

Space Weather Highlights
02 January - 08 January 2017

SWPC PRF 2158
09 January 2017

Solar activity was at very low levels with only a few low level B-class flares observed. The solar disk was mostly spotless throughout the period. 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 normal to moderate levels with high levels observed on 05-08 January. The largest flux value of the period was 25,537 pfu observed at 08/1935 UTC.

Geomagnetic field activity was at quiet to unsettled levels on 02 January under a nominal solar wind environment. By 03 January, a solar sector boundary crossing was observed at approximately 03/0956 UTC transitioning into a negative sector followed by increase in solar wind speed and total field indicating the onset of a negative polarity coronal hole high speed stream (CH HSS). Total field increased to a maximum of 15 nT on 04/0444 UTC. Solar wind increased from approximately 372 km/s to 695 km/s by 05/1423 UTC. Solar wind speeds continued near 670 km/s through the rest of the period. The geomagnetic field responded with quiet to active levels from 03-08 January.

Space Weather Outlook
09 January - 04 February 2017

Solar activity is expected to be at very low levels with low levels possible from 12-26 January due to the return of old Region 2621 (N10, L=237).

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 9-10, 12-16, 18-27 January and on 01-04 February due to CH HSS influence.

Geomagnetic field activity is expected to be at unsettled to active levels on 09, 11-14, 17-23, and 27 January through 04 February with G1 (Minor) storm levels likely on 17-19, 21-22 January, and again 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		
02 January	73	0	0	A5.7	0	0	0	0	0	0	0	0	
03 January	73	11	0	A5.5	0	0	0	0	0	0	0	0	
04 January	72	0	0	A5.4	0	0	0	0	0	0	0	0	
05 January	73	0	0	A5.5	0	0	0	0	0	0	0	0	
06 January	72	0	0	A5.6	0	0	0	0	0	0	0	0	
07 January	72	0	0	A5.8	0	0	0	0	0	0	0	0	
08 January	72	0	0	A5.5	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
	02 January	7.7e+05	1.5e+04	3.5e+03	2.0e+07	
03 January	9.4e+05	1.5e+04	3.5e+03	4.9e+06		
04 January	9.8e+05	1.6e+04	3.4e+03	5.9e+06		
05 January	2.5e+06	1.7e+04	3.4e+03	3.1e+07		
06 January	3.5e+06	1.6e+04	3.5e+03	2.4e+08		
07 January	7.0e+06	1.6e+04	3.6e+03	6.6e+08		
08 January	5.2e+06	1.5e+04	3.4e+03	9.9e+08		

Daily Geomagnetic Data

Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
	02 January	5	1-3-1-1-2-1-1-0	23	1-2-6-4-5-3-1-1	7
03 January	8	0-1-2-4-2-2-2-2	24	1-1-2-6-5-4-3-2	12	1-2-2-4-3-3-3-3
04 January	8	1-1-2-2-2-2-3-3	13	1-1-1-4-4-2-3-3	11	1-2-2-2-2-2-4-4
05 January	15	3-3-2-2-3-3-3-4	23	3-3-3-1-5-5-4-3	18	3-3-2-2-3-4-4-4
06 January	14	3-4-3-2-3-2-2-3	28	4-4-5-4-5-3-4-2	16	4-4-3-2-3-3-3-3
07 January	14	3-2-2-2-4-3-3-3	37	3-2-5-4-7-4-3-3	20	4-3-3-2-4-4-3-3
08 January	11	3-3-2-2-2-2-3-3	26	2-2-3-6-4-4-4-3	15	3-3-2-3-3-3-4-4

