

Space Weather Highlights
17 December - 23 December 2012

SWPC PRF 1947
24 December 2012

Solar activity was low. Only C1/Sf level flares were observed. Region 1633 (S07, L=111, class/area=Eki/340 on 17 December) was the most productive, with eight C1 flares to its credit. Six of these occurred in the last two days of the week. While it was the largest region on the disk at the beginning of the week, it ended tied with Region 1635 (N09, L=64, class/area=Ehi/250 on 21 December) with an area of 200 microhemispheres. Both Regins 1633 and 1635 ended the period with beta-gamma magnetic configurations. No earth-directed CMEs were observed.

No proton events were observed at geosynchronous orbit.

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

Geomagnetic field activity was at predominantly quiet levels all week. There were two exceptions. A positive polarity, southern hemisphere recurrent coronal hole high speed stream brought unsettled conditions and the only active period of the week on 17 December. At high latitudes, a single major storm period was observed. Later in the week, another positive polarity coronal hole high speed stream, this time in the northern hemisphere, brought a single unsettled period on 20 December. Activity reached minor storm levels at high latitudes. During both high speed streams, solar wind speed reached the low 500 km/s range while the southward component of the interplanetary magnetic field dipped to approximately -6 nT.

Space Weather Outlook
24 December - 19 January 2013

Solar activity is expected to be at predominantly low levels during the forecast period, with a slight chance for an M-class event.

No proton events are expected at geosynchronous orbit.

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

Geomagnetic field activity is expected to be at predominantly quiet levels with the exception of 29-30 December and 13 January when recurrent coronal hole high speed streams are expected to bring unsettled conditions.



Daily Solar Data

Date	Radio Flux 10.7cm	Sun spot No.	Sunspot Area (10 ⁻⁶ hemi.)	X-ray Background Flux	Flares							
					X-ray			Optical				
					C	M	X	S	1	2	3	4
17 December	115	83	680	B4.1	4	0	0	3	0	0	0	0
18 December	116	66	600	B4.5	2	0	0	1	0	0	0	0
19 December	113	46	430	B3.3	0	0	0	1	0	0	0	0
20 December	114	53	570	B2.4	0	0	0	0	0	0	0	0
21 December	115	55	570	B2.2	1	0	0	5	0	0	0	0
22 December	115	67	430	B2.6	5	0	0	2	0	0	0	0
23 December	114	90	450	B2.5	3	0	0	4	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	>0.6 MeV	>2MeV	>4 MeV
	17 December	1.7e+06	1.3e+04	2.8e+03		4.1e+06
18 December	2.0e+05	1.1e+04	2.8e+03		1.3e+07	
19 December	1.9e+05	1.1e+04	2.7e+03		2.0e+07	
20 December	1.6e+05	1.1e+04	2.6e+03		9.9e+06	
21 December	7.7e+04	1.1e+04	2.6e+03		6.7e+06	
22 December	1.1e+05	1.1e+04	2.8e+03		8.1e+06	
23 December	1.8e+05	1.2e+04	3.0e+03		8.4e+06	

Daily Geomagnetic Data

Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
	17 December	9	2-3-2-3-3-2-1-1	21	1-3-4-4-6-3-1-0	10
18 December	5	1-2-2-2-1-2-1-1	10	0-1-2-4-3-4-0-1	6	1-2-2-2-2-2-1-1
19 December	4	1-2-1-1-2-2-1-0	3	0-2-1-2-2-0-1-0	4	1-2-1-1-1-0-1-1
20 December	7	1-2-2-1-2-3-2-1	18	0-0-2-5-5-4-2-1	6	0-2-2-2-2-3-2-1
21 December	3	2-0-1-1-1-1-1-0	3	0-1-1-3-1-1-0-0	4	2-1-1-1-1-1-0-0
22 December	1	0-0-0-0-1-1-0-0	1	0-0-0-2-0-0-0-0	1	0-0-0-1-0-0-0-0
23 December	2	0-1-0-0-1-1-1-0	1	0-0-0-1-1-1-0-0	2	0-0-0-0-0-1-0-0

