

Space Weather Highlights
07 December – 13 December 2009

SWO PRF 1789
15 December 2009

Solar activity was very low for the first three days of the summary period. Low activity was observed on 10 December as new Region 1034 (N18, L=250, class/area Bxo/010 on 09 December) emerged on the disk and produced a C-flare at 10/1057UTC. This region continued as a small bi-polar group for the remainder of the period and showed signs of slow decay on 13 December.

No proton events were observed at geosynchronous orbit.

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

The geomagnetic field was predominantly quiet throughout the summary period. Solar wind observations from the ACE spacecraft showed velocities ranged from 375 km/s, starting the period, to 255 km/s at the end of the period. Interplanetary magnetic field activity showed intermittent periods of Bz fluctuations from +6 to -4 nT.

Space Weather Outlook
16 December 2009 – 11 January 2010

Solar activity is expected to be predominantly very low with a slight chance for brief periods of low.

No proton events are expected at geosynchronous orbit.

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

The geomagnetic field is expected to be mostly quiet for the forecast period. The exception would be for a slight chance of quiet to unsettled levels possible for 18 December due to a recurrent high speed stream.



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
07 December	71	0	0	<A1.0	0	0	0	0	0	0	0	0
08 December	72	0	0	<A1.0	0	0	0	0	0	0	0	0
09 December	73	13	10	<A1.0	0	0	0	0	0	0	0	0
10 December	74	13	10	<A1.0	1	0	0	0	0	0	0	0
11 December	72	13	10	<A1.0	0	0	0	0	0	0	0	0
12 December	75	12	10	<A1.0	0	0	0	0	0	0	0	0
13 December	76	14	10	A1.2	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
07 December	4.4e+05	2.0e+04	4.4e+03		4.3e+04	
08 December	3.7e+05	2.1e+04	4.5e+03		3.9e+04	
09 December	4.0e+05	2.0e+04	4.6e+03		4.5e+04	
10 December	4.0e+05	2.0e+04	4.6e+03		4.5e+04	
11 December	3.8e+05	2.0e+04	4.6e+03		5.3e+04	
12 December	5.7e+05	2.0e+04	4.7e+03		4.9e+04	
13 December	4.4e+05	2.1e+04	4.8e+03		4.2e+04	

