

Space Weather Highlights
23 November - 29 November 2015

SWPC PRF 2100
30 November 2015

Solar activity was at very low levels with the exception of 23 and 25 November. Region 2454 (N14, L=121, class/area Dai/150 on 23 Nov) produced a few C-class events, the largest a C8/1f at 23/0228 UTC. Between 24/1130-1530 UTC, SDO/AIA 193 and 304 imagery observed a 20 degree long eruption, centered near S10W00, along a NW to SE oriented filament channel. No Earth-directed coronal mass ejections were observed during the period.

No proton events were observed at geosynchronous orbit.

The greater than 2 MeV electron flux at geosynchronous orbit reached moderate levels on 23-27 November but decreased to normal levels on 28-29 November.

Geomagnetic field activity was at quiet levels from 23-26 November. Mostly quiet levels were observed with a few isolated unsettled periods on 27-29 November and a single active period observed during the 29/2100-2400 UTC synoptic period due to prolonged negative Bz and slightly elevated solar wind speed.

Space Weather Outlook
30 November - 26 December 2015

Solar activity is expected to be at very low to low levels throughout 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 normal to moderate levels for the majority of the period with the exception of 03-05 December, 08-09 December and 11-15 December following several recurrent coronal hole high speed streams (CH HSS).

Geomagnetic field activity is expected to be unsettled to active on 30 November-02 December with minor storm periods expected on 01 December due to a recurrent positive polarity CH HSS. Quiet to unsettled levels are expected from 03-05 December. Isolated active periods are likely again on 06-07 December and 10 December as two subsequent positive polarity CH HSSs become geoeffective respectively. Quiet to unsettled conditions are expected to dominate the remainder of the forecast period.



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
23 November	120	77	400	B4.2	3	0	0	1	1	0	0	0
24 November	113	66	290	B3.7	0	0	0	0	0	0	0	0
25 November	109	58	200	B3.1	1	0	0	0	0	0	0	0
26 November	104	56	170	B2.8	0	0	0	0	0	0	0	0
27 November	99	48	110	B2.0	0	0	0	0	0	0	0	0
28 November	97	36	110	B1.6	0	0	0	0	0	0	0	0
29 November	96	47	70	B1.6	0	0	0	2	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
	23 November		1.8e+05	1.3e+04	3.0e+03	
24 November		2.3e+05	1.3e+04	3.3e+03		1.0e+07
25 November		3.5e+05	1.2e+04	3.1e+03		1.3e+07
26 November		3.5e+05	1.2e+04	2.9e+03		1.2e+07
27 November		2.2e+05	1.1e+04	2.8e+03		2.4e+05
28 November		3.9e+05	1.2e+04	2.9e+03		4.2e+05
29 November		3.2e+05	1.2e+04	3.0e+03		1.2e+05

Daily Geomagnetic Data

Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
	23 November	2	0-0-1-0-1-1-1-0	0	0-0-0-1-0-0-0-0	3
24 November	1	0-0-0-0-1-1-0-0	0	0-0-0-1-0-0-0-0	2	0-0-0-1-0-0-0-0
25 November	1	0-0-0-0-1-1-1-0	0	0-0-0-0-0-0-0-0	2	0-0-0-0-0-0-1-0
26 November	2	0-0-0-0-0-2-1-1	0	0-0-0-0-0-0-1-0	3	0-0-0-1-0-1-1-1
27 November	4	2-1-1-1-1-1-1-1	3	0-2-1-1-1-2-0-0	7	2-3-2-2-1-1-1-2
28 November	5	0-1-1-1-2-1-2-3	9	1-0-1-2-5-1-1-2	8	1-1-1-2-3-1-2-3
29 November	7	1-0-2-2-2-2-2-3	7	0-0-1-3-3-2-2-2	5	1-1-2-2-2-2-3-4

