

Solar activity was very low through the summary period. There were no numbered spot regions. 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 to high levels. High levels were observed on 28 Feb - 03 Mar. A peak flux of 45,516 pfu was observed at 03/1950 UTC. The remaining days of the summary period were at normal background levels.

Geomagnetic field activity ranged from quiet to G1 (Minor) geomagnetic storm levels. Solar wind enhancements from the onset of influence from a negative polarity CH HSS increased geomagnetic levels from unsettled to active conditions after midday on 27 Feb. Isolated periods of G1 (Minor) geomagnetic storm levels were observed on 28 Feb - 01 Mar as wind speeds continued to increase, reaching a peak of 608 km/s on 01/0340 UTC. An isolated period of active conditions was followed by quiet to unsettled levels for the remainder of 02-03 Mar as the CH HSS slowly waned. The remaining days of the summary period were at quiet levels under nominal solar wind conditions.

Space Weather Outlook **04 March - 30 March 2019**

Solar activity is expected to be very low throughout the forecast period. No notable regions are due to return to the visible disk.

No proton events are expected at geosynchronous orbit.

The greater than 2 MeV electron flux at geosynchronous orbit is expected to range from normal background to very high levels. Very high levels are likely on 04-05 Mar and 29-30 Mar; high levels are likely on 06-13 Mar and 29-28 Mar; moderate levels are likely on 14-19 Mar; normal background levels are likely on 20-26 Mar. All enhancements in electron flux are anticipated in response to multiple, recurrent CH HSSs.

Geomagnetic field activity is expected to range from quiet to G1 (Minor) geomagnetic storm levels. G1 (Minor) levels are likely on 27-28 Mar; active levels are likely on 08-10 Mar, 26 Mar and 29 Mar; unsettled levels are likely on 04-05 Mar, 07 Mar, 11 Mar, 20 Mar and 30 Mar. Increases in geomagnetic field activity are anticipated due to the likely influence of multiple, recurrent CH HSSs. The remainder of the outlook period is expected to be at quiet levels.



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
25 February	70	0	0	A0.0	0	0	0	0	0	0	0	0
26 February	71	0	0	A0.0	0	0	0	0	0	0	0	0
27 February	71	0	0	A0.0	0	0	0	0	0	0	0	0
28 February	70	0	0	A0.0	0	0	0	0	0	0	0	0
01 March	70	0	0	A0.0	0	0	0	0	0	0	0	0
02 March	69	0	0	A0.0	0	0	0	0	0	0	0	0
03 March	70	0	0	A0.0	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
25 February		3.4e+05	1.7e+04	3.6e+03		1.6e+06
26 February		3.4e+05	1.7e+04	3.6e+03		6.0e+05
27 February		6.8e+05	1.7e+04	3.7e+03		1.5e+05
28 February		6.2e+06	1.7e+04	3.6e+03		5.0e+07
01 March		1.3e+06	1.7e+04	3.5e+03		6.3e+08
02 March		1.8e+06	1.7e+04	3.5e+03		1.6e+09
03 March		8.9e+05	1.7e+04	3.7e+03		1.9e+09

Daily Geomagnetic Data

Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
25 February	2	0-0-1-1-1-1-0-1	0	0-0-0-1-0-0-0-0	2	1-0-1-1-0-0-0-1
26 February	2	1-0-0-1-1-0-1-0	1	0-0-0-2-0-0-0-0	2	1-0-0-2-0-0-0-1
27 February	9	0-0-1-1-3-3-2-4	13	0-0-0-2-5-4-2-3	10	1-0-1-1-3-3-3-4
28 February	17	4-3-2-3-4-3-3-3	34	3-2-3-6-6-5-3-3	26	5-3-2-4-5-4-4-3
01 March	18	4-4-3-3-3-3-3-3	36	3-4-5-6-5-5-3-2	24	4-5-3-3-3-4-4-4
02 March	9	3-3-3-2-1-2-1-1	24	3-4-4-5-5-3-2-1	12	4-3-3-2-2-3-2-2
03 March	6	2-3-1-1-2-1-1-2	6	2-3-1-1-3-1-0-0	9	2-3-1-1-2-1-1-2