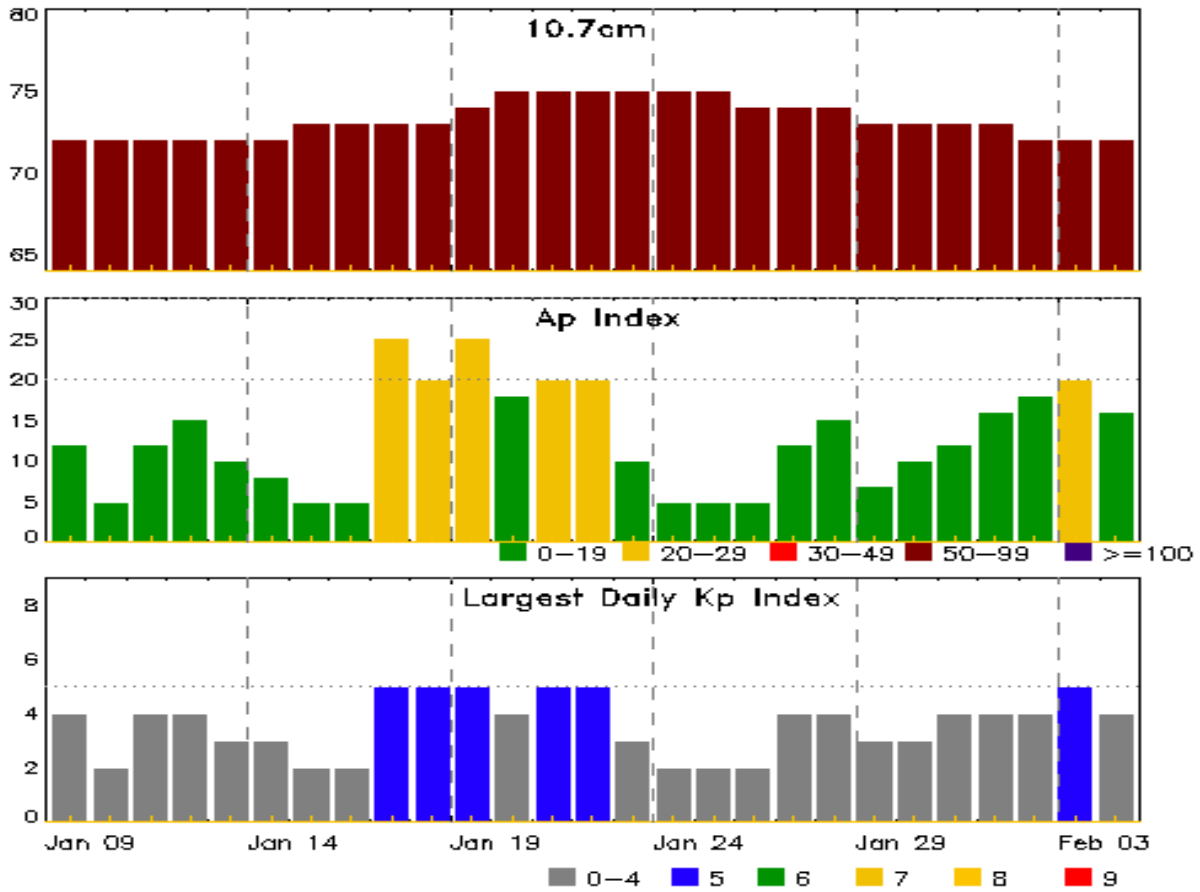


Alerts and Warnings Issued

Date & Time of Issue UTC	Type of Alert or Warning	Date & Time of Event UTC
02 Jan 1947	WATCH: Geomagnetic Storm Category G1 predicted	
03 Jan 0831	WARNING: Geomagnetic K = 4	03/0832 - 1800
03 Jan 1111	ALERT: Geomagnetic K = 4	03/1110
03 Jan 1749	EXTENDED WARNING: Geomagnetic K = 4	03/0832 - 04/0600
04 Jan 0555	EXTENDED WARNING: Geomagnetic K = 4	03/0832 - 04/1800
04 Jan 1901	WARNING: Geomagnetic K = 4	04/1902 - 05/0300
04 Jan 1939	ALERT: Geomagnetic K = 4	04/1936
05 Jan 0255	EXTENDED WARNING: Geomagnetic K = 4	04/1902 - 05/1800
05 Jan 1539	ALERT: Electron 2MeV Integral Flux \geq 1000pfu	05/1520
05 Jan 1753	EXTENDED WARNING: Geomagnetic K = 4	04/1902 - 06/0300
05 Jan 2120	WATCH: Geomagnetic Storm Category G1 predicted	
05 Jan 2322	WARNING: Geomagnetic K = 5	05/2322 - 06/0600
05 Jan 2332	EXTENDED WARNING: Geomagnetic K = 4	04/1902 - 06/1200
06 Jan 0549	EXTENDED WARNING: Geomagnetic K = 4	04/1902 - 06/1800
06 Jan 0549	EXTENDED WARNING: Geomagnetic K = 5	05/2322 - 06/1500
06 Jan 0941	CONTINUED ALERT: Electron 2MeV Integral Flux \geq 1000pfu	05/1520
06 Jan 1436	EXTENDED WARNING: Geomagnetic K = 4	04/1902 - 07/0600
06 Jan 1436	EXTENDED WARNING: Geomagnetic K = 5	05/2322 - 06/2359
07 Jan 0501	CONTINUED ALERT: Electron 2MeV Integral Flux \geq 1000pfu	05/1520
07 Jan 0554	EXTENDED WARNING: Geomagnetic K = 4	04/1902 - 07/2359