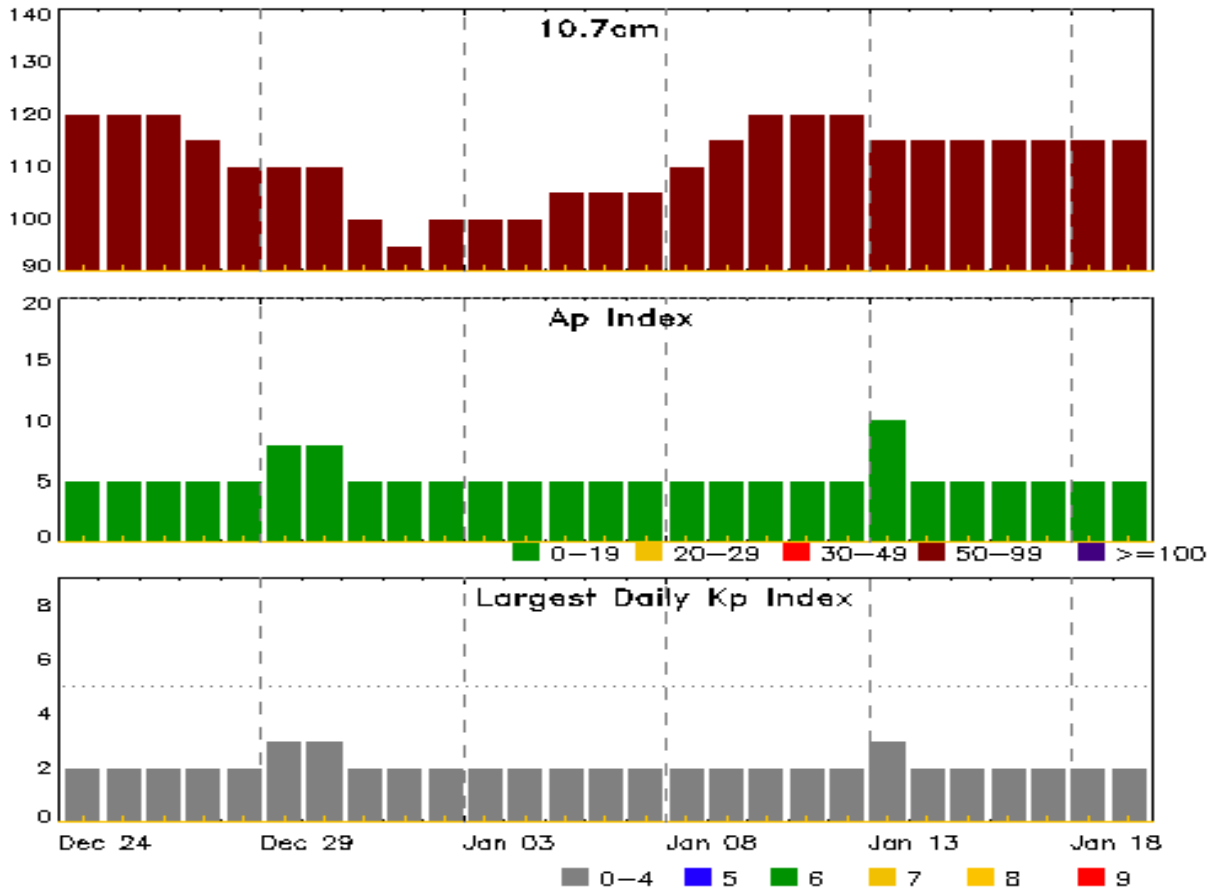


Alerts and Warnings Issued

Date & Time of Issue UTC	Type of Alert or Warning	Date & Time of Event UTC
17 Dec 1035	WARNING: Geomagnetic K = 4	17/1100 - 1800
17 Dec 1312	ALERT: Geomagnetic K = 4	17/1307



Twenty-seven Day Outlook



Date	Radio Flux 10.7cm	Planetary A Index	Largest Kp Index	Date	Radio Flux 10.7cm	Planetary A Index	Largest Kp Index
24 Dec	120	5	2	07 Jan	105	5	2
25	120	5	2	08	110	5	2
26	120	5	2	09	115	5	2
27	115	5	2	10	120	5	2
28	110	5	2	11	120	5	2
29	110	8	3	12	120	5	2
30	110	8	3	13	115	10	3
31	100	5	2	14	115	5	2
01 Jan	95	5	2	15	115	5	2
02	100	5	2	16	115	5	2
03	100	5	2	17	115	5	2
04	100	5	2	18	115	5	2
05	105	5	2	19	115	5	2
06	105	5	2				



