

Space Weather Highlights
28 October - 03 November 2019

SWPC PRF 2305
04 November 2019

Solar activity was very low. Regions 2750 (S28, L=116, class/area = Axx/010 on 01 Nov) and 2751 (N05, L=154, class/area = Bxo/010 on 02 Nov) emerged on the solar disk, where inactive of significant flare activity, and quickly decayed to plage before the end of the reporting period. 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 very high levels on 28 Oct, high levels on 29-30 Oct, 01-03 Nov, and moderate levels on 31 Oct, in response to recurrent, coronal hole high-speed stream (CH HSS) activity. A peak flux of 58,500 pfu was observed at 28/1755 UTC.

Geomagnetic field activity reached active levels on 31 Oct, unsettled levels on 28-30 Oct, and quiet levels on 01-03 Nov, due to CH HSS effects.

Space Weather Outlook
04 November - 30 November 2019

Solar activity is expected to be at very low levels 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 04, 21-30 Nov, with moderate levels on 05-11, 20 Nov, and normal levels on 12-19 Nov, in response to CH HSS influence.

Geomagnetic field activity is expected to reach G1 (Minor) storm levels on 21 Nov, with active levels on 06, 20, 22-24 Nov, due to recurrent CH HSS activity. Quiet to unsettled conditions are anticipated throughout the remainder of the outlook period.



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
28 October	69	0	0	A7.1	0	0	0	0	0	0	0	0
29 October	69	0	0	A6.7	0	0	0	0	0	0	0	0
30 October	70	0	0	A6.5	0	0	0	0	0	0	0	0
31 October	71	0	0	A6.4	0	0	0	0	0	0	0	0
01 November	71	11	10	A6.6	0	0	0	0	0	0	0	0
02 November	71	13	10	A6.7	0	0	0	0	0	0	0	0
03 November	69	0	0	A6.7	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
28 October		8.6e+05	2.1e+04	4.0e+03		1.7e+09
29 October		6.4e+05	2.1e+04	3.7e+03		1.0e+09
30 October		9.0e+05	2.1e+04	4.0e+03		5.2e+08
31 October		2.7e+05	2.1e+04	4.0e+03		3.2e+07
01 November		2.7e+05	2.1e+04	3.9e+03		8.4e+07
02 November		3.4e+05	2.1e+04	4.0e+03		1.1e+08
03 November		3.9e+05	2.0e+04	3.8e+03		1.4e+08

Daily Geomagnetic Data

Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
28 October	8	2-2-3-2-2-2-2-2	21	2-3-4-5-5-3-2-1	11	3-3-3-2-2-2-3-2
29 October	8	3-3-1-1-2-2-2-1	0	2-0-0-0-0-0-0-0	8	3-3-1-1-1-2-2-1
30 October	6	1-2-1-1-2-2-2-2	2	0-0-0-0-0-0-2-0	9	1-2-2-2-3-3-3-2
31 October	5	3-1-0-1-2-1-2-1	0	0-0-0-2-0-1-1-0	7	4-1-0-1-1-1-3-1
01 November	2	1-2-0-0-1-1-1-0	0	0-1-0-0-0-0-0-0	4	2-2-1-1-1-0-0-0
02 November	1	0-0-0-0-1-0-0-1	0	0-0-0-0-0-0-0-0	2	0-0-0-0-0-0-0-1
03 November	1	1-1-0-0-1-0-0-0	0	0-0-0-0-0-0-0-0	6	2-1-0-0-0-0-0-0