08 Jan 0501	CONTINUED ALERT: Electron 2MeV Integral Flux \geq 1000pfu	05/1520
08 Jan 1841	WARNING: Geomagnetic K = 4	08/1840 - 2359
08 Jan 1910	ALERT: Geomagnetic K = 4	08/1910
08 Jan 2355	EXTENDED WARNING: Geomagnetic K = 4	08/1840 - 09/1200



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
09 Jan	72	12	4	23 Jan	75	10	3
10	72	5	2	24	75	5	2
11	72	12	4	25	75	5	2
12	72	15	4	26	74	5	2
13	72	10	3	27	74	12	4
14	72	8	3	28	74	15	4
15	73	5	2	29	73	7	3
16	73	5	2	30	73	10	3
17	73	25	5	31	73	12	4
18	73	20	5	01 Feb	73	16	4
19	74	25	5	02	72	18	4
20	75	18	4	03	72	20	5
21	75	20	5	04	72	16	4
22	75	20	5				



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	Optical			Rgn #
	Begin	Max	End		Imp/ Brtns	Location Lat CMD		
04 Jan	0234	0239	0250	B1.8				2624
05 Jan	1820	1831	1839	B1.4				



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

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	0

Crossed West Limb.
Absolute heliographic longitude: 196

Region 2623

01 Jan	S06W07	117	plage														
02 Jan	S06W22	119	plage														
03 Jan	S06W37	121	plage														
04 Jan	S06W52	123	plage														
05 Jan	S06W67	125	plage														
06 Jan	S06W82	127	plage														
								0	0	0	0	0	0	0	0	0	0

Crossed West Limb.
Absolute heliographic longitude: 117

Region 2624

03 Jan	S08W57	141	0		Axx	1	A										
04 Jan	S08W71	142	plage														
05 Jan	S06W89	146	plage														
								0	0	0	0	0	0	0	0	0	0

