

Space Weather Highlights
20 December - 26 December 2010

SWPC PRF 1843
28 December 2010

Solar activity was at very low to low levels throughout the period with no flares detected. A partial-halo CME departed the southwest quadrant early on 23 December associated with a filament eruption.

No Proton events were observed at geosynchronous orbit.

The greater than 2 MeV electron flux at geosynchronous orbit remained at normal levels throughout the period.

Geomagnetic activity was at quiet to unsettled levels on 20 December with active to minor storm levels detected at high latitudes. Activity decreased to quiet levels during 21-26 December. The activity observed on 20 December was associated with a period of enhanced IMF B_t (peak 10 nT at 20/0404 UTC) coupled with southward IMF B_z (maximum deflection -8 nT at 20/0758 UTC).

Space Weather Outlook
29 December 2010 - 24 January 2011

Solar activity is expected to be at very low levels with a slight chance for C-class activity throughout 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 between 29 December and 11 January. Flux levels are expected to increase to moderate to high levels from 12-13 January. Normal levels are expected for the remainder of the period.

Geomagnetic field activity is expected to be quiet to unsettled on 29 December, due to subsiding affects of the aforementioned CME, before decreasing to quiet levels and remaining through 1 January. Activity is expected to increase to quiet to unsettled levels 2-4 January due to HSS effects from a large coronal hole in the northeast quadrant of the disk. The field is expected to return to quiet from 5-19 January. With recurrent CH HSS effects expected, conditions are expected to be quiet to unsettled 20-21 January, before subsiding to mostly quiet levels for the remainder of the period.



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
20 December	78	0	0	A3.7	0	0	0	0	0	0	0	0
21 December	78	0	0	A3.5	0	0	0	0	0	0	0	0
22 December	78	0	0	A3.3	0	0	0	0	0	0	0	0
23 December	80	0	0	A3.3	0	0	0	0	0	0	0	0
24 December	79	0	0	A3.4	0	0	0	0	0	0	0	0
25 December	79	28	30	A3.5	0	0	0	0	0	0	0	0
26 December	81	28	20	A3.5	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
20 December	2.5e+05	1.3e+04	3.3e+03		4.1e+06	
21 December	7.1e+04	1.3e+04	3.2e+03		2.5e+06	
22 December	9.6e+04	1.4e+04	3.3e+03		3.1e+06	
23 December	1.6e+05	1.4e+04	3.4e+03		3.5e+06	
24 December	2.0e+05	1.4e+04	3.3e+03		3.3e+06	
25 December	4.0e+05	1.4e+04	3.6e+03		3.2e+06	
26 December	2.5e+05	1.4e+04	3.6e+03		2.0e+06	