Daily Geomagnetic Data

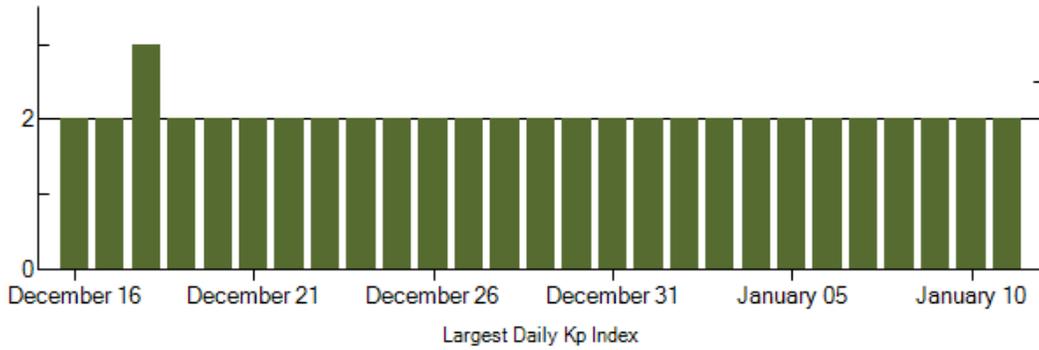
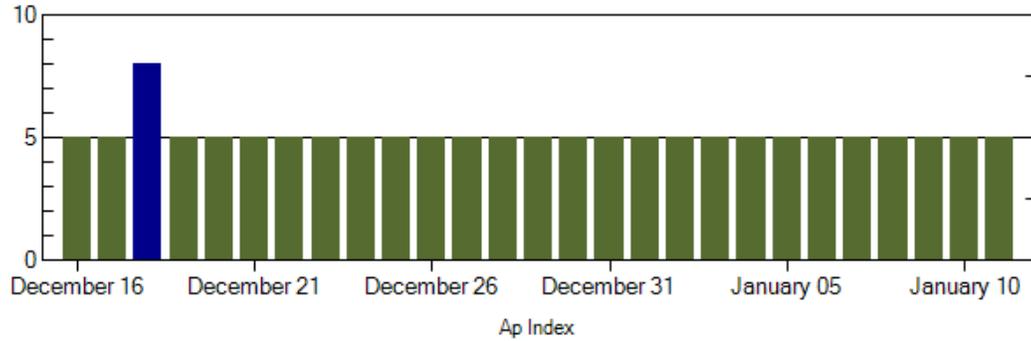
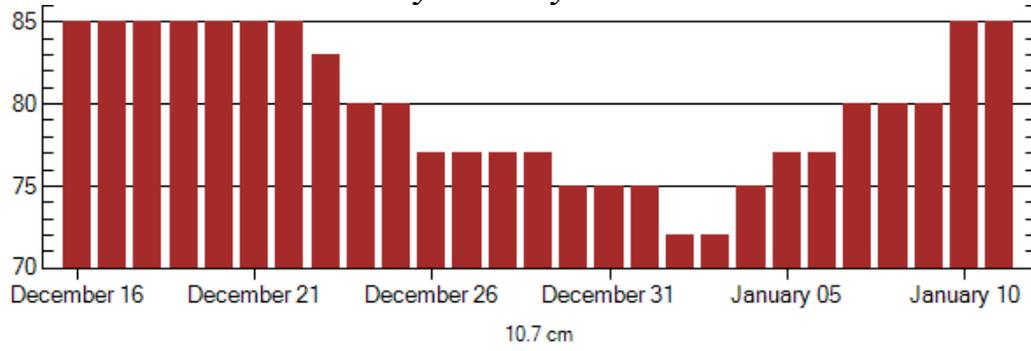
Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
	07 December	2	0-0-0-1-1-2-1-0	1	0-0-1-1-0-0-0-0	2
08 December	0	0-0-0-0-0-0-0-0	0	0-0-0-0-0-0-0-0	1	0-0-0-0-0-0-0-0
09 December	0	0-0-0-0-0-1-0-0	0	0-0-0-0-0-0-0-0	0	0-0-0-0-0-0-0-0
10 December	1	0-0-0-0-1-1-1-0	0	0-0-0-0-0-0-0-0	1	0-0-0-0-1-0-0-1
11 December	0	0-0-0-0-0-1-0-0	0	0-0-0-0-0-0-0-0	0	0-0-0-0-0-0-0-0
12 December	2	0-0-1-0-1-1-1-1	0	0-0-0-1-0-0-0-0	1	0-0-0-0-0-0-0-1
13 December	1	0-0-1-1-1-0-0-0	1	0-0-0-1-2-0-0-0	2	0-0-1-1-1-0-0-0

Alerts and Warnings Issued

Date & Time of Issue	Type of Alert or Warning	Date & Time of Event UTC
<i>No Alerts Issued</i>		



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
16 Dec	85	5	2	30 Dec	75	5	2
17	85	5	2	31	75	5	2
18	85	8	3	01 Jan	75	5	2
19	85	5	2	02	72	5	2
20	85	5	2	03	72	5	2
21	85	5	2	04	75	5	2
22	85	5	2	05	77	5	2
23	83	5	2	06	77	5	2
24	80	5	2	07	80	5	2
25	80	5	2	08	80	5	2
26	77	5	2	09	80	5	2
27	77	5	2	10	85	5	2
28	77	5	2	11	85	5	2
29	77	5	2				



Energetic Events

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

No Events Observed

Flare List

Date	Time			X-ray	Imp /	Optical	Rgn
	Begin	Max	End	Class.	Brtns	Location Lat CMD	
07 December	No Flares Observed						
08 December	No Flares Observed						
09 December	2004	2017	2025	B2.3			
10 December	1056	1057	1059	C3.4		N20E59	1034
	1445	1452	1456	B1.4		N20E59	1034
11 December	No Flares Observed						
12 December	No Flares Observed						
13 December	0917	0925	0928	B1.4			
	1658	1702	1705	B1.9			
	1749	1752	1754	B1.1			
	1838	1843	1845	B1.6			
	1959	2002	2005	B1.1			

