

Solar activity was at very low levels. No sunspots were observed on the visible disk. The strongest flare of the period reached B2 at 01/1454 UTC and was from around the E. limb. No Earth-directed CMEs were observed in available coronagraph imagery.

No proton events were observed at geosynchronous orbit.

The greater than 2 MeV electron flux at geosynchronous orbit was at normal levels on 27-28 May, moderate levels on 29 May and moderate to high levels on 31 May - 02 Jun. The increase in electron flux was due to increased solar wind speeds from a negative polarity CH HSS.

Geomagnetic field activity ranged from quiet to active levels. A weak, slow-moving transient was observed on 27 May, resulting in quiet to unsettled conditions. Total magnetic field strength reached a peak of 12 nT and no significant periods of southward Bz were observed. Solar wind speeds for the transient were between 320-380 km/s. Late on 28 May, an increase in solar winds to between 500-550 km/s was observed, producing unsettled conditions through 29 May, with an isolated period of active during the 29/0300-0600 synoptic period. The geomagnetic field returned to quiet levels after 30/0300 UTC as effects from the negative polarity CH HSS slowly waned. Quiet conditions were observed for the remainder of the reporting period.

### **Space Weather Outlook** **03 June - 29 June 2019**

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

No proton events are expected at geosynchronous orbit.

The greater than 2 MeV electron flux at geosynchronous orbit is expected to range from normal to high levels. High levels are expected on 03-06 Jun, 09-10 Jun and 26-29 Jun; moderate levels are expected on 07-08 Jun, 11-22 Jun and on 25 Jun. Normal levels are expected for the remainder of the outlook period. All increases in electron flux are anticipated due to multiple, recurrent CH HSSs.

Geomagnetic field activity is expected to remain below G1 (Minor) geomagnetic storm levels. Active conditions are likely on 25 Jun; unsettled conditions are likely on 03-05 Jun, 08-09 Jun, 23-24 Jun and 26 Jun. Elevated levels of geomagnetic activity are anticipated due to multiple, recurrent CH HSSs. Quiet conditions are expected for 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 <sup>-6</sup> hemi.)	Flux		C	M	X	S	1	2	3	4
27 May	68	0	0	A6.2	0	0	0	0	0	0	0	0	0
28 May	68	0	0	A6.5	0	0	0	0	0	0	0	0	0
29 May	68	0	0	A6.8	0	0	0	0	0	0	0	0	0
30 May	69	0	0	A7.3	0	0	0	0	0	0	0	0	0
31 May	69	0	0	A7.5	0	0	0	0	0	0	0	0	0
01 June	70	0	0	A7.8	0	0	0	0	0	0	0	0	0
02 June	70	0	0	A7.7	0	0	0	0	0	0	0	0	0

### ***Daily Particle Data***

Date	Proton Fluence (protons/cm <sup>2</sup> -day -sr)			Electron Fluence (electrons/cm <sup>2</sup> -day -sr)		
	>1 MeV	>10 MeV	>100 MeV	>0.6 MeV	>2MeV	>4 MeV
27 May	4.8e+05	1.8e+04	3.5e+03		1.6e+06	
28 May	3.8e+05	2.0e+04	3.8e+03		1.6e+06	
29 May	3.1e+05	1.9e+04	3.8e+03		3.5e+06	
30 May	7.4e+05	1.9e+04	3.8e+03		5.3e+07	
31 May	4.3e+05	1.9e+04	4.0e+03		1.6e+08	
01 June	5.3e+05	1.9e+04	4.2e+03		2.2e+08	
02 June	7.3e+05	1.9e+04	3.8e+03		1.5e+08	