Daily Geomagnetic Data

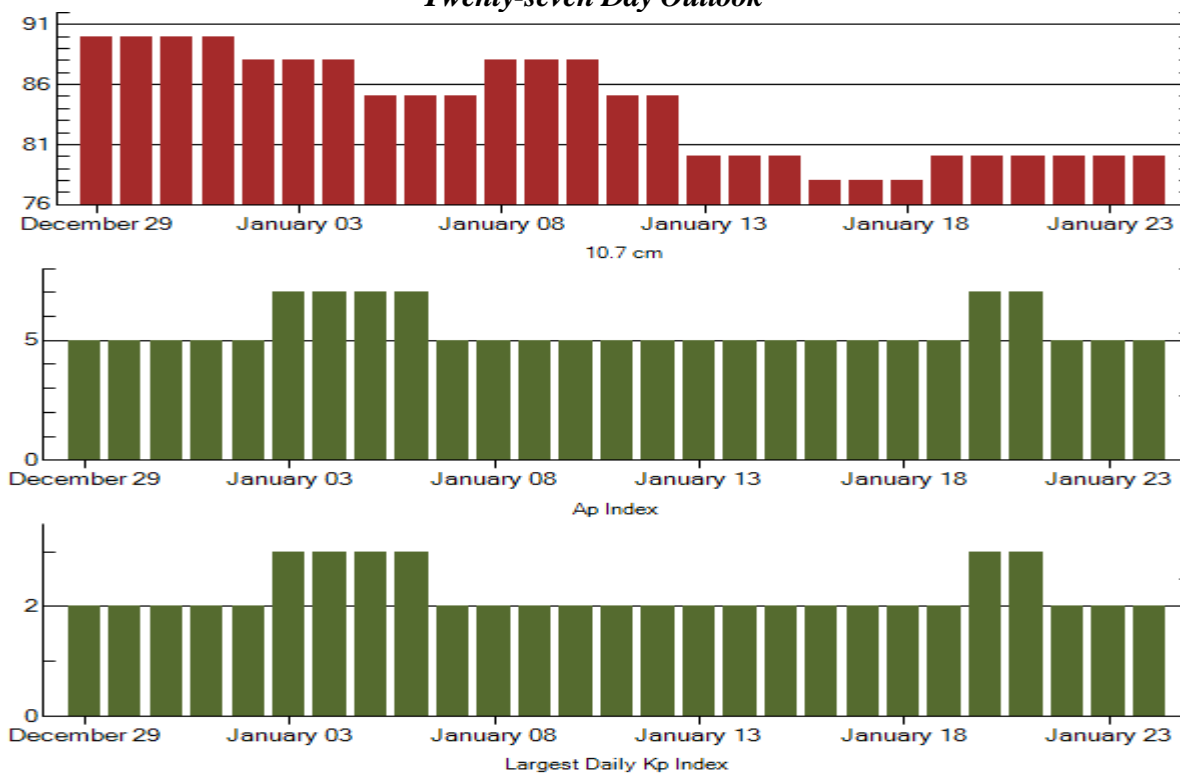
Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
20 December	6	1-3-1-2-1-1-2-2	17	0-2-4-5-4-3-2-2	8	1-3-2-2-2-2-2-3
21 December	1	0-0-0-0-0-1-1-0	1	0-0-0-1-1-0-0-0	1	0-1-0-0-1-0-0-0
22 December	1	0-0-0-0-1-2-0-0	0	0-0-0-1-0-0-0-0	0	0-0-0-0-0-0-0-0
23 December	1	0-0-0-0-0-2-0-1	1	0-0-0-2-0-0-0-0	0	0-0-0-0-0-0-0-0
24 December	3	1-2-1-0-1-2-0-0	3	0-0-2-2-2-1-0-0	3	1-2-1-0-1-1-0-0
25 December	4	1-1-2-1-0-2-1-1	4	0-0-2-2-2-2-1-0	5	1-2-2-1-1-2-1-1
26 December	2	1-0-1-0-1-1-1-1	1	0-0-1-1-1-0-0-0	2	1-0-1-0-0-0-0-1

Alerts and Warnings Issued

Date & Time of Issue	Type of Alert or Warning	Date & Time of Event UTC
20 Dec 0429	WARNING: Geomagnetic K = 4	20 Dec 0430 - 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
29 Dec	90	5	2	12 Jan	85	5	2
30	90	5	2	13	80	5	2
31	90	5	2	14	80	5	2
01 Jan	90	5	2	15	80	5	2
02	88	5	2	16	78	5	2
03	88	7	3	17	78	5	2
04	88	7	3	18	78	5	2
05	85	7	3	19	80	5	2
06	85	7	3	20	80	7	3
07	85	5	2	21	80	7	3
08	88	5	2	22	80	5	2
09	88	5	2	23	80	5	2
10	88	5	2	24	80	10	5
11	85	5	2				



Energetic Events

Energy Events											
Date	Time			X-ray		Optical Information			Peak		Sweep Freq
	$\frac{1}{2}$			Integ		Imp/	Location	Rgn	Radio Flux		Intensity
	Begin	Max	Max	Class	Flux	Brtns	Lat CMD	#	245	2695	II IV

No Events Observed

Flare List

Date	Time			X-ray Class.	Imp / Brtns	Optical		Rgn
	Begin	Max	End			Location		
						Lat	CMD	
20 December	No Flares Observed							
21 December	No Flares Observed							
22 December	No Flares Observed							
23 December	No Flares Observed							
24 December	No Flares Observed							
25 December	No Flares Observed							
26 December	No Flares Observed							

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 1135

13 Dec	N18E56	75			AXX	1	A								
14 Dec	N18E43	75													
15 Dec	N18E30	75									1				
16 Dec	N19E17	76	20	3	BXO	2	B								
17 Dec	N19E02	78		1	AXX	1	A								
18 Dec	N19W11	78													
19 Dec	N19W24	78													
20 Dec	N19W37	78													
21 Dec	N19W50	78													
22 Dec	N19W63	78													
23 Dec	N19W76	78													
24 Dec	N19W89	78													

1 0 0 0 0 0 0 0

Crossed West Limb.

