

Space Weather Highlights
22 - 28 December 2008

SWO PRF 1739
30 December 2008

Solar activity was very low. The visible disk was spotless during the entire summary period. Four weak CMEs off the northeast limb were observed by SOHO Lasco imagery between 27/0530 - 27/1818 UTC.

No proton events were observed at geosynchronous orbit.

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

Geomagnetic field activity was at mostly quiet levels at all latitudes on 22-25 December. Isolated unsettled activity was observed during this period, with a single active period observed at high latitudes late on 23 December. This activity was due to a co-rotating interaction region, followed by a recurrent coronal hole high-speed stream. The geomagnetic field returned to quiet levels at all latitudes on 26 - 28 December. ACE solar wind measurements began the period with a speed of 299 km/s, reached a high of 578 km/s at 23/1419 UTC, and ended the summary period at 312 km/s. The Bz component of the IMF ranged between a low of -10 nT (22/1545 UTC) and a high of +9.8 nT (22/1626Z).

Space Weather Outlook
31 December 2008 - 26 January 2009

Solar activity is expected to be at very low levels.

No proton events are expected at geosynchronous orbit.

The greater than 2 MeV electron flux at geosynchronous orbit is expected to reach high levels during 02 - 06 January. Normal levels are expected 31 December - 01 January and again on 07 - 26 January.

Geomagnetic field activity is expected to be at quiet to unsettled levels during 31 December - 03 January due to a recurrent coronal hole high speed stream (CH HSS). Activity is expected to decrease to quiet levels during 04 - 17 January. Activity is expected to increase to unsettled levels during 18 - 19 January due to a CH HSS. Activity is expected to decrease to quiet levels during 20 - 26 January.



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
22 December	68	0	0	<A1.0	0	0	0	0	0	0	0	0
23 December	69	0	0	<A1.0	0	0	0	0	0	0	0	0
24 December	69	0	0	<A1.0	0	0	0	0	0	0	0	0
25 December	69	0	0	<A1.0	0	0	0	0	0	0	0	0
26 December	69	0	0	<A1.0	0	0	0	0	0	0	0	0
27 December	69	0	0	<A1.0	0	0	0	0	0	0	0	0
28 December	70	0	0	<A1.0	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
	22 December	1.7E+6	1.9E+4	4.3E+3		1.4E+6
23 December	1.3E+6	1.9E+4	4.1E+3		3.8E+5	
24 December	7.7E+5	1.9E+4	4.2E+3		4.2E+6	
25 December	5.3E+5	1.8E+4	4.2E+3		4.2E+6	
26 December	6.9E+5	1.9E+4	4.4E+3		5.0E+6	
27 December	8.1E+5	1.9E+4	4.3E+3		4.8E+6	
28 December	9.3E+5	2.0E+4	4.4E+3		3.9E+6	

Daily Geomagnetic Data

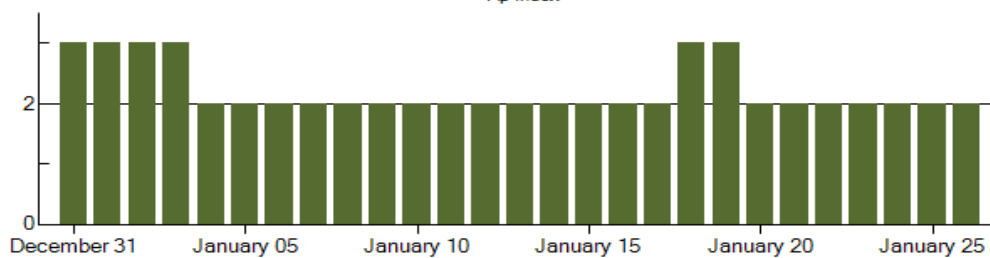
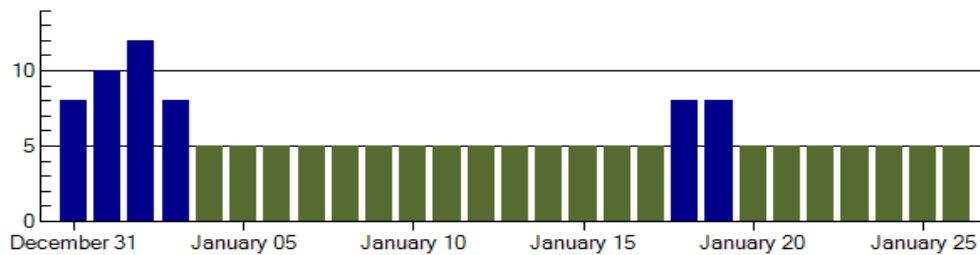
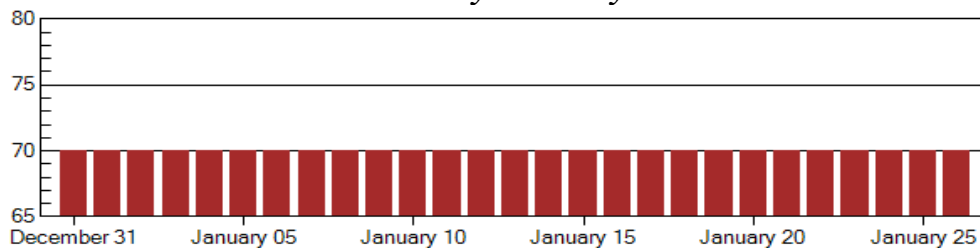
Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
	22 December	3	0-1-0-0-0-3-1-1	4	0-0-0-0-0-3-3-1	4
23 December	8	1-3-1-2-2-2-2-3	12	1-3-1-3-3-4-2-2	9	2-3-1-2-2-2-3-2
24 December	5	2-2-2-2-1-1-1-0	5	2-1-2-3-1-1-0-0	5	2-3-1-2-1-1-1-1
25 December	2	0-0-0-1-1-1-1-1	3	0-0-0-1-3-1-1-1	3	0-0-0-1-2-1-1-1
26 December	2	1-1-0-0-1-1-1-1	0	0-0-0-0-0-0-0-0	1	1-0-0-0-0-0-0-0
27 December	1	1-0-0-0-0-0-1-1	0	0-0-0-0-0-0-0-0	1	1-0-0-0-0-0-0-1
28 December	1	1-0-0-0-0-1-0-0	1	0-0-0-2-1-0-0-0	2	1-0-0-0-1-1-0-0