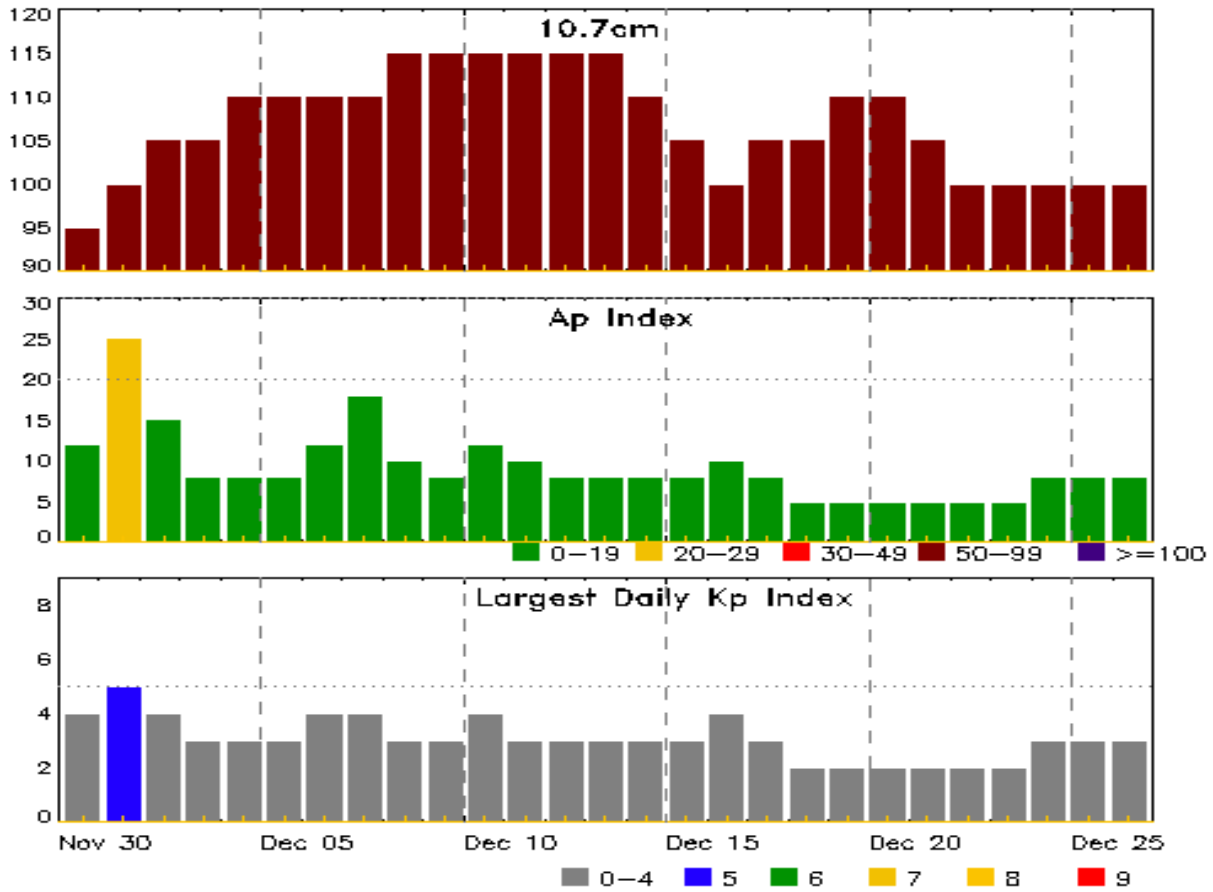


Alerts and Warnings Issued

Date & Time of Issue UTC	Type of Alert or Warning	Date & Time of Event UTC
28 Nov 2044	WATCH: Geomagnetic Storm Category G1 predicted	
29 Nov 2323	WARNING: Geomagnetic K = 4	29/2325 - 30/0600



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
30 Nov	95	12	4	14 Dec	110	8	3
01 Dec	100	25	5	15 Dec	105	8	3
02 Dec	105	15	4	16 Dec	100	10	4
03 Dec	105	8	3	17 Dec	105	8	3
04 Dec	110	8	3	18 Dec	105	5	2
05 Dec	110	8	3	19 Dec	110	5	2
06 Dec	110	12	4	20 Dec	110	5	2
07 Dec	110	18	4	21 Dec	105	5	2
08 Dec	115	10	3	22 Dec	100	5	2
09 Dec	115	8	3	23 Dec	100	5	2
10 Dec	115	12	4	24 Dec	100	8	3
11 Dec	115	10	3	25 Dec	100	8	3
12 Dec	115	8	3	26 Dec	100	8	3
13 Dec	115	8	3				