### ***Daily Geomagnetic Data***

Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
27 May	12	2-3-4-2-3-3-2-1	14	3-3-4-4-3-2-1-0	10	3-3-3-2-1-3-2-1
28 May	9	1-0-2-2-3-2-3-3	4	1-1-1-1-1-1-2-2	8	1-1-2-2-2-2-3-3
29 May	16	3-4-4-3-2-2-3-3	28	4-4-6-5-4-2-1-2	14	3-4-3-3-2-2-3-3
30 May	8	3-2-2-2-2-2-2-2	13	3-3-2-5-2-2-1-1	8	3-2-2-2-2-1-2-2
31 May	5	2-2-2-1-2-1-1-1	5	2-2-3-2-2-0-0-0	5	2-2-2-1-1-1-0-1
01 June	4	1-0-1-1-2-2-1-2	1	1-1-1-0-0-0-0-0	3	1-0-1-0-1-1-1-1
02 June	4	2-0-0-1-2-2-2-1	1	1-1-0-0-0-0-0-0	7	2-1-0-0-1-1-1-1

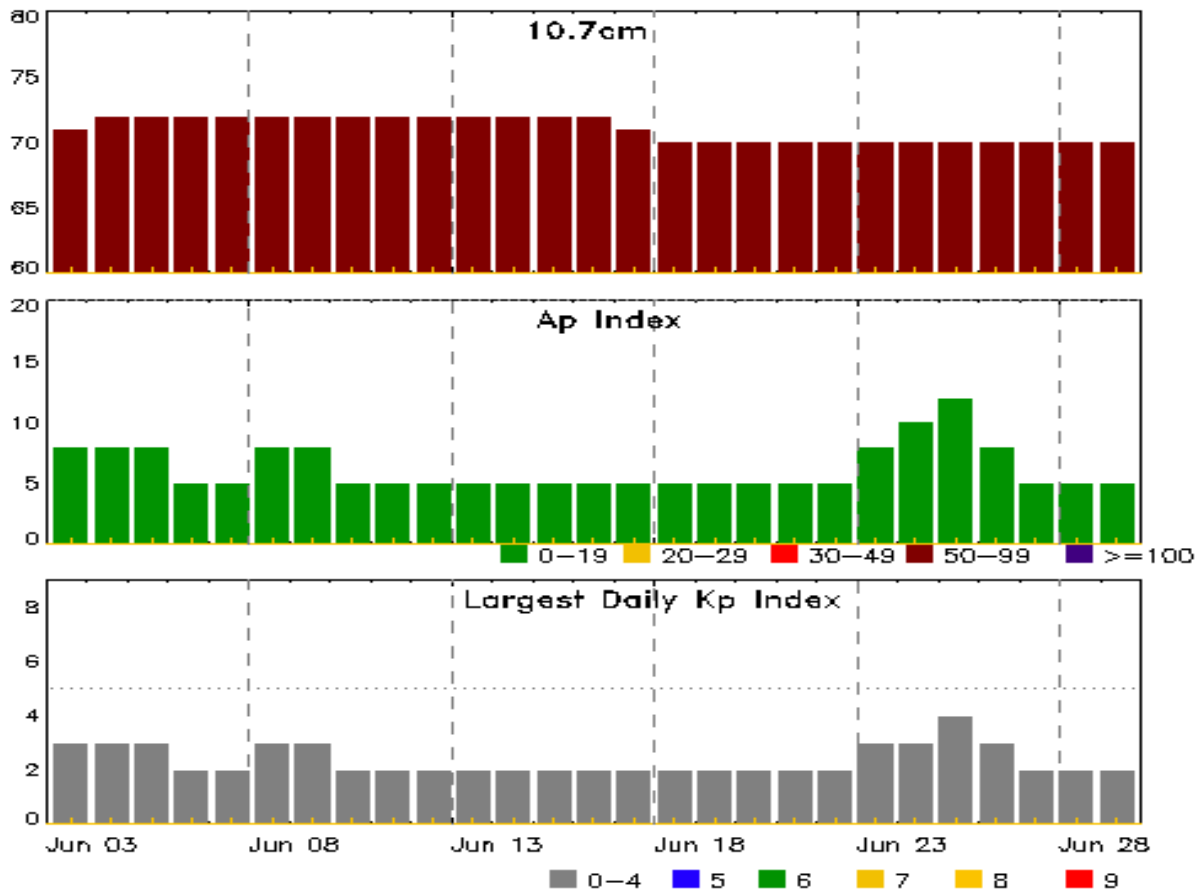


### *Alerts and Warnings Issued*

<b>Date &amp; Time of Issue UTC</b>	<b>Type of Alert or Warning</b>	<b>Date &amp; Time of Event UTC</b>
27 May 0737	WARNING: Geomagnetic K = 4	27/0736 - 1200
29 May 0328	WARNING: Geomagnetic K = 4	29/0328 - 0900
29 May 0551	ALERT: Geomagnetic K = 4	29/0551
29 May 0853	EXTENDED WARNING: Geomagnetic K = 4	29/0328 - 1500
30 May 1551	ALERT: Electron 2MeV Integral Flux $\geq$ 1000pfu	30/1535
31 May 0859	CONTINUED ALERT: Electron 2MeV Integral Flux $\geq$ 1000pfu	30/1535
