

Space Weather Highlights
08 February 2010 – 14 February 2010

SWO PRF 1798
16 February 2010

Solar activity began the week at moderate levels on 08 February with 4 M-class events from Region 1045 (N23, L=256, class/area Fkc/420 on 08 February) as well as numerous C-class events. Activity levels decreased to low for 09-11 February as Region 1045 showed steady decay and simplification. However, late on 10 February Region 1046 (N23, L=185, class/area Eac/190 on 11 February) began to grow and began to produce C-level flare activity on 11 February. Activity levels increased to high on 12 February due to an M8/Sn flare at 1126 UTC from Region 1046. The event was associated with a partial halo CME that was primarily directed off the northeast limb and had an approximate plane of sky speed of 550 km/s. Region 1045 also managed to produce an M1/2f flare at 12/1808 UTC. Activity returned to low levels for 13-14 February. Regions 1045 and 1046 both showed a declining trend. New Region 1048 (N20, L=096, class/area Bxo/010 on 14 February) began to rotate around the east limb on 13 February and produced a C9 flare at 13/1239 UTC.

No proton events were observed at geosynchronous orbit.

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

The geomagnetic field was predominantly quiet, with the exception of some brief isolated unsettled periods. Real-time solar wind observations from the ACE spacecraft showed a small increase in velocity, density and total field late on 10 February lasting partway through 11 February. However, these changes were not sufficient to increase geomagnetic activity significantly.

Space Weather Outlook
17 February 2010 – 15 March 2010

Solar activity is expected to be predominantly low with a slight chance for isolated intervals of moderate levels throughout the forecast period. Region 1048 appears to be the most likely source for elevated activity although old Region 1045 is due to return on 28 February and may also contribute to elevated activity levels.

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 17-19 February as a series of CME's associated with activity from Regions 1045 and 1046 could possibly impact the Earth during this time frame. Quiet levels are expected to predominate for 20-28 February. An increase to unsettled with a chance for active periods is possible on 01-02 March due to a recurrent high speed stream. Activity levels are expected to return to quiet for 03-15 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
08 February	94	71	460	B2.7	18	4	0	20	1	0	0	0
09 February	91	63	320	B1.0	3	0	0	4	0	0	0	0
10 February	91	55	380	B1.6	3	0	0	4	0	0	0	0
11 February	94	64	340	B1.6	1	0	0	3	0	0	0	0
12 February	96	38	220	B1.8	3	2	0	4	2	1	0	0
13 February	94	37	140	B2.1	4	0	0	3	0	0	0	0
14 February	89	28	80	B1.6	1	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
08 February	6.0e+05	1.8e+04	3.9e+03		1.3e+06	
09 February	4.4e+05	1.9e+04	4.1e+03		8.6e+05	
10 February	2.8e+05	1.9e+04	4.1e+03		7.0e+05	
11 February	4.3e+05	1.9e+04	3.8e+03		9.1e+05	
12 February	3.0e+05	1.9e+04	4.0e+03		2.4e+05	
13 February	4.0e+05	1.9e+04	4.0e+03		3.2e+05	
14 February	6.8e+05	1.9e+04	4.0e+03		3.8e+05	