Crossed West Limb.
Absolute heliographic longitude: 141

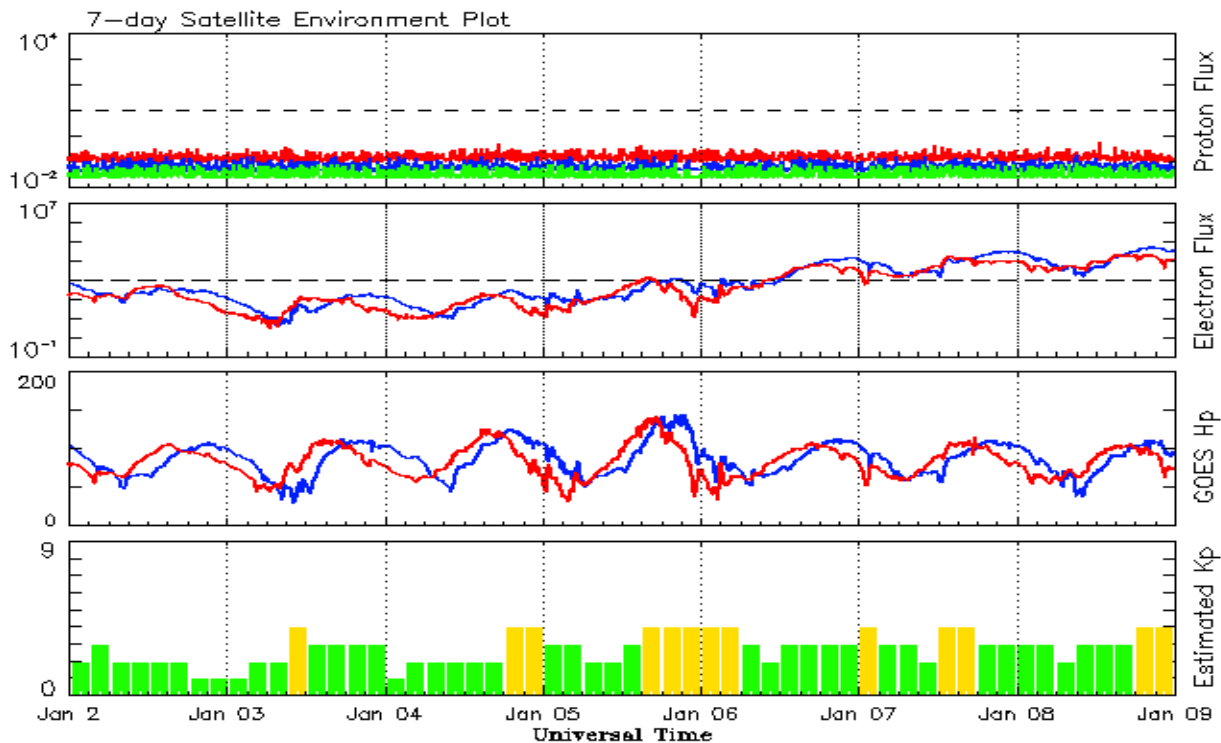


Recent Solar Indices (preliminary)
Observed monthly mean values

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	30.2	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 02 January 2017*

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.