Absolute heliographic longitude: 78

Region 1136

25 Dec	S22W57	30	10	4	BXO	3	B								
26 Dec	S22W71	31	10	4	BXO	2	B								

0 0 0 0 0 0 0 0

Still on Disk.

Absolute heliographic longitude: 30



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 1137</i>															
25 Dec	N18E23	311	20	5	CRO	5	B								
26 Dec	N18E10	310	10	5	BXO	6	B								
								0	0	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 310

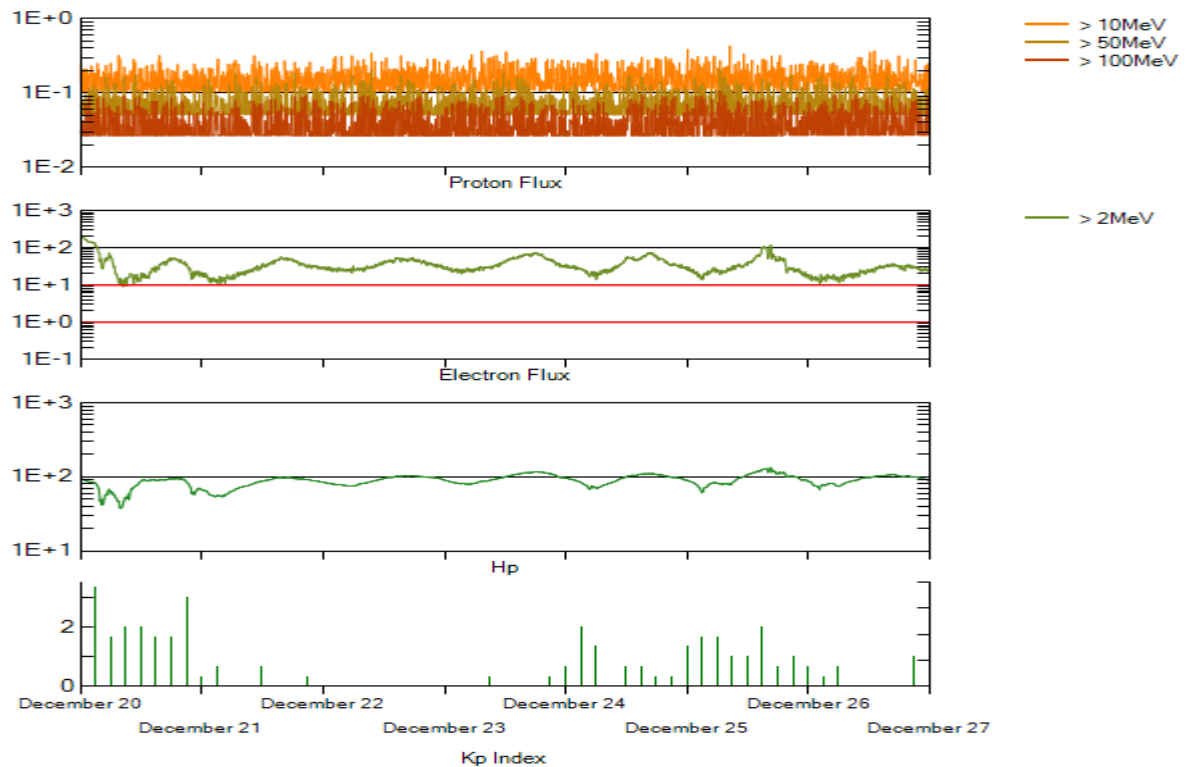


Recent Solar Indices (preliminary)
Of the observed monthly mean values

Month	Sunspot Numbers				Radio Flux		Geomagnetic		
	Observed values SEC	Ratio RI	Ratio RI/SEC	Smooth values SEC	Smooth values RI	Penticton 10.7 cm	Smooth Value	Planetary Ap	Smooth Value
2008									
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	3.9
August	0.3	0.0	0.00	7.7	4.8	67.4	72.1	5	3.8
September	6.6	4.3	0.64	9.9	6.2	70.5	73.3	4	3.8
October	7.0	4.8	0.66	11.3	7.1	72.3	74.1	3	4.1
November	7.7	4.1	0.55	12.4	7.6	73.6	74.5	3	4.5
December	15.7	10.8	0.68	13.6	8.3	76.8	74.9	2	4.8
2010									
January	21.3	13.2	0.62	14.8	9.3	81.1	75.5	3	5.0
February	31.0	18.8	0.60	16.7	10.6	84.7	76.5	5	5.1
March	24.7	15.4	0.62	19.1	12.3	83.3	77.5	5	5.3
April	11.2	8.0	0.71	21.4	14.0	75.9	78.3	10	5.5
May	19.9	8.7	0.44	23.8	15.5	73.8	79.0	8	5.7