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 245	2695	Intensity II

No Events Observed

Flare List

Date	Time			X-ray Class	Imp/ Brtns	Optical		Rgn #
	Begin	Max	End			Location Lat CMD	Rgn #	
23 Nov	0043	0048	0052	C1.6	SF	N16W51		2454
23 Nov	0109	0228	0254	C8.7	1F	N12W53		2454
23 Nov	1203	1213	1242	C1.3				
23 Nov	1707	1721	1736	B8.8				
23 Nov	1808	1820	1831	B8.2				2454
25 Nov	0728	0827	0846	C1.9				
25 Nov	1028	1043	1050	B7.9				
25 Nov	2209	2220	2239	B5.6				
26 Nov	2119	2141	2218	B9.0				
27 Nov	1335	1342	1348	B4.2				2459
28 Nov	1032	1134	1215	B6.0				2457
29 Nov	0604	0610	0617	B5.9	SF	N09W09		2458
29 Nov	0655	0737	0752	B6.3	SF	N05E19		2459



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 2454																	
13 Nov	N08E66	121	10	4	Bxo	2	B										
14 Nov	N08E52	122	20	3	Bxo	2	B										
15 Nov	N10E41	119	20	6	Bxo	8	B										
18 Nov	N11E01	120	10	3	Bxo	4	B										
19 Nov	N11W13	121	20	5	Cro	8	B										
20 Nov	N12W28	123	20	7	Cro	6	B										
21 Nov	N13W40	121	90	8	Dac	14	B	4									
22 Nov	N13W53	121	130	8	Dac	16	BG	8			6						
23 Nov	N14W67	121	150	7	Dai	16	B	2			1	1					
24 Nov	N14W82	124	30	4	Cao	4	B										
								14	0	0	7	1	0	0	0	0	

Crossed West Limb.
Absolute heliographic longitude: 120

Region 2455																	
14 Nov	N15E36	138	20	1	Bxo	2	B										
15 Nov	N15E22	138	30	5	Cro	7	B										
16 Nov	N15E09	137	20	5	Dro	5	B										
17 Nov	N15W04	137	10	4	Bxo	2	B										
18 Nov	N15W18	139	plage														
19 Nov	N15W32	140	plage														
20 Nov	N15W46	141	plage														
21 Nov	N15W60	141	plage														
22 Nov	N15W74	142	plage														
23 Nov	N15W88	143	plage														
								0	0	0	0	0	0	0	0	0	

Crossed West Limb.
Absolute heliographic longitude: 137



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 2456																	
16 Nov	N07E27	119	10	4	Bxo	5	B										
17 Nov	N05E12	121	30	5	Dro	11	B										
18 Nov	N06W00	120	50	9	Dai	12	B										
19 Nov	N06W14	122	40	7	Dai	10	B										
20 Nov	N06W29	124	20	6	Dro	8	B										
21 Nov	N06W42	123	30	5	Cao	5	B										
22 Nov	N06W53	121	20	3	Bxo	6	B										
23 Nov	N07W66	121	10	3	Bxo	3	B										
24 Nov	N07W81	123	plage														
								0	0	0	0	0	0	0	0	0	

Crossed West Limb.

Absolute heliographic longitude: 120

Region 2457																	
18 Nov	N12E84	38	plage					1									
19 Nov	N12E70	38	20	4	Bxo	3	B										
20 Nov	N11E63	32	110	7	Dso	8	B						3				
21 Nov	N11E49	32	130	8	Dsi	10	B	2					2				
22 Nov	N11E36	32	120	8	Dai	13	B	1					12				
23 Nov	N11E23	32	120	8	Dsi	14	BG										
24 Nov	N12E11	31	70	9	Cao	11	BG										
25 Nov	N12W02	30	30	8	Hsx	2	A										
26 Nov	N12W17	32	30	8	Hax	1	A										
27 Nov	N13W27	29	20	6	Hax	1	A										
28 Nov	N12W40	29	20	1	Hax	1	A										
29 Nov	N12W54	30	10	1	Hax	2	A										
								4	0	0	17	0	0	0	0	0	

Still on Disk.