Region Summary

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

Region 1034

09 Dec	N18E73	250	10	6	BXO	3	B											
10 Dec	N20E59	250	10	5	BXO	3	B											
11 Dec	N20E45	251	10	2	BXO	3	B											
12 Dec	N20E32	251	10	4	BXO	2	B											
13 Dec	N19E16	254	10	5	BXO	4	B											
								0	0	0	0	0	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 254



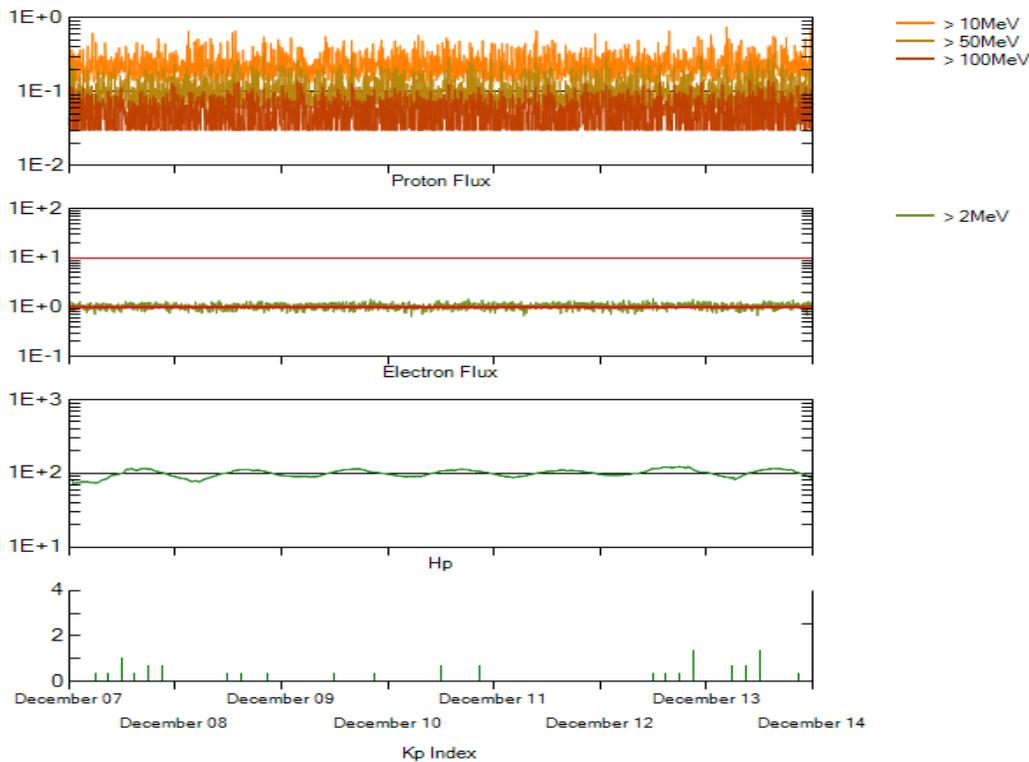
Recent Solar Indices (preliminary)
Of the observed monthly mean values

Month	Sunspot Numbers			Smooth values		Radio Flux		Geomagnetic	
	Observed SEC	values RI	Ratio RI/SEC	SEC	RI	*Penticton 10.7 cm	Smooth Value	Planetary Ap	Smooth Value
2007									
December	16.2	10.1	0.62	8.1	4.9	78.5	70.8	6	7.8
2008									
January	5.1	3.3	0.65	6.9	4.2	74.3	70.3	8	7.8
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	1.9	68.3	68.2	7	5.4
November	6.8	4.1	0.60	2.7	1.8	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	1.2	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	2.6	0.39			68.6		4	
July	5.0	3.5	0.70			68.2		4	
August	0.3	0.0	0.00			67.4		5	
September	6.6	4.2	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	

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 07 December 2009*

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.