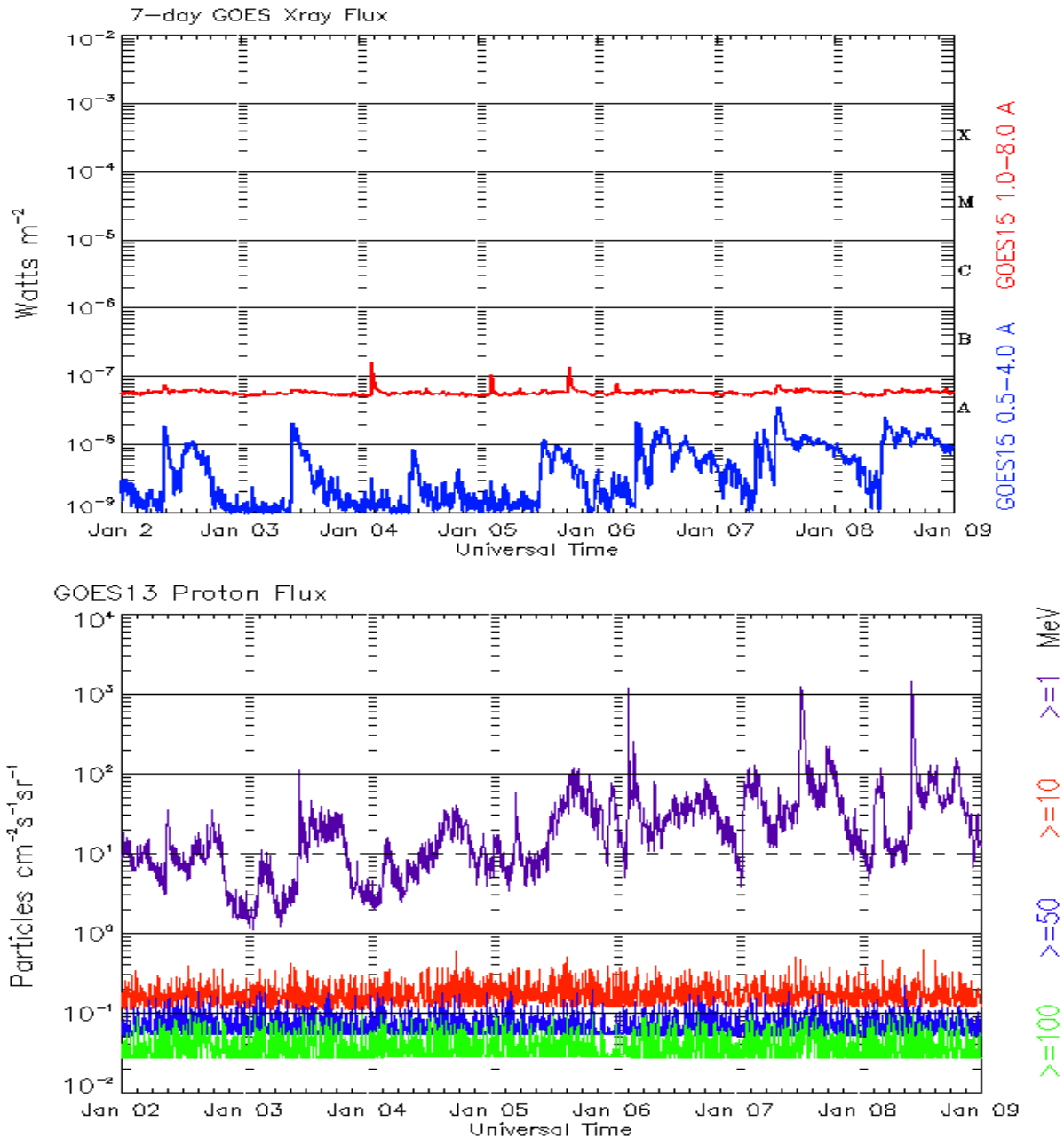
The electron flux plot contains the five-minute averaged integral electron flux (electrons/cm²-sec -sr) with energies greater than 2 MeV by the SWPC Primary GOES satellite.

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.

