

Space Weather Highlights
28 May - 03 June 2018

SWPC PRF 2231
04 June 2018

Solar activity reached low levels during the period due to an isolated C-class event, a C2/Sf flare from Region 2712 (N15, L=176, class/area Csi/80 on 28 May). No Earth-directed CMEs were observed.

No proton events were observed at geosynchronous orbit.

The greater than 2 MeV electron flux at geosynchronous orbit reached moderate levels on 28-31 May and high levels on 01-03 June due to influence from a negative polarity coronal hole high-speed stream (CH HSS). The peak flux observed was 28,659 pfu at 02/1900 UTC.

Geomagnetic field activity reached G1 (Minor) storm levels on 01 June and active levels on 31 May and 02 June due to influence from a negative polarity CH HSS. Quiet to unsettled conditions were observed throughout the remainder of the week.

Space Weather Outlook
04 June - 30 June 2018

Solar activity is expected to be very low throughout the period, with a slight chance for isolated C-class events on 04-05 and 18-30 June, due to flare potential from Region 2712.

No proton events are expected at geosynchronous orbit.

The greater than 2 MeV electron flux at geosynchronous orbit is expected to reach very high levels on 05-07 June with high levels expected on 04, 08-13, and 28-30 June. Moderate flux levels are expected for the remainder of the outlook period.

Geomagnetic field activity is expected to reach G1 (Minor) geomagnetic storm levels on 28 June, with active levels on 27 and 29 June, due to influence from a recurrent, negative polarity CH HSS. Unsettled levels are expected on 04-05, 13, 19, and 30 June. Quiet conditions are expected during the remainder of the outlook period.



Daily Solar Data

Date	Radio	Sun	Sunspot	X-ray		Flares							
	Flux	spot	Area	Background		X-ray			Optical				
	10.7cm	No.	(10 ⁻⁶ hemi.)	Flux		C	M	X	S	1	2	3	4
28 May	77	20	80	A4.8	1	0	0	7	0	0	0	0	0
29 May	75	22	70	A4.1	0	0	0	2	0	0	0	0	0
30 May	75	18	30	A3.7	0	0	0	0	0	0	0	0	0
31 May	77	21	50	A6.0	0	0	0	2	0	0	0	0	0
01 June	75	22	60	A6.7	0	0	0	1	0	0	0	0	0
02 June	74	20	30	A5.0	0	0	0	1	0	0	0	0	0
03 June	74	16	10	A4.4	0	0	0	1	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
28 May	6.8e+05	1.8e+04	3.5e+03		9.6e+06	
29 May	5.9e+05	1.8e+04	3.8e+03		4.4e+06	
30 May	7.4e+05	1.8e+04	3.9e+03		4.8e+06	
31 May	9.5e+05	1.9e+04	4.0e+03		8.2e+06	
01 June	2.3e+06	1.8e+04	3.7e+03		8.4e+07	
02 June	2.2e+06	1.7e+04	3.6e+03		7.4e+08	
03 June	2.0e+06	1.8e+04	3.5e+03		7.9e+08	

Daily Geomagnetic Data

Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
28 May	4	1-1-1-2-2-1-1-1	2	0-1-1-1-1-0-1-0	4	1-1-1-1-2-1-1-1
29 May	5	2-2-1-2-2-1-1-1	2	1-2-1-0-0-0-1-0	4	1-2-1-1-1-1-1-1
30 May	5	1-1-1-1-2-2-2-2	2	0-1-1-0-0-0-2-1	4	1-1-1-1-1-1-2-2
31 May	11	2-2-1-2-3-3-3-3	9	2-2-0-3-1-3-3-2	12	2-2-1-2-2-4-4-3
01 June	19	3-3-4-3-4-4-3-2	46	3-5-6-5-6-6-2-2	26	3-4-4-4-5-4-3-3
02 June	14	3-3-3-2-3-3-3-3	25	3-4-4-5-5-2-3-3	17	3-4-3-2-3-2-4-4
03 June	9	3-2-1-2-2-3-2-2	15	3-2-1-5-4-2-2-2	15	3-2-1-2-3-3-2-2