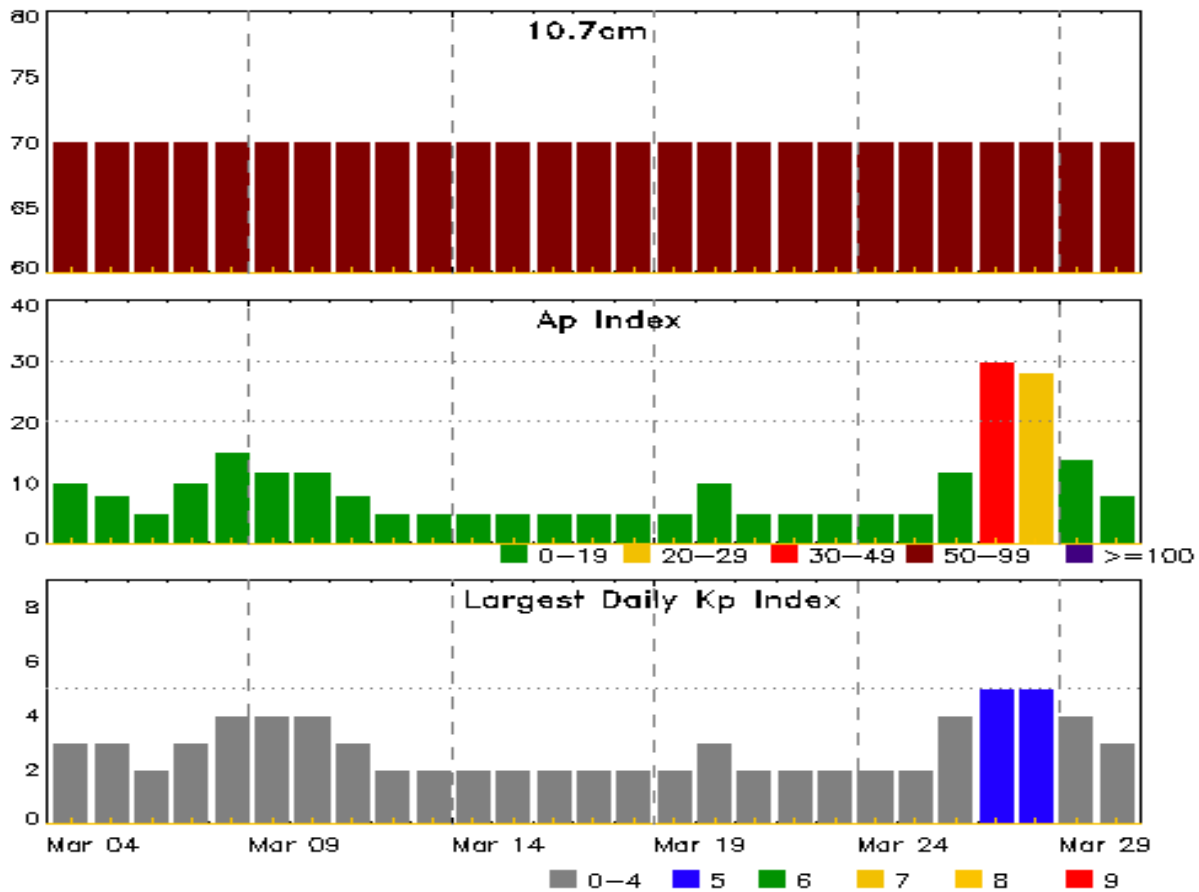


Alerts and Warnings Issued

Date & Time of Issue UTC	Type of Alert or Warning	Date & Time of Event UTC
25 Feb 2016	WATCH: Geomagnetic Storm Category G1 predicted	
27 Feb 1728	WARNING: Geomagnetic K = 4	27/1730 - 28/0600
27 Feb 2240	ALERT: Geomagnetic K = 4	27/2241
27 Feb 2311	WARNING: Geomagnetic K = 5	27/2311 - 28/0600
28 Feb 0300	ALERT: Geomagnetic K = 5	28/0259
28 Feb 0552	EXTENDED WARNING: Geomagnetic K = 4	27/1730 - 28/1500
28 Feb 1340	EXTENDED WARNING: Geomagnetic K = 4	27/1730 - 01/0300
28 Feb 1400	WARNING: Geomagnetic K = 5	28/1400 - 2100
28 Feb 1412	ALERT: Geomagnetic K = 5	28/1413
28 Feb 1726	ALERT: Electron 2MeV Integral Flux ≥ 1000 pfu	28/1710
28 Feb 1857	WATCH: Geomagnetic Storm Category G1 predicted	
01 Mar 0154	EXTENDED WARNING: Geomagnetic K = 4	27/1730 - 01/1200
01 Mar 0154	WARNING: Geomagnetic K = 5	01/0153 - 0600
01 Mar 0558	ALERT: Geomagnetic K = 5	01/0559
01 Mar 0558	EXTENDED WARNING: Geomagnetic K = 5	01/0153 - 1200
01 Mar 0913	CONTINUED ALERT: Electron 2MeV Integral Flux ≥ 1000 pfu	28/1710
01 Mar 1151	EXTENDED WARNING: Geomagnetic K = 4	27/1730 - 01/1500
01 Mar 1629	WARNING: Geomagnetic K = 4	01/1630 - 02/0900
01 Mar 1759	ALERT: Geomagnetic K = 4	01/1759
02 Mar 0859	CONTINUED ALERT: Electron 2MeV Integral Flux ≥ 1000 pfu	28/1710
03 Mar 0859	CONTINUED ALERT: Electron 2MeV Integral Flux ≥ 1000 pfu	28/1710



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 Mar	70	10	3	18 Mar	70	5	2
05	70	8	3	19	70	5	2
06	70	5	2	20	70	10	3
07	70	10	3	21	70	5	2
08	70	15	4	22	70	5	2
09	70	12	4	23	70	5	2
10	70	12	4	24	70	5	2
11	70	8	3	25	70	5	2
12	70	5	2	26	70	12	4
13	70	5	2	27	70	30	5
14	70	5	2	28	70	28	5
15	70	5	2	29	70	14	4
16	70	5	2	30	70	8	3
17	70	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 Mar	1450	1451	1452	A1.1			



