

Space Weather Highlights **15 February – 21 February 2010**

SWO PRF 1799
23 February 2010

Solar activity began the week with low levels on 15 February, with a C1.9 flare from Region 1048 (N21, L=097, class/area Bxo/010 on 15 February). Activity levels decreased to very low for the rest of the period, as Regions 1046 (N24, L=183, class/area Cao/040 on 15 February) and 1048 showed steady decay and simplification, and decayed to spotless plage on 18 February. Region 1049 (S19, L=120, class/area Dsi/060 on 20 February) emerged on the disk on 18 February and produced several B-class flares.

No proton events were observed at geosynchronous orbit.

The greater than 2 MeV electron flux at geosynchronous orbit was at normal background levels.

An interplanetary shock passage was observed on the ACE spacecraft at approximately 15/1725 UTC, followed by a weak geomagnetic sudden impulse at 15/1832 UTC (02 nT, Boulder USGS magnetometer). The shock was likely associated with an impulsive M8.3/1n flare that occurred on 12/1126 UTC. The geomagnetic field was at quiet to active levels on 15-16 February, with an isolated minor storm period observed at high latitudes between 16/0900-1200 UTC. The increased levels were due to periods of enhancement of the interplanetary magnetic field (IMF) associated with a CME passage. The southward component of the IMF showed a minimum of -13 nT at 15/1752 UTC, and the total field showed a maximum of 14nT at 15/1815 UTC. Activity decreased to predominantly quiet levels on 17 February. On 18 February, quiet levels were observed at mid-latitudes, while quiet to unsettled, with a single active period was observed at high latitudes. Predominantly quiet levels were observed for the rest of the period.

Space Weather Outlook **24 February – 22 March 2010**

Solar activity is expected to be predominantly at very low levels through 31 January. Activity is expected to increase to predominantly low levels with a slight chance for isolated intervals of moderate levels from 01-15 February, as old Region 1045 is expected to return on 01 February. Predominantly very low levels are expected on 16 February through the rest of the period.

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 predominantly quiet for 24-28 February. Quiet to unsettled levels are expected on 01-02 March, due to a recurrent coronal hole high-speed stream. Quiet levels are expected to predominate for 03-14 March. Quiet, with isolated unsettled levels are expected on 15-16 March. Activity is expected to return to quiet levels for 17-22 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
15 February	88	27	50	A9.6	1	0	0	0	0	0	0	0
16 February	87	28	50	A7.0	0	0	0	0	0	0	0	0
17 February	87	49	80	A6.5	0	0	0	0	0	0	0	0
18 February	85	17	60	A5.7	0	0	0	0	0	0	0	0
19 February	84	23	60	A5.1	0	0	0	0	0	0	0	0
20 February	84	19	60	A5.1	0	0	0	0	0	0	0	0
21 February	84	17	50	A4.4	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)		
	>1 MeV	>10 MeV	>100 MeV	>.6 MeV	>2MeV	>4 MeV
15 February	8.6e+05	2.0e+04	4.1e+03		8.4e+04	
16 February	9.7e+05	1.9e+04	4.1e+03		1.2e+05	
17 February	1.6e+05	1.9e+04	4.0e+03		4.6e+05	
18 February	5.9e+05	1.9e+04	4.1e+03		7.2e+05	
19 February	4.2e+05	1.9e+04	4.0e+03		1.4e+06	
20 February	4.8e+05	1.9e+04	4.1e+03		1.9e+06	
21 February	5.0e+05	1.8e+04	4.1e+03		1.8e+06	

Daily Geomagnetic Data

Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
15 February	8	2-3-1-1-1-1-3-3	16	2-3-3-4-3-3-3-3	14	3-3-1-2-1-2-4-4
16 February	11	4-1-3-3-1-1-1-3	14	4-2-3-5-1-1-1-1	9	4-2-3-3-0-1-0-3
17 February	2	2-1-0-0-0-0-0-2	3	2-2-1-1-0-0-0-1	4	2-2-0-0-0-0-0-2
18 February	2	0-0-0-0-2-1-1-0	8	4-0-0-0-3-3-2-0	4	0-0-0-0-2-2-2-1
19 February	3	1-0-0-0-1-1-2-2	4	1-0-1-1-3-0-1-1	3	1-0-0-0-1-1-1-2
20 February	0	0-0-0-0-1-0-0-0	0	0-0-0-0-0-1-0-0	1	0-0-0-0-0-0-0-1
21 February	3	3-0-0-0-2-0-1-0	0	0-0-0-0-1-0-0-0	1	0-0-0-0-1-0-0-1

