

**Space Weather Highlights**  
**30 September - 06 October 2019**

**SWPC PRF 2301**  
**07 October 2019**

Solar activity was very low throughout the past week. No active regions with sunspots were observed nor were there any coronal mass ejections.

No proton events were observed at geosynchronous orbit.

The greater than 2 MeV electron flux at geosynchronous orbit reached high levels each day of the summary period.

Geomagnetic field activity reached active levels on 30 Sep and 01 Oct due to weak coronal hole high speed stream effects. Quiet and quiet to unsettled conditions were observed throughout the remainder of the period.

**Space Weather Outlook**  
**07 October - 02 November 2019**

Solar activity is expected to be very low throughout the outlook period.

No proton events are expected at geosynchronous orbit.

The greater than 2 MeV electron flux at geosynchronous orbit is expected to reach high levels on 07-09 Oct and 25 Oct-2 Nov. Normal or normal to moderate levels are expected to persist through the remainder of the period.

Geomagnetic field activity is expected to reach G1 (Minor) geomagnetic storm levels on 24-25 Oct due to the influence of a recurrent coronal hole high speed stream. Active conditions are expected on 21 and 26 Oct with quiet and quiet to unsettled conditions likely throughout the remainder of the period.



### *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
30 September	68	0	0	A2.6	0	0	0	0	0	0	0	0
01 October	69	11	0	A2.3	0	0	0	0	0	0	0	0
02 October	68	11	0	A2.4	0	0	0	0	0	0	0	0
03 October	68	0	0	A2.4	0	0	0	0	0	0	0	0
04 October	68	0	0	A2.1	0	0	0	0	0	0	0	0
05 October	68	0	0	A2.2	0	0	0	0	0	0	0	0
06 October	67	0	0	A2.0	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
30 September		9.6e+05	2.0e+04	3.9e+03		3.8e+08
01 October		2.4e+05	2.1e+04	3.8e+03		1.2e+08
02 October		4.2e+05	2.0e+04	4.0e+03		1.6e+08
03 October		5.3e+05	2.1e+04	3.8e+03		2.6e+08
04 October		5.0e+05	2.1e+04	3.8e+03		1.7e+08
05 October		5.7e+05	2.2e+04	3.8e+03		9.2e+07
06 October		3.1e+05	2.1e+04	3.8e+03		7.4e+07

### *Daily Geomagnetic Data*

Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
30 September	11	3-3-4-2-2-2-1-2	41	3-4-7-6-4-4-2-1	15	3-4-4-3-2-3-2-2
01 October	11	4-3-3-3-2-1-1-1	18	3-3-5-5-3-1-0-1	13	4-4-3-3-1-0-1-1
02 October	7	3-0-0-2-3-2-1-2	15	2-1-0-5-5-1-1-2	8	3-0-0-2-3-1-1-2
03 October	5	2-1-1-1-2-1-2-1	3	1-1-2-2-0-1-1-0	5	2-1-2-1-1-1-2-1
04 October	6	1-2-2-2-2-1-2-1	6	1-1-3-1-1-3-1-0	7	2-2-3-2-2-2-2-1
05 October	6	1-1-1-1-2-2-2-3	10	1-1-3-4-3-2-1-1	7	1-2-2-2-2-2-2-3
06 October	5	2-2-2-2-1-1-1-0	7	1-2-2-4-2-1-0-0	6	2-2-2-2-1-1-0-0

