

**Space Weather Highlights**  
**02 September - 08 September 2019**

**SWPC PRF 2297**  
**09 September 2019**

Solar activity was at very low levels. Region 2748 (N14, L=205, class/area Hsx/020 on 02 Sep) was quiet and stable and decayed to plage on 03 Sep. No Earth-directed CMEs were observed.

No proton events were observed at geosynchronous orbit.

The greater than 2 MeV electron flux at geosynchronous orbit was at very high levels on 02-04 Sep and high levels on 05-08 Sep. Electron flux reached a maximum of 87,900 pfu at 04/1835 UTC.

Geomagnetic field activity ranged from quiet to G1 (minor) storm levels on 02 Sep due to effects from a large, recurrent, positive polarity CH HSS. From 03-06 Sep, quiet to active levels were observed as HSS effects continued. Quiet to unsettled levels were observed from 07-08 Sep. Wind speeds began the period near 750 km/s, but slowly decayed to end the period near 400 km/s.

**Space Weather Outlook**  
**09 September - 05 October 2019**

Solar activity is expected to be at very low levels.

No proton events are expected at geosynchronous orbit.

The greater than 2 MeV electron flux at geosynchronous orbit is expected to be at high levels from 09-13 Sep, and again from 27 Sep - 06 Oct due to HSS effects. Normal to moderate levels are expected on 14-26 Sep.

Geomagnetic field activity is expected to be at mostly quiet levels on 09-26 Sep. Isolated unsettled periods are possible on 23, 26 and 30 Sep, and 01-03 Oct. G1 (minor) to G2 (moderate) geomagnetic storm levels are likely on 27-29 Sep due to positive polarity CH HSS effects.



### ***Daily Solar Data***

Date	Radio Flux 10.7cm	Sun spot No.	Sunspot Area (10 <sup>-6</sup> hemi.)	X-ray Background Flux	Flares							
					X-ray			Optical				
					C	M	X	S	1	2	3	4
02 September	69	12	20	A5.7	0	0	0	0	0	0	0	0
03 September	69	0	0	A6.1	0	0	0	0	0	0	0	0
04 September	69	0	0	A5.5	0	0	0	0	0	0	0	0
05 September	68	0	0	A4.7	0	0	0	0	0	0	0	0
06 September	69	0	0	A4.8	0	0	0	0	0	0	0	0
07 September	74	0	0	A4.5	0	0	0	0	0	0	0	0
08 September	68	0	0	A4.0	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
02 September		9.4e+05	2.1e+04	3.7e+03		1.6e+09
03 September		1.2e+06	2.0e+04	3.6e+03		2.6e+09
04 September		1.0e+06	2.0e+04	4.0e+03		3.0e+09
05 September		6.6e+05	2.1e+04	4.1e+03		3.7e+08
06 September		4.8e+05	2.1e+04	4.3e+03		5.9e+08
07 September		9.4e+05	2.1e+04	4.0e+03		7.7e+08
08 September		2.8e+05	2.2e+04	3.8e+03		3.5e+08

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

Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
02 September	19	5-4-4-3-2-2-3-2	27	4-4-5-4-5-3-3-2	21	5-4-4-3-2-3-4-3
03 September	11	3-3-3-3-2-2-1-2	17	2-3-5-4-4-1-2-1	10	3-3-3-3-2-1-1-2
04 September	11	3-2-3-3-2-1-3-2	23	1-2-6-5-4-2-2-1	12	3-3-3-2-2-2-3-2
05 September	11	3-3-3-3-2-1-2-2	26	1-3-6-6-3-1-2-1	14	4-4-3-3-2-1-2-2
06 September	9	1-4-2-3-2-1-1-1	15	1-4-4-5-1-1-1-1	8	2-4-2-3-1-1-1-1
07 September	6	1-1-3-1-2-1-1-2	13	1-1-4-5-3-1-1-1	7	1-1-3-2-2-2-2-2
08 September	9	2-2-3-2-2-2-1-3	15	2-3-3-5-3-2-1-2	7	2-3-3-2-2-2-2-3