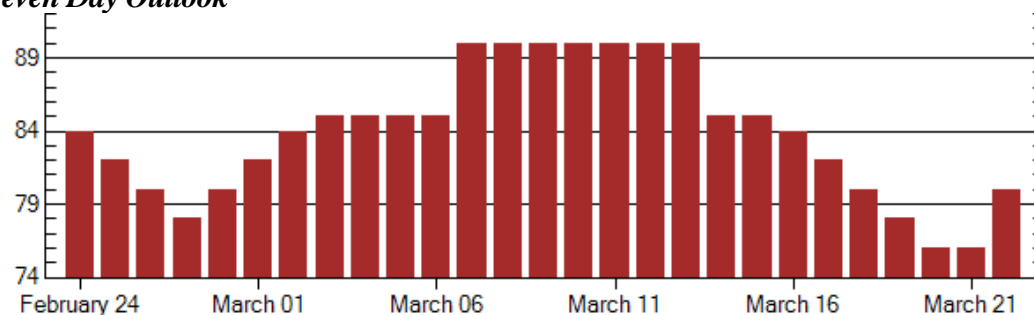


Alerts and Warnings Issued

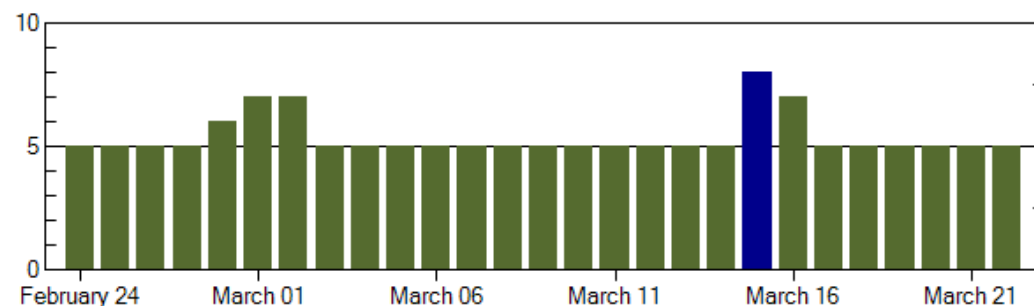
Date & Time of Issue	Type of Alert or Warning	Date & Time of Event UTC
15 Feb 0503	WARNING: Geomagnetic K = 4	15 Feb 0510 - 1600
15 Feb 0516	ALERT: Geomagnetic K = 4	15 Feb 0515
15 Feb 1755	WARNING: Geomagnetic Sudden Impulse expected	15 Feb 1830 - 1900
15 Feb 1757	WARNING: Geomagnetic K = 4	15 Feb 1800 - 2359
15 Feb 1845	SUMMARY: Geomagnetic Sudden Impulse	15 Feb 1832
15 Feb 2048	ALERT: Geomagnetic K = 4	15 Feb 2045
16 Feb 0045	WARNING: Geomagnetic K = 4	16 Feb 0050 - 1600
16 Feb 0053	ALERT: Geomagnetic K = 4	16 Feb 0052
16 Feb 0850	ALERT: Geomagnetic K = 4	16 Feb 0845
16 Feb 0950	ALERT: Geomagnetic K = 4	16 Feb 0950