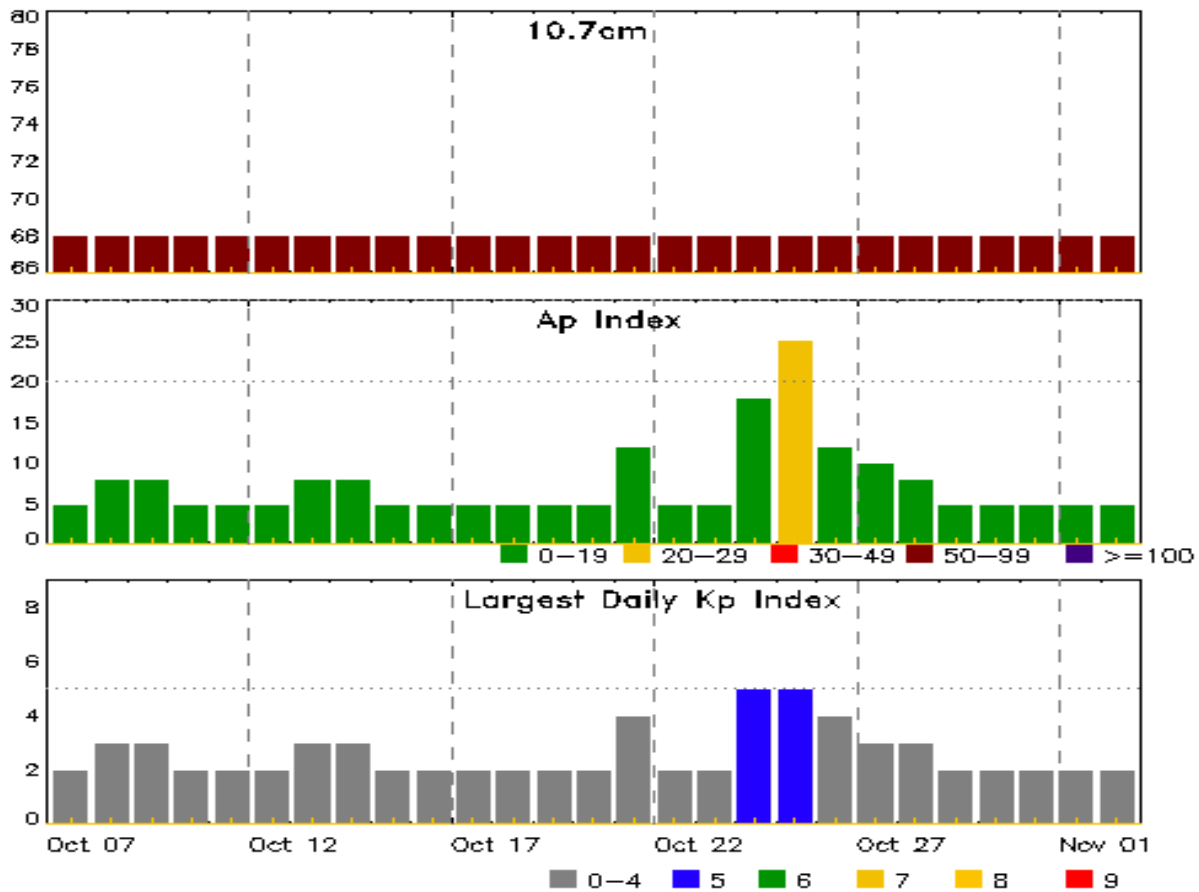


### *Alerts and Warnings Issued*

<b>Date &amp; Time of Issue UTC</b>	<b>Type of Alert or Warning</b>	<b>Date &amp; Time of Event UTC</b>
30 Sep 0002	ALERT: Geomagnetic K = 4	29/2359
30 Sep 0539	WARNING: Geomagnetic K = 4	30/0538 - 1800
30 Sep 0724	CONTINUED ALERT: Electron 2MeV Integral Flux $\geq$ 1000pfu	28/1310
01 Oct 0258	WARNING: Geomagnetic K = 4	01/0257 - 0900
01 Oct 0301	ALERT: Geomagnetic K = 4	01/0259
01 Oct 0800	EXTENDED WARNING: Geomagnetic K = 4	01/0257 - 1500
01 Oct 1231	CONTINUED ALERT: Electron 2MeV Integral Flux $\geq$ 1000pfu	28/1310
02 Oct 1249	CONTINUED ALERT: Electron 2MeV Integral Flux $\geq$ 1000pfu	28/1310
03 Oct 0807	CONTINUED ALERT: Electron 2MeV Integral Flux $\geq$ 1000pfu	28/1310
04 Oct 1629	CONTINUED ALERT: Electron 2MeV Integral Flux $\geq$ 1000pfu	28/1310
05 Oct 1302	CONTINUED ALERT: Electron 2MeV Integral Flux $\geq$ 1000pfu	
05 Oct 1303	CONTINUED ALERT: Electron 2MeV Integral Flux $\geq$ 1000pfu	28/1310
06 Oct 1322	CONTINUED ALERT: Electron 2MeV Integral Flux $\geq$ 1000pfu	28/1310