Energetic Events

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

No Events Observed

Flare List

Date	Time			X-ray Class	Imp/ Brtns	Location Lat CMD	Rgn #
	Begin	Max	End				
17 Dec	0016	0027	0029	C1.3	SF	N17W70	1632
17 Dec	0115	0121	0127	C1.0	SF	N17W72	1632
17 Dec	0132	0220	0439	C1.3			1629
17 Dec	0731	0737	0743	B7.4			1634
17 Dec	0807	0812	0815	B6.7	SF	N18W63	1631
17 Dec	1216	1220	1223	B7.5			1631
17 Dec	1344	1351	1406	B9.5			1632
17 Dec	1441	1502	1517	C1.3			1631
17 Dec	2219	2223	2227	B9.1			1631
18 Dec	1300	1308	1312	C1.4			1631
18 Dec	1637	1642	1645	C1.3	SF	S06E25	1633
18 Dec	1959	2003	2007	B9.5			1634
19 Dec	0156	0157	0200		SF	S06E20	1633
19 Dec	0443	0447	0453	B5.8			1633
19 Dec	2239	2242	2244	B4.4			1635
20 Dec	0719	0722	0726	B4.1			1635
20 Dec	0943	0946	0949	B4.9			1635
20 Dec	1621	1634	1640	B4.4			1634
21 Dec	0450	0454	0458	B6.0	SF	N15E48	1635
21 Dec	0502	0504	0506		SF	N15E48	1635
21 Dec	0607	0613	0618	B6.8			1633
21 Dec	1216	1220	1222	B4.3			1635
21 Dec	1408	1412	1415	B3.8			1635
21 Dec	1504	1508	1515	B3.0			1635
21 Dec	1703	1708	1711	B5.4			1635
21 Dec	1830	1835	1859		SF	N09E42	1635
21 Dec	1929	1934	1939	B6.5	SF	N11E36	1635
21 Dec	2028	2041	2059	B6.4	SF	N09E40	1635
21 Dec	2226	2233	2239	B5.9			1635
21 Dec	2352	2355	0000	C1.9			1635
22 Dec	0015	0015	0017		SF	N09E39	1635



Flare List

Date	Time			X-ray Class	Optical		Rgn #
	Begin	Max	End		Imp/ Brtns	Location Lat CMD	
22 Dec	0127	0130	0132	B6.8			1633
22 Dec	0357	0405	0409	C1.9	SF	N11E31	1635
22 Dec	0924	0930	0935	B5.2			1635
22 Dec	1356	1407	1425	B8.0			1635
22 Dec	1725	1726	1727	B8.6			1633
22 Dec	1731	1732	1733	C1.4			1633
22 Dec	1802	1809	1817	B8.4			1635
22 Dec	2042	2047	2050	C1.1			1633
22 Dec	2215	2220	2223	C1.9			1633
22 Dec	2256	2304	2309	C1.0			1633
22 Dec	2331	2334	2338	B7.1			
23 Dec	0012	0020	0024	C1.1			1633
23 Dec	0222	0230	0243	C1.5	SF	N11E25	1635
23 Dec	0304	0307	0309	B8.2	SF	S07W31	1633
23 Dec	0443	0443	0445		SF	S08W32	1633
23 Dec	0543	0550	0552	C1.3	SF	S08W33	1633
23 Dec	1250	1256	1301	B4.4			1635
23 Dec	1423	1429	1439	B7.5			1635
23 Dec	1613	1617	1638	B4.2			1635
23 Dec	2000	2044	2057	B9.3			1635



Region Summary

Date	Location		Sunspot Characteristics				Flares											
	Lat CMD	Helio 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 1628																		
05 Dec	N10E65	243	5		Axx	1	A	1										
06 Dec	N09E51	244	10	1	Axx	1	A											
07 Dec	N09E37	246	plage															
08 Dec	N09E23	247	plage															
09 Dec	N09E09	248	plage															
10 Dec	N09W05	249	plage															
11 Dec	N09W19	249	plage															
12 Dec	N09W33	249	plage															
13 Dec	N09W47	251	plage															
14 Dec	N09W61	252	plage															
15 Dec	N09W74	252	plage															
16 Dec	N09W87	252	plage															
									1	0	0	0	0	0	0	0	0	0