01 Jun 0859	CONTINUED ALERT: Electron 2MeV Integral Flux $\geq$ 1000pfu	30/1535
02 Jun 0902	CONTINUED ALERT: Electron 2MeV Integral Flux $\geq$ 1000pfu	30/1535



## 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
03 Jun	71	8	3	17 Jun	71	5	2
04	72	8	3	18	70	5	2
05	72	8	3	19	70	5	2
06	72	5	2	20	70	5	2
07	72	5	2	21	70	5	2
08	72	8	3	22	70	5	2
09	72	8	3	23	70	8	3
10	72	5	2	24	70	10	3
11	72	5	2	25	70	12	4
12	72	5	2	26	70	8	3
13	72	5	2	27	70	5	2
14	72	5	2	28	70	5	2
15	72	5	2	29	70	5	2
16	72	5	2				

### ***Energetic Events***

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

**No Events Observed**

### ***Flare List***

Date	Time			X-ray	Optical		
	Begin	Max	End		Class	Imp/ Brtns	Location Lat CMD Rgn #
30 May	1755	1756	1757		A1.0		
01 Jun	1448	1454	1500		B2.2		



### ***Region Summary***

Location		Sunspot Characteristics					Flares							
Date	Lat CMD	Helio	Area	Extent	Spot	Spot	Mag	X-ray			Optical			
		Lon	10 <sup>-6</sup> hemi.	(helio)	Class	Count	Class	C	M	X	S	1	2	3