Daily Geomagnetic Data

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

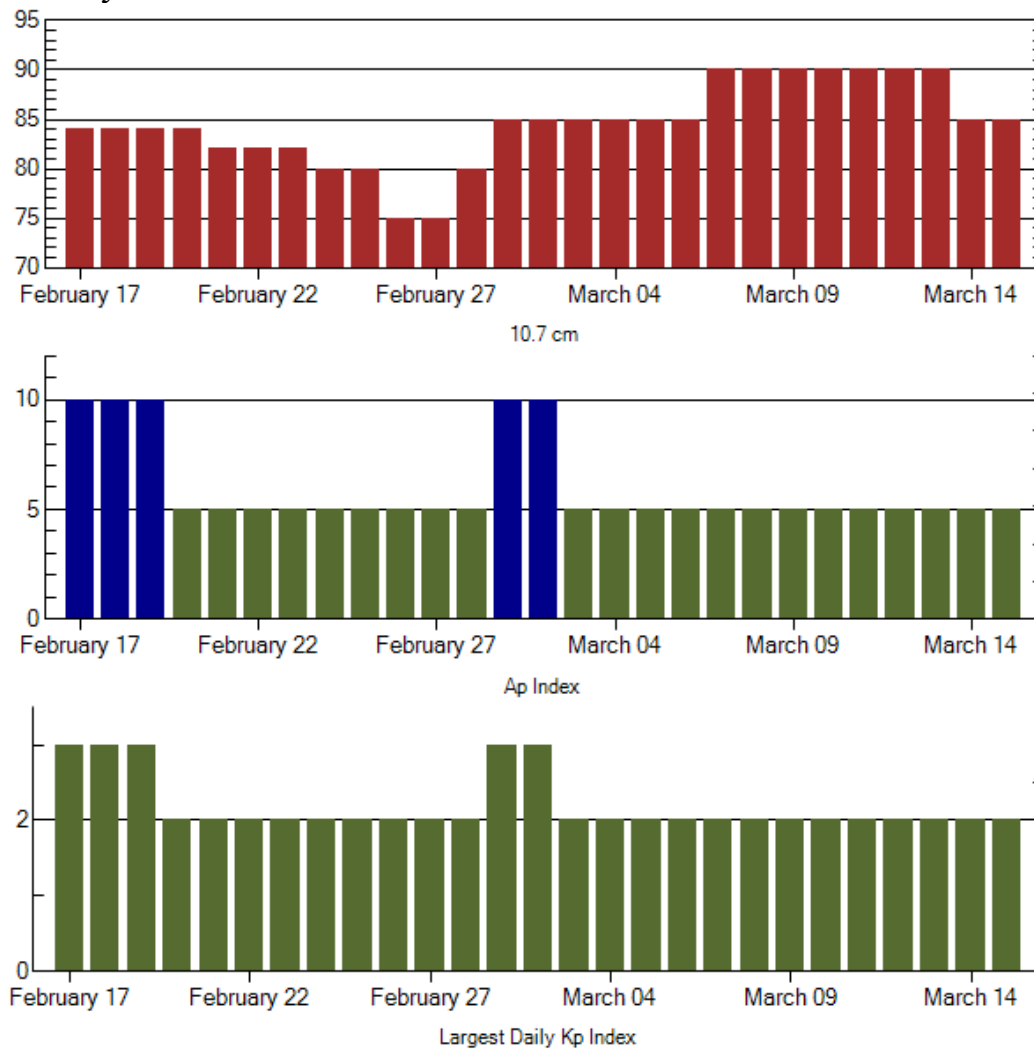


Alerts and Warnings Issued

Date & Time of Issue	Type of Alert or Warning	Date & Time of Event UTC
08 Feb 0428	SUMMARY: 10cm Radio Burst	08 Feb 0413 - 0413
08 Feb 0544	SUMMARY: 10cm Radio Burst	08 Feb 0515 - 0515
08 Feb 0546	SUMMARY: 10cm Radio Burst	08 Feb 0515 - 0516
08 Feb 0647	CANCELLATION: 10cm Radio Burst	
08 Feb 0804	SUMMARY: 10cm Radio Burst	08 Feb 0739 - 0741
08 Feb 2257	WARNING: Geomagnetic Sudden Impulse expected	08 Feb 2300 - 2359
12 Feb 0313	WARNING: Geomagnetic K = 4	12 Feb 0330 - 1600
12 Feb 0823	SUMMARY: 10cm Radio Burst	12 Feb 0723 - 0723
12 Feb 1145	ALERT: X-ray Flux exceeded M5	12 Feb 1126
12 Feb 1234	SUMMARY: X-ray Event exceeded M5	12 Feb 1119 - 1128
12 Feb 1310	SUMMARY: 10cm Radio Burst	12 Feb 1125 - 1126



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
17 Feb	84	10	3	03 Mar	85	5	2
18	84	10	3	04	85	5	2
19	84	10	3	05	85	5	2
20	84	5	2	06	85	5	2
21	84	5	2	07	85	5	2
22	82	5	2	08	90	5	2
23	82	5	2	09	90	5	2
24	82	5	2	10	90	5	2
25	80	5	2	11	90	5	2
26	80	5	2	12	90	5	2
27	75	5	2	13	90	5	2
28	75	5	2	14	90	5	2
01 Mar	80	5	2	15	85	5	2
02	85	10	3				



Energetic Events

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
08 Feb	0736	0743	0746	M4.0	0.013				1045	1000	150		
08 Feb	1157	1203	1206	M1.1	0.003				1045				
08 Feb	1332	1347	1350	M2.0	0.008				1045				
08 Feb	2101	2123	2128	M1.0	0.004	SN	N23W12		1045				
12 Feb	1119	1126	1128	M8.3	0.019	1N	N26E11		1046	11000	350		
12 Feb	1752	1808	1815	M1.1	0.006	2F	N28W53		1045				