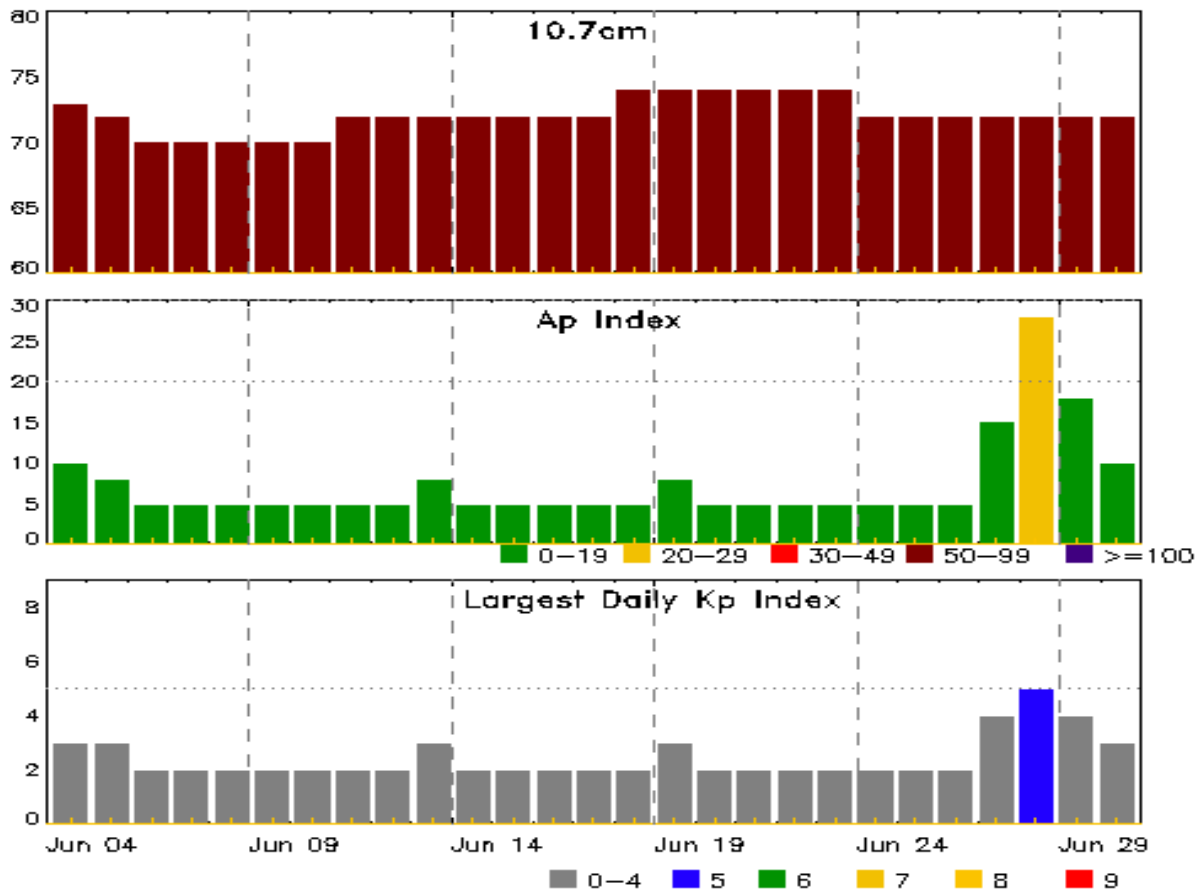


Alerts and Warnings Issued

Date & Time of Issue UTC	Type of Alert or Warning	Date & Time of Event UTC
29 May 1850	WATCH: Geomagnetic Storm Category G1 predicted	
30 May 1834	WATCH: Geomagnetic Storm Category G1 predicted	
31 May 1722	WARNING: Geomagnetic K = 4	31/1720 - 01/0900
31 May 1735	ALERT: Geomagnetic K = 4	31/1735
01 Jun 0521	EXTENDED WARNING: Geomagnetic K = 4	31/1720 - 01/1800
01 Jun 0521	WARNING: Geomagnetic K = 5	01/0520 - 1500
01 Jun 1331	EXTENDED WARNING: Geomagnetic K = 4	31/1720 - 01/2359
01 Jun 1331	EXTENDED WARNING: Geomagnetic K = 5	01/0520 - 2359
01 Jun 1331	ALERT: Geomagnetic K = 5	01/1329
01 Jun 1621	ALERT: Electron 2MeV Integral Flux ≥ 1000 pfu	01/1610
01 Jun 2355	EXTENDED WARNING: Geomagnetic K = 4	31/1720 - 02/0900
01 Jun 2355	EXTENDED WARNING: Geomagnetic K = 5	01/0520 - 02/0600
02 Jun 0555	EXTENDED WARNING: Geomagnetic K = 5	01/0520 - 02/1500
02 Jun 0555	EXTENDED WARNING: Geomagnetic K = 4	31/1720 - 02/1800
02 Jun 0911	CONTINUED ALERT: Electron 2MeV Integral Flux ≥ 1000 pfu	01/1610
02 Jun 1754	EXTENDED WARNING: Geomagnetic K = 4	31/1720 - 03/0300
03 Jun 0227	EXTENDED WARNING: Geomagnetic K = 4	31/1720 - 03/1200
03 Jun 0859	CONTINUED ALERT: Electron 2MeV Integral Flux ≥ 1000 pfu	01/1610