Region Summary

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

No Active Regions

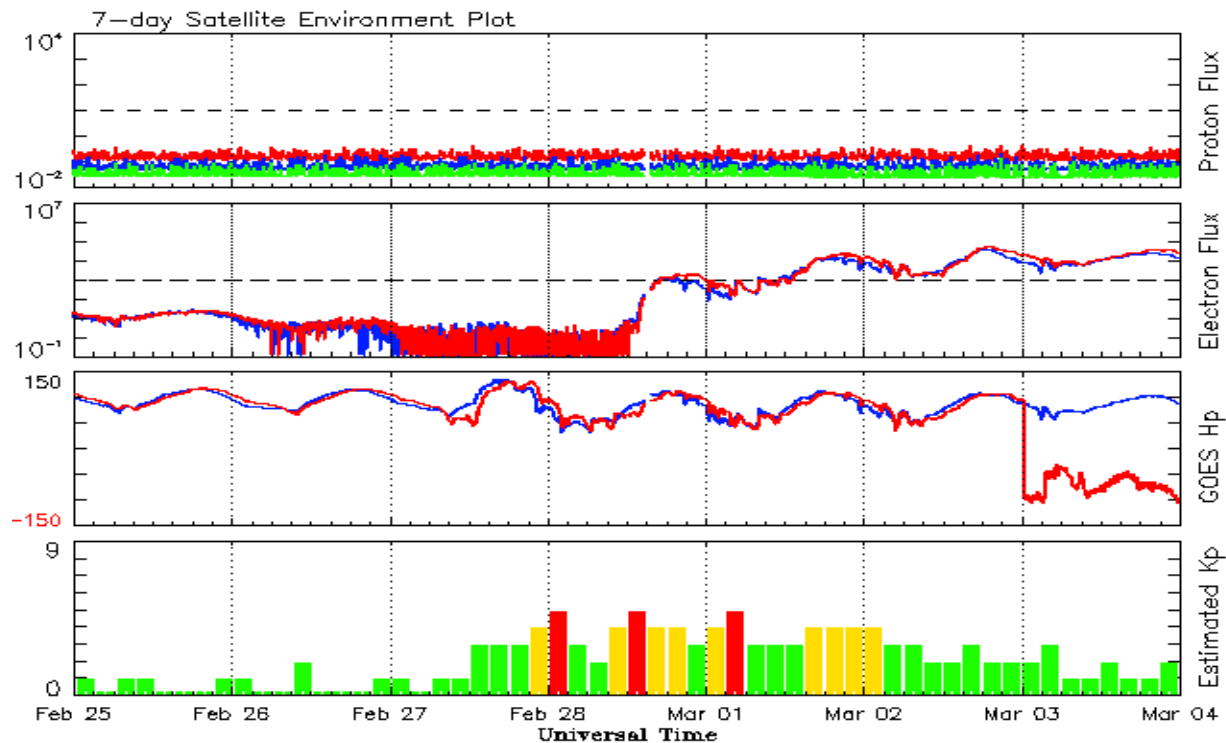


Recent Solar Indices (preliminary)
Observed monthly mean values

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
2017									
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	11.8	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
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	4.4	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	4.1	69.1	70.0	10	7.3
September	5.7	2.0	0.35			68.3		9	
