

Space Weather Highlights
14 November - 20 November 2016

SWPC PRF 2151
21 November 2016

Solar activity was very low through the period with only a few low-level B-class flares observed from Regions 2610 (N16, L=018, class/area Dao/050 on 17 November), and 2611 (N03, L=291, class/area Cao/020 on 18 November). No Earth-directed coronal mass ejections (CME) were observed in available satellite imagery during the reporting period.

No proton events were observed at geosynchronous orbit.

The greater than 2 MeV electron flux at geosynchronous orbit was at high levels throughout the period (14-20 November). The maximum flux of 19,442 pfu was observed at 15/1530 UTC.

Geomagnetic field activity was at quiet to unsettled levels on 14-15 November in response to waning influence from a negative polarity coronal hole high speed stream (CH HSS). Solar wind speed steadily decreased from a peak of 681 km/s to period ending values below 400 km/s. Total field ranged between 1 and 7 nT while the Bz component reached a maximum southward deviation of -6 nT. Quiet conditions were observed on 16-20 November under an ambient solar wind environment.

Space Weather Outlook
21 November - 17 December 2016

Solar activity is expected to be at very low levels with a slight chance for C-class flares over 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 normal to moderate levels with high levels likely on 22 November - 07 December, and 10-17 December due to recurrent CH HSS influence.

Geomagnetic field activity is expected to be at unsettled to active levels on 21-29 November and 07-11 December, with G1 (Minor) geomagnetic storm levels likely on 22-24 November, due to recurrent CH HSS effects.



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
14 November	77	26	30	A7.0	0	0	0	1	0	0	0	0
15 November	77	29	30	A7.9	0	0	0	1	0	0	0	0
16 November	81	18	40	A7.9	0	0	0	0	0	0	0	0
17 November	79	27	60	A7.3	0	0	0	0	0	0	0	0
18 November	78	28	30	A6.8	0	0	0	0	0	0	0	0
19 November	77	22	20	A6.8	0	0	0	1	0	0	0	0
20 November	76	11	10	A6.6	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	>0.6 MeV	>2MeV	>4 MeV
	14 November		3.1e+06	1.5e+04	3.5e+03	
15 November		1.9e+06	1.4e+04	3.5e+03		7.1e+08
16 November		2.2e+06	1.5e+04	3.6e+03		6.2e+08
17 November		1.5e+06	1.5e+04	3.5e+03		2.6e+08
18 November		9.6e+05	1.5e+04	3.7e+03		2.3e+08
19 November		1.4e+06	1.5e+04	3.4e+03		2.0e+08
20 November		1.1e+06	1.5e+04	3.6e+03		8.6e+07

Daily Geomagnetic Data

Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
	14 November	8	0-2-2-3-2-2-1-3	18	2-1-3-5-4-4-2-2	11
15 November	7	3-3-1-2-2-1-1-0	8	2-2-0-3-4-2-0-0	7	3-2-1-2-3-1-1-1
16 November	3	1-1-0-0-1-1-1-2	2	0-0-1-2-0-1-0-0	4	1-1-1-1-0-1-2-2
17 November	2	1-0-1-0-1-1-1-1	2	1-0-1-0-0-1-1-1	4	2-1-0-0-0-1-2-1
18 November	3	2-0-0-0-2-2-0-0	1	0-0-0-1-0-1-0-0	3	2-1-0-0-0-2-1-0
19 November	2	0-0-1-1-1-1-1-1	0	0-0-0-1-0-0-0-0	3	0-0-0-1-1-1-1-1
20 November	2	0-1-1-0-2-0-0-1	2	0-0-0-2-2-1-0-0	2	0-1-1-1-1-1-1-1