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
04 Jun	73	10	3	18 Jun	74	5	2
05	72	8	3	19	74	8	3
06	70	5	2	20	74	5	2
07	70	5	2	21	74	5	2
08	70	5	2	22	74	5	2
09	70	5	2	23	74	5	2
10	70	5	2	24	72	5	2
11	72	5	2	25	72	5	2
12	72	5	2	26	72	5	2
13	72	8	3	27	72	15	4
14	72	5	2	28	72	28	5
15	72	5	2	29	72	18	4
16	72	5	2	30	72	10	3
17	72	5	2				

Energetic Events

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

No Events Observed

Flare List

Date	Time			X-ray Class	Optical		
	Begin	Max	End		Imp/ Brtns	Location Lat CMD	Rgn #
28 May	1215	1218	1220	B1.1			
28 May	1221	1221	1224		SF	N15E27	2712
28 May	1342	1347	1351	B1.3			
28 May	1405	1406	1419		SF	N15E26	2712
28 May	1425	1428	1432	B1.4	SF	N15E26	2712
28 May	1502	1507	1511	B7.2			
28 May	1557	1601	1605	B5.2			
28 May	1614	1621	1642	B7.0	SF	N15E25	2712
28 May	1652	1704	1705	C2.7	SF	N16E24	2712
28 May	1843	1844	1857	B2.0	SF	N16E24	2712
28 May	1938	1938	1941		SF	N15E22	2712
28 May	2050	2054	2057	B1.7			2712
29 May	0036	0040	0047	B2.7	SF	N15E19	2712
29 May	0125	0128	0135	B1.2	SF	N15E20	2712
29 May	1618	1621	1628	B1.0			2712
30 May	1814	1817	1820	B1.1			
30 May	1904	1908	1911	B1.3			2710
31 May	0059	0108	0121	B5.0	SF	N15E20	2712
31 May	0341	0434	0446	B2.2			2712
31 May	0652	0658	0705	B2.0			2712
31 May	0841	0845	0848	B1.3			2712
31 May	1040	1058	1107	B2.6			2712
31 May	1321	1422	1514	B2.3			
31 May	1604	1613	1617	B1.9			2712
31 May	2102	2109	2113	B1.2			2712
31 May	2133	2143	2147	B1.3			2712
31 May	2256	2302	2307	B2.8	SF	N16W20	2712
01 Jun	0457	0504	0509	B2.1			2712
01 Jun	0605	0610	0616	B2.8	SF	N13W28	2712
01 Jun	0753	0756	0801	B1.1			2712
02 Jun	0427	0430	0437	B1.8			2712



Flare List

Date	Time			Optical			
	Begin	Max	End	X-ray Class	Imp/ Brtns	Location Lat CMD	Rgn #
02 Jun	0804	0811	0822	B2.4			2712
02 Jun	1822	1841	1846	B2.8			2712
02 Jun	2046	2051	2054	B1.6			2712
02 Jun	2152	2157	2209	B2.0	SF	N16W20	2712
02 Jun	2231	2235	2239	B1.1			2712
02 Jun	2356	0001	0015	B1.7			2712
03 Jun	0041	0044	0047	B1.1			2712
03 Jun	0231	0237	0252	B2.0			2712
03 Jun	0551	0557	0601	B1.8			2712
03 Jun	0632	0636	0641	B1.6			2712
03 Jun	0753	0756	0758	B7.9	SF	N14W54	2712
03 Jun	1747	1752	1757	B1.6			2712