Crossed West Limb.
 Absolute heliographic longitude: 249

Region 1629																		
08 Dec	N12E32	238	30	4	Cro	3	B					1						
09 Dec	N11E19	237	50	6	Dao	4	B											
10 Dec	N11E04	238	70	7	Dai	14	B											
11 Dec	N11W10	238	120	8	Dao	15	B											
12 Dec	N11W24	238	120	9	Dao	15	B	1				2						
13 Dec	N11W36	240	120	9	Dai	14	B											
14 Dec	N11W49	240	170	9	Dai	12	B											
15 Dec	N11W62	240	170	9	Dso	9	B											
16 Dec	N11W75	240	80	9	Dso	7	B											
17 Dec	N13W88	239	80	2	Hsx	1	A	1										
								2	0	0	3	0	0	0	0	0	0	0

Crossed West Limb.
 Absolute heliographic longitude: 238



Region Summary - continued

Date	Location		Sunspot Characteristics				Flares										
	Lat CMD	Helio 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 1631																	
12 Dec	N20W08	219	30	3	Dao	7	B										
13 Dec	N21W20	224	70	6	Dai	10	B										
14 Dec	N21W33	224	100	8	Dai	13	B										
15 Dec	N21W46	224	120	9	Dai	19	B	1									
16 Dec	N20W60	225	140	9	Dsi	15	B	1			3						
17 Dec	N23W75	226	140	9	Dsi	10	B	1			1						
18 Dec	N23W89	226	80	9	Dso	5	B	1									
								4	0	0	4	0	0	0	0		

Crossed West Limb.
Absolute heliographic longitude: 219

Region 1632																	
12 Dec	N16W14	231	10	3	Cro	5	B										
13 Dec	N17W28	232	20	5	Bxo	5	B	1			1						
14 Dec	N17W42	233	10	5	Bxo	4	B										
15 Dec	N17W56	234	0	1	Axx	1	A										
16 Dec	N17W70	235	plage					1			1						
17 Dec	N19W84	235	50	6	Cao	6	B	2			2						
								4	0	0	4	0	0	0	0		

Crossed West Limb.
Absolute heliographic longitude: 231

Region 1633																	
14 Dec	S07E84	109	plage					1									
15 Dec	S07E69	109	270	15	Ehi	8	B										
16 Dec	S07E54	111	260	12	Eho	11	B										
17 Dec	S07E41	111	340	12	Eki	15	B										
18 Dec	S07E27	111	320	12	Eki	13	BG	1			1						
19 Dec	S07E13	111	260	12	Eko	9	B				1						
20 Dec	S07W00	111	260	12	Eko	13	B										
21 Dec	S07W13	112	260	12	Eki	15	B										
22 Dec	S05W27	113	170	13	Esi	12	B	4									
23 Dec	S07W39	111	200	13	Eai	25	BG	2			3						
								8	0	0	5	0	0	0	0		

Still on Disk.
Absolute heliographic longitude: 111



Region Summary - continued

Date	Location		Sunspot Characteristics				Flares																
	Lat CMD	Lon	Helio 10 ⁶ hemi.	Area	Extent (helio)	Spot Class	Spot Count	Mag Class	X-ray			Optical											
									C	M	X	S	1	2	3	4							
Region 1634																							
15 Dec	S13E69	109	90	2	Hsx	1	A																
16 Dec	S12E56	109	90	3	Hsx	1	A																
17 Dec	S13E42	108	70	2	Hsx	1	A																
18 Dec	S13E28	108	80	4	Hsx	5	A																
19 Dec	S13E14	110	60	2	Hsx	2	A																
20 Dec	S13W00	111	60	2	Hsx	2	A																
21 Dec	S13W12	111	60	2	Hsx	2	A																
22 Dec	S12W25	111	60	6	Cso	7	B																
23 Dec	S13W33	105	50	12	Cao	7	B																
													0	0	0	0	0	0	0	0	0	0	

Still on Disk.

