Space Weather Highlights
16 January - 22 January 2017

SWPC PRF 2160
23 January 2017

Solar activity was at low levels due to a C9/1f flare observed at 21/0726 UTC from Region 2628 (N12, L=173, class/area Dao/210 on 22 January). Region 2628 was responsible for additional C-class flaring on 21 January. The rest of the period was at very low levels. No Earth-directed coronal mass ejections were observed.

No proton events were observed at geosynchronous orbit.

The greater than 2 MeV electron flux at geosynchronous orbit was at normal to moderate levels with high levels observed on 16-17, and 20-22 January. The largest flux value of the period was 3,090 pfu observed at 16/1935 UTC.

Geomagnetic field activity ranged from quiet to active levels over the period. Solar wind parameters were indicative of background conditions to start the period. Early on 18 January, wind speed began to increase as a positive polarity coronal hole high speed stream (CH HSS) became geoeffective. Wind speed reached a maximum value of 651 km/s at 19/0320 UTC and total field peaked at 17 nT at 18/0605 UTC before gradually decreasing throughout the remainder of the period. The geomagnetic field was at quiet levels on 16-17 January, quiet to active levels on 18-19 & 21 January, and quiet to unsettled levels on 20 & 22 January.

Space Weather Outlook
23 January - 18 February 2017

Solar activity is likely to be low with a slight chance for M-class flares on 23-31 January and 14-18 February due to the flare potential in Region 2628. Very low levels are expected on 01-13 February.

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 23-27 January, 01-13 February, and again on 16-18 February due to CH HSS influence.

Geomagnetic field activity is expected to be at unsettled to active levels on 23, 27-31 January, 01-07 February and 14-18 February with G1 (Minor) geomagnetic storm levels likely on 03 February 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	4
16 January	78	24	180	A6.9	0	0	0	0	0	0	0	0
17 January	79	26	140	A7.0	0	0	0	0	0	0	0	0
18 January	79	25	100	A7.0	0	0	0	0	0	0	0	0
19 January	80	26	90	A7.1	0	0	0	0	0	0	0	0
20 January	83	61	180	B1.0	0	0	0	8	0	0	0	0
21 January	86	67	270	B1.4	6	0	0	5	1	0	0	0
22 January	87	61	350	B1.3	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
16 January	1.1e+06	1.5e+04	3.6e+03	7.7e+07		
17 January	1.4e+06	1.4e+04	3.2e+03	4.5e+07		
18 January	1.9e+06	1.5e+04	3.6e+03	6.4e+06		
19 January	2.5e+06	1.5e+04	3.4e+03	2.4e+07		
20 January	1.9e+06	1.5e+04	3.5e+03	8.1e+07		
21 January	1.9e+06	1.4e+04	3.5e+03	7.6e+07		
22 January	2.1e+06	1.4e+04	3.4e+03	3.5e+07		