Region Summary

Date	Location		Sunspot Characteristics					Flares							
	Lat CMD	Helio	Area 10 ⁻⁶ hemi.	Extent (helio)	Spot Class	Spot Count	Mag Class	X-ray			Optical				
		Lon						C	M	X	S	1	2	3	4
<i>Region 2710</i>															
21 May	N16E64	223	20	2	Cro	2	B					1			
22 May	N17E52	221	20	5	Bxo	2	B								
23 May	N18E38	222	10	6	Bxo	2	B								
24 May	N17E25	222	0	1	Axx	1	A					2			
25 May	N17E11	223	plage												
26 May	N17W03	224	plage												
27 May	N17W17	224	plage												
28 May	N17W31	225	plage												
29 May	N17W45	226	plage												
30 May	N17W59	227	plage												
31 May	N17W73	227	plage												
01 Jun	N17W87	228	plage												
								0	0	0	3	0	0	0	0

Crossed West Limb.

Absolute heliographic longitude: 224

Region 2711

23 May	N06W28	288	40	5	Dao	8	B								
24 May	N06W41	288	60	6	Cai	6	B								
25 May	N06W55	289	40	7	Cso	5	B				1				
26 May	N07W70	291	30	4	Cro	3	B								
27 May	N05W84	291	10	3	Bxo	2	B								
								0	0	0	1	0	0	0	0

Crossed West Limb.

Absolute heliographic longitude: 288



Region Summary - continued

Date	Location	Sunspot Characteristics						Flares								
	Lat CMD	Helio	Area 10 ⁻⁶ hemi.	Extent (helio)	Spot Class	Spot Count	Mag Class	X-ray			Optical					
		Lon						C	M	X	S	1	2	3	4	
Region 2712																
23 May	N13E89	172	plage					1								
24 May	N13E75	172		80	6	Cso	2		B				1			
25 May	N14E56	178		40	9	Cao	7		B				2			
26 May	N15E43	178	40	8	Cao	3	B									
27 May	N15E28	179	40	9	Cro	5	B					1				
28 May	N15E18	176	80	7	Csi	10	B	1				7				
29 May	N16E05	176	70	8	Csi	12	B					2				
30 May	N16W09	177	30	8	Cro	8	B									
31 May	N16W23	177	50	8	Dro	11	BG					2				
01 Jun	N16W36	177	60	7	Dro	12	BG					1				
02 Jun	N15W48	176	30	9	Cro	10	B					1				
03 Jun	N14W63	178	10	6	Bxo	6	B					1				
								2	0	0	18	0	0	0	0	

Still on Disk.