October	6.9	2.9	0.42			69.5		7	
November	7.3	3.5	0.48			68.9		6	
December	5.6	1.9	0.34			70.0		7	
2019									
January	16.0	4.7	0.29			71.6		6	
February		0.5				70.6		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 25 February 2019*

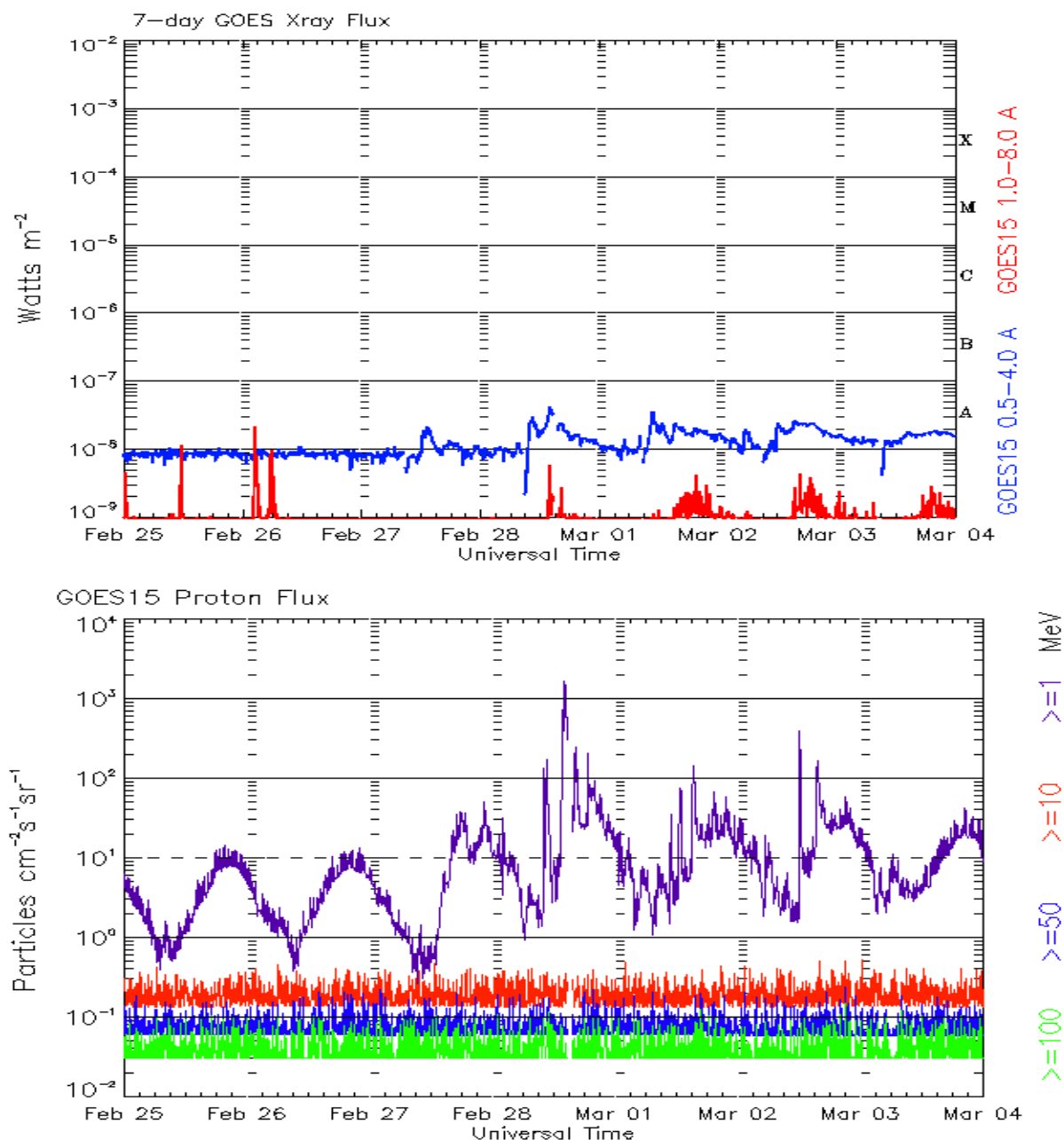
The proton flux plot contains the five-minute averaged integral proton flux (protons/cm²-sec -sr) as measured by the SWPC Primary GOES satellite, near West 75, for each of three energy thresholds: greater than 10, 50, and 100 MeV.