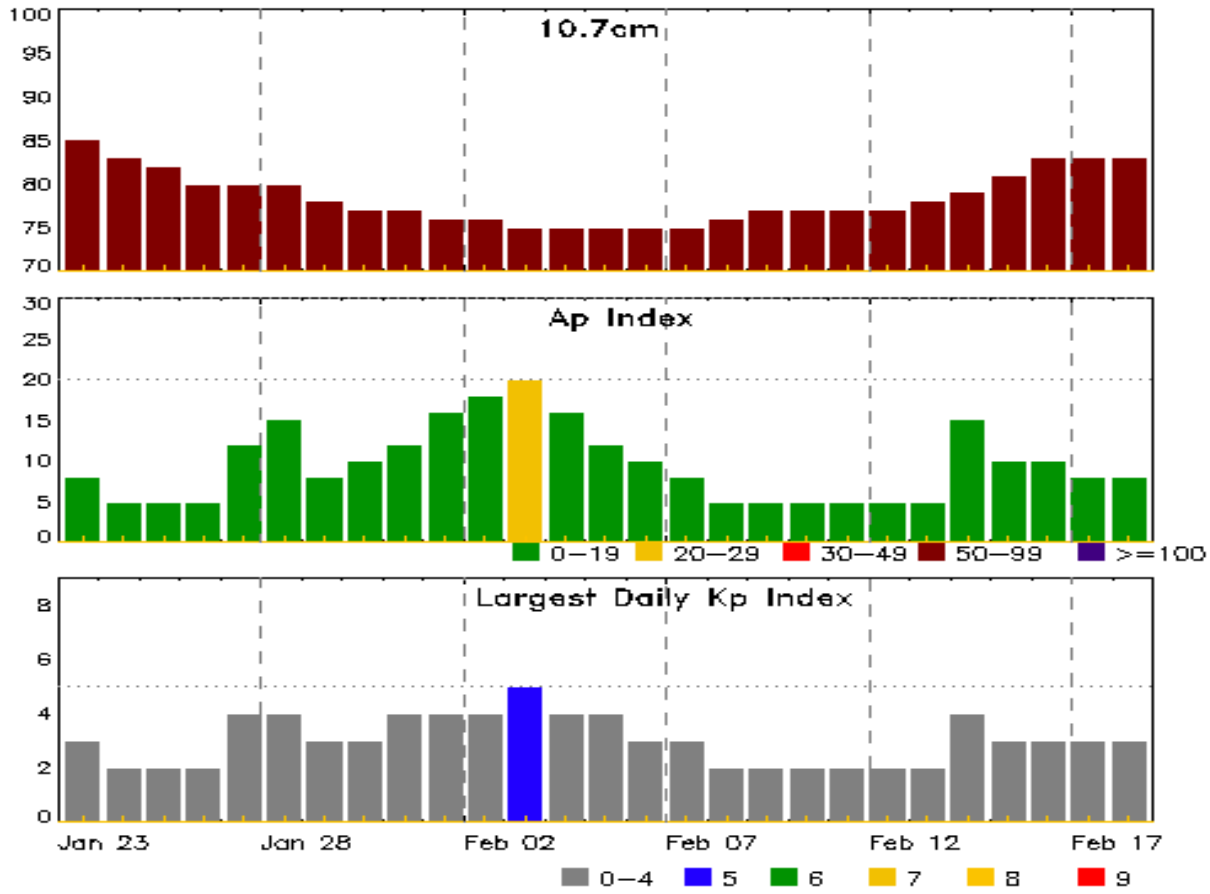
Daily Geomagnetic Data

Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
16 January	2	0-1-1-0-1-0-1-0	0	0-0-1-0-0-0-0-0	3	1-1-1-0-0-0-1-1
17 January	3	0-1-0-0-2-2-2-1	2	0-0-0-2-2-1-0-0	4	1-1-0-1-1-2-1-1
18 January	11	1-2-2-2-3-3-3-3	27	0-1-4-5-6-4-3-3	17	1-3-3-3-3-4-4-4
19 January	10	4-2-3-2-2-2-1-2	17	3-2-3-5-4-3-1-1	11	4-3-3-3-2-2-1-2
20 January	9	2-3-2-1-1-1-3-3	10	2-1-3-3-4-1-1-2	11	3-3-2-2-2-1-3-3
21 January	9	3-2-2-2-1-2-2-3	14	2-1-3-4-3-3-3-3	11	3-1-2-2-1-2-3-4
22 January	8	3-3-2-2-2-2-1-1	16	2-1-2-5-5-1-2-1	15	3-3-3-2-2-2-2-2