Absolute heliographic longitude: 30



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 2458																							
22 Nov	N09E72	356	60	2	Hax	1	A																
23 Nov	N09E57	358	120	5	Cso	4	B																
24 Nov	N10E46	356	160	7	Dao	8	B																
25 Nov	N08E33	355	100	7	Dai	10	B																
26 Nov	N08E21	354	80	9	Cao	8	B																
27 Nov	N08E07	355	70	3	Cao	3	B																
28 Nov	N08W07	356	80	6	Cao	4	B																
29 Nov	N08W21	357	40	6	Cao	3	B						1										
								0	0	0		1	0	0	0	0							

Still on Disk.

Absolute heliographic longitude: 355

Region 2459																							
24 Nov	N05E75	327	30	3	Cao	3	B																
25 Nov	N04E59	329	60	1	Cai	4	B																
26 Nov	N04E45	330	40	2	Cao	3	B																
27 Nov	N04E33	329	10	2	Cao	2	B																
28 Nov	N04E19	330	10	2	Axx	1	A																
29 Nov	N04E04	332	10	1	Axx	1	A						1										
								0	0	0		1	0	0	0	0							

Still on Disk.

Absolute heliographic longitude: 332

Region 2460																							
25 Nov	N13E29	359	10	3	Bxo	2	B																
26 Nov	N12E16	359	20	4	Cro	4	B																
27 Nov	N12W01	3	10	1	Bxo	2	B																
28 Nov	N12W15	4	plage																				
29 Nov	N12W29	5	plage																				
								0	0	0		0	0	0	0	0							

Still on Disk.

Absolute heliographic longitude: 3

Region 2461																							
29 Nov	S07W54	29	10	1	Axx	1	A																
								0	0	0		0	0	0	0	0							

Still on Disk.

