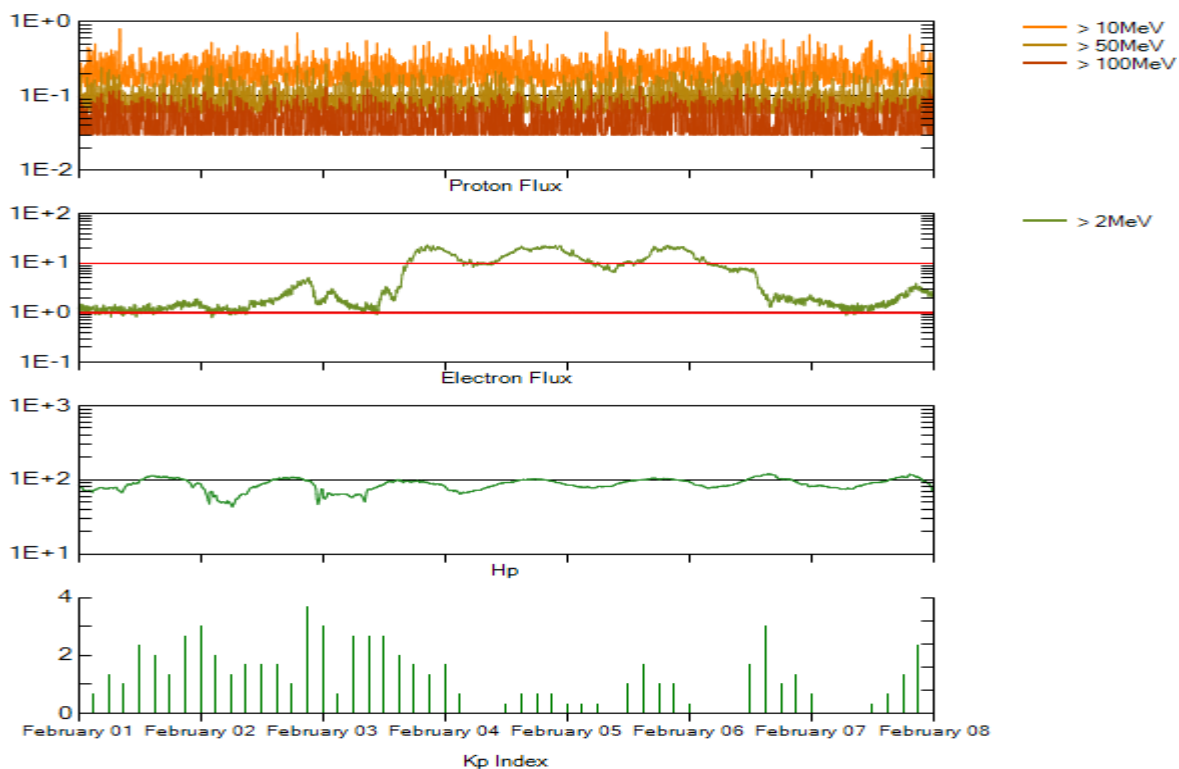
Recent Solar Indices (preliminary)
Of the observed monthly mean values

Month	Sunspot Numbers					Radio Flux		Geomagnetic	
	Observed	values	Ratio	Smooth	values	*Penticton	Smooth	Planetary	Smooth
	SEC	RI	RI/SEC	SEC	RI	10.7 cm	Value	Ap	Value
2008									
February	3.8	2.1	0.55	5.9	3.6	71.1	69.9	11	7.6
March	15.9	9.3	0.58	5.3	3.3	72.9	69.8	11	7.5
April	4.9	2.9	0.59	5.3	3.4	70.2	69.8	9	7.3
May	5.7	3.2	0.56	5.7	3.5	68.4	69.8	6	7.2
June	4.2	3.4	0.81	5.2	3.3	65.9	69.4	7	7.0
July	1.0	0.8	0.80	4.5	2.8	65.7	68.8	5	6.8
August	0.0	0.5	**	4.4	2.7	66.3	68.6	5	6.3
September	1.5	1.1	0.73	3.7	2.3	67.1	68.4	6	5.8
October	5.2	2.9	0.56	2.9	1.8	68.3	68.2	7	5.4
November	6.8	4.1	0.60	2.7	1.7	68.6	68.3	4	5.1
December	1.3	0.8	0.62	2.7	1.7	69.2	68.5	4	4.9
2009									
January	2.8	1.3	0.46	3.0	1.8	69.8	68.7	4	4.7
February	2.5	1.4	0.56	3.1	1.9	70.0	68.8	5	4.7
March	0.7	0.7	1.00	3.4	2.0	69.2	69.0	5	4.6
April	1.2	0.8	1.00	3.7	2.2	69.7	69.3	4	4.3
May	3.9	2.9	0.74	3.8	2.3	70.5	69.7	4	4.1
June	6.6	2.9	0.39	4.4	2.7	68.6	70.2	4	4.0
July	5.0	3.2	0.70	5.8	3.6	68.2	71.0	4	3.8
August	0.3	0.0	0.00			67.4		5	
September	6.6	4.3	0.64			70.5		4	
October	7.0	4.6	0.66			72.3		3	
November	7.7	4.2	0.55			73.6		3	
December	15.7	10.6	0.68			76.8		2	
2010									
January	21.3	13.1	0.62			81.0		2	

NOTE: Values are final except for the most recent 6 months which are considered preliminary. Cycle 23 started in May 1996 with an RI=8.0. Cycle 23 maximum was April 2000 with an RI=120.8.