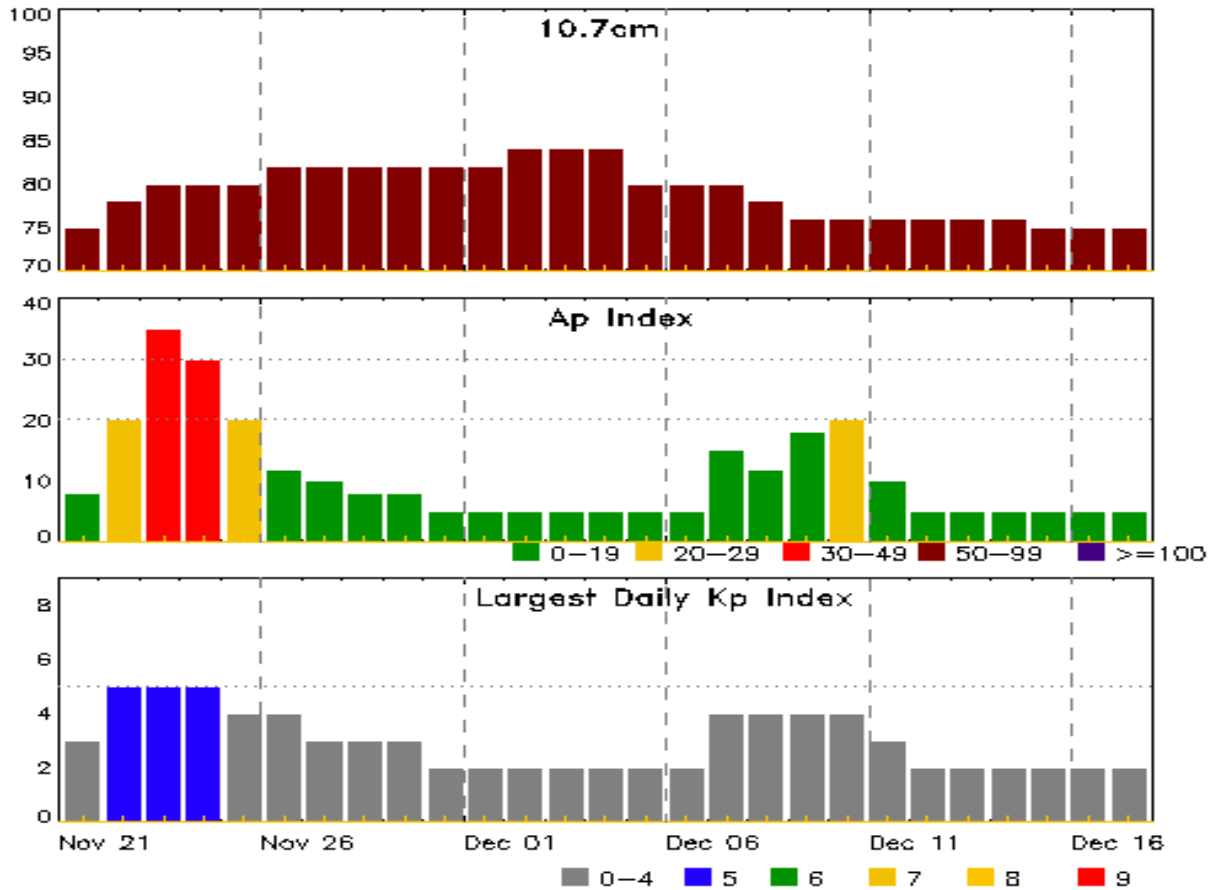


Alerts and Warnings Issued

Date & Time of Issue UTC	Type of Alert or Warning	Date & Time of Event UTC
14 Nov 0056	EXTENDED WARNING: Geomagnetic K = 5	13/2003 - 14/0600
14 Nov 0501	CONTINUED ALERT: Electron 2MeV Integral Flux \geq 1000pfu	13/0950
14 Nov 2248	WARNING: Geomagnetic K = 4	14/2250 - 15/0300
15 Nov 0500	CONTINUED ALERT: Electron 2MeV Integral Flux \geq 1000pfu	13/0950
16 Nov 0500	CONTINUED ALERT: Electron 2MeV Integral Flux \geq 1000pfu	13/0950
17 Nov 0500	CONTINUED ALERT: Electron 2MeV Integral Flux \geq 1000pfu	13/0950
18 Nov 0500	CONTINUED ALERT: Electron 2MeV Integral Flux \geq 1000pfu	13/0950
19 Nov 0500	CONTINUED ALERT: Electron 2MeV Integral Flux \geq 1000pfu	13/0950
19 Nov 2107	WATCH: Geomagnetic Storm Category G1 predicted	
20 Nov 1113	CONTINUED ALERT: Electron 2MeV Integral Flux \geq 1000pfu	13/0950
20 Nov 2100	WATCH: Geomagnetic Storm Category G1 predicted	