Flare List

				Optical			
	Time			X-ray	Imp /	Location	Rgn
Date	Begin	Max	End	Class.	Brtns	Lat CMD	
08 February	0015	0016	0022	C1.4	SF	N22E02	1045
	0110	0114	0116	B5.8			
	0129	0131	0136	B7.0	SF	N21E01	1045
	0236	0237	0245	B7.4	SF	N22W01	1045
	0248	0249	0251	B8.3	SF	N22E00	1045
	0315	0317	0336	C6.2	SF	N23E00	1045
	0338	0343	0345		SF	N22E01	1045
	0355	0356	0402	C2.4	SF	N25E00	1045
	0411	0414	0444	C7.7	SF	N21W01	1045
	0516	0516	0556	C8.6	1F	N21W01	1045
	0557	0607	0625	C6.8	SF	N21W01	1045
	0627	0635	0644		SF	N21W02	1045
	0700	0701	0708	C1.9	SF	N21W03	1045
	0736	0743	0746	M4.0			1045
	0803	0807	0810	C1.9			
	0954	0958	1003	C2.8			
	1100	1114	1118	C1.8			
	1157	1203	1206	M1.1			1045
	1332	1347	1350	M2.0			1045
	1501	1507	1533	C1.2	SF	N22W08	1045
	1535	1550	1609	C1.3	SF	N22W08	1045
	1546	1552	1556	C3.8			
	1655	1705	1709	C1.3	SF	N22W09	1045
	1726	1726	1736	B7.0	SF	N23W08	1045
	1743	1749	1756	B7.7			
	1806	1809	1825	C1.3	SF	N21W09	1045
	1821	1825	1829	B7.8			
	1831	1840	1850		SF	N22W09	1045
	1906	1910	1919	C2.4	SF	N22W10	1045
	1934	1938	1940	C1.7			
	2001	2006	2009	B8.6			
	2121	2122	2140	M1.0	SN	N23W12	1045



Flare List - continued

Date	Time			X-ray Class.	Imp / Brtns	Optical	
	Begin	Max	End			Location Lat CMD	Rgn
08 February	2155	2158	2205	C2.2	SF	N22W11	1045
	2234	2239	2244	B8.4			
09 February	0013	0029	0054	B6.1			
	0119	0123	0144	C2.7	SF	N22W13	1045
	0412	0417	0430	C2.4	SF	N21W17	1045
	0744	0747	0750	B1.8			
	0816	0817	0820		SF	N21W20	1045
	0847	0847	0856	B6.5	SF	N22W18	1045
	1024	1031	1046	B2.5			
	1124	1131	1139	C1.8			
10 February	1737	1741	1748	B2.4			
	0023	0026	0028	C1.5			
	0215	0220	0225	B2.8			
	0556	0559	0602	B3.4			
	0613	0614	0618	B8.6	SF	N20W28	1045
	0710	0712	0715	B4.8	SF	N20W29	1045
	0716	0719	0721	B7.7			
	0808	0812	0817	B4.2			
	1143	1150	1156	B3.4			
	1505	1517	1528	C1.2	SF	N22W33	1045
	1511	1512	1521	C3.7	SF	N21W32	1045
	2203	2210	2216	B9.5			
11 February	2312	2315	2318	B3.8			
	0150	0151	0155	B3.5	SF	N21W39	1045
	0557	0615	0627	B6.5			
	1430	1434	1442	B2.3			
	1511	1512	1519	B5.2	SF	N23E19	1046
	1700	1704	1709	B2.5			
	1930	1939	1951	C1.1	SF	N23E17	1046
	2202	2205	2210	B2.6			
12 February	0354	0358	0401	B3.2			
	0722	0724	0737	C7.9	1N	N24E13	1046
	0941	0941	0949	B9.6	SF	N22E07	1046
	B1127	U1127	A1140	M8.3	1N	N26E11	1046
	1242	1246	1249	B8.9			
	1525	1529	1532	B6.2			
	1546	1551	1554	B6.5			
	1759	1807	1841	M1.1	2F	N28W53	1045
	2049	2052	2059	C1.3	SF	N22E01	1046
	2237	2243	2254	C3.0	SF	N25W56	1045
	2355	0000	0031		SF	N23W60	1045