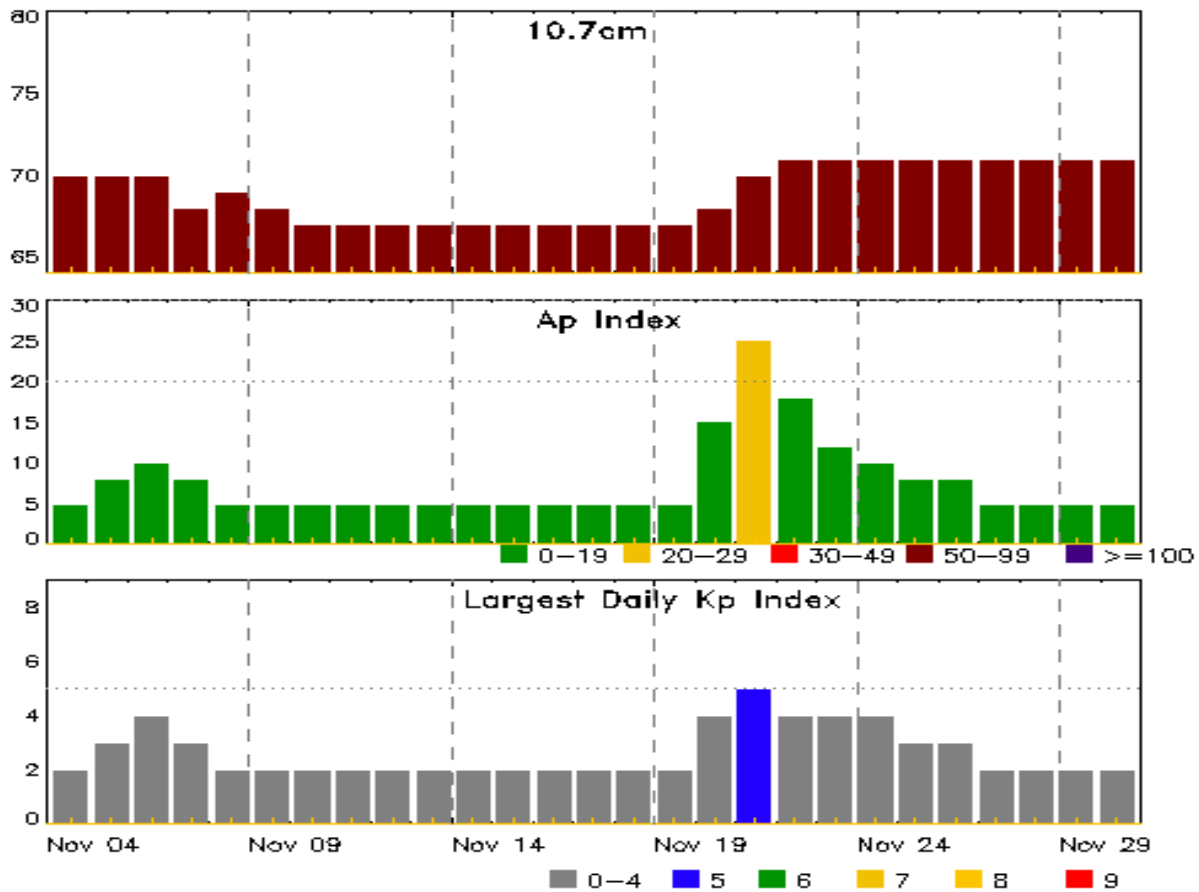


Alerts and Warnings Issued

Date & Time of Issue UTC	Type of Alert or Warning	Date & Time of Event UTC
28 Oct 0531	EXTENDED WARNING: Geomagnetic K = 4	24/1102 - 28/1800
28 Oct 0859	CONTINUED ALERT: Electron 2MeV Integral Flux \geq 1000pfu	27/0859
28 Oct 1217	CANCELLATION: Geomagnetic K = 4	
29 Oct 0859	CONTINUED ALERT: Electron 2MeV Integral Flux \geq 1000pfu	27/0859
30 Oct 0902	CONTINUED ALERT: Electron 2MeV Integral Flux \geq 1000pfu	27/0859
31 Oct 0043	WARNING: Geomagnetic K = 4	31/0043 - 0600
31 Oct 0209	ALERT: Geomagnetic K = 4	31/0208
01 Nov 1319	ALERT: Electron 2MeV Integral Flux \geq 1000pfu	01/1250
02 Nov 1236	CONTINUED ALERT: Electron 2MeV Integral Flux \geq 1000pfu	01/1250
03 Nov 1035	CONTINUED ALERT: Electron 2MeV Integral Flux \geq 1000pfu	01/1250