Absolute heliographic longitude: 176

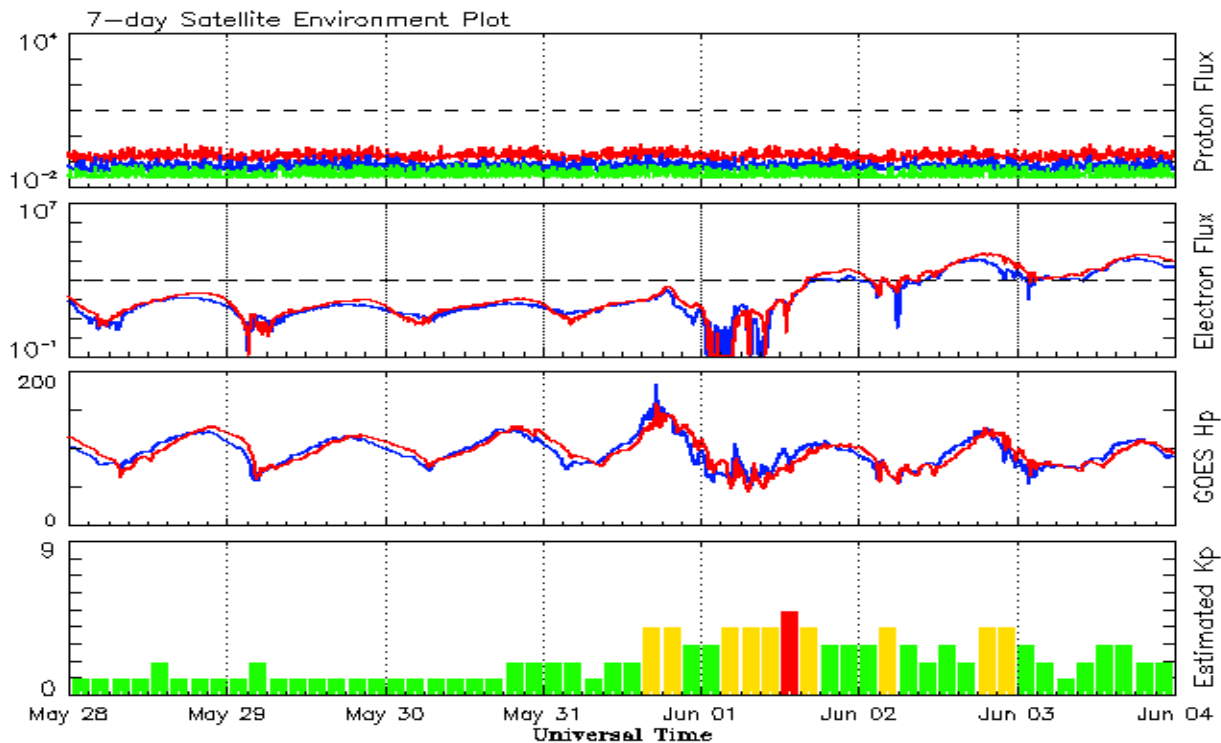


Recent Solar Indices (preliminary)
Observed monthly mean values

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
2016									
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	36.5	23.1	85.9	87.7	10	11.2
August	50.4	30.1	0.60	34.2	21.6	85.0	85.5	10	11.2
September	37.4	26.8	0.72	32.1	19.9	87.8	83.7	16	11.3
October	30.0	20.0	0.67	31.1	18.9	86.1	82.5	16	11.6
November	22.4	12.8	0.57	29.4	17.9	78.7	81.1	10	11.6
December	17.6	11.1	0.64	28.1	17.1	75.1	80.0	10	11.4
2017									
January	28.1	15.7	0.55	27.3	16.7	77.4	79.4	10	11.3
February	22.0	15.8	0.71	25.5	15.9	76.9	78.7	10	11.3
March	25.4	10.6	0.42	24.6	15.4	74.6	78.6	15	11.5
April	30.4	19.4	0.64	24.3	14.9	80.9	78.4	13	11.5
May	18.1	11.3	0.62	23.1	14.0	73.5	77.7	9	11.3
June	18.0	11.5	0.64	22.0	13.3	74.8	77.3	7	11.3
July	18.8	10.7	0.59	20.8	12.6	77.7	76.8	9	11.0
August	25.0	19.6	0.80	19.7	11.7	77.9	76.3	12	10.7
September	42.2	26.2	0.62	18.6	10.9	92.0	75.9	19	10.3
October	16.0	7.9	0.49	16.8	10.0	76.4	75.1	11	9.8
November	7.7	3.4	0.44	15.7	9.2	72.1	74.6	11	9.5
December	7.6	4.9	0.64			71.5		8	
2018									
January	7.8	4.0	0.51			70.0		6	
February	16.0	6.4	0.40			72.0		7	
March	6.0	1.5	0.25			68.4		8	
April	7.0	5.3	0.76			70.0		7	
May	15.0	7.9	0.53			70.9		8	

