

Space Weather Highlights
26 December - 01 January 2017

SWPC PRF 2157
02 January 2017

Solar activity was at background levels through the period.

No proton events were observed at geosynchronous orbit.

The greater than 2 MeV electron flux at geosynchronous orbit was at high levels from 26-31 Dec, dropping to normal to moderate levels late on 31 Dec - 01 Jan due to increased geomagnetic activity from the onset of a positive polarity CH HSS.

Geomagnetic field activity ranged from quiet to G1 (Minor) storm levels through the period. G1 conditions were observed early on 26 Dec as influence from a positive polarity CH HSS persisted from the previous reporting period. The CH HSS began to wane early on 27 Dec, causing a geomagnetic activity decrease to quiet to active levels. As solar wind speeds continue their slow decline, quiet to unsettled conditions on 28 Dec gave way to quiet conditions on 29-30 Dec. Quiet to unsettled activity was once again observed beginning on 31 Dec as the onset of another positive polarity CH HSS was observed. Wind speeds increased from around 300 km/s to between 450-550 km/s as well as total magnetic field strength from around 5 nT to a peak of nearly 20 nT at 31/1636 UTC. Active conditions were observed early on 01 Jan as the CIR transitioned into the high-speed stream proper. As total magnetic field strength gradually trended towards 5 nT, geomagnetic activity decreased to quiet to unsettled levels.

Space Weather Outlook
02 January - 28 January 2017

Solar activity is expected to be at very low levels throughout the outlook period.

No proton events are expected at geosynchronous orbit.

The greater than 2 MeV electron flux at geosynchronous orbit is expected to be high on 02-03 Jan, 05-13 Jan, and 18-27 Jan; moderate electron flux is expected on 04 Jan, 14-17 Jan and 28 Jan. All increases in electron flux are anticipated in response to multiple, recurrent CH HSSs

Geomagnetic field activity is expected to be at unsettled levels on 02 Jan, 08 Jan, 14 Jan and 23 Jan; active levels are expected on 03-04 Jan, 06-07 Jan, 20-22 Jan and 27-28 Jan; G1 (Minor) storm levels are likely on 05 Jan and 17-19 Jan. All elevated geomagnetic activity is anticipated in response to multiple, recurrent CH HSSs. The remainder of the outlook period is expected to observe quiet conditions under an ambient solar wind environment.



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	
26 December	74	13	10	A6.3	0	0	0	0	0	0	0	0	0
27 December	74	14	30	A6.4	0	0	0	2	0	0	0	0	0
28 December	73	14	10	A6.4	0	0	0	0	0	0	0	0	0
29 December	73	0	0	A6.9	0	0	0	0	0	0	0	0	0
30 December	74	11	10	A7.1	0	0	0	0	0	0	0	0	0
31 December	74	11	10	A6.4	0	0	0	0	0	0	0	0	0
01 January	73	0	0	A5.7	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	>0.6 MeV	>2MeV	>4 MeV
	26 December		2.8e+06	1.4e+04	3.2e+03	
27 December		1.4e+06	1.4e+04	3.3e+03		6.2e+08
28 December		1.3e+06	1.4e+04	3.5e+03		5.8e+08
29 December		1.1e+06	1.6e+04	4.1e+03		7.0e+08
30 December		1.6e+06	1.5e+04	3.7e+03		4.7e+08
31 December		2.1e+06	1.5e+04	3.7e+03		1.2e+08
01 January		1.5e+06	1.5e+04	3.5e+03		1.6e+07

Daily Geomagnetic Data

Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
	26 December	15	4-3-3-2-3-3-2-3	45	4-4-5-6-6-6-2-2	22
27 December	8	3-3-1-2-2-1-2-2	12	3-2-1-4-4-2-2-1	11	4-3-2-2-2-1-2-3
28 December	4	1-2-0-1-1-2-1-1	5	1-2-0-3-1-2-1-1	6	2-3-1-1-1-2-1-2
29 December	2	2-1-1-1-0-1-0-0	9	1-1-1-4-3-3-1-0	5	2-1-1-1-1-2-1-1
30 December	2	0-1-0-0-1-0-1-1	1	0-0-0-2-1-0-0-0	4	1-2-0-1-1-1-1-1
31 December	10	1-2-1-3-3-3-3-2	21	0-0-1-5-5-5-3-2	12	1-2-2-3-3-3-3-2
01 January	9	3-3-3-2-1-2-1-1	26	2-4-4-6-5-2-2-1	22	4-4-3-2-2-3-2-2