Alerts and Warnings Issued

Date & Time of Issue	Type of Alert or Warning	Date & Time of Event UTC
22 Dec 1725	WARNING: Geomagnetic K=4	22 Dec 1726 - 2359
22 Dec 2355	EXTENDED WARNING: Geomagnetic K=4	22 Dec 1726 - 23/1600



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
31 Dec	70	8	3	14	70	5	2
01 Jan	70	10	3	15	70	5	2
02	70	12	3	16	70	5	2
03	70	8	3	17	70	5	2
04	70	5	2	18	70	8	3
05	70	5	2	19	70	8	3
06	70	5	2	20	70	5	2
07	70	5	2	21	70	5	2
08	70	5	2	22	70	5	2
09	70	5	2	23	70	5	2
10	70	5	2	24	70	5	2
11	70	5	2	25	70	5	2
12	70	5	2	26	70	5	2
13	70	5	2				



Energetic Events

Date	Time		X-ray		Optical Information			Peak		Sweep Freq		
	½		Integ		Imp/	Location		Radio Flux		Intensity		
	Begin	Max	Max	Class	Flux	Brtns	Lat	CMD	#	245	2695	II

No Events Observed

Flare List

Date	Time			X-ray	Imp /	Location	Rgn
	Begin	Max	End	Class.	Brtns	Lat	CMD
22 Dec	<i>No Flares Observed</i>						
23 Dec	<i>No Flares Observed</i>						
24 Dec	<i>No Flares Observed</i>						
25 Dec	<i>No Flares Observed</i>						
26 Dec	<i>No Flares Observed</i>						
27 Dec	<i>No Flares Observed</i>						
28 Dec	<i>No Flares Observed</i>						

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	1	2	3	4

No active regions.