No Active Regions

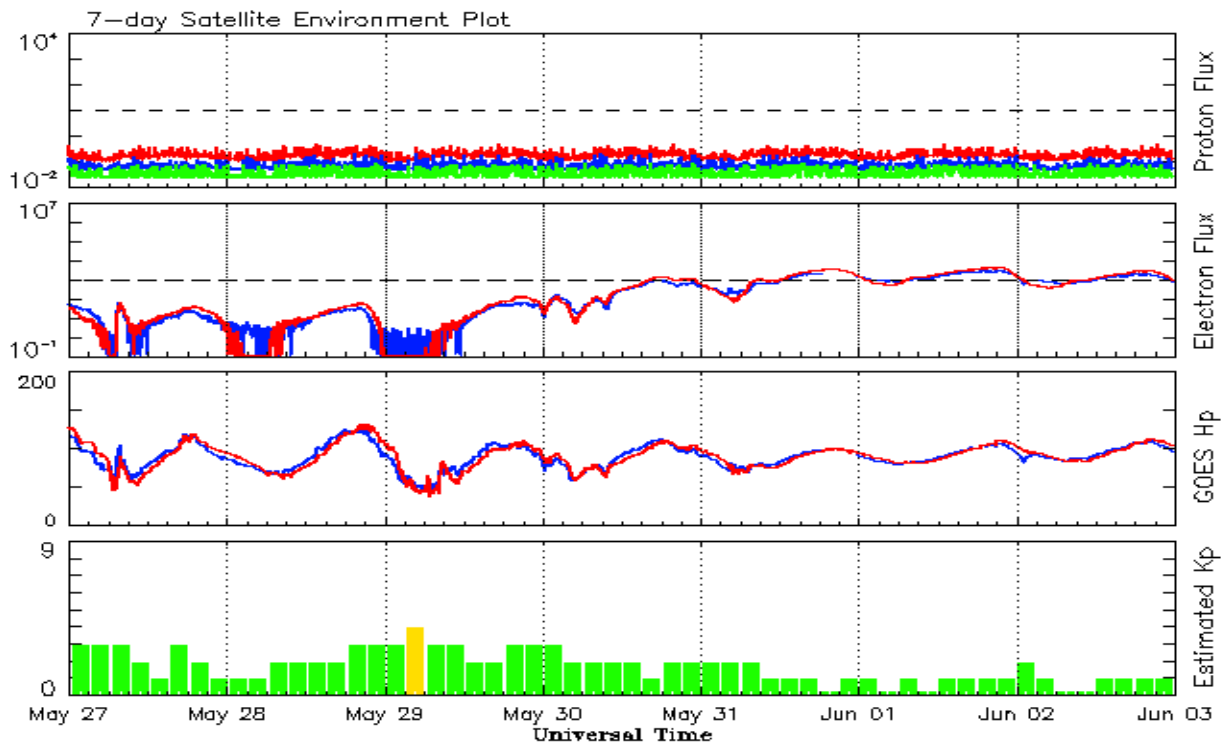


**Recent Solar Indices (preliminary)**  
**Observed monthly mean values**

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
<b>2017</b>									
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	11.8	77.9	76.3	12	10.7
September	42.2	26.2	0.62	18.6	11.0	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	15.7	9.1	71.5	74.4	8	9.4
<b>2018</b>									
January	7.8	4.1	0.51	15.0	8.5	70.0	74.0	6	9.3
February	16.0	6.4	0.40	13.7	7.6	72.0	73.3	7	9.1
March	6.0	1.5	0.25	11.5	5.9	68.4	71.9	8	8.6
April	7.0	5.3	0.76	9.6	4.7	70.0	70.6	7	8.0
May	15.0	7.9	0.53	9.2	4.5	70.9	70.2	8	7.6
June	19.7	9.4	0.48	9.1	4.3	72.5	70.0	7	7.4
July	1.3	1.0	0.77	9.4	4.3	69.7	70.0	6	7.3
August	10.0	5.2	0.53	9.0	4.0	69.1	70.0	10	7.3
September	5.7	2.0	0.35	8.7	4.0	68.3	70.1	9	7.3
October	6.9	2.9	0.42	9.2	4.1	69.5	70.3	7	7.1
November	7.3	2.9	0.48	9.5	4.0	68.9	70.4	6	7.0
December	5.6	1.9	0.34			70.0		7	
<b>2019</b>									
January	16.0	4.7	0.29			71.6		6	
February		0.5				70.6		7	
March	14.8	5.7	0.39			71.5		6	
April	11.5	5.5	0.48			72.4		6	
May	18.1	6.1	0.34			71.3		7	

**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 27 May 2019*

The proton flux plot contains the five-minute averaged integral proton flux (protons/cm<sup>2</sup>-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.