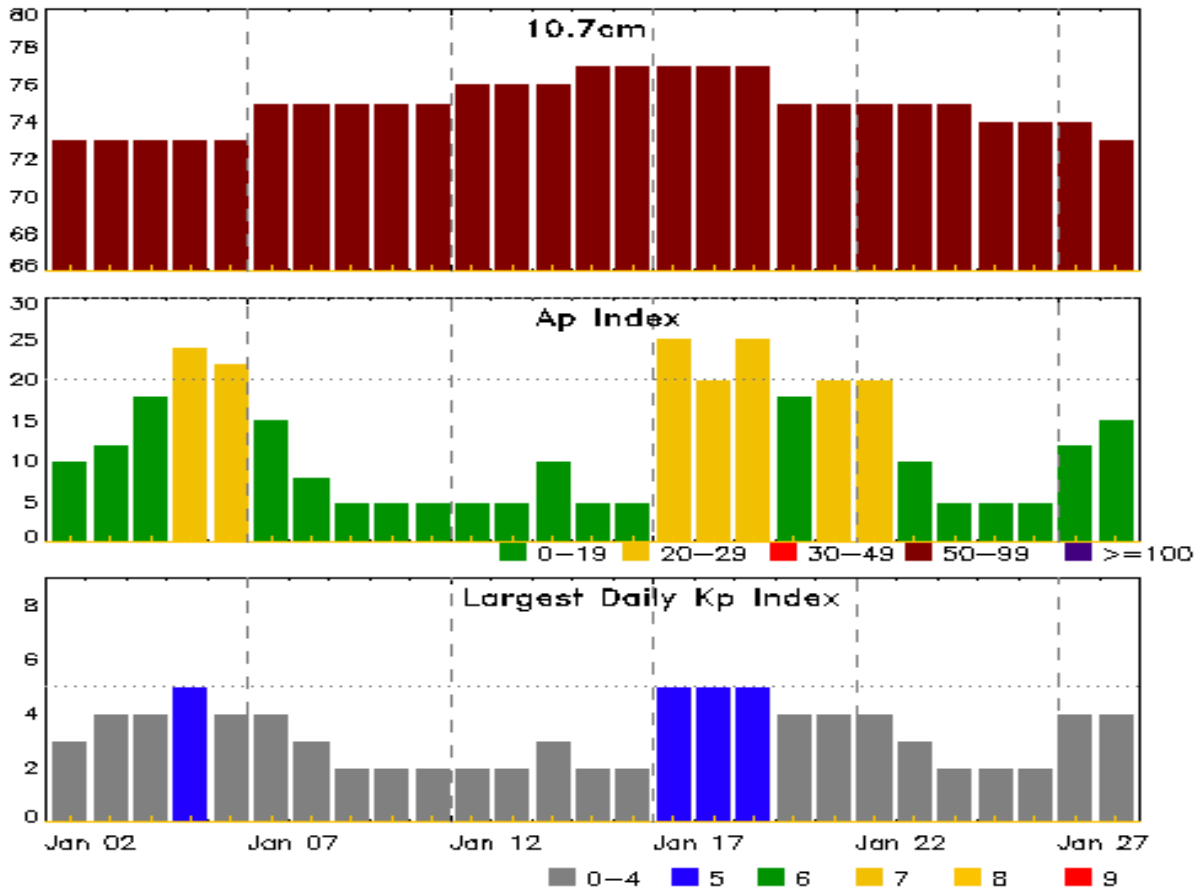


Alerts and Warnings Issued

Date & Time of Issue UTC	Type of Alert or Warning	Date & Time of Event UTC
26 Dec 0201	WARNING: Geomagnetic K = 5	26/0200 - 0900
26 Dec 0203	EXTENDED WARNING: Geomagnetic K = 4	25/0255 - 26/1400
26 Dec 0204	ALERT: Geomagnetic K = 5	26/0204
26 Dec 0501	CONTINUED ALERT: Electron 2MeV Integral Flux \geq 1000pfu	22/1215
26 Dec 1456	WARNING: Geomagnetic K = 4	26/1455 - 2200
26 Dec 1501	ALERT: Geomagnetic K = 4	26/1459
26 Dec 2114	EXTENDED WARNING: Geomagnetic K = 4	26/1455 - 27/0600
27 Dec 0500	CONTINUED ALERT: Electron 2MeV Integral Flux \geq 1000pfu	22/1215
27 Dec 0505	EXTENDED WARNING: Geomagnetic K = 4	26/1455 - 27/1800
28 Dec 0500	CONTINUED ALERT: Electron 2MeV Integral Flux \geq 1000pfu	22/1215
28 Dec 2100	WATCH: Geomagnetic Storm Category G1 predicted	
29 Dec 0500	CONTINUED ALERT: Electron 2MeV Integral Flux \geq 1000pfu	22/1215
30 Dec 0500	CONTINUED ALERT: Electron 2MeV Integral Flux \geq 1000pfu	22/1215
31 Dec 0500	CONTINUED ALERT: Electron 2MeV Integral Flux \geq 1000pfu	22/1215
31 Dec 0558	WATCH: Geomagnetic Storm Category G1 predicted	
31 Dec 1134	WARNING: Geomagnetic K = 4	31/1133 - 01/1500
01 Jan 0300	ALERT: Geomagnetic K = 4	01/0259



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
02 Jan	73	10	3	16 Jan	77	5	2
03	73	12	4	17	77	25	5
04	73	18	4	18	77	20	5
05	73	24	5	19	77	25	5
06	73	22	4	20	75	18	4
07	75	15	4	21	75	20	4