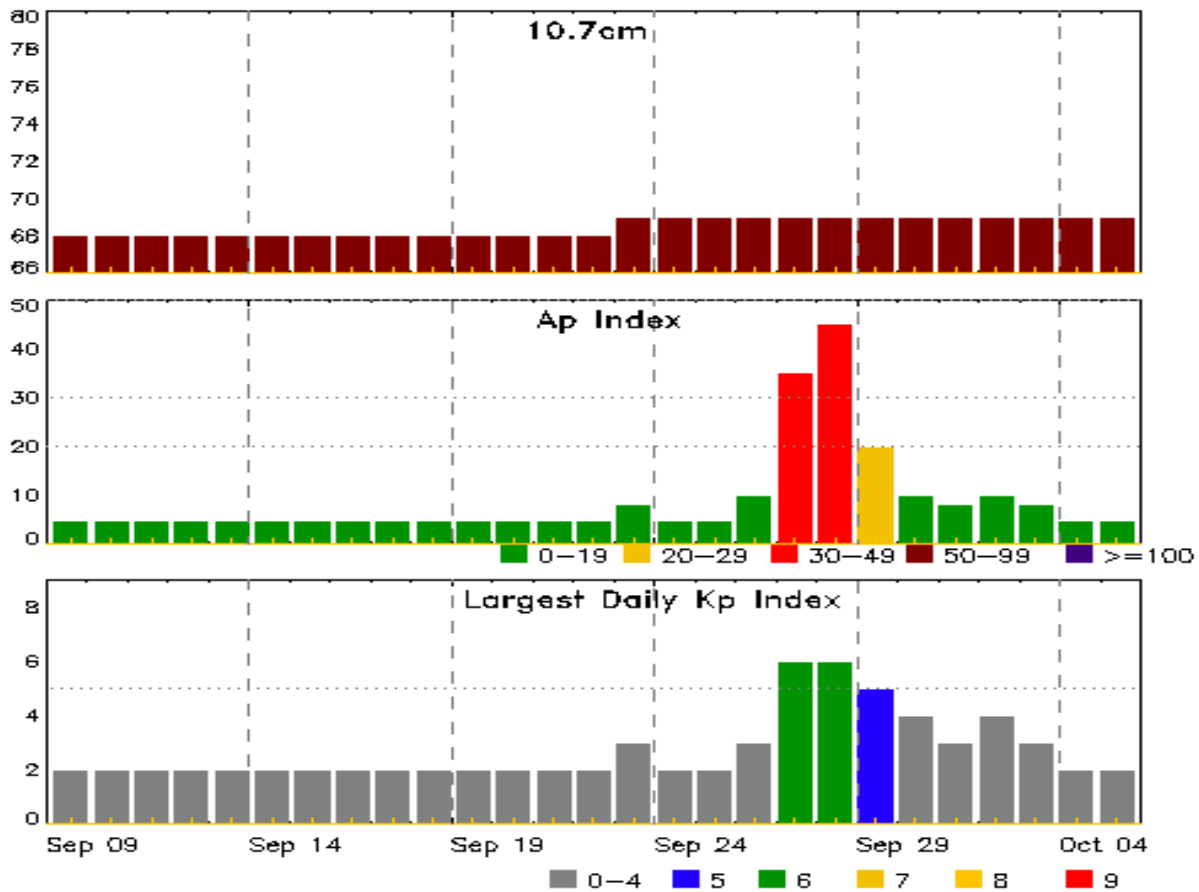


### *Alerts and Warnings Issued*

<b>Date &amp; Time of Issue UTC</b>	<b>Type of Alert or Warning</b>	<b>Date &amp; Time of Event UTC</b>
02 Sep 0003	ALERT: Geomagnetic K = 5	01/2359
02 Sep 0211	ALERT: Geomagnetic K = 5	02/0207
02 Sep 0859	CONTINUED ALERT: Electron 2MeV Integral Flux $\geq$ 1000pfu	31/1540
02 Sep 1455	EXTENDED WARNING: Geomagnetic K = 4	30/2035 - 03/0300
03 Sep 0240	EXTENDED WARNING: Geomagnetic K = 4	30/2035 - 03/1200
03 Sep 0859	CONTINUED ALERT: Electron 2MeV Integral Flux $\geq$ 1000pfu	31/1540
04 Sep 0900	CONTINUED ALERT: Electron 2MeV Integral Flux $\geq$ 1000pfu	31/1540
05 Sep 0247	WARNING: Geomagnetic K = 4	05/0247 - 1200
05 Sep 0250	ALERT: Geomagnetic K = 4	05/0250
05 Sep 0527	WARNING: Geomagnetic K = 5	05/0527 - 0900
05 Sep 0901	CONTINUED ALERT: Electron 2MeV Integral Flux $\geq$ 1000pfu	31/1540
06 Sep 0451	WARNING: Geomagnetic K = 4	06/0451 - 1200
06 Sep 0503	ALERT: Geomagnetic K = 4	06/0503
06 Sep 0859	CONTINUED ALERT: Electron 2MeV Integral Flux $\geq$ 1000pfu	31/1540
07 Sep 0859	CONTINUED ALERT: Electron 2MeV Integral Flux $\geq$ 1000pfu	31/1540