Alerts and Warnings Issued

Date & Time of Issue UTC	Type of Alert or Warning	Date & Time of Event UTC
16 Jan 1352	CONTINUED ALERT: Electron 2MeV Integral Flux >= 1000pfu	05/1520
16 Jan 2213	WATCH: Geomagnetic Storm Category G1 predicted	
17 Jan 1436	CONTINUED ALERT: Electron 2MeV Integral Flux >= 1000pfu	05/1520
18 Jan 0954	WARNING: Geomagnetic K = 4	18/0955 - 1800
18 Jan 1741	EXTENDED WARNING: Geomagnetic K = 4	18/0955 - 19/0600
18 Jan 1801	ALERT: Geomagnetic K = 4	18/1759
19 Jan 0524	EXTENDED WARNING: Geomagnetic K = 4	18/0955 - 19/1800
20 Jan 0351	WARNING: Geomagnetic K = 4	20/0350 - 1200
20 Jan 1354	ALERT: Electron 2MeV Integral Flux >= 1000pfu	20/1340
21 Jan 1151	CONTINUED ALERT: Electron 2MeV Integral Flux >= 1000pfu	20/1340
21 Jan 2243	WARNING: Geomagnetic K = 4	21/2242 - 22/0600
21 Jan 2245	ALERT: Geomagnetic K = 4	21/2245
22 Jan 1456	CONTINUED ALERT: Electron 2MeV Integral Flux >= 1000pfu	20/1340

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
23 Jan	85	8	3	06 Feb	75	10	3
24	83	5	2	07	75	8	3
25	82	5	2	08	76	5	2
26	80	5	2	09	77	5	2
27	80	12	4	10	77	5	2
28	80	15	4	11	77	5	2
29	78	8	3	12	77	5	2
30	77	10	3	13	78	5	2
31	77	12	4	14	79	15	4
01 Feb	76	16	4	15	81	10	3
02	76	18	4	16	83	10	3
03	75	20	5	17	83	8	3
04	75	16	4	18	83	8	3
05	75	12	4				

Energetic Events

	Time			X-ray		Optical Information			Peak Radio Flux		Sweep Freq Intensity	
Date	Begin	Max	Half Max	Class	Integ Flux	Imp/ Brtns	Location Lat CMD	Rgn #	245	2695	II	IV

No Events Observed

Flare List

	Time				Optical		
Date	Begin	Max	End	X-ray Class	Imp/ Brtns	Location Lat CMD	Rgn #
16 Jan	0141	0144	0148	B1.3			2626
16 Jan	1812	1823	1835	B1.4			2625
18 Jan	1833	1836	1839	B1.3			
20 Jan	0633	0636	0637	B1.0			2628
20 Jan	0637	0638	0642	B1.4	SF	N12E61	2628
20 Jan	0644	0702	0709	B1.7	SF	N12E61	2628
20 Jan	0735	0736	0737		SF	N12E61	2628
20 Jan	0738	0739	0743		SF	N12E61	2628
20 Jan	0746	0756	0801	B2.7	SF	N12E61	2628
20 Jan	0808	0809	0813		SF	N12E61	2628
20 Jan	0815	0830	0846		SF	N12E61	2628
20 Jan	0851	0853	0857		SF	N12E61	2628
20 Jan	0933	0939	0942	B4.3			2628
20 Jan	1037	1046	1052	B5.3			2628
20 Jan	1509	1516	1520	B3.1			2628
20 Jan	1709	1712	1716	B4.1			2627
20 Jan	2057	2100	2104	B2.6			2627
21 Jan	0210	0217	0221	B5.4			2628
21 Jan	0224	0227	0237	B7.1	SF	N12E53	2628
21 Jan	0238	0239	0240		SF	N12E53	2628
21 Jan	0300	0305	0307	B7.6			2628
21 Jan	0402	0405	0407	B3.6	SF	N12E53	2628
21 Jan	0543	0545	0552		SF	N12E46	2628
21 Jan	0623	0629	0636	C1.2	SF	N11E46	2628
21 Jan	0656	0726	0842		1F	N13E44	2628
21 Jan	0702	0705	0709	B8.4			2628
21 Jan	0714	0726	0729	C9.3			2628
21 Jan	0823	0826	0829	B3.5			2628
21 Jan	0858	0906	0910	B3.8			2628
21 Jan	0912	0917	0926	B5.1			2628
21 Jan	0940	0946	0952	C1.0			2628

