

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 reached high levels throughout the reporting period with a peak flux of 29,524 pfu on 24/1830 UTC.

Geomagnetic field activity was quiet levels on 19 Dec and mostly quiet levels with an isolated period of unsettled conditions on 20 Dec. Activity increased to active with an isolated period of G2 (Moderate) storm levels late on 21 Dec due to the onset of a positive polarity CH HSS increasing wind speeds from around 350 km/s to over 650 km/s. An isolated period of G1 (Minor) was observed early on 22 Dec before geomagnetic activity decreased to unsettled and activity conditions through 23 Dec. 24 Dec underwent a further decrease with quiet to unsettled conditions throughout the day despite wind speeds maintaining between 600-750 km/s. Quiet to unsettled conditions were isolated by frequent periods of active levels on 25 Dec as the influence of a positive polarity CH HSS continued to keep solar wind speeds enhanced to around 700 km/s.

Space Weather Outlook **26 December - 21 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 reach high levels from 26-29 Dec, 31 Dec-02 Jan, 04-13 Jan, and 18-21 Jan due to multiple CH HSS influences; normal to moderate levels are expected on 30 Dec, 03 Jan, and 14-17 Jan.

Geomagnetic field activity is expected to be at quiet to G1 (Minor) levels on 26 Dec due to CH HSS influences. G1 (Minor) conditions are also likely on 04-05 Jan and 17-19 Jan. Active conditions are likely on 30 Dec, 06-07 Jan, and 20-21 Jan. Unsettled conditions are likely on 31 Dec, 02-03 Jan, 08 Jan, and 14 Jan. All anticipated enhancements in field activity are due to recurrent CH HSSs. Mostly quiet conditions are expected for the remainder of the outlook 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
19 December	73	12	10	A5.2	0	0	0	0	0	0	0	0
20 December	75	25	10	A5.4	0	0	0	0	0	0	0	0
21 December	75	15	50	A6.7	0	0	0	0	0	0	0	0
22 December	75	12	20	A6.2	0	0	0	0	0	0	0	0
23 December	74	0	0	A6.3	0	0	0	0	0	0	0	0
24 December	73	0	0	A6.3	0	0	0	0	0	0	0	0
25 December	73	0	0	A5.7	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
	19 December		4.0e+05	1.4e+04	3.2e+03	
20 December		5.2e+05	1.5e+04	3.7e+03		6.5e+06
21 December		3.5e+06	1.4e+04	3.3e+03		9.5e+06
22 December		2.9e+06	1.5e+04	3.4e+03		1.8e+08
23 December		5.1e+06	1.5e+04	3.3e+03		5.9e+08
24 December		2.5e+06	1.4e+04	3.5e+03		8.9e+08
25 December		4.5e+06	1.4e+04	3.2e+03		7.0e+08

Daily Geomagnetic Data

Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
	19 December	5	1-2-1-2-2-1-2-0	7	0-0-3-3-3-2-1-0	5
20 December	4	1-1-1-2-1-2-0-2	11	0-1-3-5-1-3-1-1	6	1-1-1-2-1-2-1-3
21 December	18	2-2-2-3-3-5-4-3	36	1-1-2-5-5-7-4-3	23	2-2-1-3-4-6-4-4
22 December	15	4-4-3-3-2-2-3-2	38	4-3-6-6-5-4-3-3	23	5-4-4-3-3-3-4-3
23 December	17	3-4-3-3-3-2-3-4	37	3-4-5-6-5-4-4-4	24	4-4-3-4-3-4-4-4
24 December	10	3-2-3-2-2-3-2-1	27	3-2-5-5-5-4-3-2	14	3-3-3-2-3-3-2-2
25 December	12	3-3-2-2-3-3-3-2	27	2-1-2-6-5-4-4-3	22	4-4-2-4-4-4-4-3