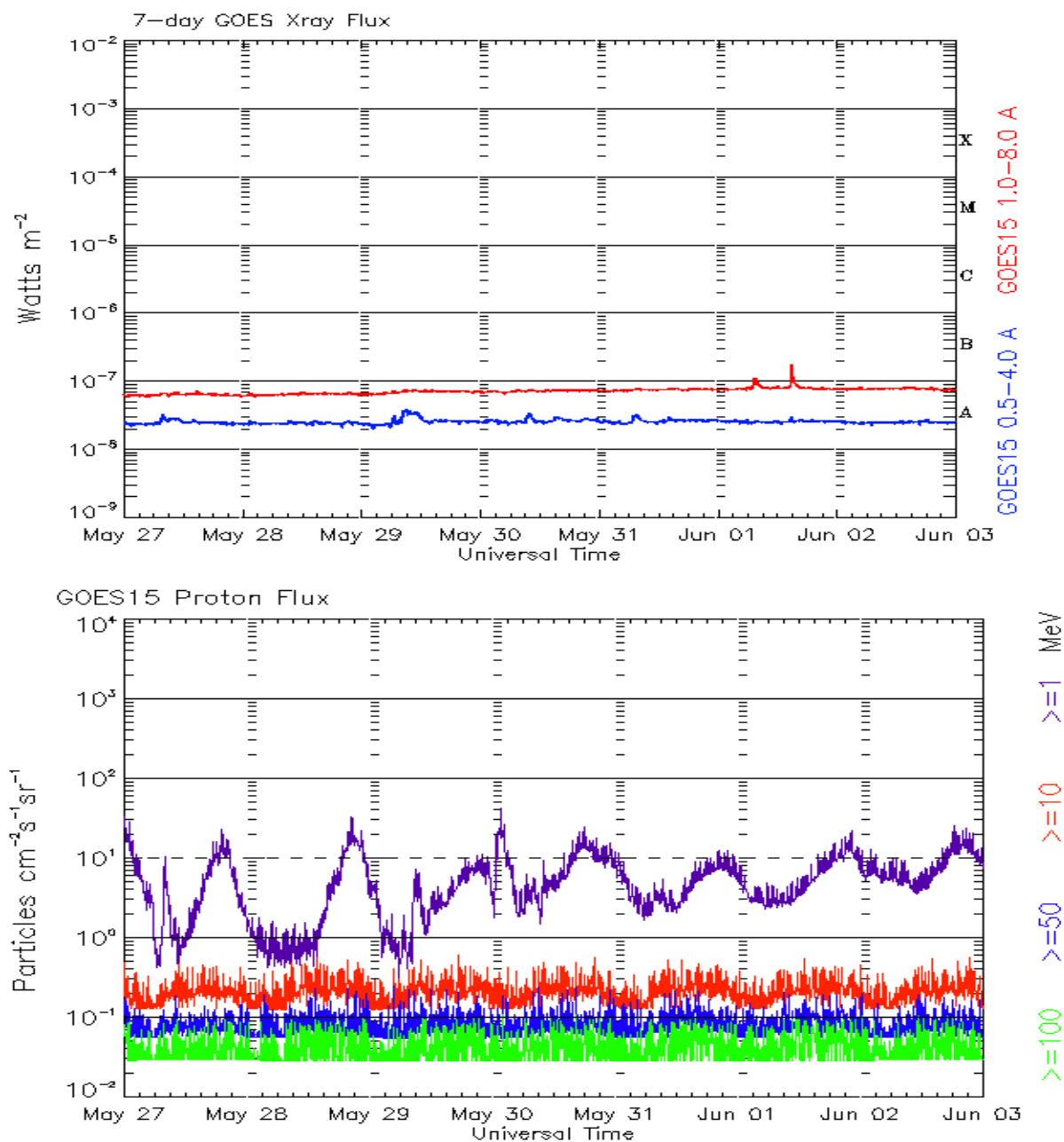
The electron flux plot contains the five-minute averaged integral electron flux (electrons/cm<sup>2</sup>-sec -sr) with energies greater than 2 MeV by the SWPC Primary GOES satellite.