08 Sep 1250	CONTINUED ALERT: Electron 2MeV Integral Flux $\geq$ 1000pfu	31/1540



## 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 Sep	68	5	2	23 Sep	69	8	3
10	68	5	2	24	69	5	2
11	68	5	2	25	69	5	2
12	68	5	2	26	69	10	3
13	68	5	2	27	69	35	6
14	68	5	2	28	69	45	6
15	68	5	2	29	69	20	5
16	68	5	2	30	69	10	4
17	68	5	2	01 Oct	69	8	3
18	68	5	2	02	69	10	4
19	68	5	2	03	69	8	3
20	68	5	2	04	69	5	2
21	68	5	2	05	69	5	2
22	68	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 Class	Optical		
	Begin	Max	End		Imp/ Brtns	Location Lat CMD	Rgn #
No Flares Observed							



## *Region Summary*

Location		Sunspot Characteristics						Flares							
		Helio	Area	Extent	Spot	Spot	Mag	X-ray			Optical				
Date	Lat CMD	Lon	10 <sup>6</sup> hemi.	(helio)	Class	Count	Class	C	M	X	S	1	2	3	4
Region 2748															
01 Sep	N14E22	205	10	3	Bxo	2	B								
02 Sep	N14E07	205	20	2	Hsx	2	A								
03 Sep	N14W06	206	plage												
04 Sep	N14W20	207	plage												
05 Sep	N14W34	208	plage												
06 Sep	N14W48	209	plage												
07 Sep	N14W62	209	plage												
08 Sep	N14W75	209	plage												
								0	0	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 206