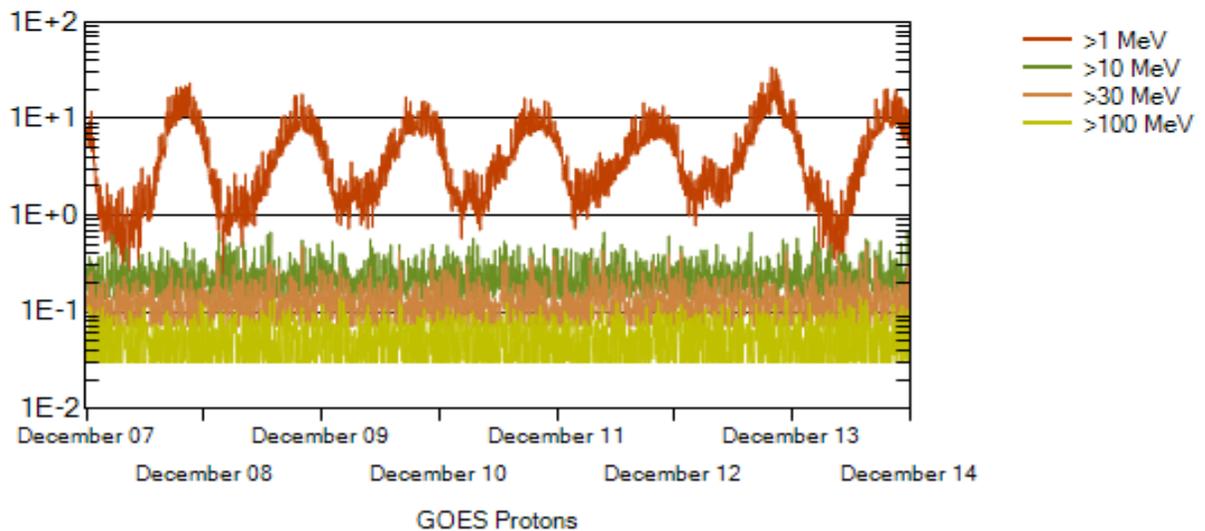
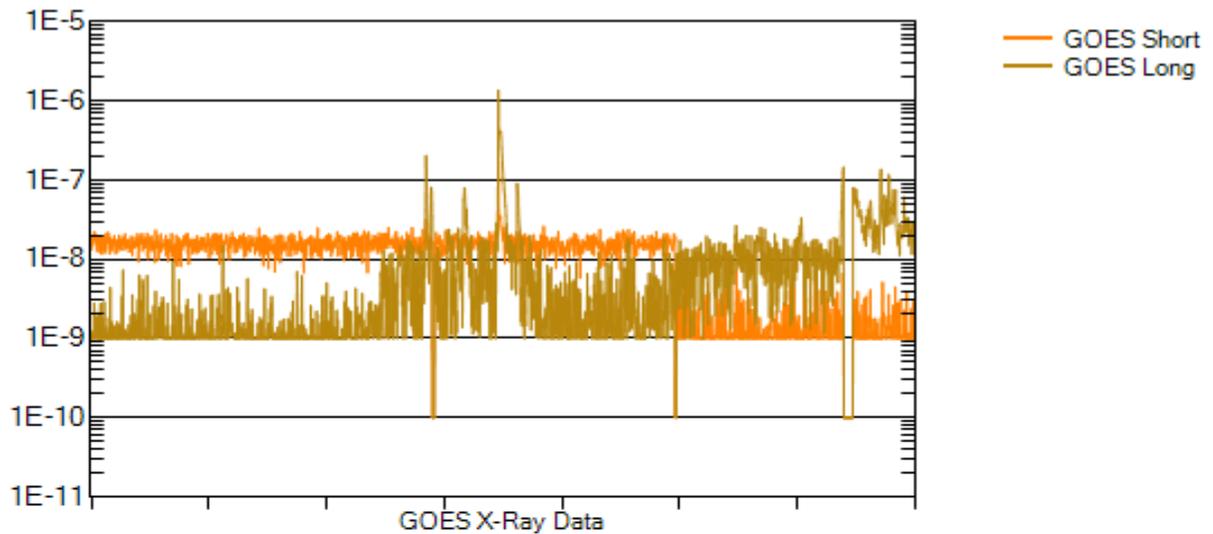
Electrons plot contains the five-minute averaged integral electron flux (electrons/cm²-sec -sr) with energies greater than 2 MeV at GOES-11.

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.