** SWPC sunspot number was zero so a ratio could not be computed.





Weekly Geosynchronous Satellite Environment Summary
Week Beginning 25 January 2010

GOES-11 designated Primary Proton and Electron Satellite.

Protons plot contains the five-minute averaged integral proton flux (protons/cm²–sec–sr) as measured by GOES-11 (W135) for each of three energy thresholds: greater than 10, 50, and 100 MeV.

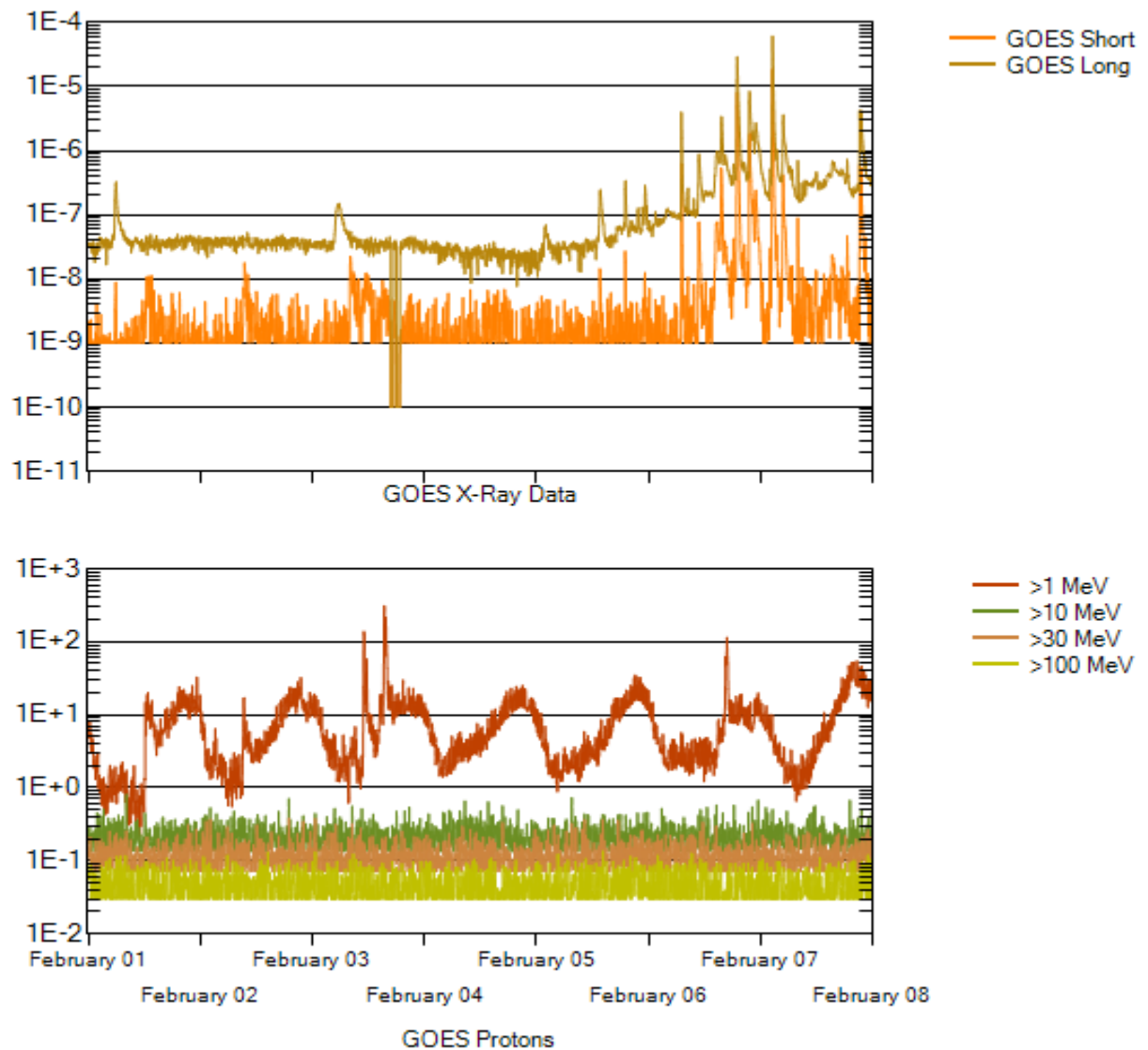
Electrons plot contains the five-minute averaged integral electron flux (electrons/cm²–sec–sr) with energies greater than 2 MeV at GOES-11.

Hp plot contains the five minute averaged magnetic field H - component in nanoteslas (nT) as measured by GOES-11. 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 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 Hartland, UK. These data are made available through cooperation from the Geological Survey of Canada (GSC), British Geological Survey (BGS) 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 SWPC 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 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/m^2) as measured by GOES 14 (W105) in two wavelength bands, 0.05 - 0.4 and 0.1 - 0.8 nm. The letters A, B, C, M and X refer to x-ray event levels for the 0.1 - 0.8 nm band.

Proton plot contains the five-minute averaged integral proton flux ($\text{protons/cm}^2\text{-sec-sr}$) as measured by GOES-11 for each of the energy thresholds: >1, >10, >30 and >100 MeV. P10 event threshold is 10 pfu ($\text{protons/cm}^2\text{-sec-sr}$) at greater than 10 MeV.