08	75	8	3	22	75	20	4
09	75	5	2	23	75	10	3
10	75	5	2	24	75	5	2
11	75	5	2	25	74	5	2
12	76	5	2	26	74	5	2
13	76	5	2	27	74	12	4
14	76	10	3	28	73	15	4
15	77	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	Radio Flux 2695	Intensity II

No Events Observed

Flare List

Date	Time			X-ray Class	Imp/ Brtns	Optical		Rgn #
	Begin	Max	End			Location Lat CMD	Rgn #	
26 Dec	1847	1852	1858	B3.0				2621
26 Dec	2056	2101	2105	B8.3				2621
26 Dec	2158	2202	2227	B2.9				2621
26 Dec	2325	2329	2332	B3.3				2621
27 Dec	0820	0846	0858	B3.1	SF	N09W50		2621
27 Dec	1004	1012	1018	B1.6	SF	N09W52		2621
27 Dec	1233	1238	1242	B1.5				2621
29 Dec	2011	2015	2020	B1.3				2619
30 Dec	0130	0133	0136	B1.0				2619
30 Dec	1222	1229	1239	B2.2				2621
31 Dec	0132	0350	0417	B2.4				
31 Dec	0738	0812	0836	B1.8				



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 2619

18 Dec	N04E15	280	20	3	Dso	3	B										
19 Dec	N04W00	280	10	5	Bxo	2	B										
20 Dec	N03W10	278	plage			1											
21 Dec	N03W25	280	plage														
22 Dec	N03W39	281	plage														
23 Dec	N03W53	282	plage														
24 Dec	N03W67	283	plage														
25 Dec	N03W82	285	plage														
									0	0	0	0	0	0	0	0	0

Crossed West Limb.
Absolute heliographic longitude: 280

Region 2621

26 Dec	N11W45	234	10	3	Bxo	3	B										
27 Dec	N10W61	237	30	7	Cro	4	B				2						
28 Dec	N10W74	237	10	4	Bxo	4	B										
29 Dec	N10W88	238	plage														
									0	0	0	2	0	0	0	0	0