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 Nov	70	5	2	18 Nov	67	5	2
05	70	8	3	19	67	5	2
06	70	10	4	20	68	15	4
07	68	8	3	21	70	25	5
08	69	5	2	22	71	18	4
09	68	5	2	23	71	12	4
10	67	5	2	24	71	10	4
11	67	5	2	25	71	8	3
12	67	5	2	26	71	8	3
13	67	5	2	27	71	5	2
14	67	5	2	28	71	5	2
15	67	5	2	29	71	5	2
16	67	5	2	30	71	5	2
17	67	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 Nov	1900	1901	1902	A1.1			



Region Summary

Location		Sunspot Characteristics					Flares								
	Helio	Area	Extent	Spot	Spot	Mag	X-ray			Optical					
Date	Lat CMD	Lon	10 ⁻⁶ hemi.	(helio)	Class	Count	Class	C	M	X	S	1	2	3	4

Region 2750

01 Nov	S28E25	116	10	1	Axx	1	A								
02 Nov	S28E11	117	plage												
03 Nov	S28W03	118	plage												
								0	0	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 118

Region 2751

02 Nov	N05W26	154	10	1	Bxo	3	B								
03 Nov	N06W41	156	plage												
								0	0	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 154

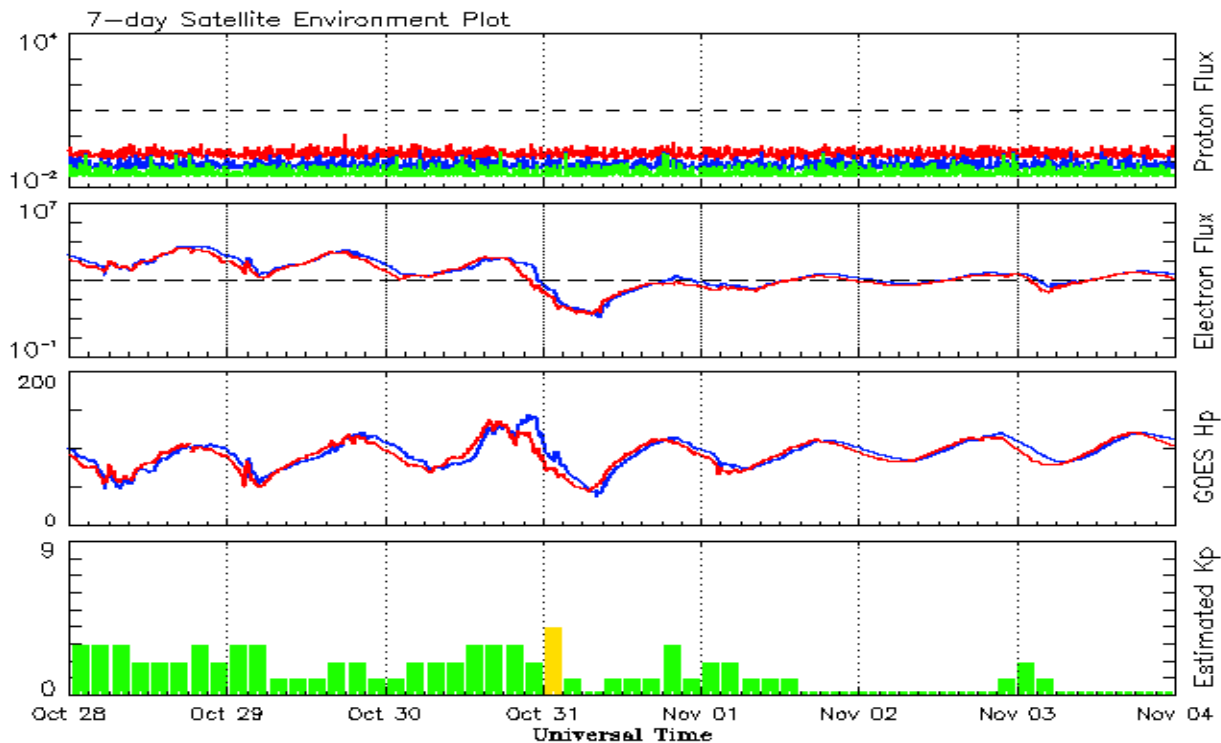


Recent Solar Indices (preliminary)
Observed monthly mean values

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
2017									
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
2018									
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
2019									
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	7.9	2.6	72.4	69.6	6	6.7
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	
October	1.8	0.2	0.11			67.4		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 October 2019*

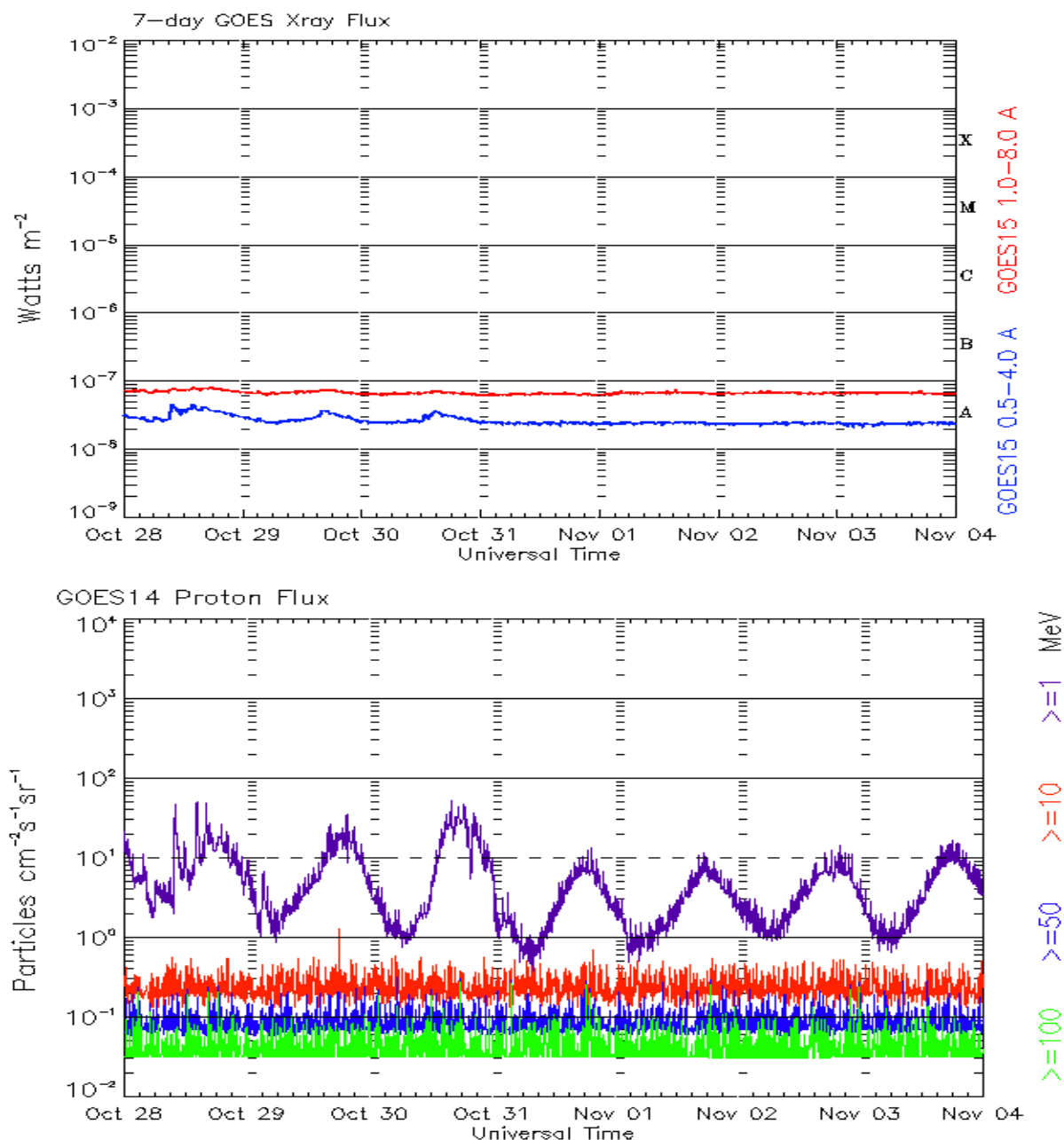
The proton flux plot contains the five-minute averaged integral proton flux (protons/cm²-sec -sr) as measured by the SWPC Primary GOES satellite, near West 75, for each of three energy thresholds: greater than 10, 50, and 100 MeV.