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. Hp 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 27 May 2019*

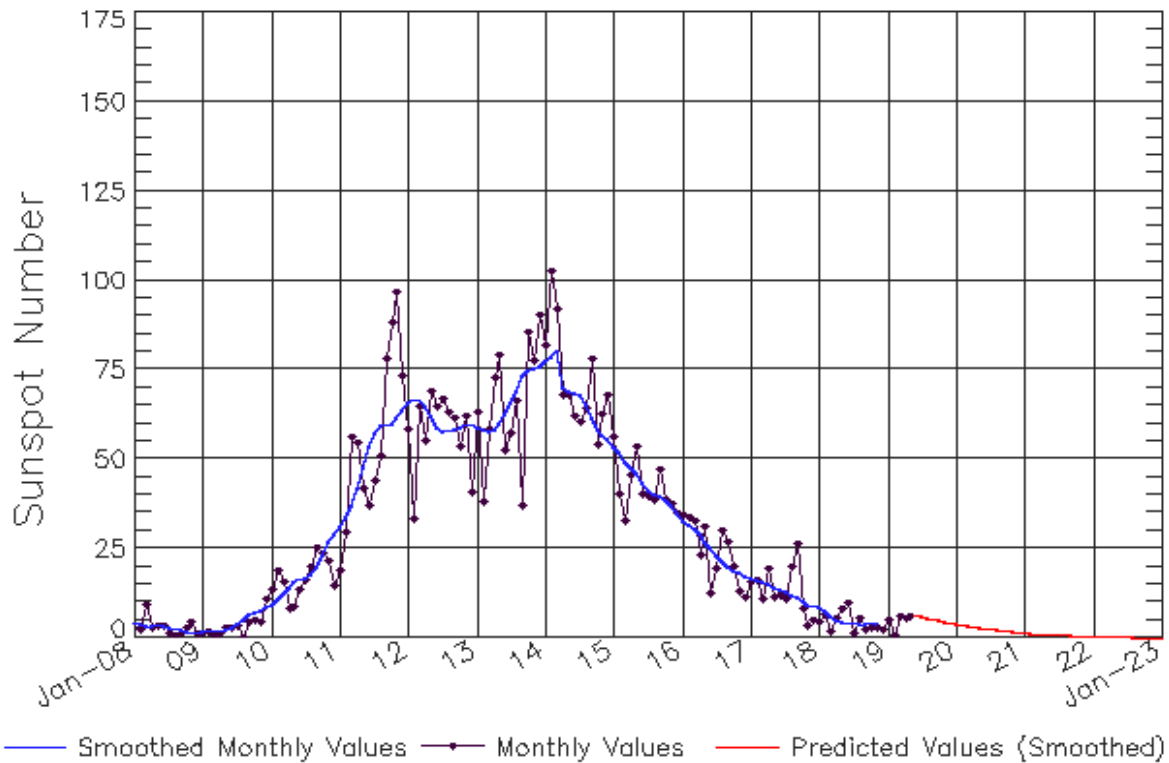
The x-ray plots contains five-minute averages x-ray flux ( $\text{Watt}/\text{m}^2$ ) as measure by the SWPC primary GOES X-ray satellite, usually at West 105 longitude, in two wavelength bands, 0.05 - 0.4 and 0.1 - 0.8 nm. The letters A, B, C, M and X refer to x-ray event levels for the 0.1 - 0.8 nm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