Crossed West Limb.
Absolute heliographic longitude: 234

Region 2622

30 Dec	N12W59	196	10	1	Axx	1	A										
31 Dec	N11W71	195	10	1	Axx	1	A										
01 Jan	N11W85	195	plage														
									0	0	0	0	0	0	0	0	0

Still on Disk.
Absolute heliographic longitude: 196

Region 2623

01 Jan	S06W07	117	plage														
									0	0	0	0	0	0	0	0	0

Still on Disk.
Absolute heliographic longitude: 117

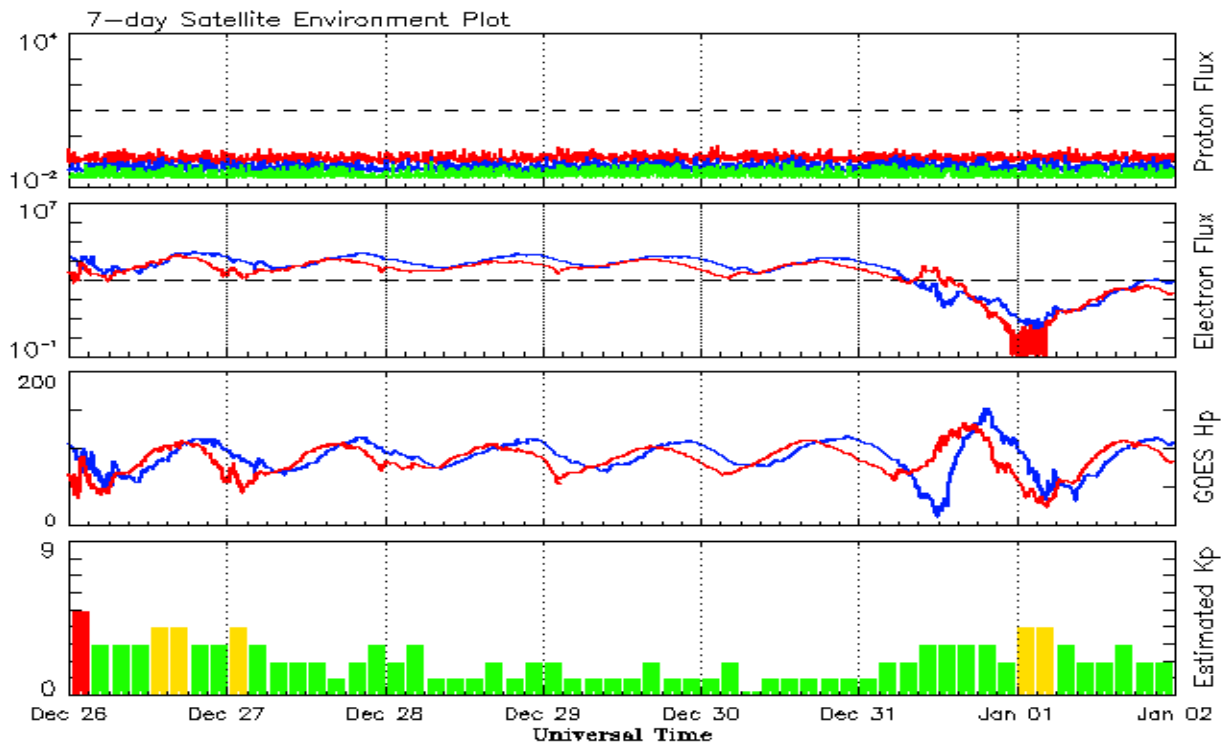


Recent Solar Indices (preliminary)
Observed monthly mean values

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
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	42.1	26.9	93.1	93.2	12	11.7
June	19.3	12.3	0.65	39.0	25.0	81.9	90.4	9	11.4
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	
November	22.4	12.8	0.57			78.7		10	
December	17.6	11.3	0.64			75.1		10	

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 26 December 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.