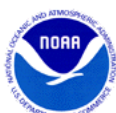




*Weekly GOES Satellite X-ray and Proton Plots
Week Beginning 02 January 2017*

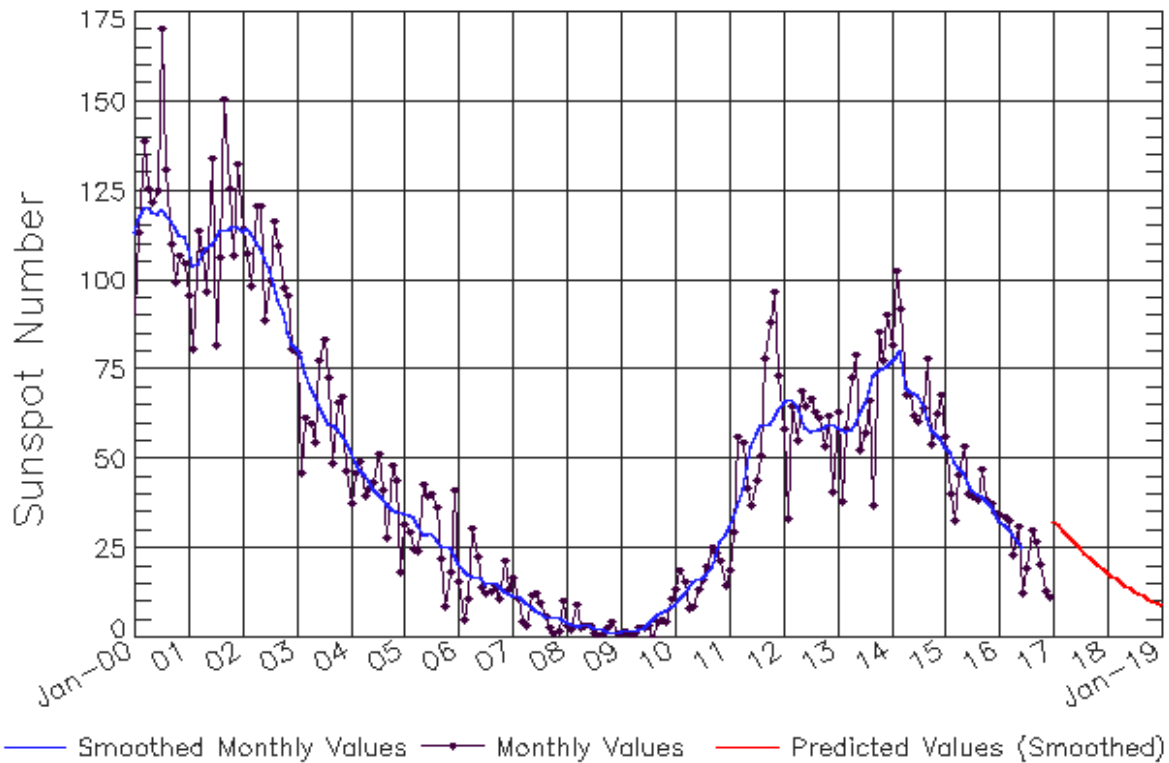
The x-ray plots contains five-minute averages x-ray flux (Watt/m²) as measure by the SWPC primary GOES X-ray satellite, usually at West 105 longitude, in two wavelength bands, 0.05 - 0.4 and 0.1 - 0.8 nm. The letters A, B, C, M and X refer to x-ray event levels for the 0.1 - 0.8 nm band.

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.



