

Space Weather Highlights
10 December - 16 December 2012

SWPC PRF 1946
17 December 2012

Solar activity was low. The largest flare of the period came from Region 1629 (N11, L=240, class/area=Dai/170 on 14 December), a C5/Sf 12/0727Z. Region 1630 (N19, L=253, class/area=Cai/90 on 11 December), also produced a C5 flare on 10/0558Z. The remainder of the period was dominated by infrequent, low-level C-class activity. No earth-directed coronal mass ejections were observed during the week.

A 10 MeV proton enhancement at geosynchronous orbit was observed on 14-15 December. 10 MeV particle flux was slightly elevated beginning around 14/0900Z. An eruption from the beyond the west limb, in the southern hemisphere, was visible in STEREO-A EUVI imagery beginning around 14/1200Z. 10 MeV flux began climbing more steeply around 14/2245Z, reaching a peak of 9.36 pfu at 15/0155Z, just below the S1 threshold of 10 pfu. Flux returned to normal levels over the course of the next two days.

The greater than 2 MeV electron flux at geosynchronous orbit was at normal levels throughout the week.

Geomagnetic field activity quiet all week. Solar wind speed at the ACE spacecraft ranged from around 270 km/s to the near 470 km/s while Bz was never less than -8 nT. A very weak shock was observed at the ACE spacecraft at 14/1852Z, and at GOES by 14/1946Z. Isolated unsettled to minor storm levels were subsequently observed at high latitudes mid-day on 15 and 16 December.

Space Weather Outlook
17 December - 12 January 2013

Solar activity is expected to be low with a slight chance for moderate activity through the forecast period.

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 except during 19-21 December when a high speed stream is expected to bring the flux to high levels.

Geomagnetic field activity is expected to begin the forecast period at unsettled levels with a slight chance for an active period on 17-18 December as a recurrent coronal hole high speed stream becomes geoeffective. The remainder of the forecast period is expected to be generally quiet barring any geoeffective coronal mass ejections.



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
10 December	104	49	140	B1.8	1	0	0	2	0	0	0	0
11 December	104	55	210	B1.9	0	0	0	1	0	0	0	0
12 December	112	82	190	B1.9	1	0	0	3	0	0	0	0
13 December	117	77	260	B2.5	1	0	0	1	0	0	0	0
14 December	119	71	290	B3.5	1	0	0	0	0	0	0	0
15 December	122	88	650	B3.3	1	0	0	0	0	0	0	0
16 December	120	74	570	B3.0	2	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
	10 December	2.6e+05	1.1e+04	2.7e+03		8.7e+05
11 December	2.1e+05	1.1e+04	2.7e+03		9.0e+05	
12 December	2.1e+05	1.1e+04	2.8e+03		9.6e+05	
13 December	1.8e+05	1.1e+04	2.6e+03		7.1e+05	
14 December	5.8e+06	2.9e+04	2.7e+03		8.0e+05	
15 December	6.7e+07	1.6e+05	2.6e+03		1.4e+06	
16 December	5.4e+06	2.4e+04	2.7e+03		1.0e+06	

Daily Geomagnetic Data

Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
	10 December	3	2-1-1-0-1-0-1-1	4	1-0-1-3-2-0-0-0	3
11 December	2	2-1-0-0-0-1-1-1	0	0-0-1-0-0-0-0-0	2	1-1-0-0-0-0-1-1
12 December	3	1-0-1-1-1-1-1-1	1	0-0-0-0-2-1-0-0	2	0-0-1-0-1-1-0-0
13 December	2	1-1-0-0-1-1-0-1	0	0-0-0-0-0-0-0-0	3	1-1-0-0-0-1-0-0
14 December	4	1-2-1-1-1-0-1-2	0	0-0-0-0-0-0-0-1	3	1-1-1-0-0-0-1-2
15 December	7	1-3-1-2-2-1-2-2	11	0-1-2-3-5-2-1-1	7	2-2-1-2-2-2-2-2
16 December	5	1-0-2-2-2-2-1-1	11	1-0-3-4-4-2-1-1	5	2-0-2-2-2-2-1-1