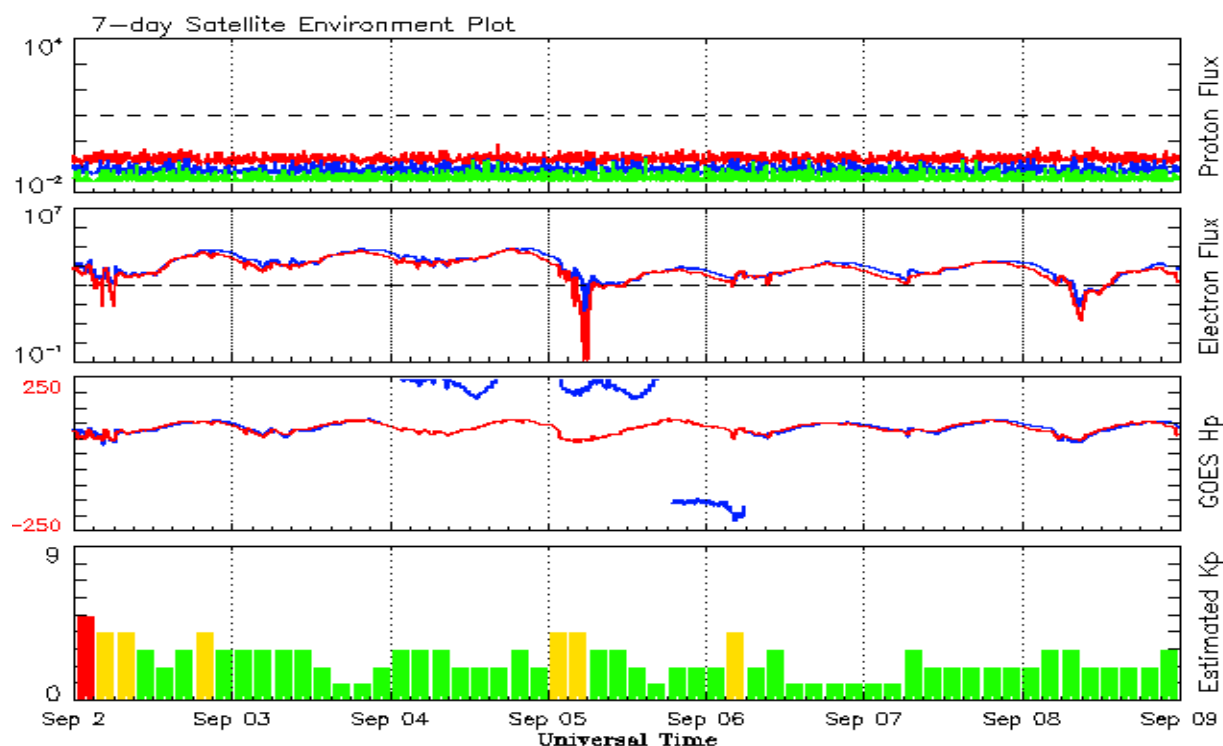


***Recent Solar Indices (preliminary)***  
***Observed monthly mean values***

Month	Sunspot Numbers					Radio Flux		Geomagnetic	
	<u>Observed values</u>		<u>Ratio</u>	<u>Smooth values</u>		<u>Penticton</u>	<u>Smooth</u>	<u>Planetary</u>	<u>Smooth</u>
	SEC	RI	RI/SEC	SEC	RI	10.7 cm	Value	Ap	Value
<b>2017</b>									
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	4.2	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	3.9	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	9.3	3.6	70.0	70.3	7	6.9
<b>2019</b>									
January	16.0	4.6	0.29	9.0	3.2	71.6	70.0	6	6.8
February		0.5		8.7	3.0	70.6	69.8	7	6.7
March	14.8	5.6	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	
June	11.6	0.7	0.06			68.1		5	
July	1.6	0.5	0.31			67.1		6	
August	2.5	0.4	0.16			67.0		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 02 September 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.