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



# ISES Solar Cycle Sunspot Number Progression

Observed data through May 2019



Updated 2019 Jun 3

NOAA/SWPC Boulder, CO USA

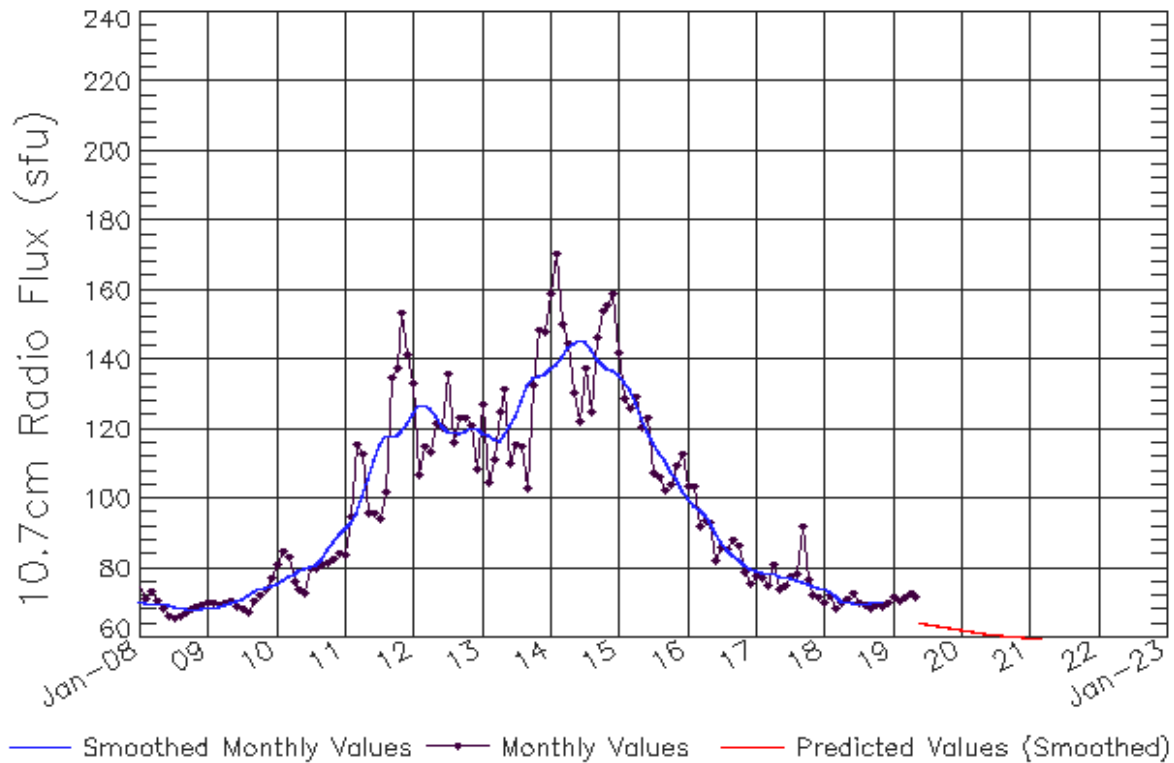
## Smoothed Sunspot Number Prediction

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2010	7	9	11	13	14	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	16	16	11	19	11	12	11	20	26	8	3	5
	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)
2018	4	6	2	5	8	9	1	5	2	3	3	2
	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)
2019	5	1	6	6	6	6	6	6	5	5	4	4
	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)
2020	4	4	3	3	3	3	2	2	2	2	2	2
	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)
2021	2	1	1	1	1	1	1	1	1	1	1	1
	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)
2022	1	0	0	0	0	0	0	0	0	0	0	0
	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)