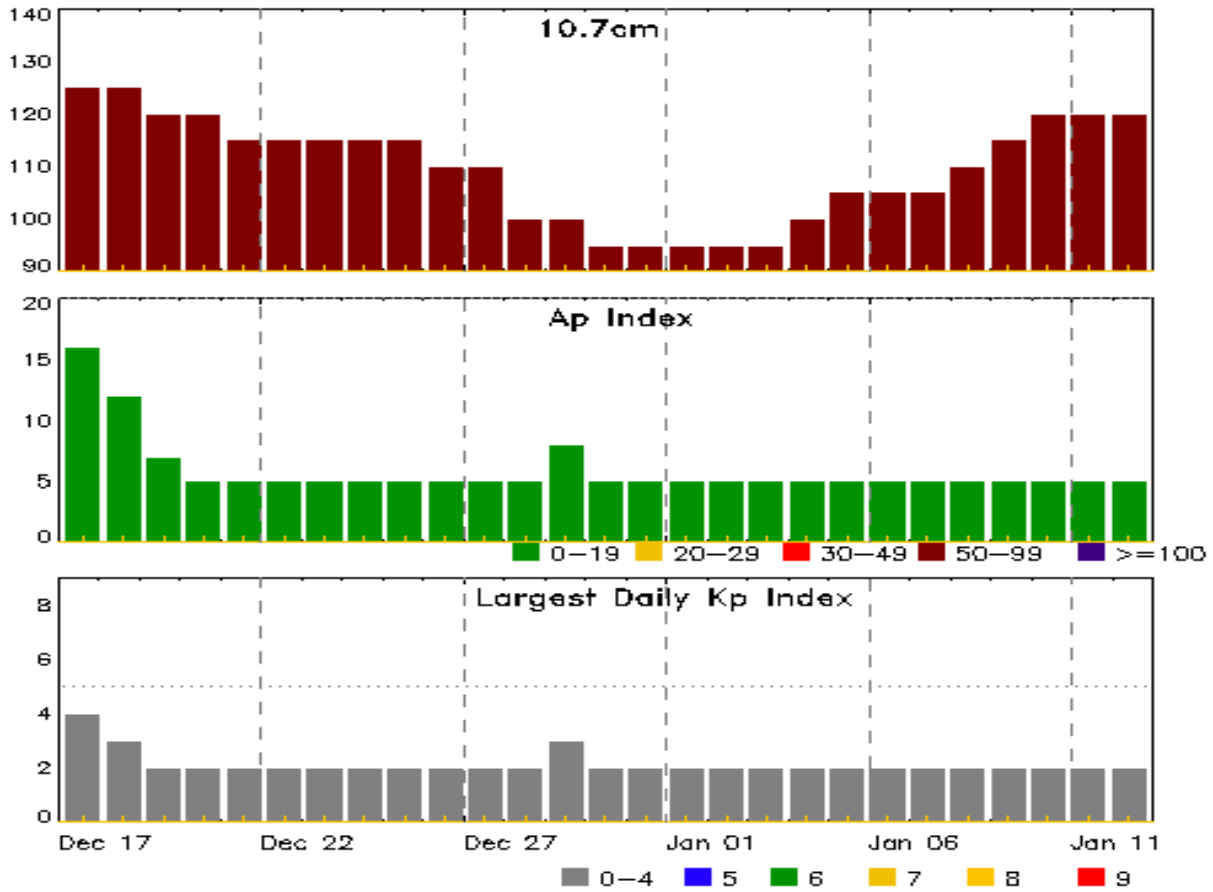


Alerts and Warnings Issued

Date & Time of Issue UTC	Type of Alert or Warning	Date & Time of Event UTC
15 Dec 0158	WARNING: Proton 10MeV Integral Flux > 10pfu	15/0157 - 1200