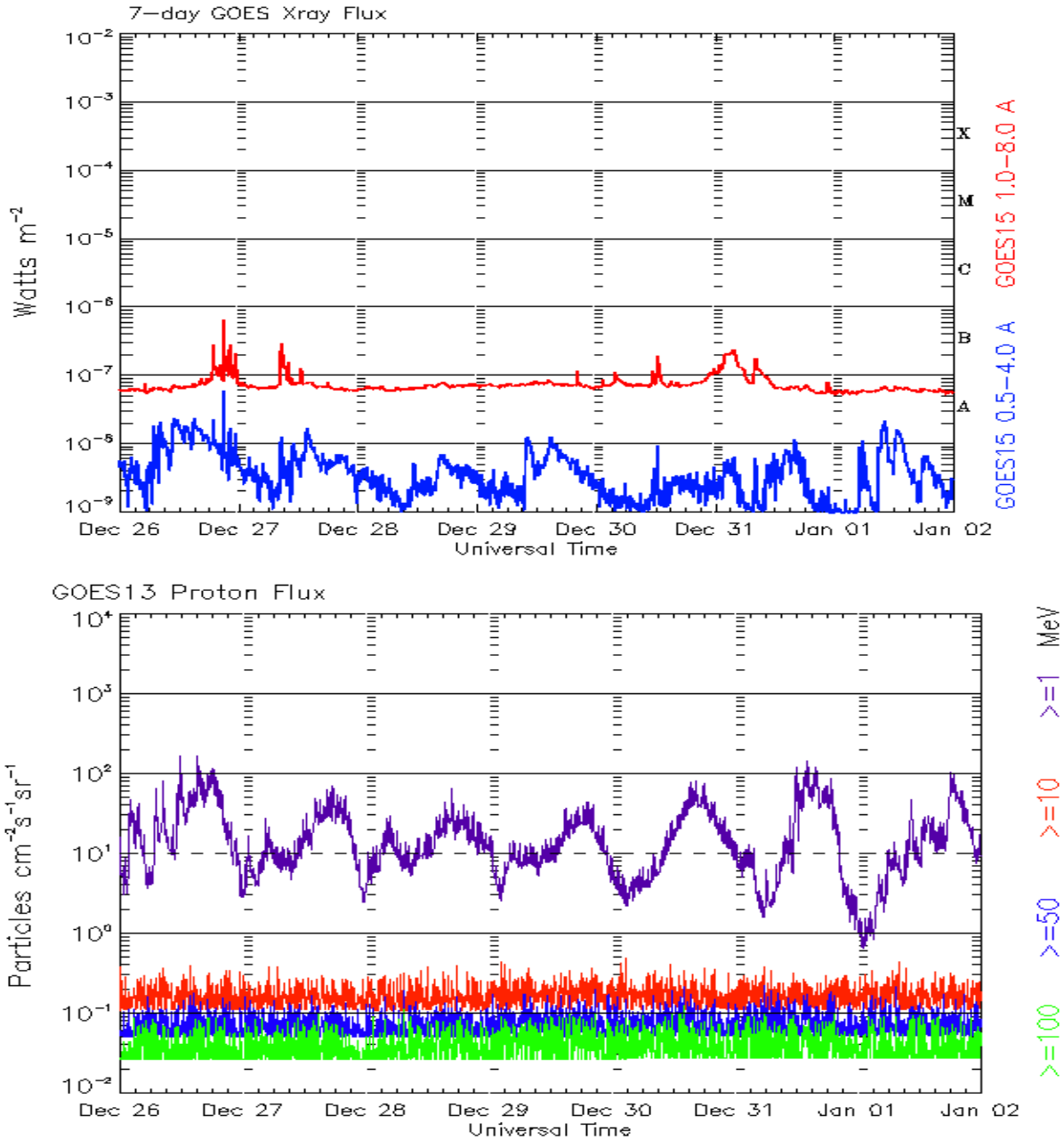
The electron flux plot contains the five-minute averaged integral electron flux (electrons/cm²-sec -sr) with energies greater than 2 MeV by the SWPC Primary GOES satellite.

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.

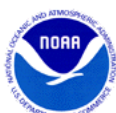




*Weekly GOES Satellite X-ray and Proton Plots
Week Beginning 26 December 2016*

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.



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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