## 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
07 Oct	68	5	2	21 Oct	68	12	4
08	68	8	3	22	68	5	2
09	68	8	3	23	68	5	2
10	68	5	2	24	68	18	5
11	68	5	2	25	68	25	5
12	68	5	2	26	68	12	4
13	68	8	3	27	68	10	3
14	68	8	3	28	68	8	3
15	68	5	2	29	68	5	2
16	68	5	2	30	68	5	2
17	68	5	2	31	68	5	2
18	68	5	2	01 Nov	68	5	2
19	68	5	2	02	68	5	2
20	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			Optical			
	Begin	Max	End	X-ray Class	Imp/ Brtns	Location Lat CMD	Rgn #
01 Oct	0141	0145	0149	B1.6			



## *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	4
Region 2749															
01 Oct	S09E61	129	0		Axx	1	A								
02 Oct	S09E48	129	0		Axx	1	A								
03 Oct	S09E34	130	plage												
04 Oct	S09E20	131	plage												
05 Oct	S09E06	132	plage												
06 Oct	S09W08	133	plage												
								0	0	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 132

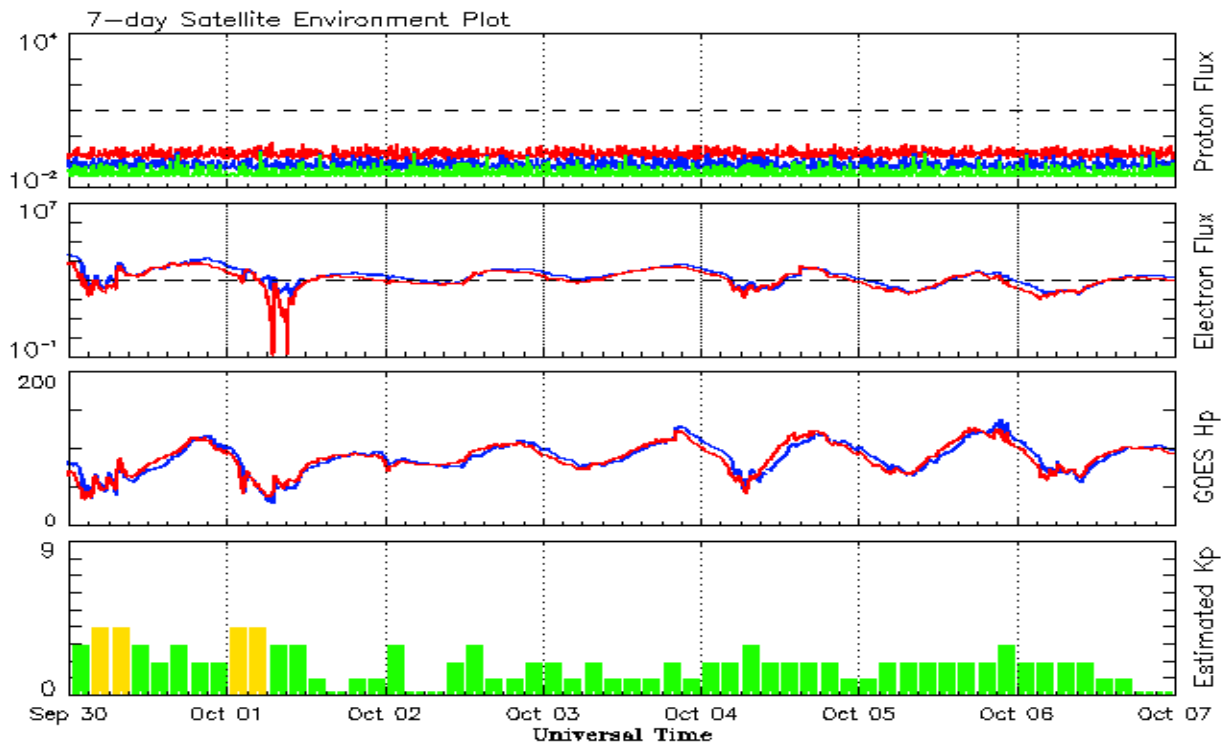


**Recent Solar Indices (preliminary)**  
**Observed monthly mean values**

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>									
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	8.3	2.8	71.5	69.7	6	6.6
April	11.5	5.5	0.48			72.4		6	
May	18.1	5.9	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	
September	2.6	0.7	0.27			68.1		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 30 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.

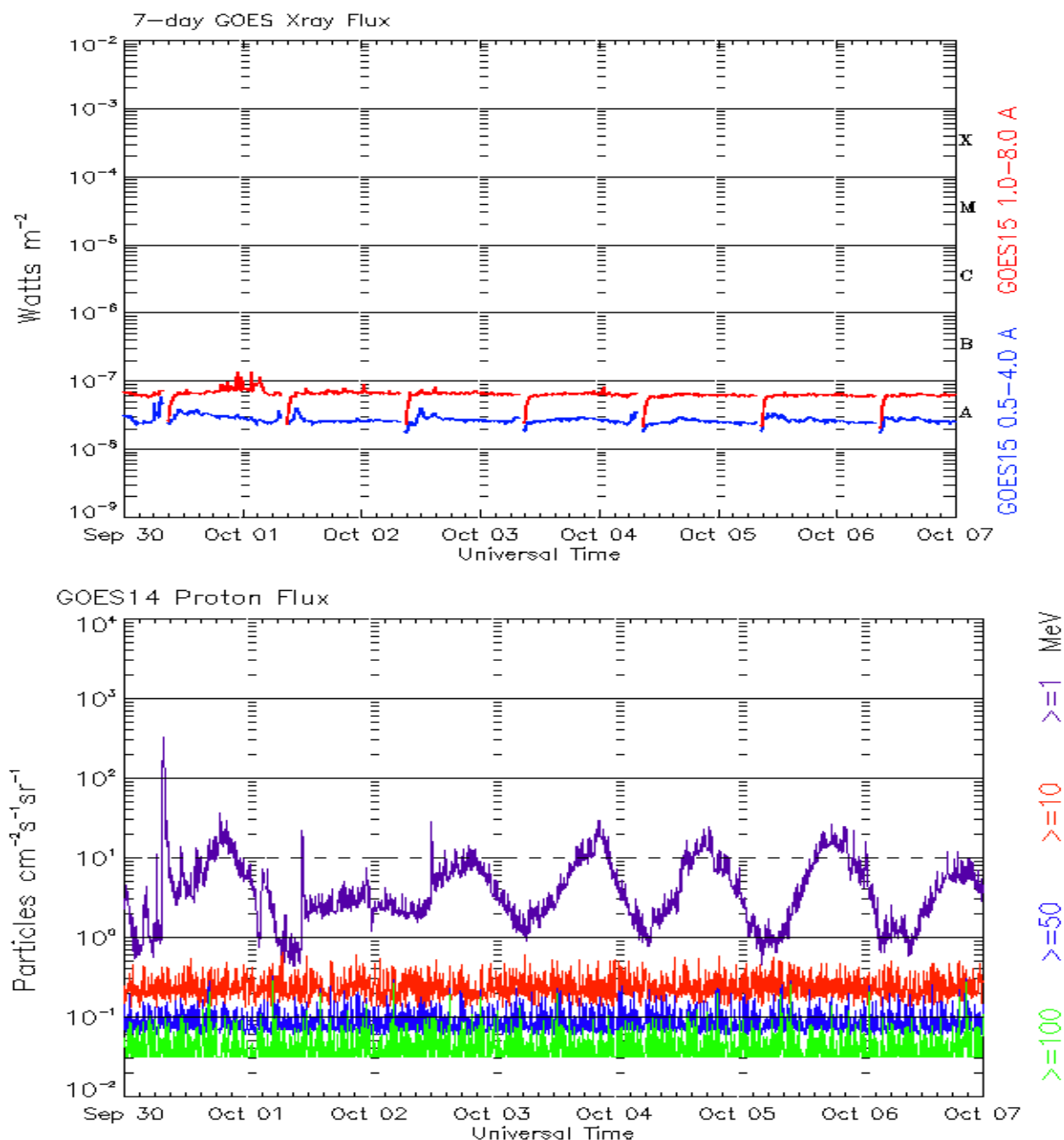
The electron flux plot contains the five-minute averaged integral electron flux (electrons/cm<sup>2</sup>-sec -sr) with energies greater than 2 MeV by the SWPC Primary GOES satellite.