Flare List - continued

Date	Time			X-ray Class.	Imp / Brtns	Optical	
	Begin	Max	End			Location Lat CMD	Rgn
13 February	0143	0143	0147	B7.9	SF	N25E02	1046
	0239	0323	0329	B5.1			
	0746	0752	0806	C4.3			
	1228	1239	1248	C9.6			
	1812	1817	1821	B4.3	SF	N25W13	1046
	2001	2003	2009	C2.7			
	2042	2052	2105	C3.0	SF	N25W04	1046
	2328	2332	2336	B5.3			
14 February	0852	0901	0909	B6.5			
	1149	1204	1218	C4.3			
	2007	2012	2023	B2.7			
	2133	2138	2141	B2.5			



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 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								
08 Feb	N23W86	325													
								0	0	0	3	0	0	0	0
Crossed West Limb.															
Absolute heliographic longitude: 322															
Region 1044															
05 Feb	N18W36	314	10	1	AXX	1	A								
06 Feb	N18W49	314													
07 Feb	N18W62	314													
08 Feb	N18W75	314													
09 Feb	N18W88	314													
								0	0	0	0	0	0	0	0
Crossed West Limb.															
Absolute heliographic longitude: 314															
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	4		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	8	0	42	3	1	0	0
Still on Disk.															
Absolute heliographic longitude: 253															



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 1046														
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							
								4	1	0	7	2	0	0

Still on Disk.

Absolute heliographic longitude: 185

<i>Region 1047</i>															
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													
								0	0	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 170

<i>Region 1048</i>															
14 Feb	N20E64	96	10	5	BXO	2	B	1							
								1	0	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 96



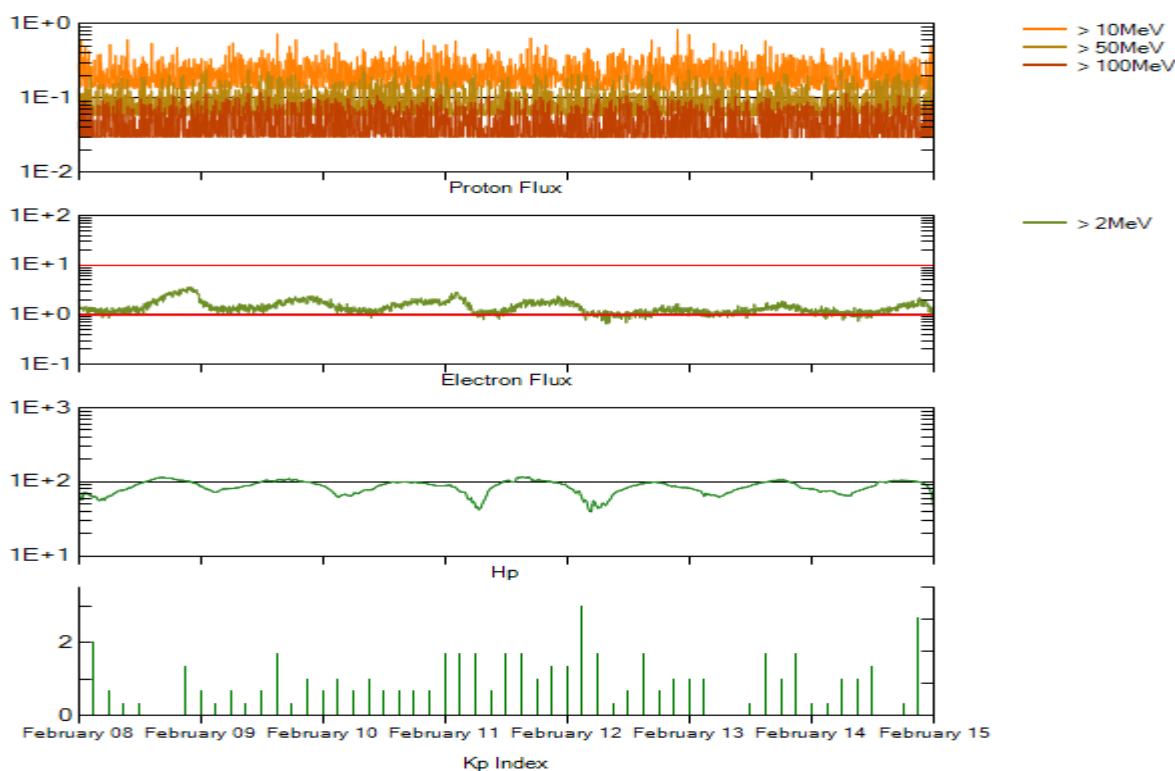
Recent Solar Indices (preliminary)
Of the observed monthly mean values

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 08 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.