ISES Solar Cycle Sunspot Number Progression

Observed data through Dec 2016



Updated 2017 Jan 9

NOAA/SWPC Boulder, CO USA

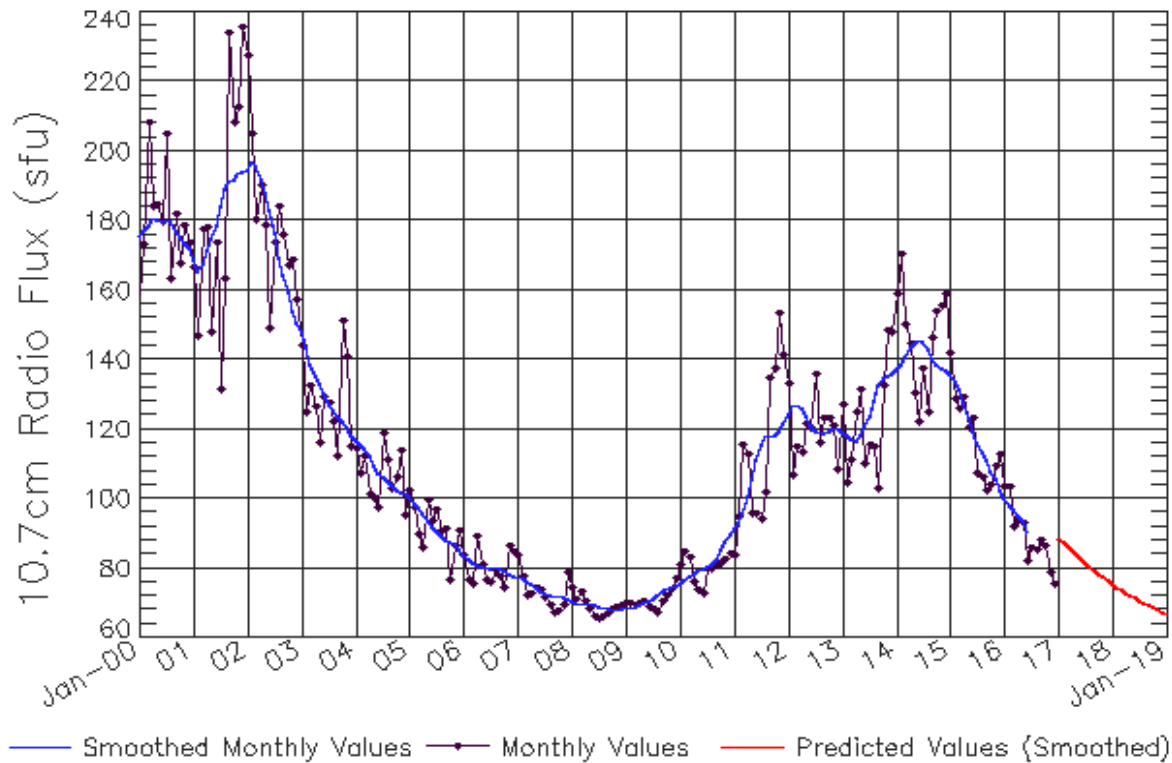
Smoothed Sunspot Number Prediction

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2010	9	10	11	13	15	16	17	17	20	23	27	29
	(1)	(2)	(3)	(5)	(5)	(6)	(7)	(7)	(8)	(9)	(9)	(10)
2011	19	30	56	54	42	37	44	51	78	88	97	73
	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)
2012	58	33	64	55	69	65	67	63	61	53	62	41
	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)
2013	63	38	58	72	79	53	57	66	37	86	78	90
	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)
2014	82	102	92	68	68	62	60	64	78	54	62	68
	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)
2015	56	40	33	45	53	40	40	39	47	38	37	35
	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)
2016	34	34	33	23	31	12	19	30	27	20	13	11
	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)
2017	33	31	30	29	27	26	25	24	23	21	20	19
	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)
2018	18	17	16	15	15	14	13	12	12	11	10	10
	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)
2019	9	8	8	7	7	6	6	6	5	5	4	4
	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)