Absolute heliographic longitude: 29

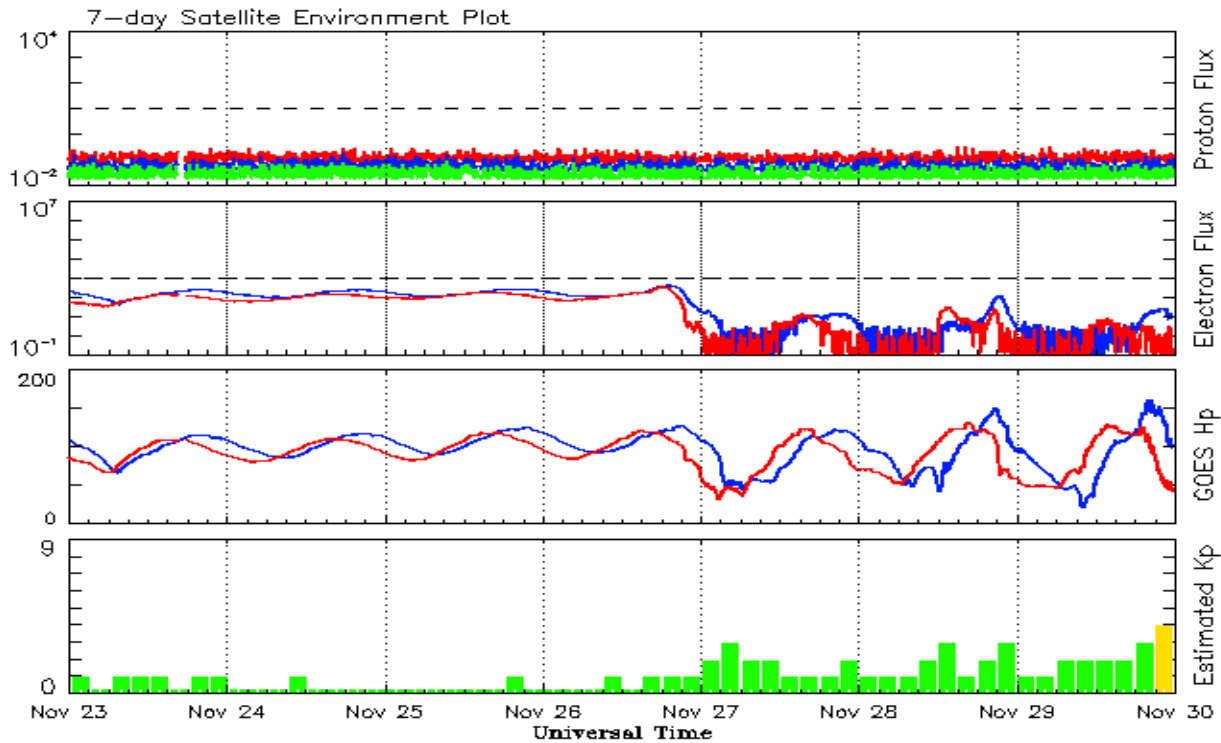


Recent Solar Indices (preliminary)
Observed monthly mean values

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	
2013										
November	125.7	77.6	0.62	114.6	114.6	75.3	148.4	135.4	5	7.9
December	118.2	90.3	0.76	115.4	115.4	75.9	147.7	135.9	5	7.5
2014										
January	125.9	81.8	0.65	117.7	117.7	77.3	158.6	137.3	6	7.1
February	174.6	102.3	0.59	119.5	119.5	78.3	170.3	138.6	12	6.9
March	141.1	91.9	0.65	123.2	123.2	80.8	149.9	140.8	6	7.2
April	130.5	67.5	0.65	124.8	124.8	69.8	144.3	143.5	9	7.5
May	116.8	67.5	0.64	122.3	122.3	69.0	130.0	144.7	7	7.9
June	107.7	61.7	0.66	121.4	121.4	68.5	122.2	145.5	7	8.4
July	113.6	60.1	0.64	120.4	120.4	67.6	137.3	145.2	5	8.8
August	106.2	64.1	0.70	115.1	115.1	65.0	124.7	142.8	9	8.9
September	127.4	78.0	0.69	107.4	107.4	61.1	146.1	140.1	11	9.3
October	92.0	54.0	0.66	101.7	101.7	58.4	153.7	138.4	10	9.9
November	101.8	62.2	0.69	97.9	97.9	56.8	155.3	137.4	10	10.1
December	120.0	67.7	0.65	95.2	95.2	55.3	158.7	137.0	12	10.5
2015										
January	101.2	55.8	0.66	92.1	92.1	53.6	141.7	135.8	10	11.0
February	70.6	40.0	0.63	88.3	88.3	51.7	128.8	133.8	10	11.5
March	61.7	32.7	0.62	84.2	84.2	49.3	126.0	131.2	17	12.0
April	72.5	45.2	0.75	80.5	80.5	47.3	129.2	127.3	12	12.4
May	83.0	53.3	0.71				120.1		9	
June	77.3	39.9	0.53				123.2		14	
July	68.4	39.8	0.58				107.0		10	
August	61.6	38.8	0.63				106.2		16	
September	72.5	46.9	0.65				102.1		16	
October	59.5	37.0	0.62				104.1		15	

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 23 November 2015*

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.