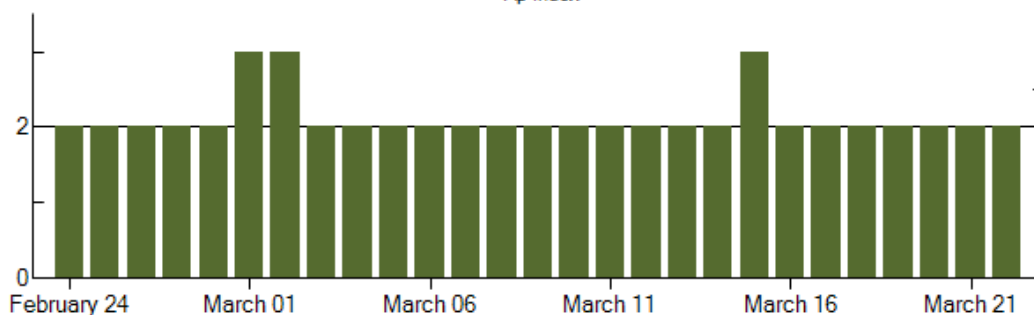
Twenty-seven Day Outlook



10.7 cm



Ap Index



Largest Daily Kp Index

Date	Radio Flux 10.7 cm	Planetary A Index	Largest Kp Index	Date	Radio Flux 10.7 cm	Planetary A Index	Largest Kp Index
24 Feb	84	5	2	10 Mar	90	5	2
25	82	5	2	11	90	5	2
26	80	5	2	12	90	5	2
27	78	5	2	13	90	5	2
28	80	6	2	14	85	5	2
01 Mar	82	7	3	15	85	8	3
02	84	7	3	16	84	7	2
03	85	5	2	17	82	5	2
04	85	5	2	18	80	5	2
05	85	5	2	19	78	5	2
06	85	5	2	20	76	5	2
07	90	5	2	21	76	5	2
08	90	5	2	22	80	5	2
09	90	5	2				



Energetic Events

Date	Time		X-ray		Optical Information			Peak		Sweep Freq
	$\frac{1}{2}$		Integ		Imp/	Location		Radio Flux		Intensity
	Begin	Max	Max	Class	Brtns	Lat	CMD	#	245	2695
<i>No Events Observed</i>										

Flare List

Date	Time			Optical		
	Begin	Max	End	X-ray Class.	Imp / Brtns	Location Lat CMD Rgn
15 February	0105	0116	0134	C1.9		
	1030	1034	1036	B2.3		
	1042	1047	1055	B5.0		
	1530	1534	1556	B1.7		
	1735	1740	1744	B1.9		
16 February	0348	0412	0432	B2.6		
17 February	0647	0653	0702	B1.1		
	0729	0741	0755	B2.6		
	2028	2031	2035	B1.3		
	2341	2344	2352	B1.1		
18 February	0050	0100	0105	B1.3		
	1132	1137	1145	B1.8		
19 February	0905	0916	0933	B2.7		
20 February	0915	0919	0927	B1.2		
21 February	0150	0156	0201	B1.4		
	1112	1216	1226	B1.2		
	1540	1608	1641	B1.4		



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 1045															
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		
08 Feb		N23W17	256	420	20 FKC	35	BGD	13	1			20	1		
09 Feb		N23W26	252	300	19 FKC	25	BGD	2				4			
10 Feb		N22W39	252	240	17 FAI	16	B	2				4			
11 Feb		N22W52	252	150	17 FSI	11	B					1			
12 Feb		N19W63	251	90	22 FSO	5	BG	1	1			2		1	
13 Feb		N24W69	242	10	17 BXO	4	B								
14 Feb		N24W82	242												
								24	5	0	42	3	1	00	

Crossed West Limb.

Absolute heliographic longitude: 253

<i>Region 1046</i>															
07 Feb	N25E65	187	30	4	BXO	2	B								
08 Feb	N24E52	186	30	10	BXO	4	B								
09 Feb	N24E42	184	10	11	BXO	7	B								
10 Feb	N24E28	185	130	10	DSO	8	B								
11 Feb	N23E15	185	190	12	EAC	33	BG	1			2				
12 Feb	N24E00	185	130	11	ESC	13	BG	2	1		2	2			
13 Feb	N23W11	184	130	12	CSO	13	B	1			3				
14 Feb	N24W23	183	70	11	CAO	6	B								
15 Feb	N24W36	183	40	6	CAO	4	B								
16 Feb	N22W49	183	40	3	CRO	3	B								
17 Feb	N22W58	179	30	1	HSX	3	A								
18 Feb	N22W71	179													
19 Feb	N22W84	179													
20 Feb	N22W97	179													
								4	1	0	7	2	0	0	0

Crossed West Limb.