Flare List

	Time			Optical			
Date	Begin	Max	End	X-ray Class	Imp/ Brtns	Location Lat CMD	Rgn #
21 Jan	1019	1023	1027	C1.1			2628
21 Jan	1059	1108	1111	C6.1			2628
21 Jan	1319	1326	1330	C1.8			2628
21 Jan	1408	1411	1413	B5.1			2628
22 Jan	1223	1227	1234	B2.4			2628

Region Summary

	Location		Sunspot Characteristics					Flares							
		Helio	Area	Extent	Spot	Spot	Mag	X-ray			Optical				
Date	Lat CMD	Lon	10^{-6} hemi.	(helio)	Class	Count	Class	C	M	X	S	1	2	3	4
			Region 2625												
12 Jan	N03E72	254	30	1	Hsx	1	A								
13 Jan	N03E58	254	50	4	Cso	3	B								
14 Jan	N03E45	254	50	8	Cso	3	B								
15 Jan	N03E31	255	40	1	Hsx	1	A								
16 Jan	N01E18	254	60	1	Hsx	1	A								
17 Jan	N01E06	252	50	3	Hsx	2	A								
18 Jan	S00W07	252	40	5	Cao	2	B								
19 Jan	S00W20	253	20	5	Hax	2	A								
20 Jan	S00W35	255	40	1	Hax	2	A								
21 Jan	N01W48	255	30	2	Hax	3	A								
22 Jan	N01W62	256	0	1	Axx	1	A								
								0	0	0	0	0	0	0	0

Still on Disk.
Absolute heliographic longitude: 252

			Region 2626												
13 Jan	N08E67	245	20		Hsx	1	A								
14 Jan	N08E55	244	140	2	Hsx	2	A								
15 Jan	N09E42	244	140	3	Hax	2	A								
16 Jan	N08E29	243	120	3	Hax	3	A								
17 Jan	N08E16	242	90	3	Cao	4	B								
18 Jan	N07E03	243	60	2	Hax	3	A								
19 Jan	N08W11	244	70	2	Hax	4	A								
20 Jan	N08W24	244	50	3	Hax	3	A								
21 Jan	N08W37	244	40	3	Hsx	3	A								
22 Jan	N08W50	244	30	2	Hax	1	A								
								0	0	0	0	0	0	0	0

Still on Disk.
Absolute heliographic longitude: 243

			Region 2627												
20 Jan	N05E28	192	70	5	Dao	12	B								
21 Jan	N06E15	192	80	6	Dai	13	B								
22 Jan	N06E01	193	110	7	Dai	11	B								
								0	0	0	0	0	0	0	0