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
21 Nov	75	8	3	05 Dec	80	5	2
22	78	20	5	06	80	5	2
23	80	35	5	07	80	15	4
24	80	30	5	08	78	12	4
25	80	20	4	09	76	18	4
26	82	12	4	10	76	20	4
27	82	10	3	11	76	10	3
28	82	8	3	12	76	5	2
29	82	8	3	13	76	5	2
30	82	5	2	14	76	5	2
01 Dec	82	5	2	15	75	5	2
02	84	5	2	16	75	5	2
03	84	5	2	17	75	5	2
04	84	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 245	2695	Intensity II

No Events Observed

Flare List

Date	Time			X-ray Class	Imp/ Brtns	Optical		Rgn #
	Begin	Max	End			Location Lat CMD		
14 Nov	2337	2341	2344	B1.2	SF	N14E03		2610
15 Nov	0028	0035	0042	B6.1				2610
15 Nov	1653	1658	1701	B4.2	SF	N14W08		2610
15 Nov	2041	2050	2113	B1.8				
19 Nov	0710	0715	0720	B1.9	SF	N05E40		2611
19 Nov	2246	2250	2254	B1.1				2611



Region Summary

Date	Location		Sunspot Characteristics				Flares							
	Lat CMD	Lon	Helio 10 ⁶ hemi.	Extent (helio)	Spot Class	Spot Count	Mag Class	X-ray			Optical			
								C	M	X	S	1	2	3

Region 2606

03 Nov	N12E61	107	10	1	Axx	1	A										
04 Nov	N11E50	105	10	1	Axx	1	A										
05 Nov	N11E36	106	10	1	Axx	1	A										
06 Nov	N10E24	104	10	1	Axx	1	A										
07 Nov	N11E10	105	10	1	Bxo	2	B										
08 Nov	N11W04	106	plage														
09 Nov	N11W18	107	plage														
10 Nov	N11W32	108	plage														
11 Nov	N11W46	108	plage														
12 Nov	N11W60	109	plage														
13 Nov	N11W74	110	plage														
14 Nov	N11W88	111	plage														
									0	0	0	0	0	0	0	0	0

Crossed West Limb.
Absolute heliographic longitude: 106

Region 2608

11 Nov	S07W60	122	20	5	Bxo	3	B										
12 Nov	S08W74	123	30	6	Bxo	3	B										
13 Nov	S08W85	121	0	1	Axx	1	A										
									0	0	0	0	0	0	0	0	0

Crossed West Limb.
Absolute heliographic longitude: 122

Region 2609

12 Nov	S08W00	49	30	3	Bxo	2	B										
13 Nov	S09W15	51	20	3	Cro	4	B										
14 Nov	S08W30	53	10	4	Bxo	2	B										
15 Nov	S08W46	56	10	5	Bxo	2	B										
16 Nov	S08W60	57	plage														
17 Nov	S08W74	57	plage														
18 Nov	S08W88	58	plage														
									0	0	0	0	0	0	0	0	0

Crossed West Limb.
Absolute heliographic longitude: 49



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 2610																							
12 Nov	N15E27		22	30	3	Cro	3	B															
13 Nov	N14E15		21	20	3	Cro	3	B						1									
14 Nov	N14W00		23	20	4	Bxo	4	B						1									
15 Nov	N14W13		23	20	4	Cro	7	B						1									
16 Nov	N15W22		19	40	6	Dai	8	B															
17 Nov	N16W35		18	50	6	Dao	6	B															
18 Nov	N15W48		17	10	5	Bxo	5	B															
19 Nov	N15W59		16	10	1	Axx	1	A															
20 Nov	N15W73		17	plage																			
														0	0	0	3	0	0	0	0	0	

Still on Disk.

Absolute heliographic longitude: 23

Region 2611

17 Nov	N03E54		289	10	1	Hrx	1	A														
18 Nov	N03E39		291	20	3	Cao	3	B														
19 Nov	N03E29		288	10	1	Axx	1	A						1								
20 Nov	N04E17		287	10	1	Axx	1	A														
														0	0	0	1	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 287