Absolute heliographic longitude: 185



Region Summary - continued

Date	Helio		Location		Sunspot Characteristics			Flares							
	(° Lat ° CMD)	Lon	Area (10 ⁻⁶ hemi)	Extent (helio)	Spot Class	Spot Count	Mag Class	X-ray			Optical				
								C	M	X	S	1	2	3	4

Region 1047

08 Feb	S15E70	169	10	2	AXX	2	A								
09 Feb	S17E61	165	10	1	AXX	1	A								
10 Feb	S18E43	170	10	1	AXX	1	A								
11 Feb	S18E30	170													
12 Feb	S18E17	170													
13 Feb	S18E04	170													
14 Feb	S18W09	170													
15 Feb	S18W22	170													
16 Feb	S18W35	170													
17 Feb	S18W48	170													
18 Feb	S18W61	170													
19 Feb	S18W74	170													
20 Feb	S18W87	170													

0 0 0 0 0 0 0 0

Crossed West Limb.

Absolute heliographic longitude: 170

Region 1048

14 Feb	N20E64	96	10	5	BXO	2	B	1							
15 Feb	N21E50	97	10	5	BXO	3	B								
16 Feb	N21E34	100	10	3	BXO	5	B								
17 Feb	N20E24	97	10	2	AXX	4	A								
18 Feb	N20E11	97													
19 Feb	N20W02	97													
20 Feb	N20W15	97													
21 Feb	N20W28	97													

1 0 0 0 0 0 0 0

Still on Disk.

Absolute heliographic longitude: 97

Region 1049

17 Feb	S19E02	119	40	5	DSO	12	B								
18 Feb	S19W13	121	60	7	DAO	7	B								
19 Feb	S19W25	120	60	8	DSI	13	B								
20 Feb	S19W38	120	60	8	DSI	9	B								
21 Feb	S18W53	121	50	10	CSO	7	B								

0 0 0 0 0 0 0 0

Still on Disk.

Absolute heliographic longitude: 119



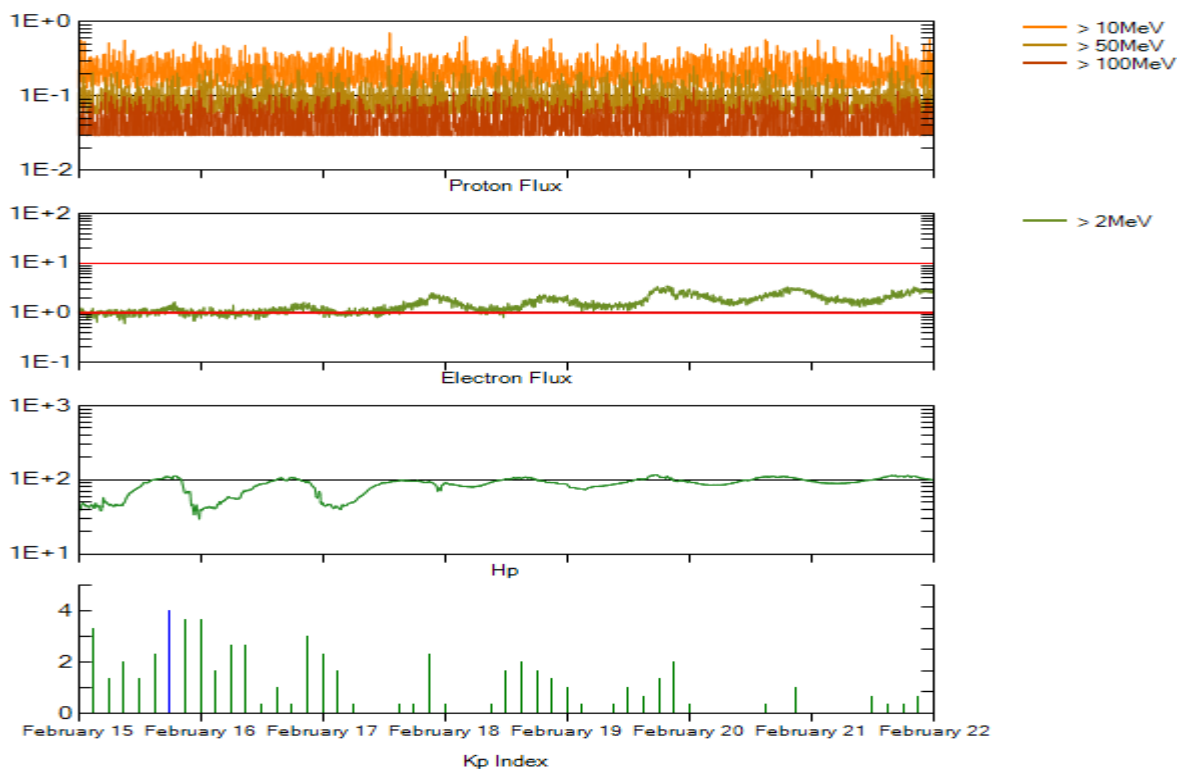
Recent Solar Indices (preliminary)
Of the observed monthly mean values

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	

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 15 February 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.