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
17 Dec	125	16	4	31 Dec	95	5	2
18	125	12	3	01 Jan	95	5	2
19	120	7	2	02	95	5	2
20	120	5	2	03	95	5	2
21	115	5	2	04	100	5	2
22	115	5	2	05	105	5	2
23	115	5	2	06	105	5	2
24	115	5	2	07	105	5	2
25	115	5	2	08	110	5	2
26	110	5	2	09	115	5	2
27	110	5	2	10	120	5	2
28	100	5	2	11	120	5	2
29	100	8	3	12	120	5	2
30	95	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	Optical Location Lat CMD	Rgn #
	Begin	Max	End				
10 Dec	0044	0052	0056	B6.3	SF	N20E02	1630
10 Dec	0332	0338	0342	B4.7	SF	N19E00	1630
10 Dec	0549	0558	0601	C5.5			1630
10 Dec	0931	0935	0938	B3.6			1630
11 Dec	0040	0046	0049	B5.7			1630
11 Dec	0302	0310	0315	B5.6	SF	N18W12	1630
11 Dec	2341	2346	2349	B5.7			1630
12 Dec	0002	0011	0018	B5.7	SF	N17W24	1630
12 Dec	0105	0109	0112	B4.7	SF	N12W12	1629
12 Dec	0302	0306	0309	B3.3			
12 Dec	0722	0727	0730	C5.7	SF	N11W16	1629
12 Dec	1226	1239	1244	B5.0			
12 Dec	1328	1335	1346	B9.5			1629
12 Dec	1835	1847	1855	B7.9			1629
12 Dec	1943	1946	1948	B4.3			
13 Dec	1157	1202	1210	B4.6			1629
13 Dec	1338	1350	1354	B4.5			1629
13 Dec	1403	1407	1415	B5.0			
13 Dec	1911	1922	1933	C1.2	SF	N17W21	1632
14 Dec	0929	0932	0936	B7.3			1633
14 Dec	1213	1217	1223	C1.0			1633
14 Dec	1406	1412	1421	B6.7			1633
14 Dec	2158	2224	2242	B9.0			1629
15 Dec	0906	0911	0915	B7.8			1631
15 Dec	0952	0956	0959	B6.2			1633
15 Dec	1037	1047	1052	B4.7			1633
15 Dec	1144	1151	1155	B5.8			1631
15 Dec	1214	1224	1229	B6.2			1631
15 Dec	1234	1239	1242	B5.6			1633
15 Dec	1243	1244	1246	B5.6			1633
15 Dec	1257	1305	1308	B5.5			1629



Flare List

Date	Time			X-ray Class	Optical		Rgn #
	Begin	Max	End		Imp/ Brtns	Location Lat CMD	
15 Dec	1350	1358	1406	B5.2			1633
15 Dec	1446	1452	1457	B4.5			1633
15 Dec	1618	1619	1624	B6.6			
15 Dec	1942	1947	1954	C1.2			1631
15 Dec	2109	2119	2136	B6.5			1633
15 Dec	2219	2223	2226	B7.7			1632
16 Dec	0111	0115	0120	B5.5			1633
16 Dec	0300	0301	0306		SF	N19W48	1631
16 Dec	0316	0316	0329		SF	N19W48	1631
16 Dec	0538	0539	0550		SF	N19W49	1631
16 Dec	1044	1047	1049	B6.4			
16 Dec	1452	1455	1458	B5.4			1633
16 Dec	1518	1521	1523	B5.3			1631
16 Dec	2028	2103	2132	C1.1			1631
16 Dec	2207	2211	2215	C1.0			1632
16 Dec	2320	2323	2325	B6.5	SF	N17W70	1632



Region Summary

Date	Location		Sunspot Characteristics				Flares										
	Lat CMD	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 1623																	
27 Nov	N11E74	341	170	2	Dso	2	B	2									
28 Nov	N09E60	340	450	11	Eko	3	B	1				1					
29 Nov	N09E48	340	350	11	Eko	11	BG	5				7					
30 Nov	N08E35	339	210	8	Dao	9	BG										
01 Dec	N08E21	340	230	7	Dao	7	BG										
02 Dec	N08E08	340	130	7	Dao	4	B										
03 Dec	N08W05	341	140	7	Cso	6	B										
04 Dec	N08W18	341	150	10	Dso	4	B										
05 Dec	N08W33	342	120	9	Cso	7	B										
06 Dec	N08W47	342	90	5	Dso	4	B										
07 Dec	N07W61	343	110	3	Hsx	2	A										
08 Dec	N07W74	344	40	2	Hsx	1	A										
09 Dec	N07W87	343	40	2	Hsx	1	A										
								8	0	0	8	0	0	0	0	0	

Crossed West Limb.
Absolute heliographic longitude: 341

Region 1626																	
04 Dec	N11E24	298	10	1	Hax	2	A										
05 Dec	N11E12	297	10	2	Bxo	2	B										
06 Dec	N11W02	298	plage														
07 Dec	N11W16	299	plage														
08 Dec	N11W30	300	plage														
09 Dec	N11W44	301	plage														
10 Dec	N11W58	302	plage														
11 Dec	N11W72	302	plage														
12 Dec	N11W86	302	plage														
								0	0	0	0	0	0	0	0	0	

Crossed West Limb.
Absolute heliographic longitude: 298



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 1627																		
05 Dec	S16W09	318	5			Axx	1	A										
06 Dec	S16W23	319	plage															
07 Dec	S16W37	320	plage															
08 Dec	S16W51	321	plage															
09 Dec	S16W65	322	plage															
10 Dec	S16W79	323	plage															
									0	0	0	0	0	0	0	0	0	

Crossed West Limb.
 Absolute heliographic longitude: 318

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	

Still on Disk.
 Absolute heliographic longitude: 249



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 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										
								1	0	0	3	0	0	0	0	0	

Still on Disk.