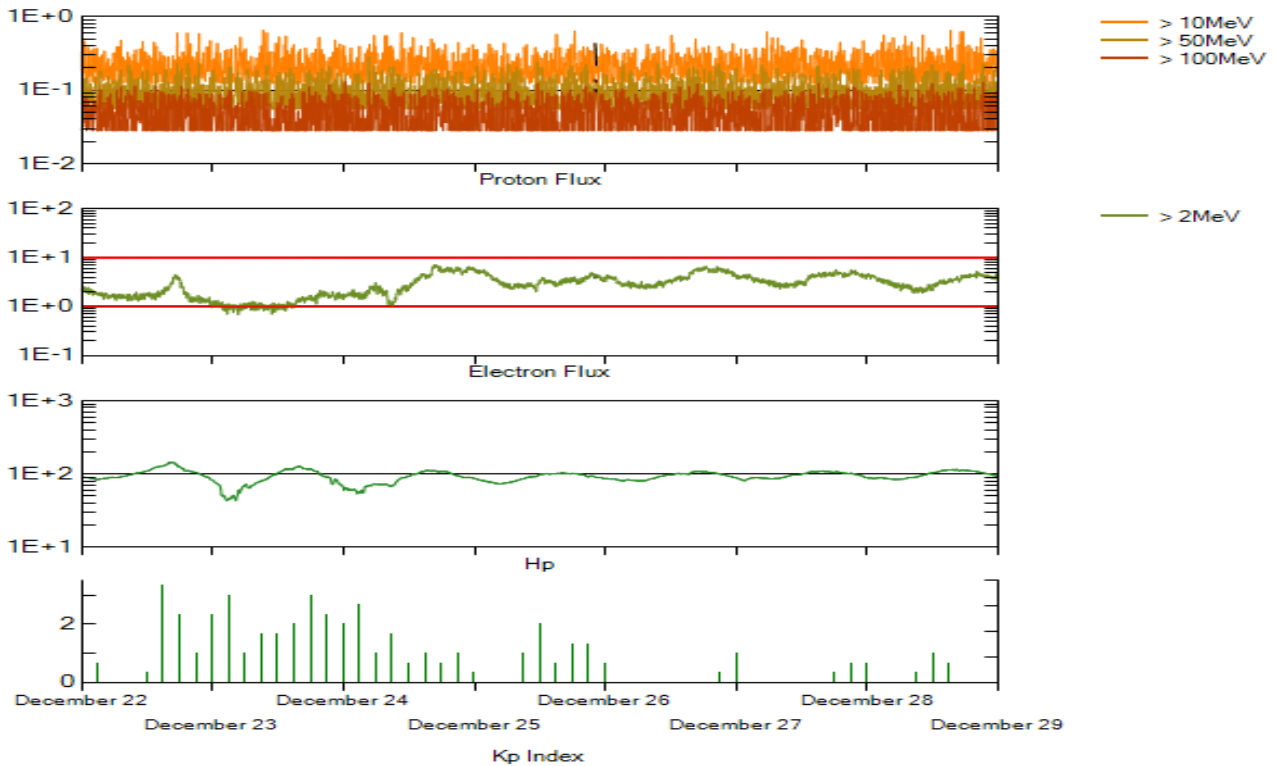
Recent Solar Indices (preliminary)
Of the observed monthly mean values

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
2006									
November	31.5	21.5	0.68	22.3	12.7	86.4	78.5	9	8.5
December	22.2	13.6	0.61	20.7	12.1	84.3	77.9	15	8.5
2007									
January	26.6	16.9	0.64	19.7	12.0	83.5	77.5	6	8.4
February	17.2	10.6	0.62	18.9	11.6	77.8	76.9	6	8.4
March	9.7	4.8	0.49	17.5	10.8	72.3	76.0	8	8.4
April	6.9	3.7	0.54	16.0	9.9	72.4	75.2	9	8.5
May	19.4	11.7	0.60	14.2	8.7	74.5	74.2	9	8.4
June	20.0	12.0	0.60	12.8	7.7	73.7	73.2	7	7.8
July	15.6	10.0	0.64	11.6	7.0	71.6	72.5	8	7.4
August	9.9	6.2	0.63	10.2	6.1	69.2	71.8	7	7.6
September	4.8	2.4	0.50	9.9	5.9	67.1	71.5	9	7.8
October	1.3	0.9	0.70	10.0	6.1	65.5	71.5	9	7.9
November	2.5	1.7	0.68	9.4	5.7	69.7	71.1	5	7.8
December	16.2	10.1	0.62	8.1	5.0	78.6	70.5	4	7.8
2008									
January	5.1	3.4	0.67	6.9	4.2	72.1	70.0	6	7.7
February	3.8	2.1	0.55	5.9	3.6	71.2	69.6	9	7.6
March	15.9	9.3	0.58	5.3	3.3	72.9	69.5	10	7.4
April	4.9	2.9	0.59	5.3	3.3	70.3	69.6	9	7.1
May	5.7	2.9	0.51			68.4		6	
June	4.2	3.1	0.74			65.9		7	
July	1.0	0.5	0.50			65.8		6	
August	0.0	0.5	**			66.4		5	
September	1.5	1.1	0.73			67.1		5	
October	5.2	2.9	0.56			68.3		6	

NOTE: All smoothed values after September 2002 and monthly values after March 2003 are preliminary estimates. The lowest smoothed sunspot index number for Cycle 22, RI = 8.0, occurred in May 1996. The highest smoothed sunspot number for Cycle 23, RI= 120.8, occurred April 2000. *After June 1991, the 10.7 cm radio flux data source is Penticton, B.C. Canada. Prior to that, it was Ottawa.

**SEC sunspot number was less than RI value, so a ratio could not be done.





Weekly Geosynchronous Satellite Environment Summary
Week Beginning 22 December 2008

GOES-11 designated Primary Electron Satellite and GOES-10 Secondary: December 1, 2008 the GOES-12 Electron sensor began experiencing periods of noise and sensor is unreliable.