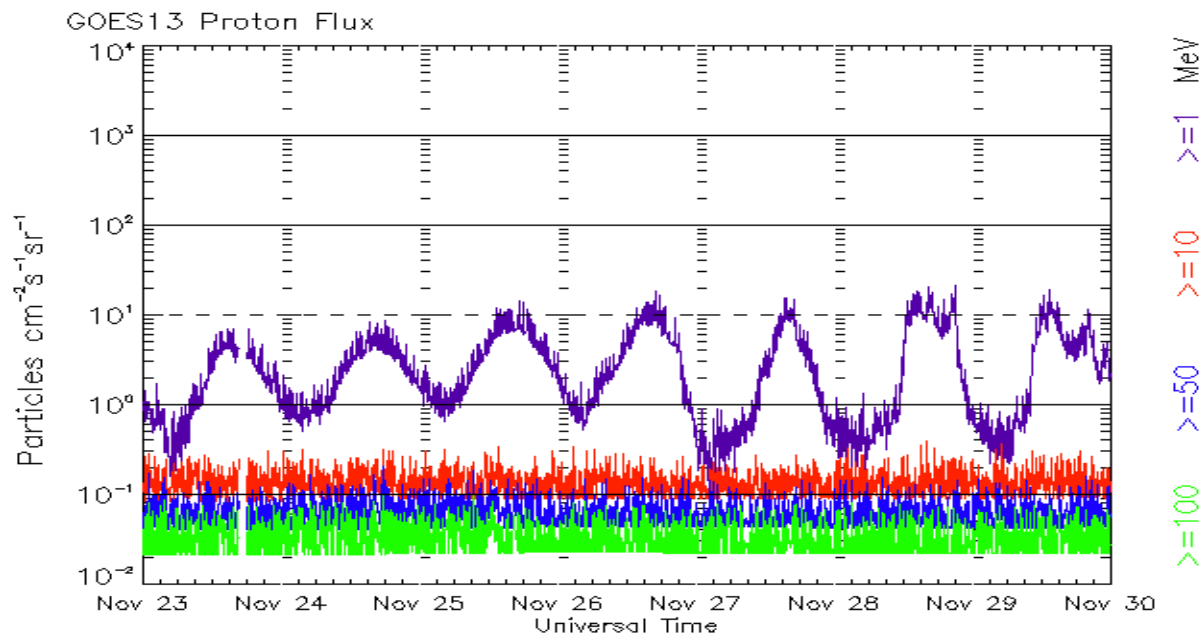
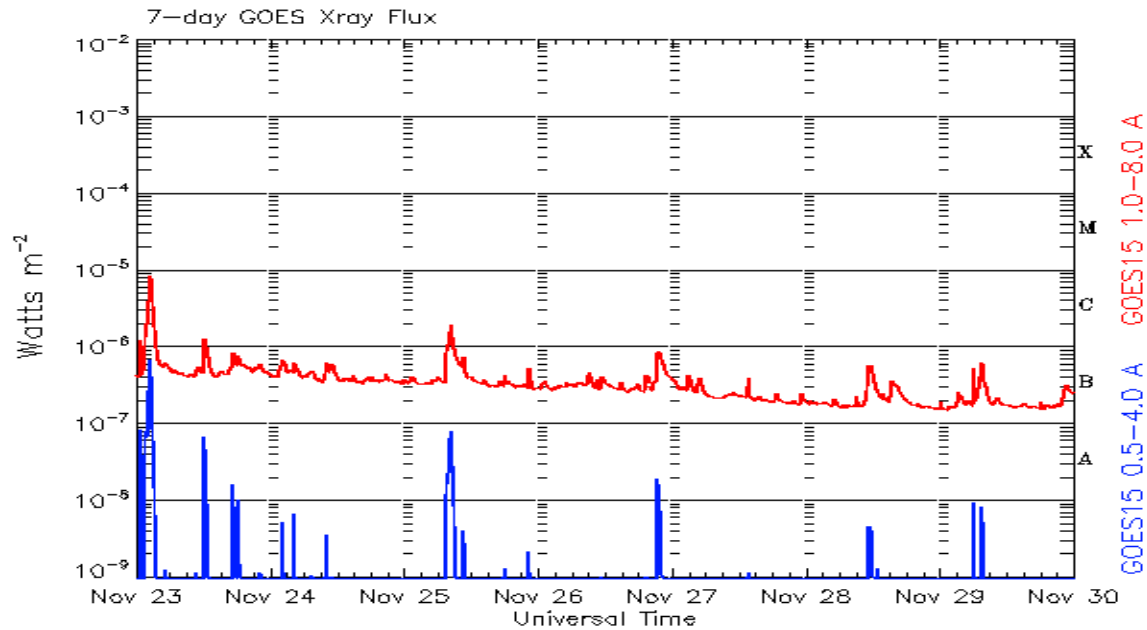
The electron flux plot contains the five-minute averaged integral electron flux (electrons/cm²-sec -sr) with energies greater than 2 MeV by the SWPC Primary GOES satellite.

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 23 November 2015*

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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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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