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 30 September 2019*

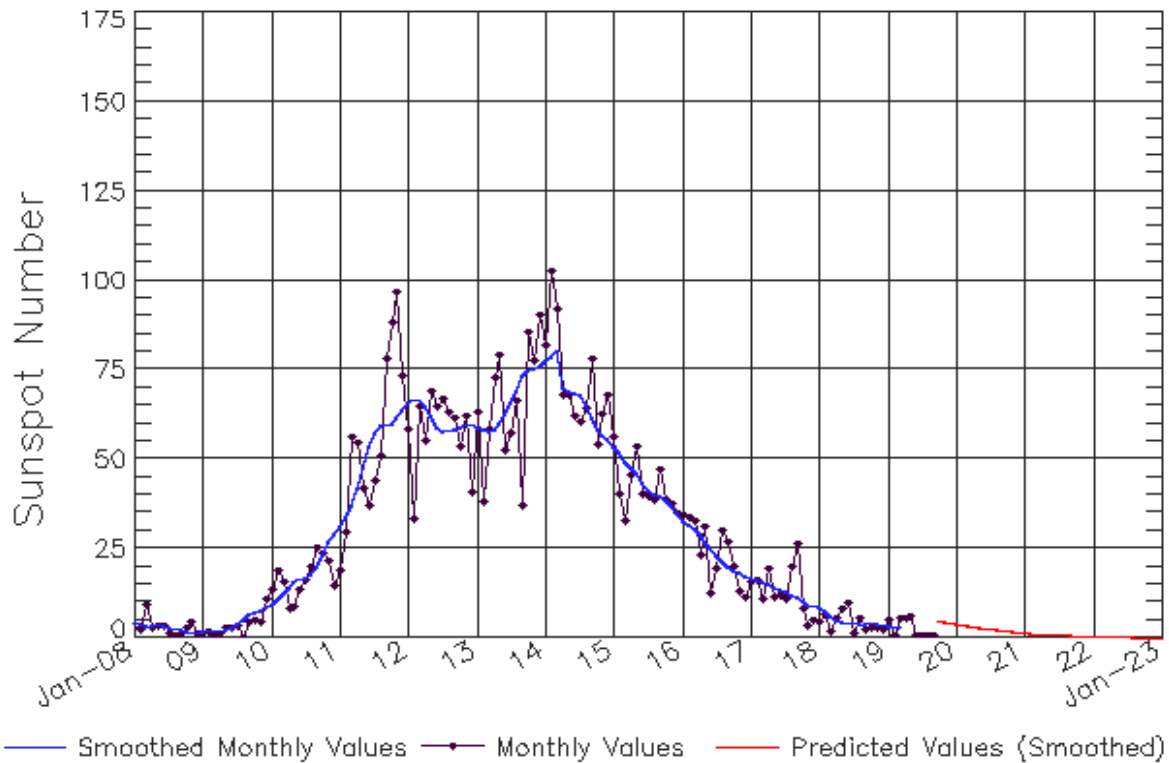
The x-ray plots contains five-minute averages x-ray flux ( $\text{Watt/m}^2$ ) as measure by the SWPC primary GOES X-ray satellite, usually at West 105 longitude, in two wavelength bands, 0.05 - 0.4 and 0.1 - 0.8 nm. The letters A, B, C, M and X refer to x-ray event levels for the 0.1 - 0.8 nm band.