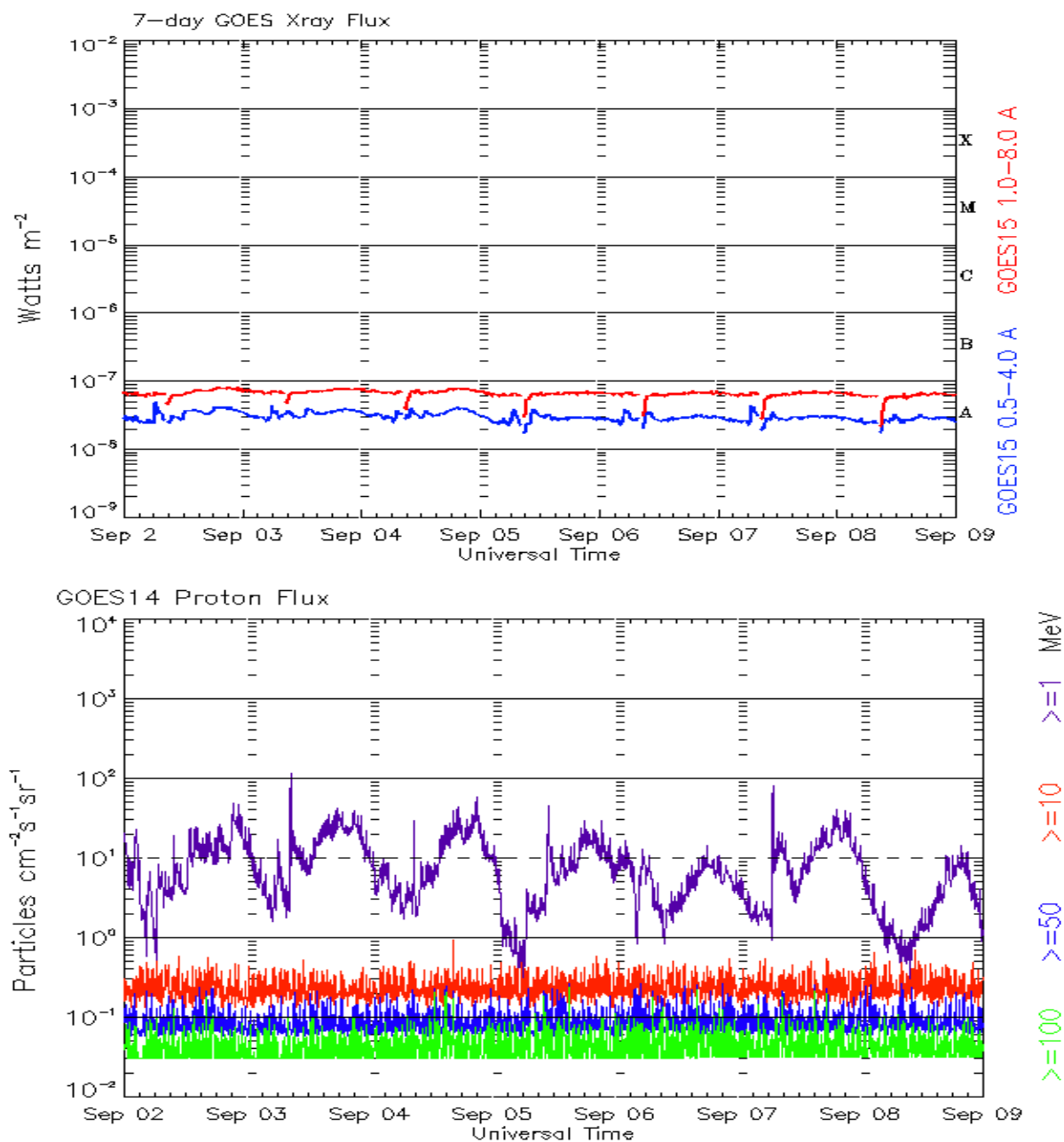
The electron flux plot contains the five-minute averaged integral electron flux (electrons/cm<sup>2</sup>-sec -sr) with energies greater than 2 MeV by the SWPC Primary GOES satellite.