Still on Disk.
Absolute heliographic longitude: 193

Region Summary - continued

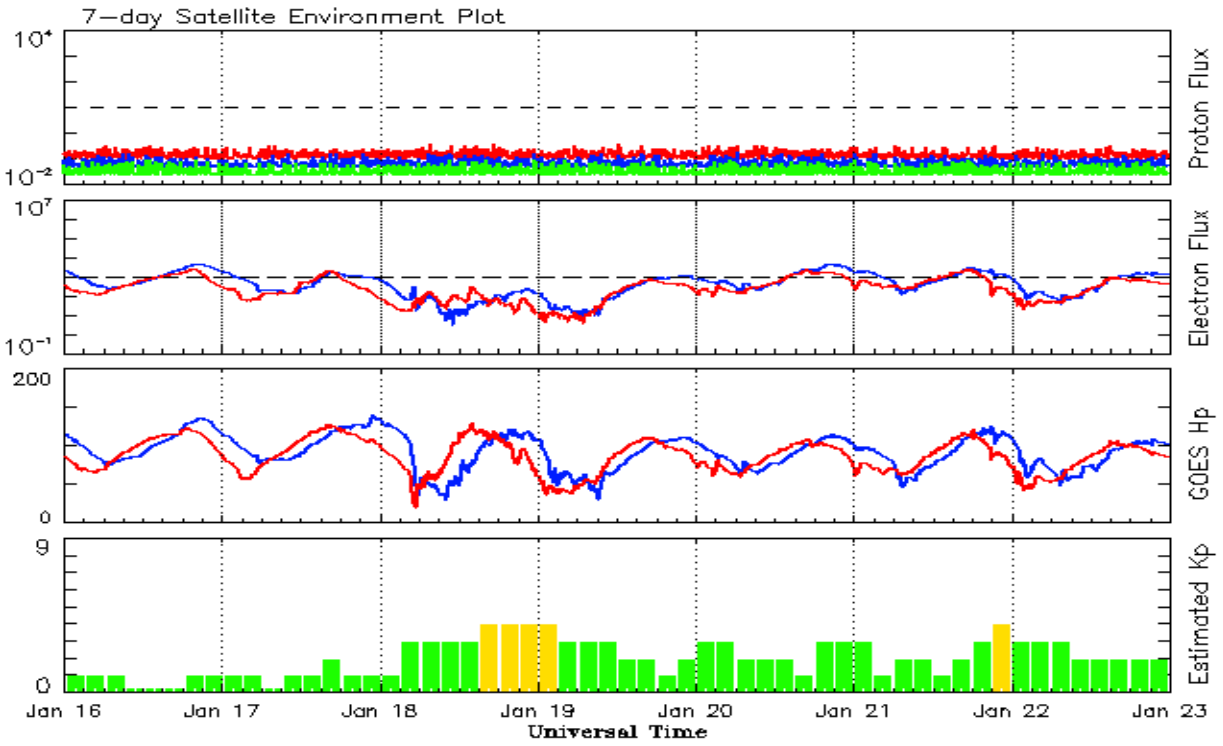
	Location		Sunspot Characteristics					Flares							
		Helio	Area	Extent	Spot	Spot	Mag	X-ray			Optical				
Date	Lat CMD	Lon	10^{-6} hemi.	(helio)	Class	Count	Class	C	M	X	S	1	2	3	4
		Region 2628													
20 Jan	N12E49	171	20	1	Bxo	4	B				8				
21 Jan	N12E36	171	120	9	Dai	8	BG	6			5	1			
22 Jan	N12E21	173	210	9	Dao	8	BG								
								6	0	0	13	1	0	0	0

Still on Disk.
Absolute heliographic longitude: 173

Recent Solar Indices (preliminary)
Observed monthly mean values

	Sunspot Numbers					Radio Flux		Geomagnetic	
	Observed values		Ratio	Smooth values		Penticton	Smooth	Planetary	Smooth
Month	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	30.2	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	24.9	81.9	90.4	9	11.4
July	36.8	19.4	0.53			85.9		10	
August	50.4	30.1	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 16 January 2017