Absolute heliographic longitude: 111

Region 1635																							
18 Dec	N10E72	65	120	9	Dso	3	B																
19 Dec	N09E58	65	110	7	Cso	5	B																
20 Dec	N09E44	66	250	12	Eki	8	B																
21 Dec	N09E35	64	250	12	Ehi	8	BG	1					5										
22 Dec	N10E22	64	200	11	Esi	18	BG	1					2										
23 Dec	N12E09	63	200	8	Dai	28	BG	1					1										
								3	0	0	8	0	0	0	0	0	0	0	0	0	0	0	

Still on Disk.

Absolute heliographic longitude: 63

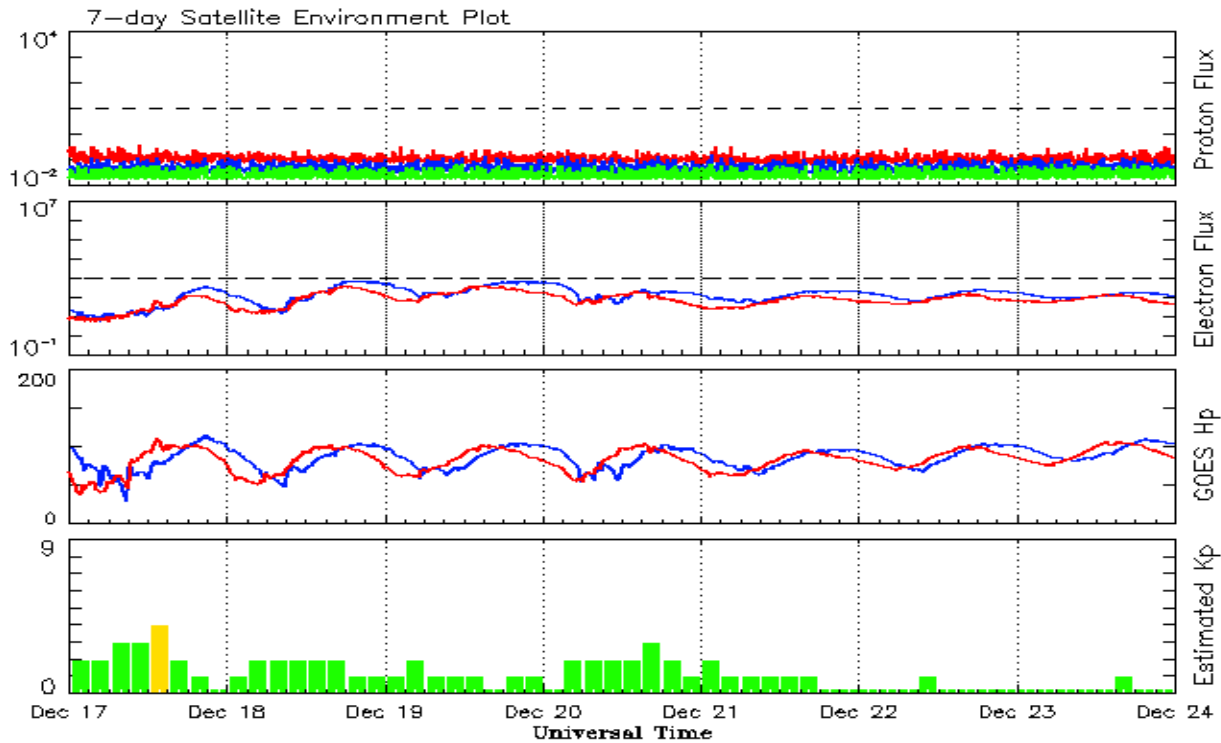


Recent Solar Indices (preliminary)
Observed monthly mean values

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
2010									
December	22.0	14.4	0.66	43.8	28.8	84.3	89.6	4	6.5
2011									
January	32.1	18.8	0.59	47.2	30.9	83.7	91.2	6	6.7
February	53.2	29.6	0.55	50.6	33.4	94.5	92.7	6	6.8
March	81.0	55.8	0.69	55.2	36.9	115.3	95.8	7	7.2
April	81.7	54.4	0.67	61.5	41.8	112.6	100.4	9	7.5
May	61.4	41.6	0.68	69.0	47.6	95.9	105.6	9	7.5
June	55.5	37.0	0.67	76.5	53.2	95.8	110.9	8	7.4
July	67.0	43.8	0.66	82.5	57.3	94.2	115.4	9	7.3
August	66.1	50.6	0.77	84.9	59.0	101.7	117.9	8	7.4
September	106.4	78.0	0.73	84.6	59.5	134.5	118.4	13	7.7
October	116.8	88.0	0.75	84.6	59.9	137.2	118.4	7	8.0
November	133.1	96.7	0.73	86.3	61.1	153.1	119.5	3	8.0
December	106.3	73.0	0.69	89.2	63.4	141.2	121.6	3	8.0
2012									
January	91.3	58.3	0.64	92.0	65.5	133.1	124.4	6	8.3
February	50.1	32.9	0.66	94.2	66.9	106.7	126.7	7	8.4
March	77.9	64.3	0.82	94.1	66.8	115.1	126.8	14	8.1
April	84.4	55.2	0.65	91.3	64.6	113.1	125.8	9	8.0
May	99.5	69.0	0.69	87.7	61.7	121.5	123.8	8	8.2
June	88.6	64.5	0.73			120.5		10	
July	99.6	66.5	0.67			135.6		13	
August	85.8	63.1	0.74			115.7		7	
September	84.0	61.5	0.73			123.2		8	
October	73.5	53.3	0.73			123.3		9	
November	89.2	61.4	0.69			120.9		6	

Note: Values are final except for the most recent 6 months which are considered preliminary.
Cycle 24 started in Dec 2008 with an RI=1.7.





*Weekly Geosynchronous Satellite Environment Summary
Week Beginning 17 December 2012*

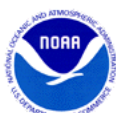
The proton flux plot contains the five-minute averaged integral proton flux (protons/cm²-sec -sr) as measured by the SWPC Primary GOES satellite, near West 75, for each of three energy thresholds: greater than 10, 50, and 100 MeV.