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. 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 September 2019*

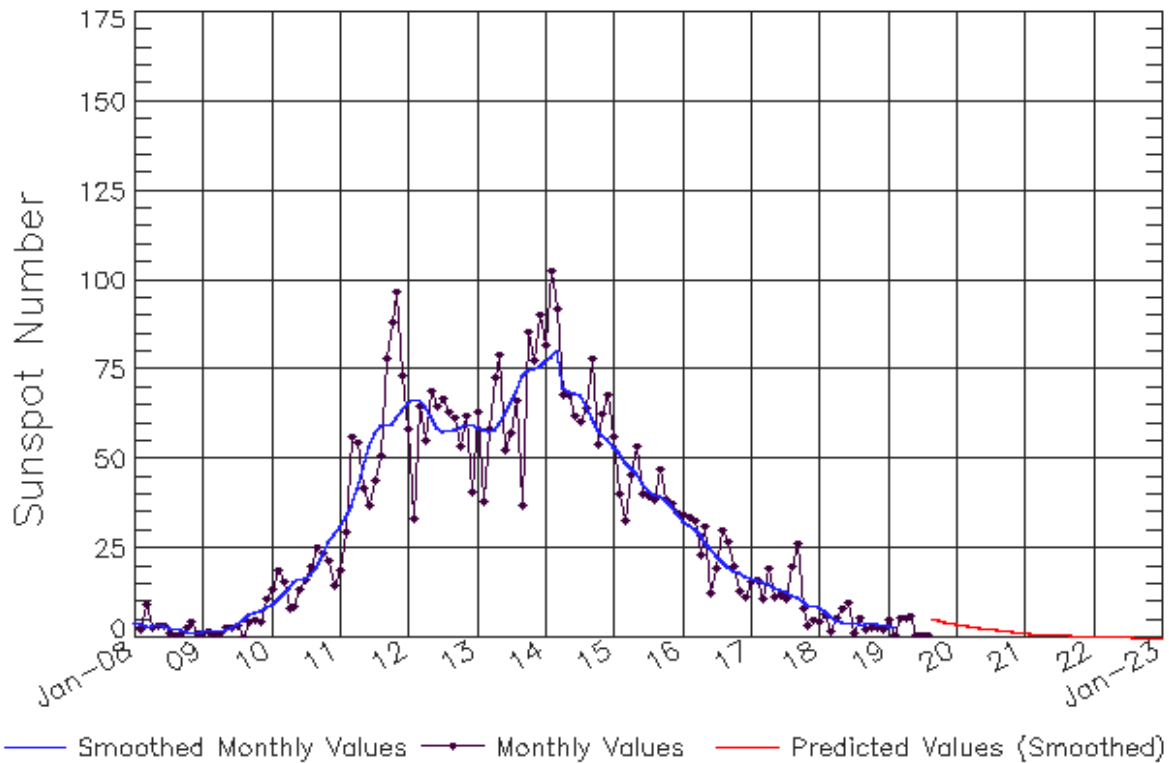
The x-ray plots contains five-minute averages x-ray flux (Watt/m<sup>2</sup>) as measure by the SWPC primary GOES X-ray satellite, usually at West 105 longitude, in two wavelength bands, 0.05 - 0.4 and 0.1 - 0.8 nm. The letters A, B, C, M and X refer to x-ray event levels for the 0.1 - 0.8 nm band.

The proton plot contains the five-minute averaged integral flux units (pfu = protons/cm<sup>2</sup> -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 Aug 2019