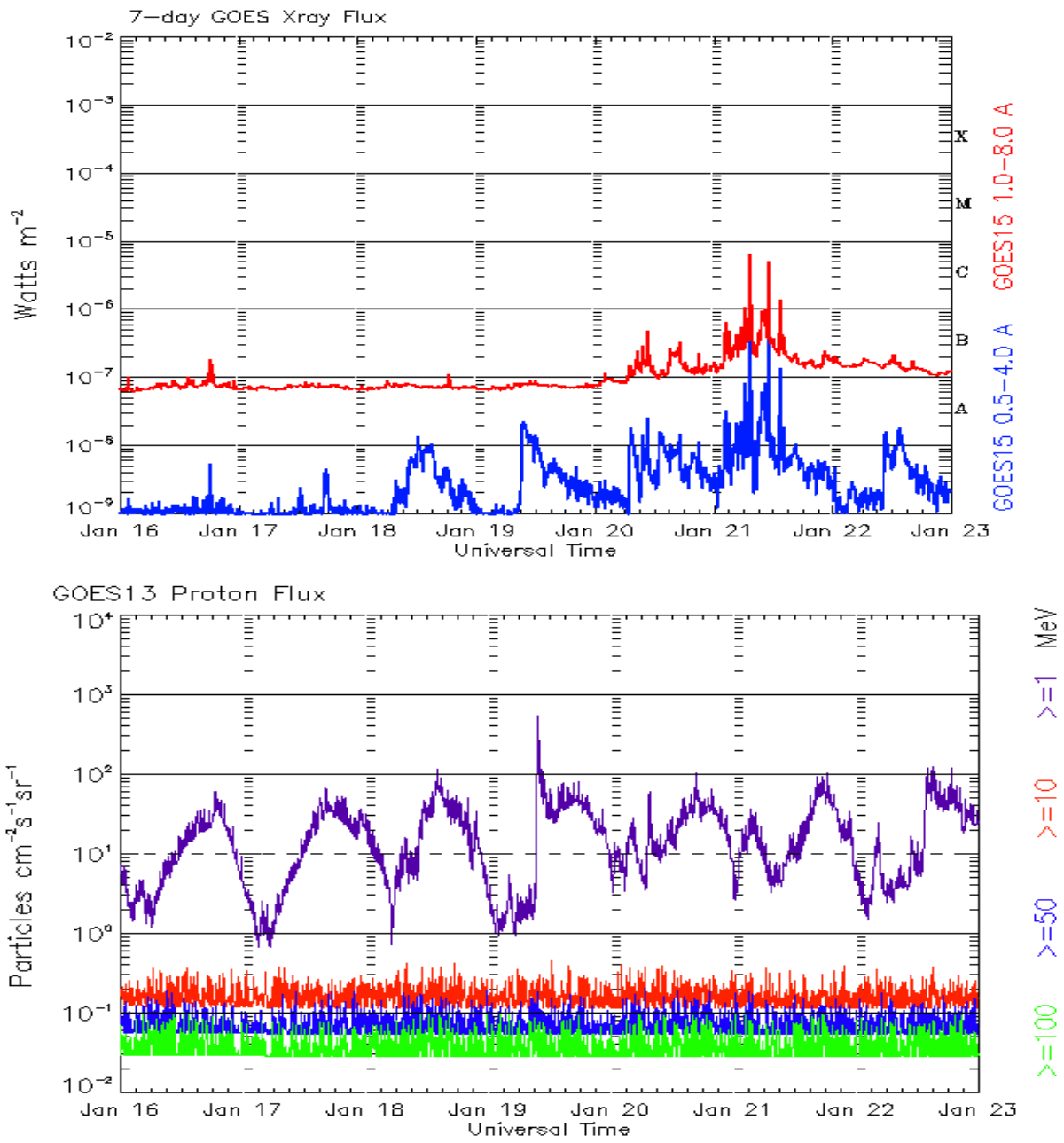
The proton flux plot contains the five-minute averaged integral proton flux (protons/cm^2-sec -sr) as measured by the SWPC Primary GOES satellite, near West 75, for each of three energy thresholds: greater than 10, 50, and 100 MeV.

The electron flux plot contains the five-minute averaged integral electron flux (electrons/cm^2-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 16 January 2017

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)

Published every Monday by the Space Weather Prediction Center.

U.S. Department of Commerce
NOAA / National Weather Service
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

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

http://spaceweather.gov/weekly/ -- Current and previous year
http://spaceweather.gov/ftpmenu/warehouse.html -- Online achive from 1997
http://spaceweather.gov/ftpmenu/ -- Some content as ascii text
http://spaceweather.gov/SolarCycle/ -- Solar Cycle Progression web site

http://spaceweather.gov/contacts.html -- Contact and Copyright information
http://spaceweather.gov/weekly/Usr_guide.pdf -- User Guide