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 25 February 2019*

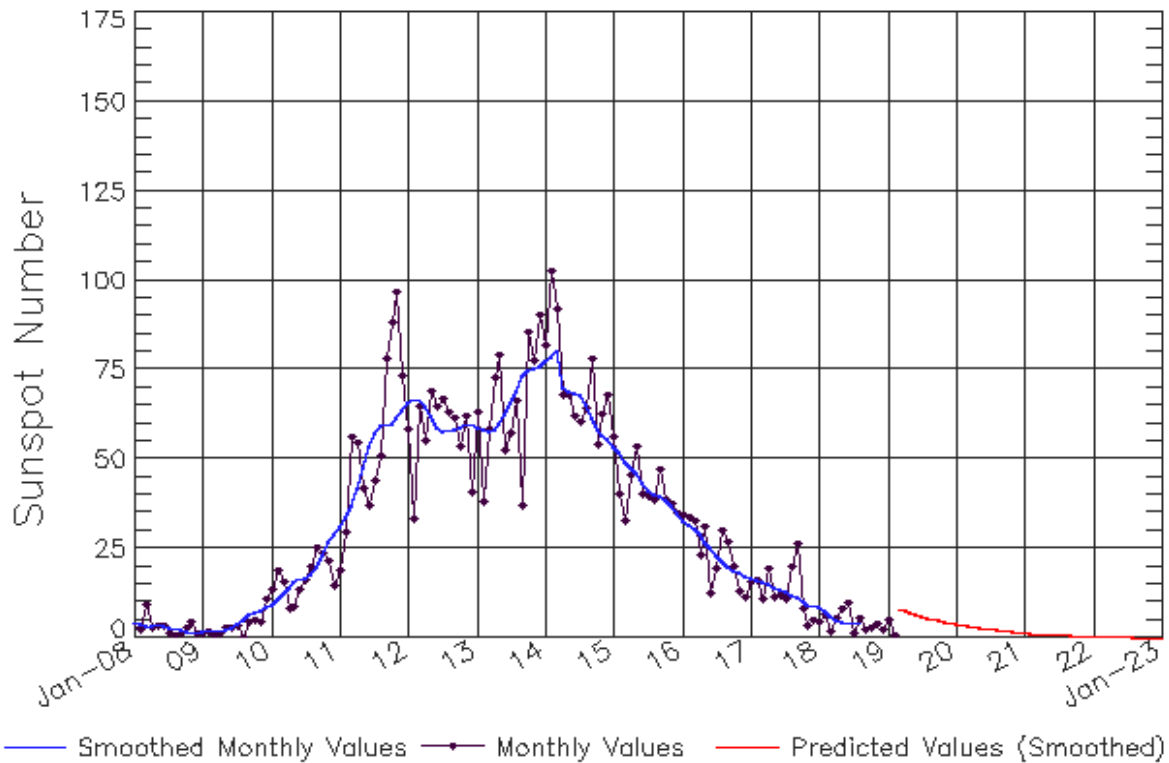
The x-ray plots contains five-minute averages x-ray flux (Watt/m^2) as measure by the SWPC primary GOES X-ray satellite, usually at West 105 longitude, in two wavelength bands, 0.05 - 0.4 and 0.1 - 0.8 nm. The letters A, B, C, M and X refer to x-ray event levels for the 0.1 - 0.8 nm band.