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 28 May 2018*

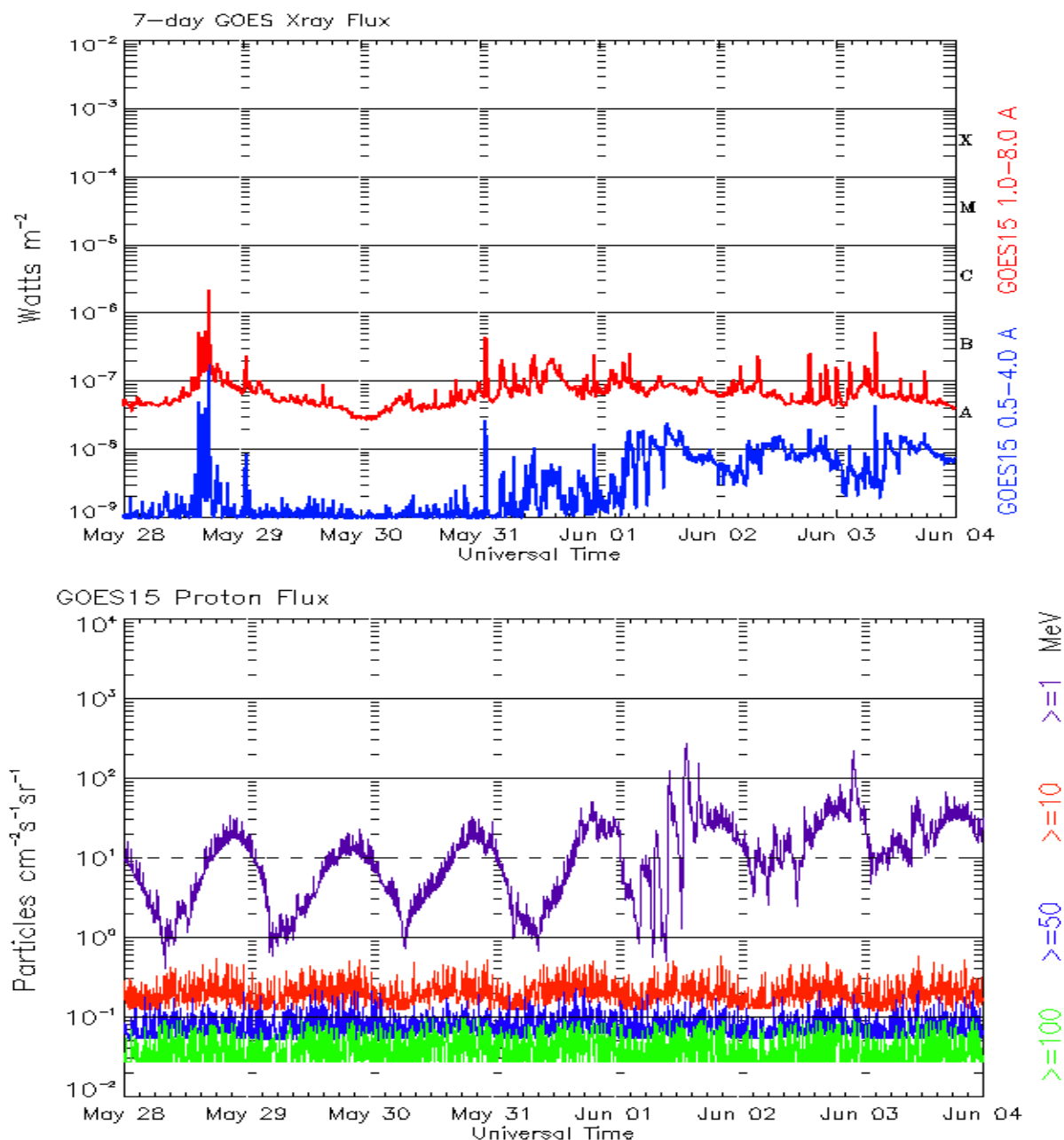
The proton flux plot contains the five-minute averaged integral proton flux (protons/cm²-sec -sr) as measured by the SWPC Primary GOES satellite, near West 75, for each of three energy thresholds: greater than 10, 50, and 100 MeV.