The proton plot contains the five-minute averaged integral flux units (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 Sep 2019



Updated 2019 Oct 7

NOAA/SWPC Boulder, CO USA

## Smoothed Sunspot Number Prediction

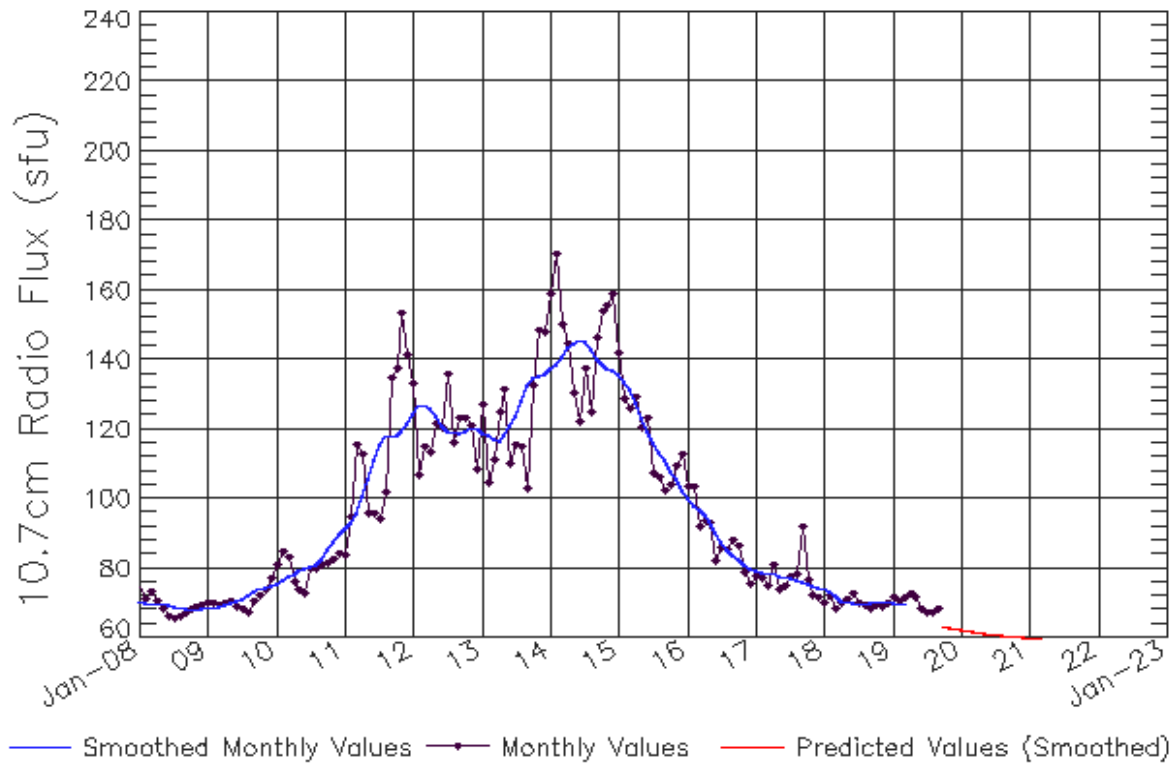
Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2010	7	9	11	13	14	16	17	17	20	23	27	29
	(1)	(2)	(3)	(5)	(5)	(6)	(7)	(7)	(8)	(9)	(9)	(10)
2011	19	30	56	54	42	37	44	51	78	88	97	73
	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)
2012	58	33	64	55	69	65	67	63	61	53	62	41
	(10)	(10)	(10)	(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	1	1	0	1	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)