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 October 2019*

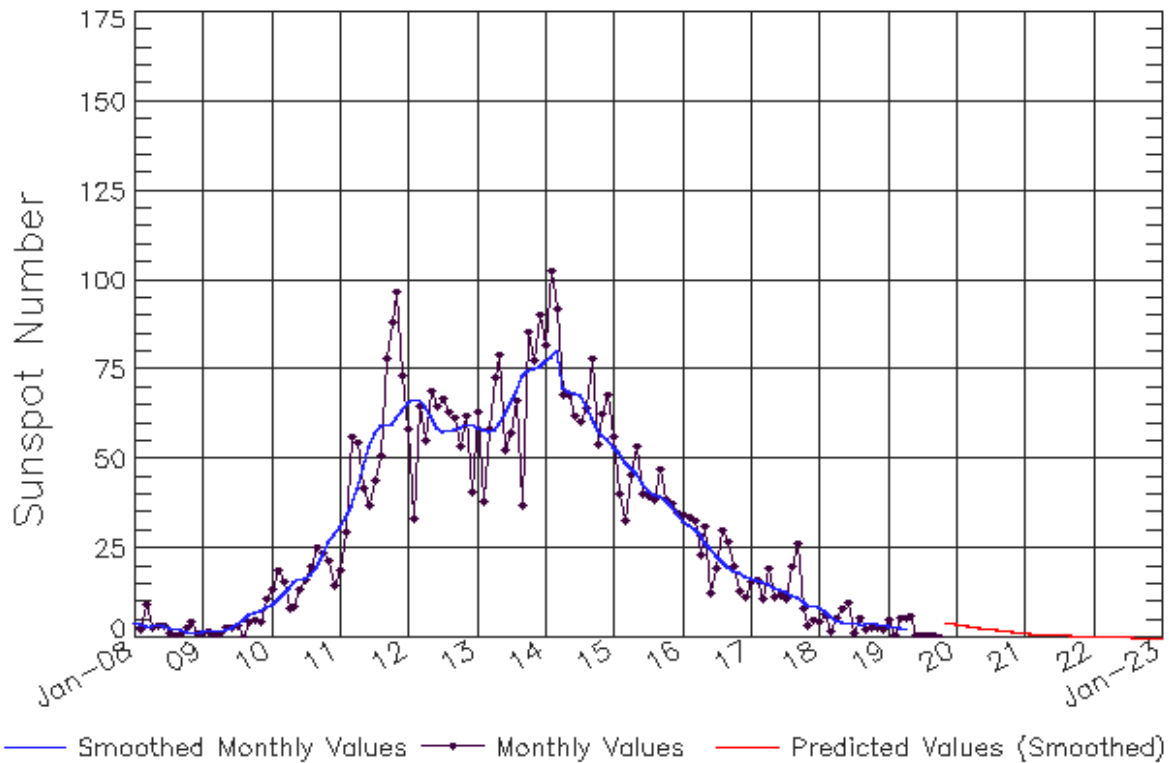
The x-ray plots contains five-minute averages x-ray flux (Watt/m²) as measure by the SWPC primary GOES X-ray satellite, usually at West 105 longitude, in two wavelength bands, 0.05 - 0.4 and 0.1 - 0.8 nm. The letters A, B, C, M and X refer to x-ray event levels for the 0.1 - 0.8 nm band.