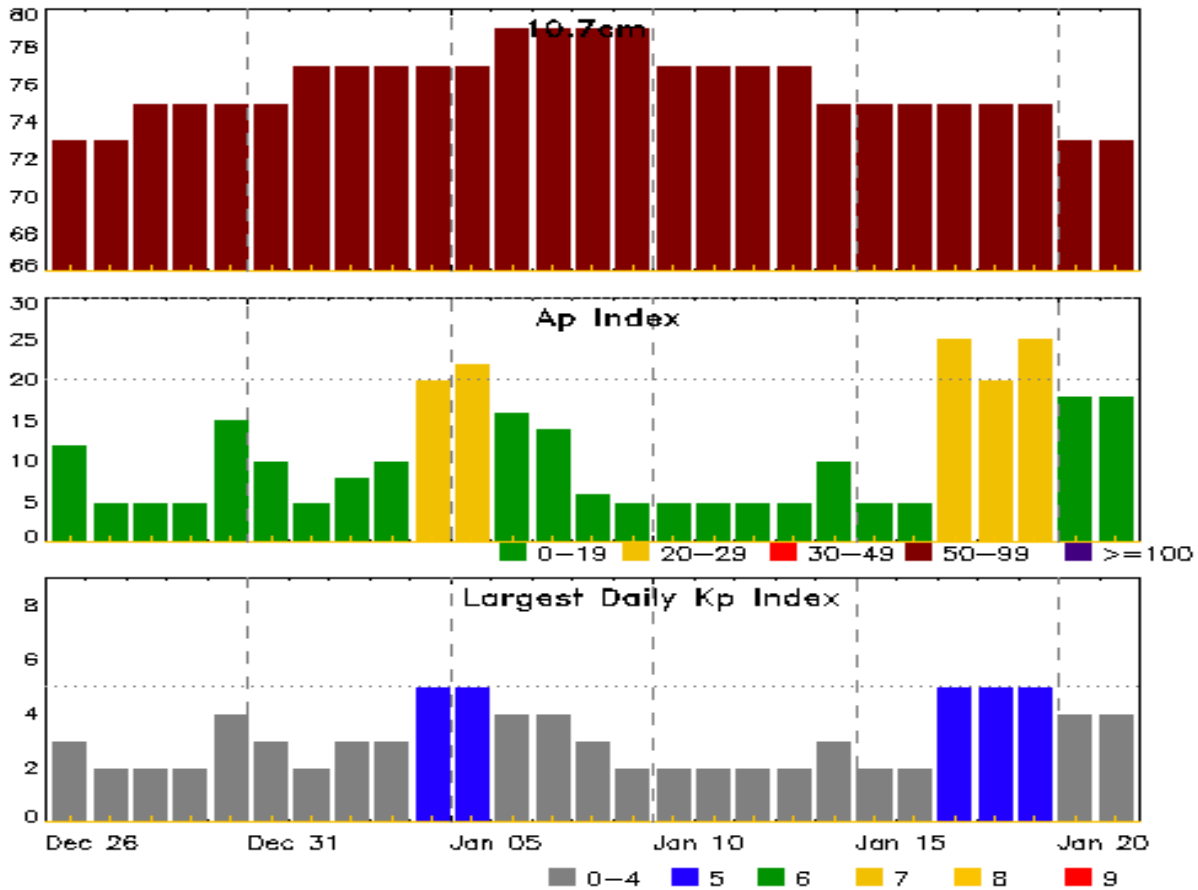


Alerts and Warnings Issued

Date & Time of Issue UTC	Type of Alert or Warning	Date & Time of Event UTC
19 Dec 1914	WATCH: Geomagnetic Storm Category G1 predicted	
21 Dec 0520	WARNING: Geomagnetic K = 4	21/0520 - 1800
21 Dec 0832	WARNING: Geomagnetic K = 5	21/0831 - 1500
21 Dec 1500	ALERT: Geomagnetic K = 4	21/1459
21 Dec 1605	WARNING: Geomagnetic K = 5	21/1604 - 2200
21 Dec 1606	ALERT: Geomagnetic K = 5	21/1606
21 Dec 1610	WARNING: Geomagnetic K = 6	21/1610 - 2200
21 Dec 1619	ALERT: Geomagnetic K = 6	21/1613
21 Dec 1755	EXTENDED WARNING: Geomagnetic K = 4	21/0520 - 22/0600
21 Dec 2156	EXTENDED WARNING: Geomagnetic K = 5	21/1604 - 22/0300
22 Dec 0232	EXTENDED WARNING: Geomagnetic K = 4	21/0520 - 22/1800
22 Dec 0233	EXTENDED WARNING: Geomagnetic K = 5	21/1604 - 22/1500
22 Dec 0308	ALERT: Geomagnetic K = 5	22/0259
22 Dec 1234	ALERT: Electron 2MeV Integral Flux \geq 1000pfu	22/1215
22 Dec 1441	EXTENDED WARNING: Geomagnetic K = 5	21/1604 - 22/2359
22 Dec 1441	EXTENDED WARNING: Geomagnetic K = 4	21/0520 - 23/0600
23 Dec 0504	CONTINUED ALERT: Electron 2MeV Integral Flux \geq 1000pfu	22/1215
23 Dec 0555	EXTENDED WARNING: Geomagnetic K = 4	21/0520 - 23/1800
23 Dec 1727	EXTENDED WARNING: Geomagnetic K = 4	21/0520 - 24/0600
24 Dec 0500	CONTINUED ALERT: Electron 2MeV Integral Flux \geq 1000pfu	22/1215
24 Dec 0555	EXTENDED WARNING: Geomagnetic K = 4	21/0520 - 24/1400
24 Dec 1323	EXTENDED WARNING: Geomagnetic K = 4	21/0520 - 24/2359
25 Dec 0256	WARNING: Geomagnetic K = 4	25/0255 - 1400
25 Dec 0259	ALERT: Geomagnetic K = 4	25/0259
25 Dec 0509	CONTINUED ALERT: Electron 2MeV Integral Flux \geq 1000pfu	22/1215
25 Dec 1318	EXTENDED WARNING: Geomagnetic K = 4	25/0255 - 2359
25 Dec 2338	EXTENDED WARNING: Geomagnetic K = 4	25/0255 - 26/0600