June	17.9	13.6	0.75			72.6		7	
July	23.1	16.1	0.70			79.9		5	
August	28.2	19.6	0.70			79.7		8	
September	35.6	25.2	0.71			81.1		5	
October	35.0	23.5	0.67			81.6		6	
November	36.1	21.6	0.60			82.5		5	

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. Solar minimum for cycle 23 was December 2008.





Weekly Geosynchronous Satellite Environment Summary
Week Beginning 20 December 2010

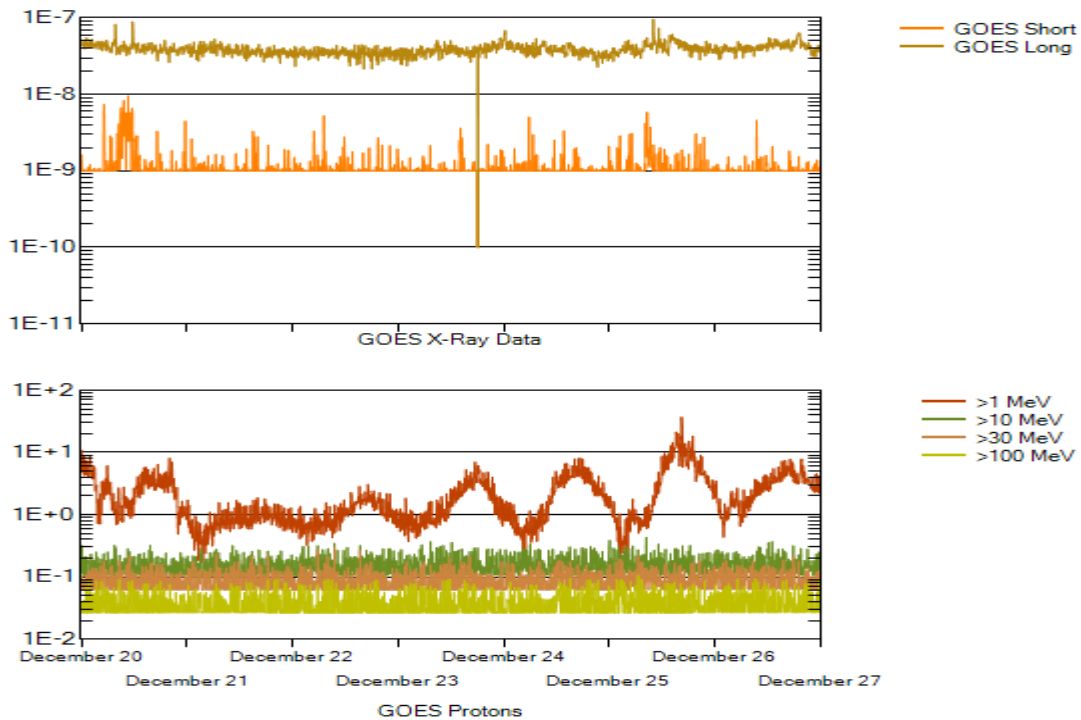
The proton flux plot contains the five-minute averaged integral proton flux (protons/cm²–sec–sr) as measured by GOES-13 (W75) for each of three energy thresholds: greater than 10, 50, and 100 MeV. The electron flux plot contains the five-minute averaged integral electron flux (electrons/cm²–sec–sr) with energies greater than 2 MeV at GOES-13.

The Hp plot contains the five minute averaged Hp magnetic field component in nanoteslas (nT) as measured by GOES-13. The Hp 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 *Week Beginning 20 December 2010*

The 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.

The proton plot contains the five-minute averaged integral proton flux ($\text{protons/cm}^2\text{-sec-sr}$) as measured by GOES-13 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.