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 28 May 2018*

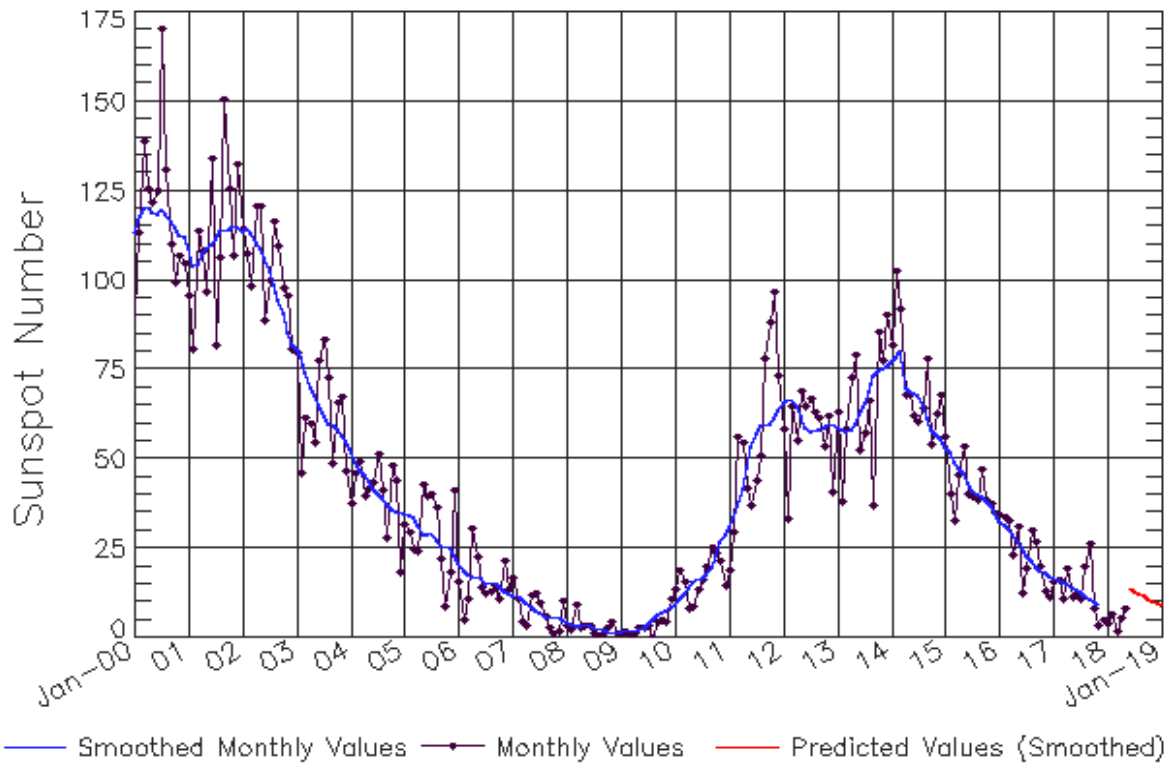
The x-ray plots contains five-minute averages x-ray flux (Watt/m^2) as measure by the SWPC primary GOES X-ray satellite, usually at West 105 longitude, in two wavelength bands, 0.05 - 0.4 and 0.1 - 0.8 nm. The letters A, B, C, M and X refer to x-ray event levels for the 0.1 - 0.8 nm band.