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
26 Dec	73	12	3	09 Jan	79	5	2
27	73	5	2	10	77	5	2
28	75	5	2	11	77	5	2
29	75	5	2	12	77	5	2
30	75	15	4	13	77	5	2
31	75	10	3	14	75	10	3
01 Jan	77	5	2	15	75	5	2
02	77	8	3	16	75	5	2
03	77	10	3	17	75	25	5
04	77	20	5	18	75	20	5
05	77	22	5	19	75	25	5
06	79	16	4	20	73	18	4
07	79	14	4	21	73	18	4
08	79	6	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 #	245	2695	II

No Events Observed

Flare List

Date	Time			X-ray Class	Optical			Rgn #
	Begin	Max	End		Imp/ Brtns	Location Lat CMD		
21 Dec	1412	1419	1426	B2.7				2620



Region Summary

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

Region 2618

14 Dec	N13W35	22	10	1	Bxo	1	B										
15 Dec	N14W48	22	10	2	Axx	2	A										
16 Dec	N14W62	23	plage														
17 Dec	N14W76	24	plage														
18 Dec	N14W90	25	plage														
									0	0	0	0	0	0	0	0	0

Crossed West Limb.

Absolute heliographic longitude: 22

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

Still on Disk.

Absolute heliographic longitude: 280

Region 2620

20 Dec	S23W37	305	10	4	Bxo	4	B										
21 Dec	S23W50	305	50	5	Cso	5	B										
22 Dec	S23W64	306	20	1	Hsx	2	A										
23 Dec	S23W78	307	plage														
24 Dec	S23W92	308	plage														
									0	0	0	0	0	0	0	0	0

Crossed West Limb.

Absolute heliographic longitude: 305

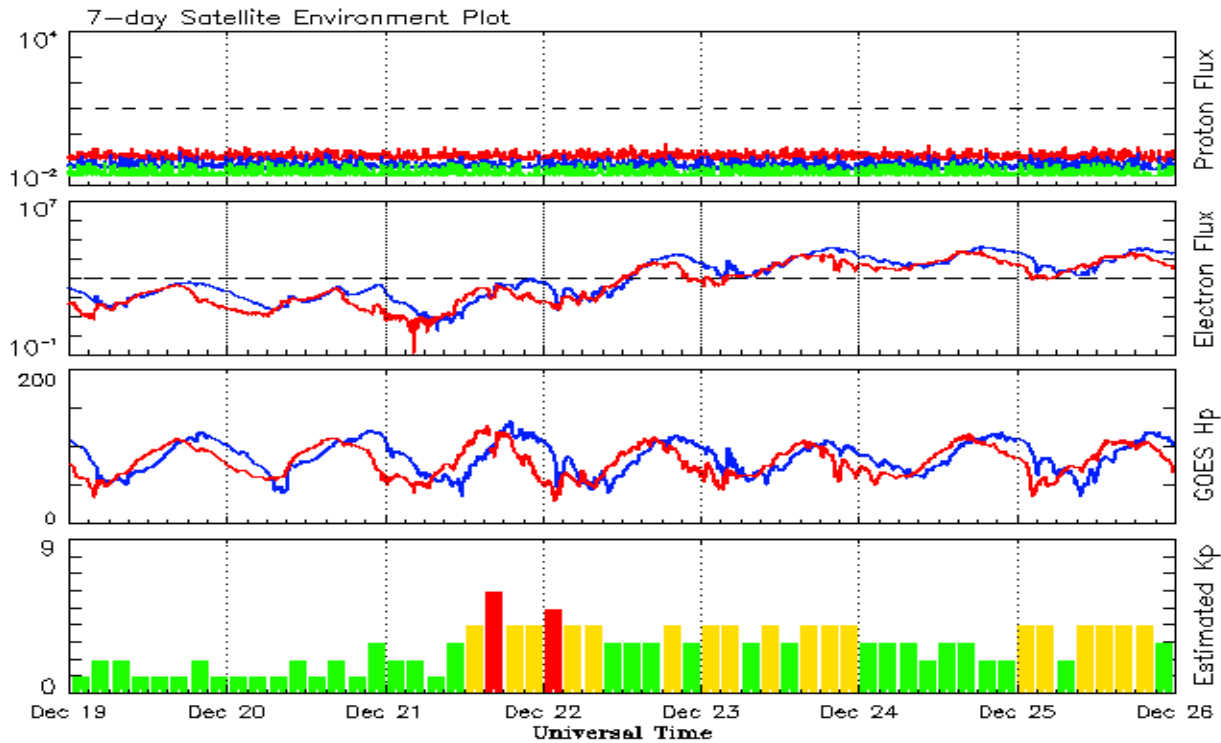


Recent Solar Indices (preliminary)
Observed monthly mean values

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									
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	42.1	26.9	93.1	93.2	12	11.7
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	
November	22.4	12.8	0.57			78.7		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 19 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.