Absolute heliographic longitude: 238

Region 1630																	
09 Dec	N18E02	254	40	5	Dao	5	B	1									
10 Dec	N19W11	253	70	7	Dai	15	B	1				2					
11 Dec	N19W25	253	90	7	Cai	20	B					1					
12 Dec	N19W39	253	30	7	Dai	15	B					1					
13 Dec	N20W52	256	50	7	Dao	8	B										
14 Dec	N20W66	257	10	7	Bxo	2	B										
15 Dec	N20W80	258	plage														
								2	0	0	4	0	0	0	0	0	

Crossed West Limb.

Absolute heliographic longitude: 254

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					
								2	0	0	3	0	0	0	0	0	

Still on Disk.

Absolute heliographic longitude: 219



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 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											
								2	0	0		2	0	0	0	0	0	0					

Still on Disk.
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																
								1	0	0		0	0	0	0	0	0	0					

Still on Disk.
Absolute heliographic longitude: 111

Region 1634																							
15 Dec	S13E69	109	90	2	Hsx	1	A																
16 Dec	S12E56	109	90	3	Hsx	1	A																
								0	0	0		0	0	0	0	0	0	0					

Still on Disk.
Absolute heliographic longitude: 109

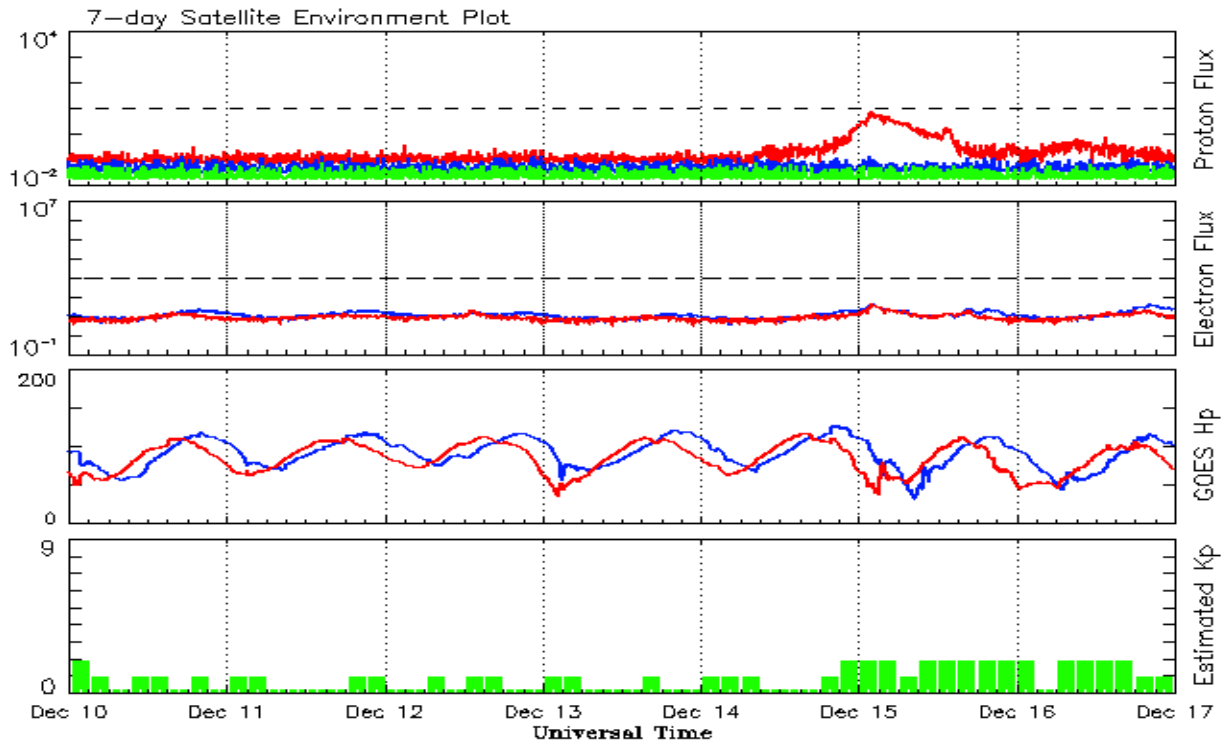


Recent Solar Indices (preliminary)
Observed monthly mean values

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 10 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.