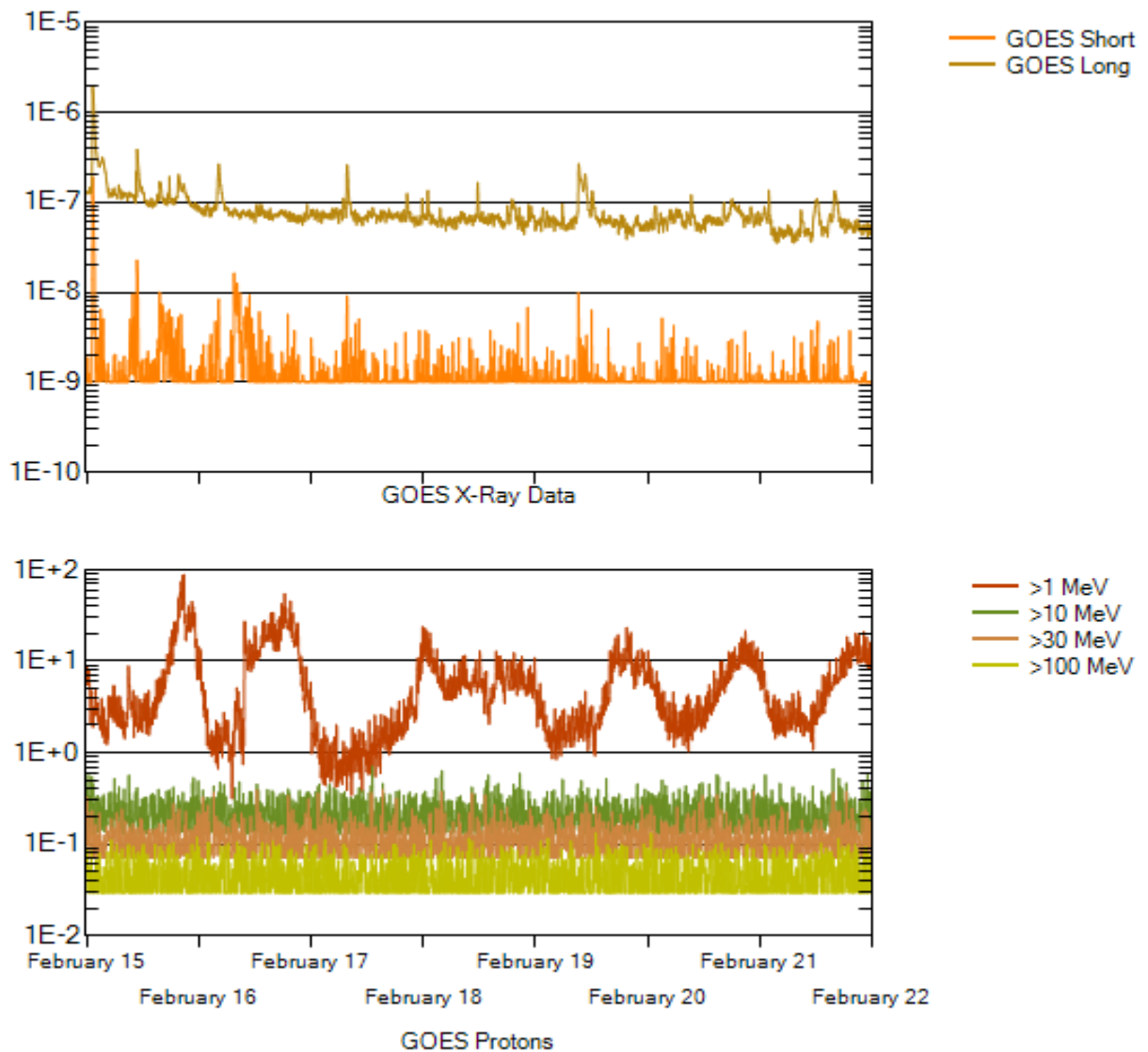
Electrons plot contains the five-minute averaged integral electron flux (electrons/cm²–sec–sr) with energies greater than 2 MeV at GOES-11.

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.