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 Oct 2019



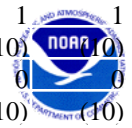
Updated 2019 Nov 4

NOAA/SWPC Boulder, CO USA

Smoothed Sunspot Number Prediction

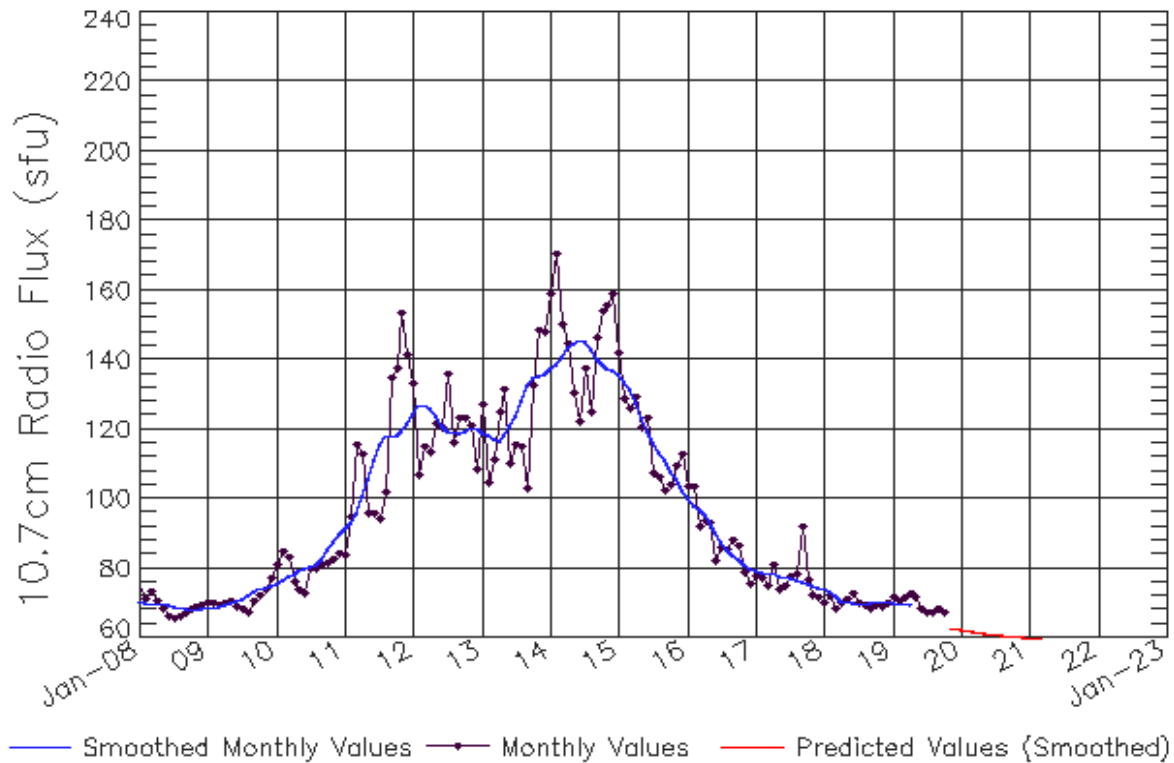
Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2010	7 (1)	9 (2)	11 (3)	13 (5)	14 (5)	16 (6)	17 (7)	17 (7)	20 (8)	23 (9)	27 (9)	29 (10)
2011	19 (10)	30 (10)	56 (10)	54 (10)	42 (10)	37 (10)	44 (10)	51 (10)	78 (10)	88 (10)	97 (10)	73 (10)
2012	58 (10)	33 (10)	64 (10)	55 (10)	69 (10)	65 (10)	67 (10)	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)	1 (10)	0 (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 2305 04 November 2019