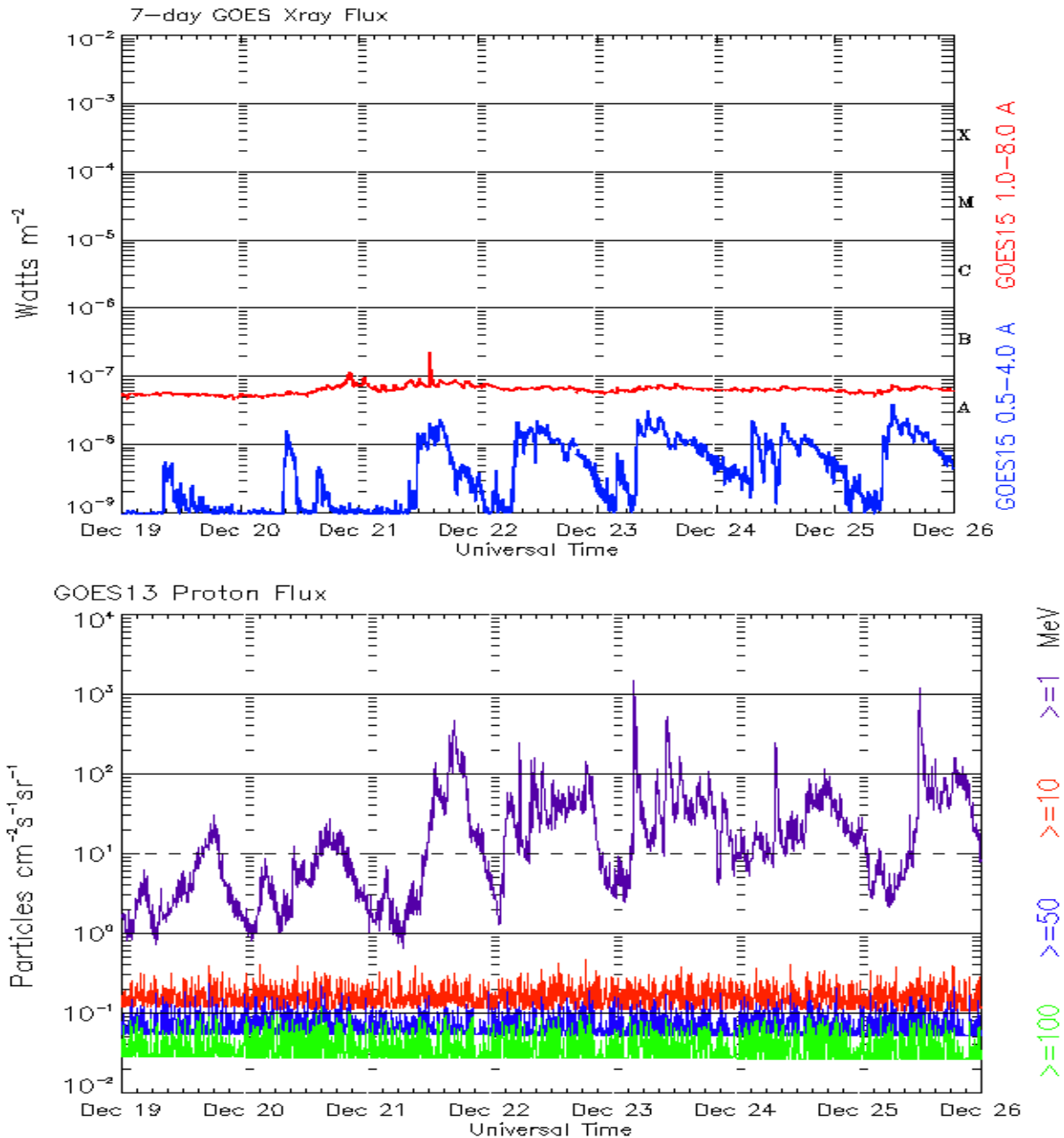
The electron flux plot contains the five-minute averaged integral electron flux (electrons/cm²-sec -sr) with energies greater than 2 MeV by the SWPC Primary GOES satellite.

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 19 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.



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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

The Weekly has been published continuously since 1951 and is available online since 1997.

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<http://spaceweather.gov/ftpmenu/> -- Some content as ascii text

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