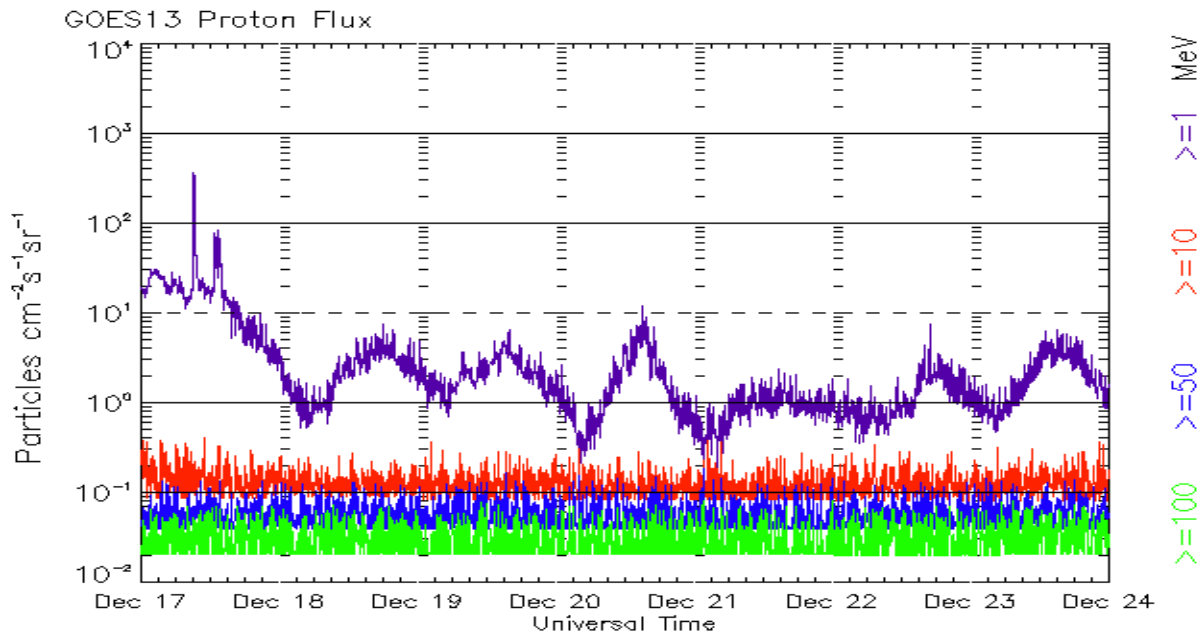
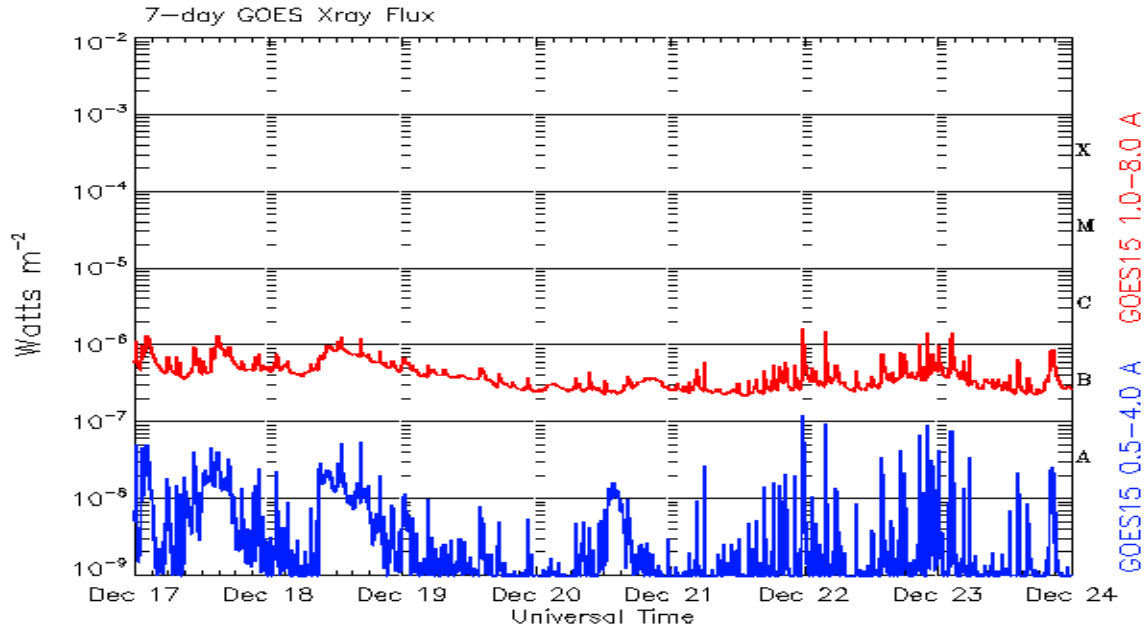
The electron flux plot contains the five-minute averaged integral electron flux (electrons/cm²-sec -sr) with energies greater than 2 MeV by the SWPC Primary GOES satellite.

The Hp plot contains the five minute averaged Hp magnetic field component in nanoteslas (nT) as by the SWPC Primary GOES satellite. The Hp component is parallel to the spin axis of the satellite, which is nearly parallel to the Earth's rotation axis.

The Estimated 3-hour Planetary Kp-index is derived at the NOAA Space Weather Prediction Center using data from the following ground-based magnetometers: Boulder, Colorado; Chambon la Foret, France; Fredericksburg, Virginia; Fresno, California; Hartland, UK; Newport, Washington; Sitka, Alaska. These data are made available thanks to the cooperative efforts between SWPC and data providers around the world, which currently includes the U.S. Geological Survey, the British Geological Survey, and the Institut de Physique du Globe de Paris.

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 17 December 2012*

The x-ray plots contains five-minute averages x-ray flux (Watt/ m^2) as measure by the SWPC primary GOES X-ray satellite, usually at West 105 longitude, 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 intergral flux units (pfu = protons/ cm^2 -sec -sr) as measured by the primary SWPC GOES Proton satellite for each of the energy thresholds: >1, >10, >30, and >100 MeV. The P10 event threshold is 10 pfu at greater than 10 MeV.



Preliminary Report and Forecast of Solar Geophysical Data (The Weekly)

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Notice: The 27-day Outlook, Satellite Environment, X-ray and Proton plots have been redesigned. Comments and suggestions are welcome SWPC.Webmaster@noaa.gov

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