SWPC PRE 2301 07 October 2019



# ISES Solar Cycle F10.7cm Radio Flux Progression

Observed data through Sep 2019



Updated 2019 Oct 7

NOAA/SWPC Boulder, CO USA

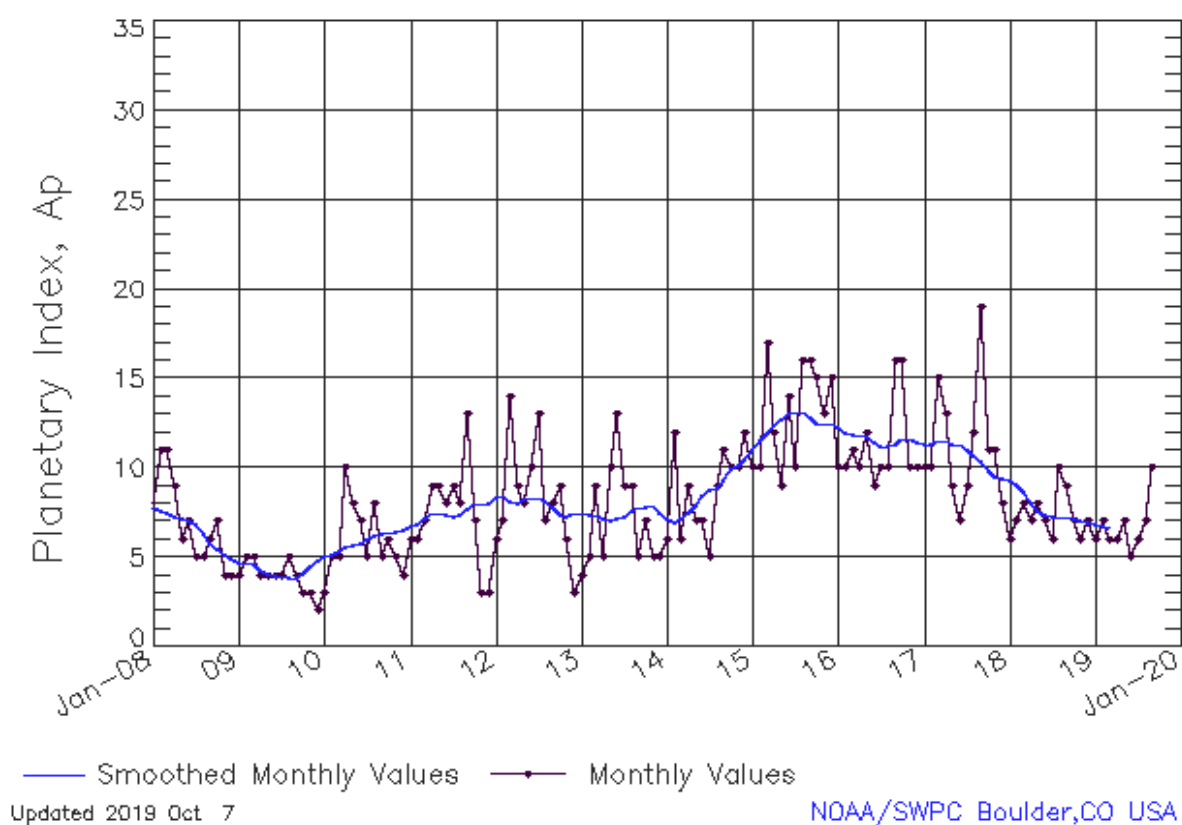
## Smoothed F10.7cm Radio Flux Prediction

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



*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  
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](mailto: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