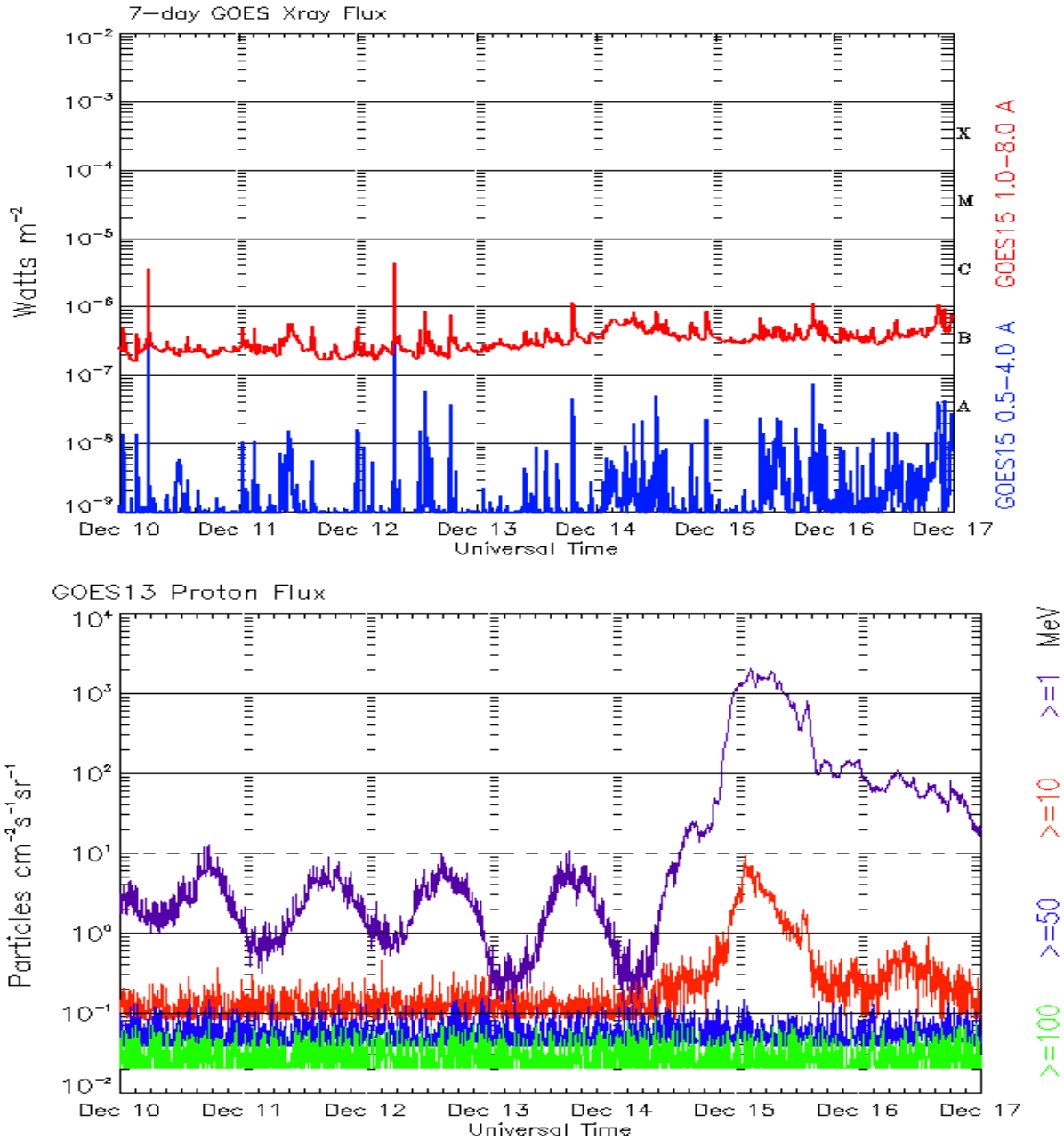
The electron flux plot contains the five-minute averaged integral electron flux (electrons/cm²-sec -sr) with energies greater than 2 MeV by the SWPC Primary GOES satellite.

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 10 December 2012*

The x-ray plots contains five-minute averages x-ray flux (Watt/m²) 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/cm² -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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325 Broadway, Boulder CO 80305

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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