Updated 2019 Sep 9

NOAA/SWPC Boulder, CO USA

## Smoothed Sunspot Number Prediction

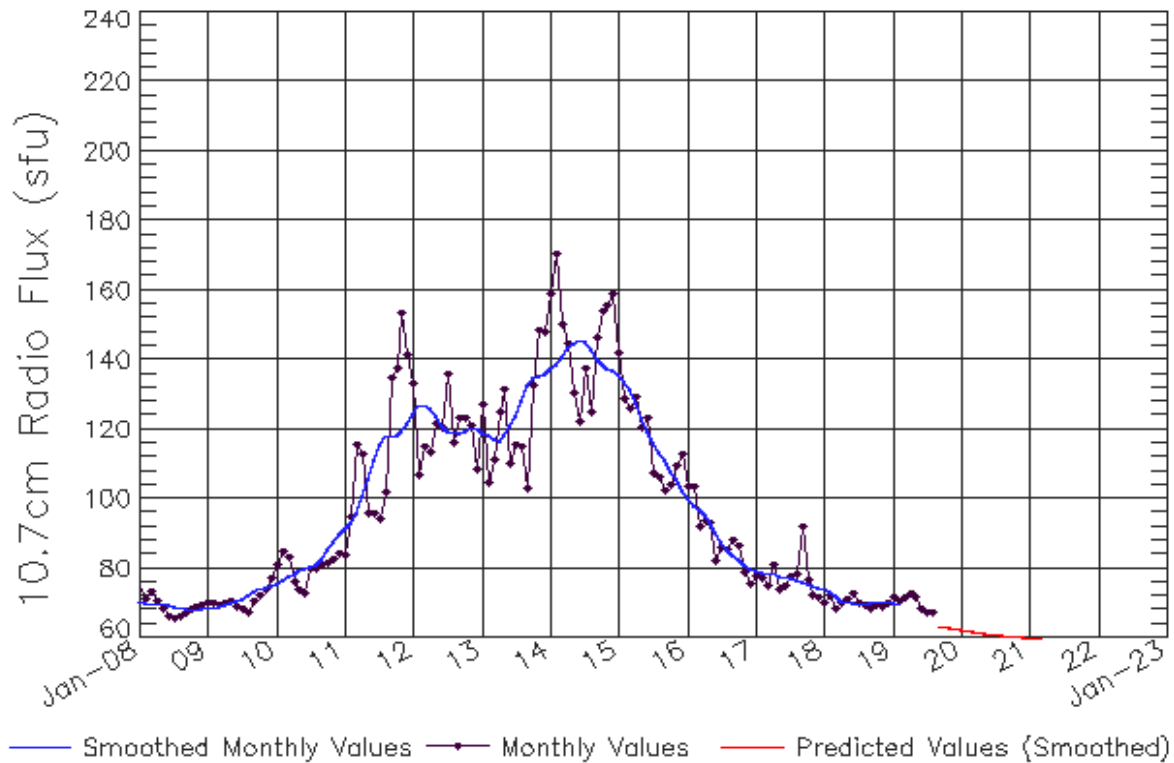
Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2010	7 (1)	9 (2)	11 (3)	13 (5)	14 (5)	16 (6)	17 (7)	17 (7)	20 (8)	23 (9)	27 (9)	29 (10)
2011	19 (10)	30 (10)	56 (10)	54 (10)	42 (10)	37 (10)	44 (10)	51 (10)	78 (10)	88 (10)	97 (10)	73 (10)
2012	58 (10)	33 (10)	64 (10)	55 (10)	69 (10)	65 (10)	67 (10)	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)	9 (10)	1 (10)	5 (10)	2 (10)	3 (10)	3 (10)	2 (10)
2019	5 (10)	1 (10)	6 (10)	6 (10)	6 (10)	1 (10)	1 (10)	0 (10)	5 (10)	5 (10)	4 (10)	4 (10)
2020	4 (10)	4 (10)	3 (10)	3 (10)	3 (10)	3 (10)	2 (10)	2 (10)	2 (10)	2 (10)	2 (10)	2 (10)
2021	2 (10)	1 (10)	1 (10)	1 (10)	1 (10)	1 (10)	1 (10)	1 (10)	1 (10)	1 (10)	1 (10)	1 (10)
2022	1 (10)	0 (10)	0 (10)	0 (10)	0 (10)	0 (10)	0 (10)	0 (10)	0 (10)	0 (10)	0 (10)	0 (10)
2023	0 (10)	0 (10)	0 (10)	0 (10)	0 (10)	0 (10)	0 (10)	0 (10)	0 (10)	0 (10)	0 (10)	0 (10)