ISES Solar Cycle F10.7cm Radio Flux Progression

Observed data through Oct 2019



Updated 2019 Nov 4

NOAA/SWPC Boulder, CO USA

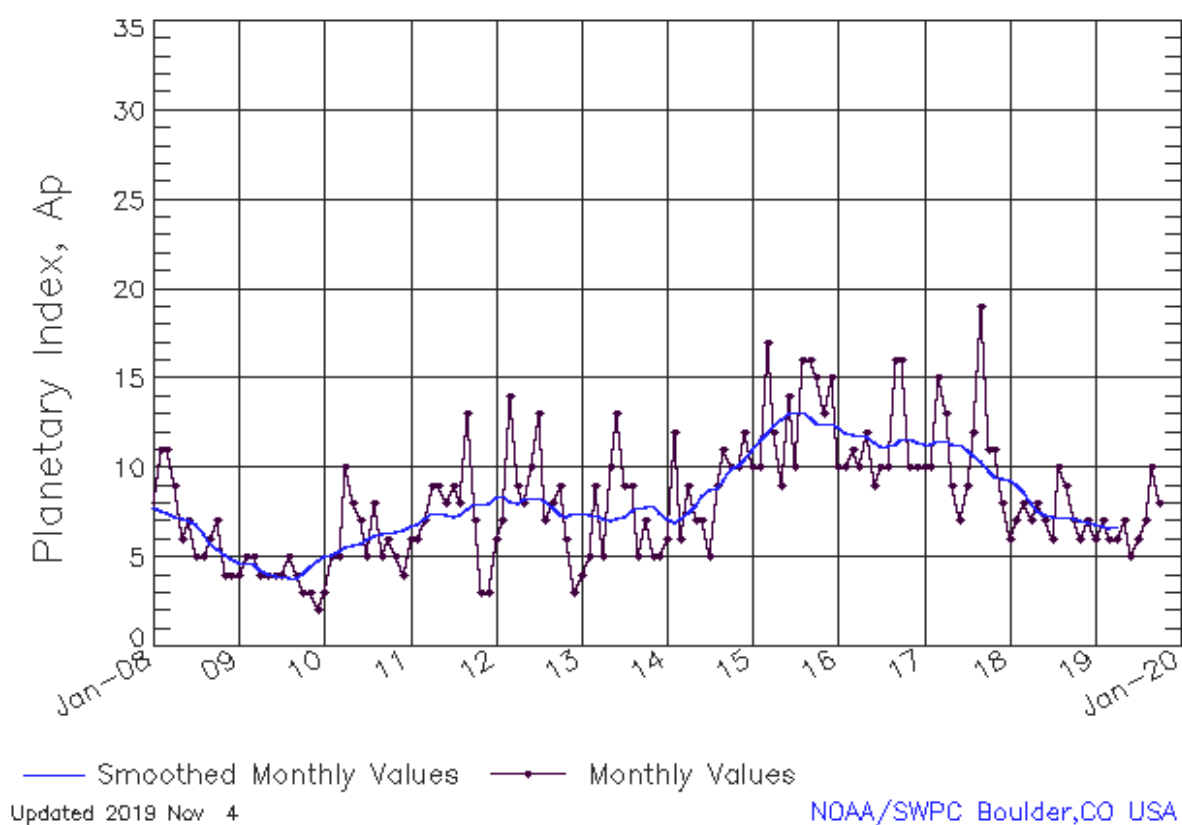
Smoothed F10.7cm Radio Flux Prediction

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 (***)
2018	74 (***)	73 (***)	72 (***)	71 (***)	70 (***)	70 (***)	70 (***)	70 (***)	70 (***)	70 (***)	70 (***)	70 (***)
2019	70 (***)	70 (***)	70 (***)	70 (***)	69 (1)	69 (1)	68 (2)	67 (3)	67 (4)	66 (4)	65 (5)	64 (6)
2020	64 (7)	63 (8)	62 (8)	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 Oct 2019



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.

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<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