ISES Solar Cycle F10.7cm Radio Flux Progression

Observed data through Dec 2016



Updated 2017 Jan 9

NOAA/SWPC Boulder, CO USA

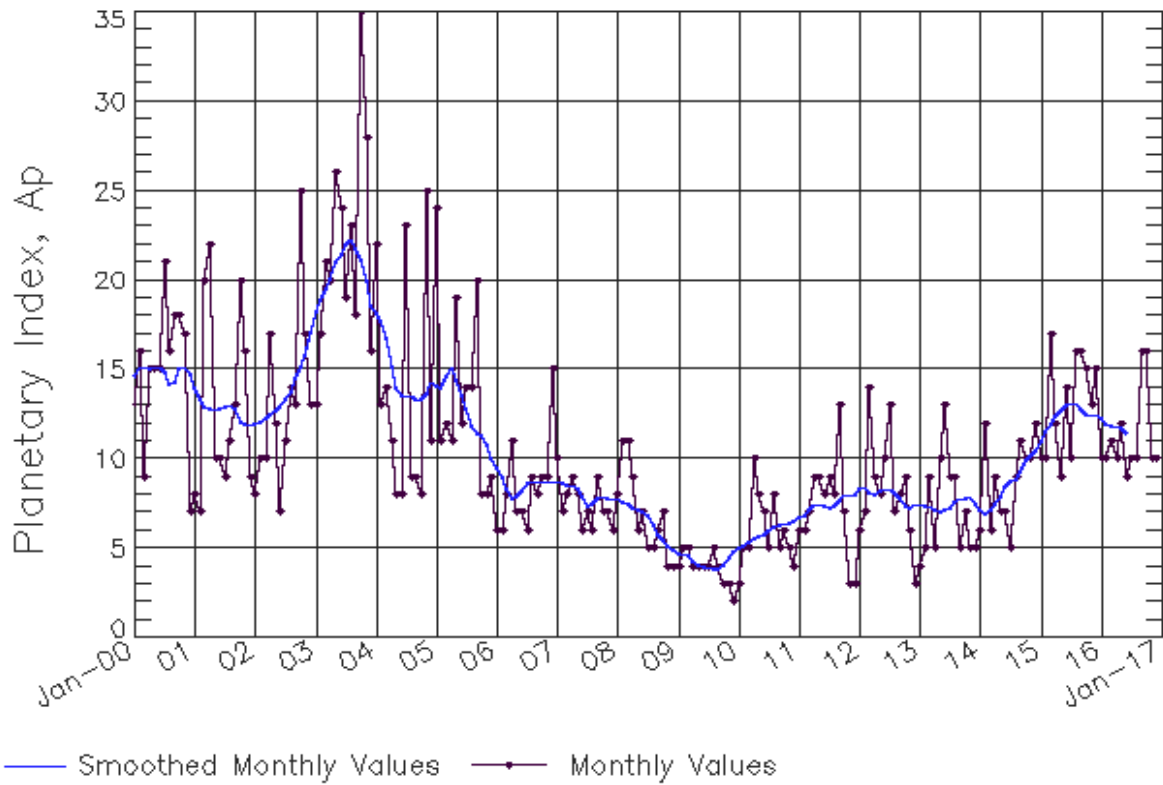
Smoothed F10.7cm Radio Flux Prediction

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2010	76 (***)	77 (***)	78 (***)	78 (***)	79 (***)	80 (***)	80 (***)	81 (***)	82 (***)	85 (***)	88 (***)	90 (***)
2011	91 (***)	93 (***)	96 (***)	100 (***)	106 (***)	111 (***)	115 (***)	118 (***)	118 (***)	118 (***)	120 (***)	122 (***)
2012	124 (***)	127 (***)	127 (***)	126 (***)	124 (***)	121 (***)	120 (***)	119 (***)	119 (***)	119 (***)	120 (***)	120 (***)
2013	119 (***)	118 (***)	117 (***)	117 (***)	118 (***)	121 (***)	124 (***)	128 (***)	132 (***)	135 (***)	135 (***)	136 (***)
2014	137 (***)	139 (***)	141 (***)	144 (***)	145 (***)	146 (***)	145 (***)	143 (***)	140 (***)	138 (***)	137 (***)	137 (***)
2015	136 (***)	134 (***)	131 (***)	127 (***)	123 (***)	120 (***)	116 (***)	113 (***)	111 (***)	108 (***)	105 (***)	103 (***)
2016	100 (***)	98 (***)	97 (***)	95 (***)	93 (***)	90 (***)	88 (1)	87 (1)	86 (2)	85 (3)	85 (4)	84 (4)
2017	84 (5)	84 (6)	83 (7)	83 (8)	82 (8)	82 (9)	82 (9)	80 (9)	79 (9)	78 (9)	77 (9)	76 (9)
2018	75 (9)	75 (9)	74 (9)	73 (9)	72 (9)	71 (9)	71 (9)	70 (9)	69 (9)	69 (9)	68 (9)	67 (9)
2019	67 (9)	66 (9)	66 (9)	65 (9)	65 (9)	65 (9)	64 (9)	64 (9)	63 (9)	63 (9)	63 (9)	63 (9)



ISES Solar Cycle Ap Progression

Observed data through Dec 2016



Updated 2017 Jan 9

NOAA/SWPC Boulder, CO USA

Solar Cycle Comparison charts are temporarily unavailable.



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

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 archive 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