SWPC PRF 2297 09 September 2019



# ISES Solar Cycle F10.7cm Radio Flux Progression

Observed data through Aug 2019



Updated 2019 Sep 9

NOAA/SWPC Boulder, CO USA

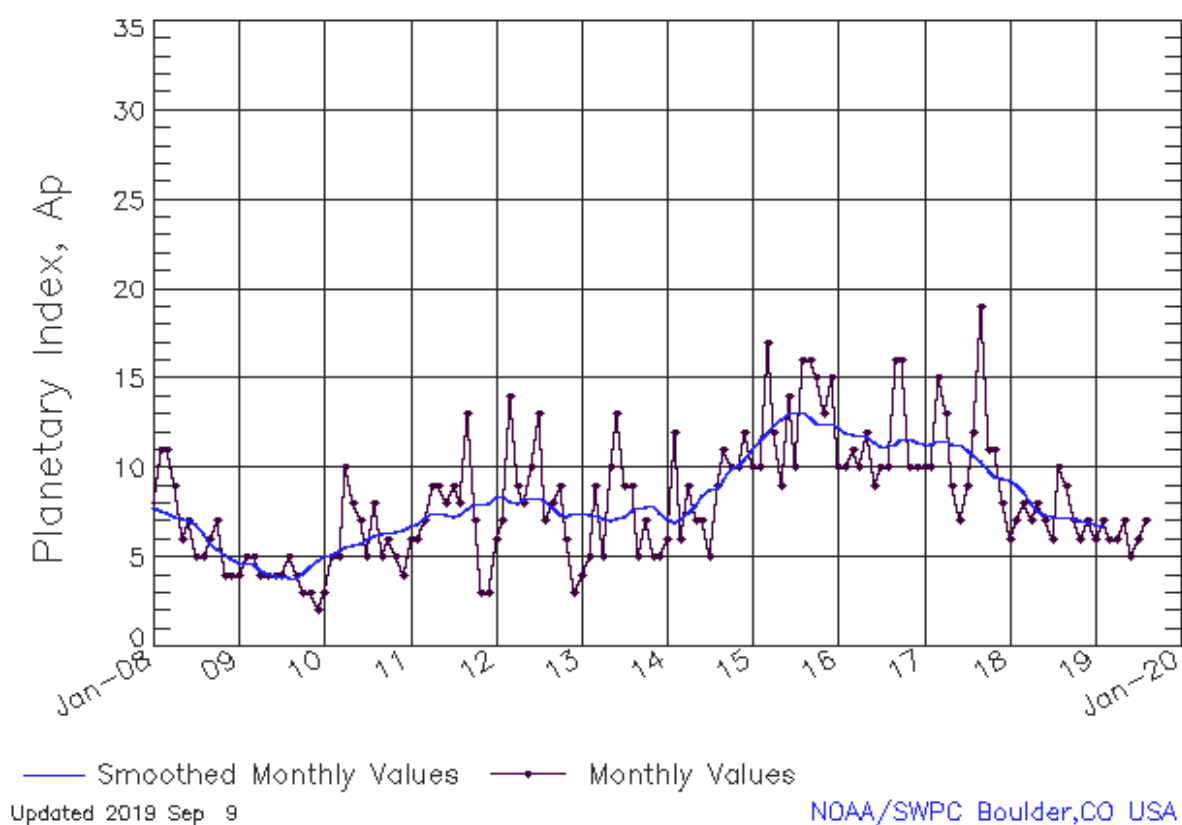
## Smoothed F10.7cm Radio Flux Prediction

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 (***)	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 (***)
2019	70 (***)	70 (***)	70 (1)	69 (1)	69 (2)	68 (3)	67 (4)	67 (4)	66 (5)	65 (6)	64 (7)	63 (8)
2020	63 (8)	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 Aug 2019



*Solar Cycle Comparison charts are temporarily unavailable.*

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

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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](http://spaceweather.gov/weekly/Usr_guide.pdf) -- User Guide