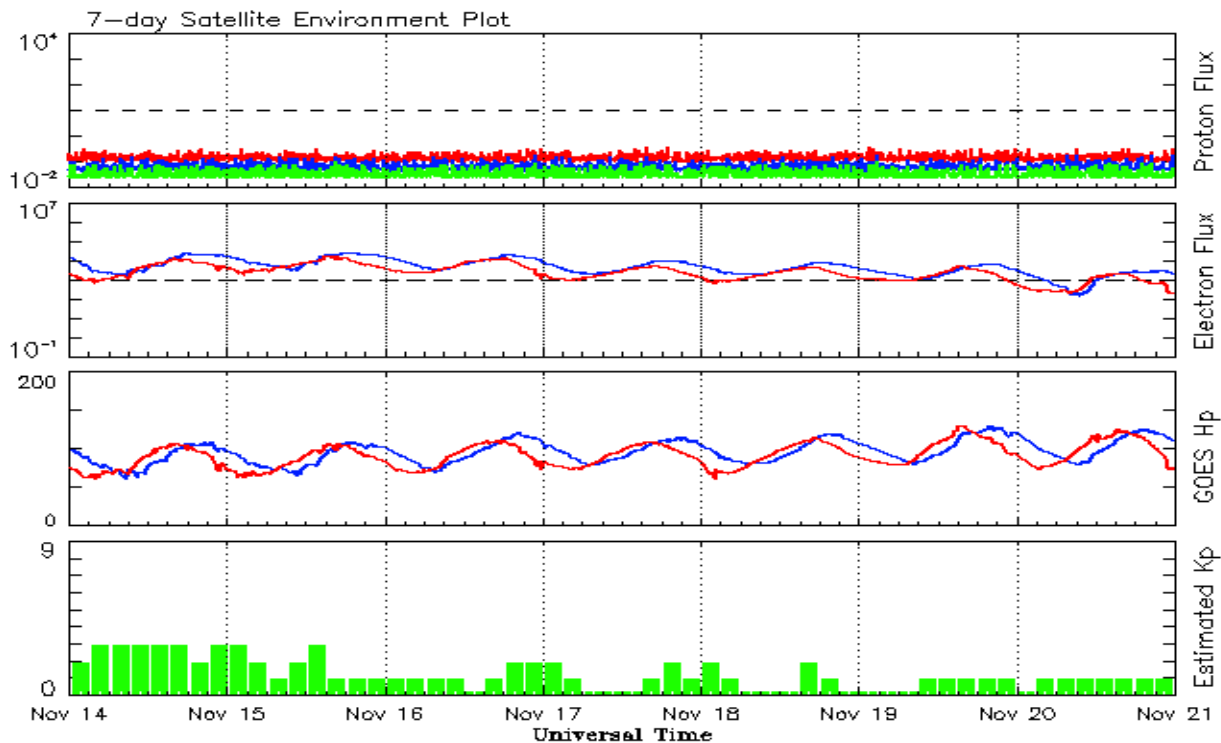


Recent Solar Indices (preliminary)
Observed monthly mean values

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	
2014										
November	101.8	62.2	0.69	97.9	56.8	155.3	137.4	10	10.1	
December	120.0	67.7	0.65	95.2	55.3	158.7	137.0	12	10.5	
2015										
January	101.2	55.8	0.66	92.1	53.6	141.7	135.8	10	11.0	
February	70.6	40.0	0.63	88.3	51.7	128.8	133.8	10	11.5	
March	61.7	32.7	0.62	84.2	49.3	126.0	131.2	17	12.0	
April	72.5	45.2	0.75	80.5	47.3	129.2	127.3	12	12.4	
May	83.0	53.3	0.71	77.5	45.7	120.1	123.3	9	12.7	
June	77.3	39.9	0.53	73.1	43.3	123.2	119.5	14	13.0	
July	68.4	39.5	0.58	68.2	41.0	107.0	116.0	10	13.1	
August	61.6	38.6	0.63	65.5	39.8	106.2	113.3	16	13.1	
September	72.5	47.2	0.65	64.0	39.5	102.1	110.8	16	12.8	
October	59.5	38.2	0.62	61.8	38.6	104.1	107.9	15	12.5	
November	61.8	37.3	0.61	59.0	36.7	109.6	105.3	13	12.5	
December	54.1	34.8	0.64	55.1	34.7	112.8	102.5	15	12.5	
2016										
January	50.4	34.2	0.67	51.4	32.6	103.5	99.9	10	12.3	
February	56.0	33.8	0.61	49.6	31.5	103.5	98.1	10	12.0	
March	40.9	32.5	0.80	47.7	30.3	91.6	96.6	11	11.8	
April	39.2	22.7	0.58	45.0	28.7	93.4	95.3	10	11.8	
May	48.9	30.9	0.64			93.1		12		
June	19.3	12.3	0.65			81.9		9		
July	36.8	19.5	0.53			85.9		10		
August	50.4	30.4	0.60			85.0		10		
September	37.4	26.8	0.72			87.8		16		
October	30.0	20.2	0.67			86.1		16		

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 14 November 2016*

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.