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.

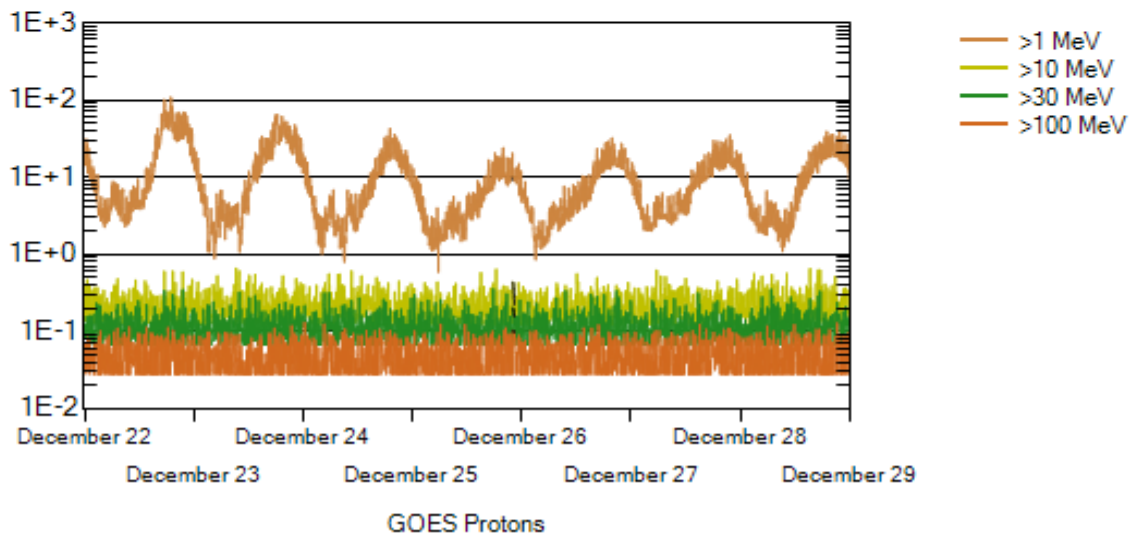
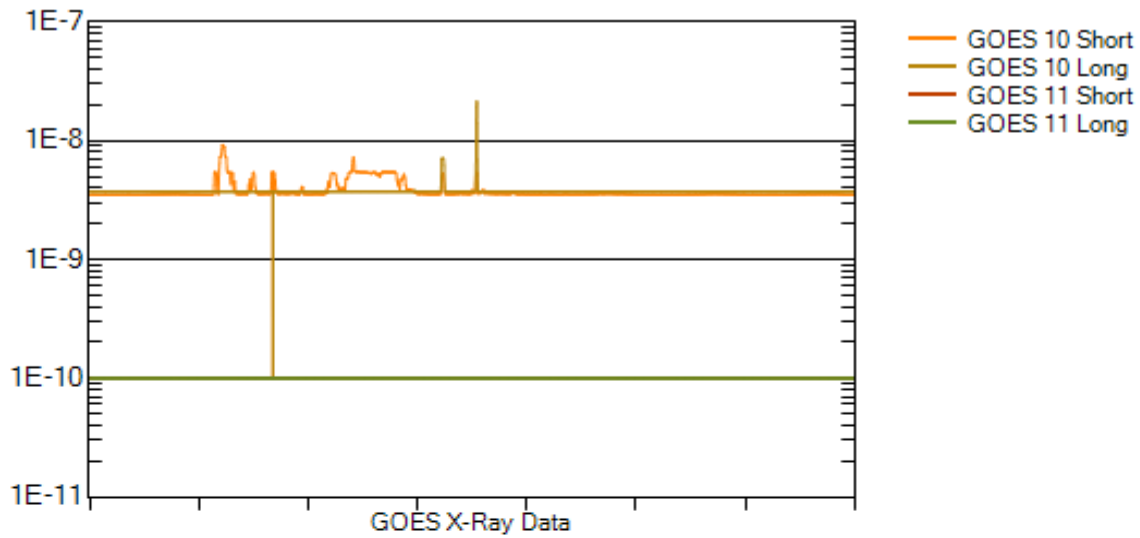
Electrons plot contains the five-minute averaged integral electron flux (electrons/cm²-sec -sr) with energies greater than 2 MeV at GOES-11 (W135).

Hp plot contains the five minute averaged magnetic field H - component in nanoteslas (nT) as measured by GOES-12. 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 10 (W060) and GOES 11 (W135) in two wavelength bands, .05 - .4 and .1 - .8 nm. The letters A, B, C, M and X refer to x-ray event levels for the .1 - .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 (W135) 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.