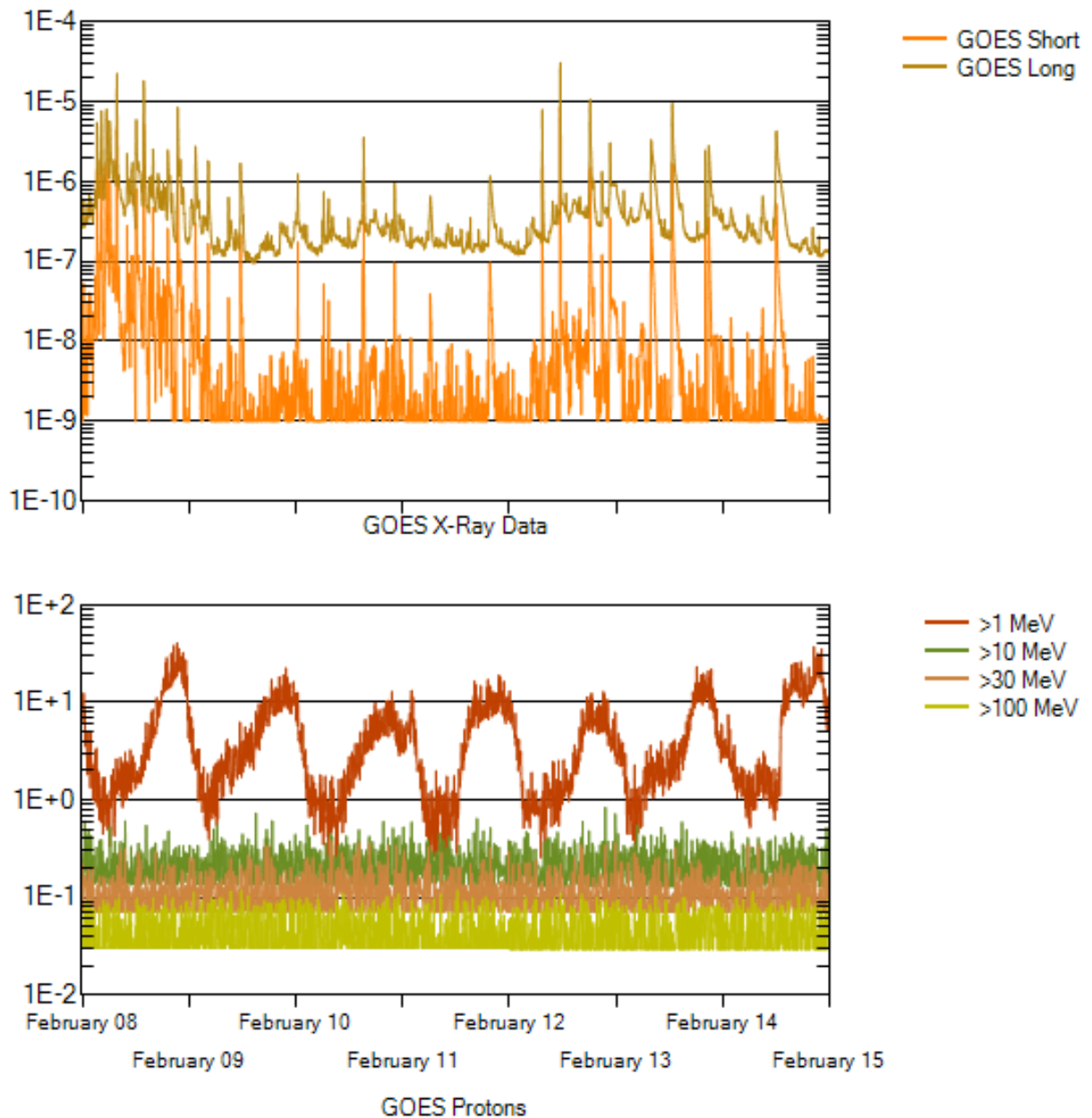
Electrons plot contains the five-minute averaged integral electron flux (electrons/cm²–sec–sr) with energies greater than 2 MeV at GOES-11.

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.