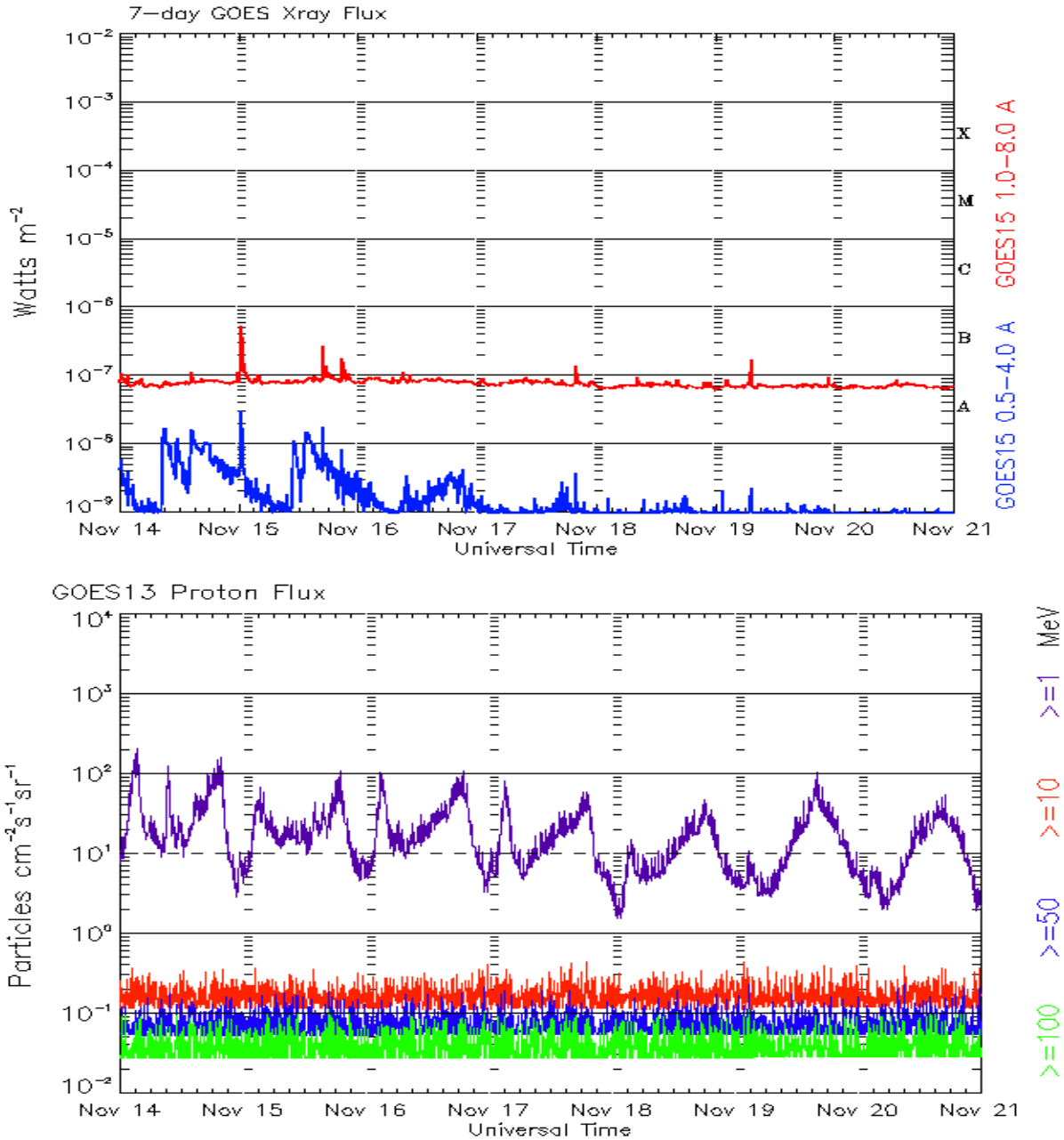
The electron flux plot contains the five-minute averaged integral electron flux (electrons/cm²-sec -sr) with energies greater than 2 MeV by the SWPC Primary GOES satellite.

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 14 November 2016*

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.



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U.S. Department of Commerce
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Space Weather Prediction Center
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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