# ISES Solar Cycle F10.7cm Radio Flux Progression

Observed data through May 2019



Updated 2019 Jun 3

NOAA/SWPC Boulder, CO USA

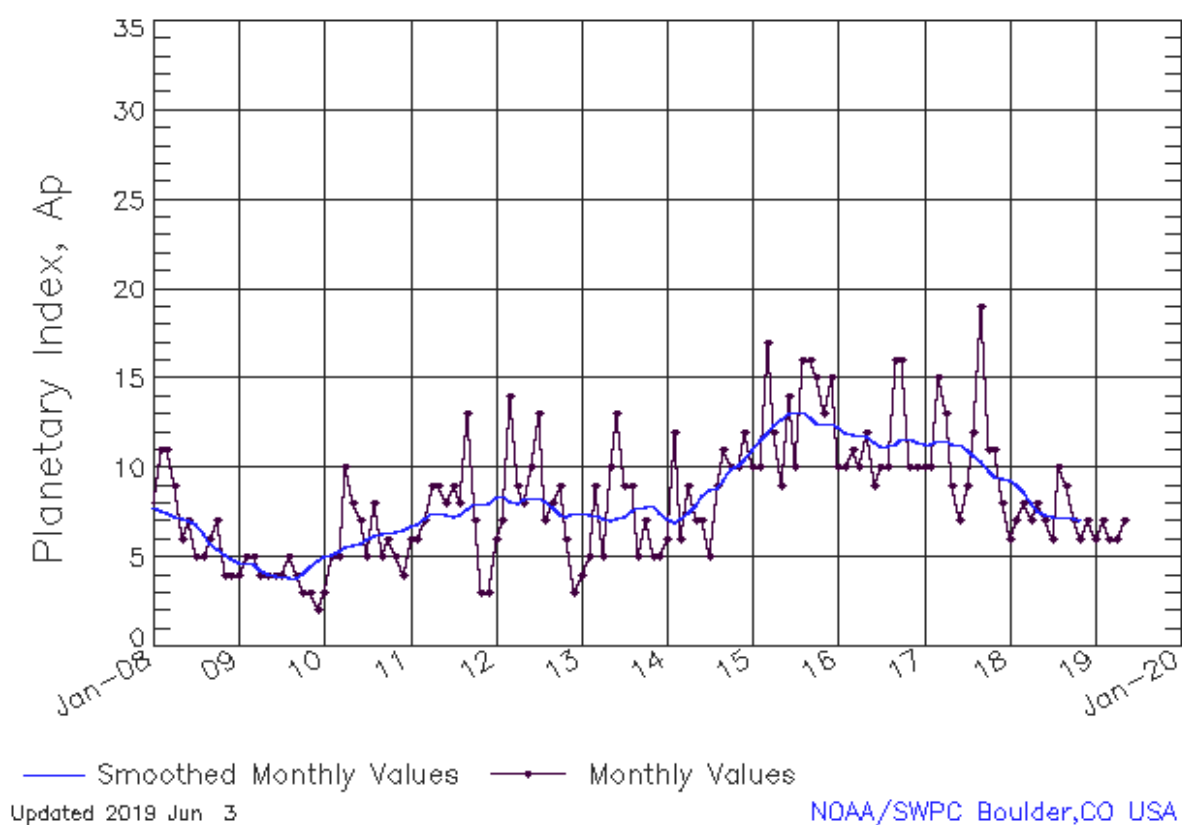
## Smoothed F10.7cm Radio Flux Prediction

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 (***)
2018	74 (***)	73 (***)	72 (***)	71 (***)	70 (***)	70 (***)	70 (***)	70 (***)	70 (***)	70 (***)	70 (***)	70 (1)
2019	70 (1)	69 (2)	69 (3)	68 (4)	68 (4)	67 (5)	66 (6)	66 (7)	65 (8)	64 (8)	63 (9)	63 (9)
2020	62 (9)	62 (9)	62 (9)	62 (9)	61 (9)	61 (9)	61 (9)	61 (9)	61 (9)	60 (9)	60 (9)	60 (9)
2021	60 (9)	60 (9)	60 (9)	60 (9)	60 (9)	60 (9)	60 (9)	59 (9)	59 (9)	59 (9)	59 (9)	59 (9)
2022	59 (9)	59 (9)	59 (9)	59 (9)	59 (9)	59 (9)	59 (9)	59 (9)	59 (9)	59 (9)	59 (9)	59 (9)



# ISES Solar Cycle Ap Progression

Observed data through May 2019



*Solar Cycle Comparison charts are temporarily unavailable.*

## ***Preliminary Report and Forecast of Solar Geophysical Data (The Weekly)***

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NOAA / National Weather Service  
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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.

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

<http://spaceweather.gov/SolarCycle/> -- Solar Cycle Progression web site

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[http://spaceweather.gov/weekly/Usr\\_guide.pdf](http://spaceweather.gov/weekly/Usr_guide.pdf) -- User Guide