The proton plot contains the five-minute averaged integral flux units ($\text{pfu} = \text{protons/cm}^2\text{-sec -sr}$) 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 May 2018



Updated 2018 Jun 4

NOAA/SWPC Boulder, CO USA

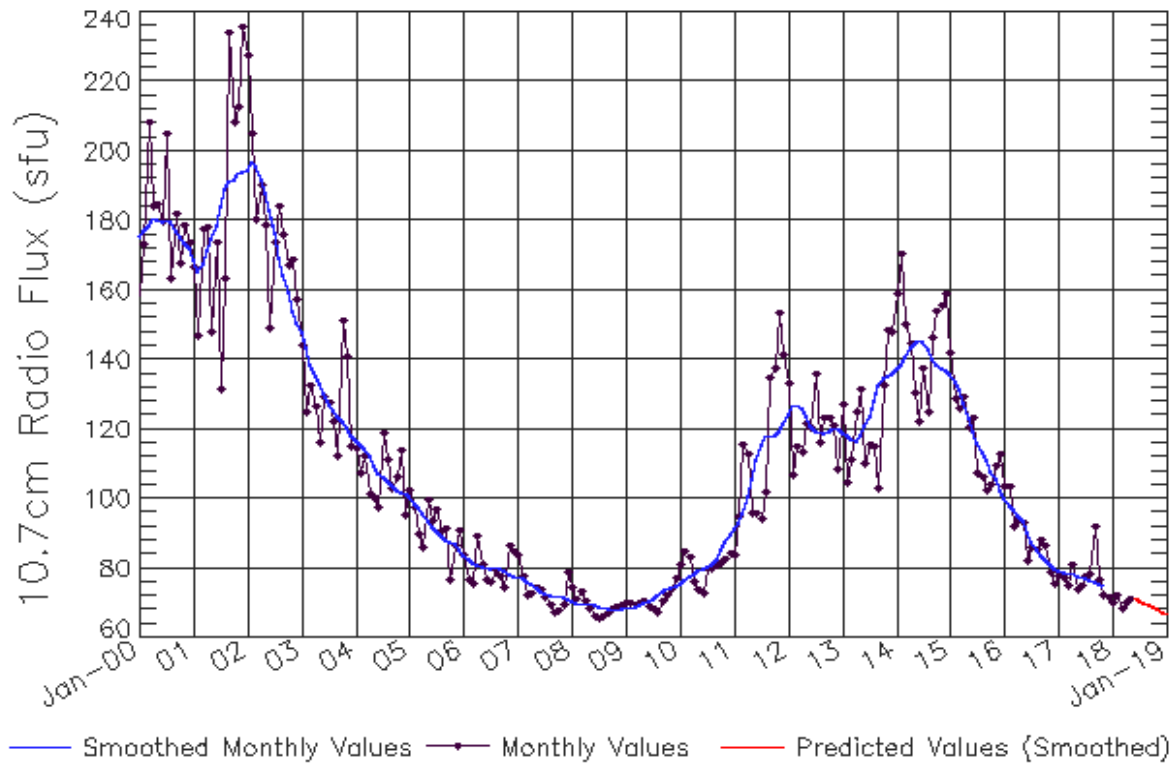
Smoothed Sunspot Number Prediction

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



ISES Solar Cycle F10.7cm Radio Flux Progression

Observed data through May 2018

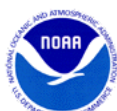


Updated 2018 Jun 4

NOAA/SWPC Boulder, CO USA

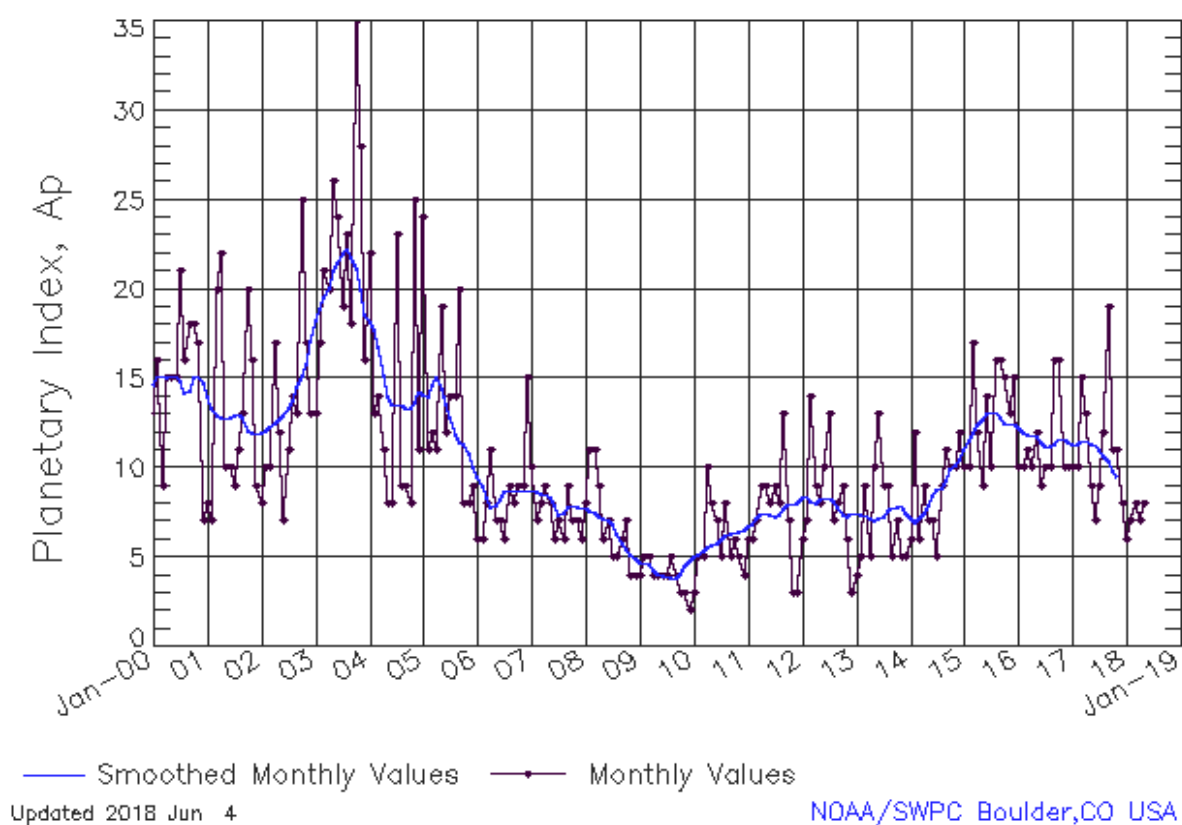
Smoothed F10.7cm Radio Flux Prediction

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 (***)	86 (***)	84 (***)	83 (***)	81 (***)	80 (***)
2017	79 (***)	79 (***)	79 (***)	78 (***)	78 (***)	77 (***)	77 (***)	76 (***)	76 (***)	75 (***)	75 (***)	74 (1)
2018	74 (1)	73 (2)	72 (3)	71 (4)	70 (4)	70 (5)	70 (6)	69 (7)	69 (8)	69 (8)	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 May 2018



Solar Cycle Comparison charts are temporarily unavailable.

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
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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