The proton plot contains the five-minute averaged integral flux units (pfu = protons/ 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 Feb 2019



Updated 2019 Mar 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	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	4	2
	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)
2019	5	1	8	7	7	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)

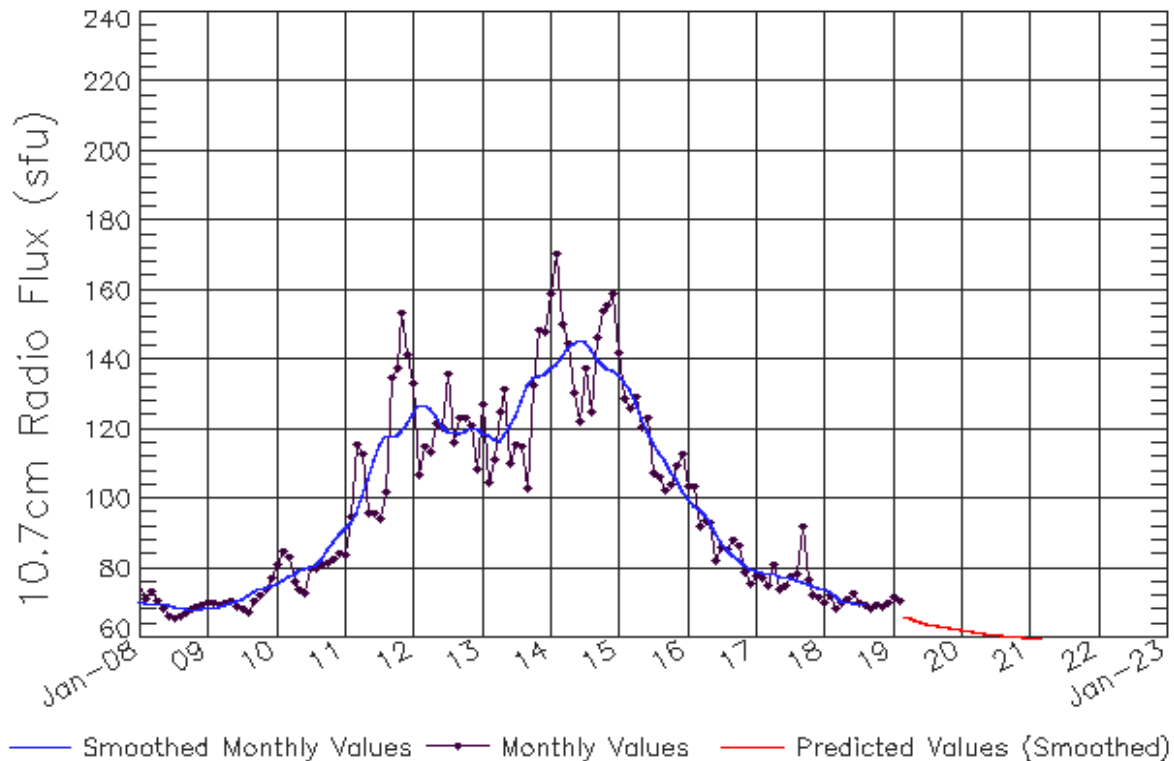
10

SWPC PRE 2270 04 March 2019



ISES Solar Cycle F10.7cm Radio Flux Progression

Observed data through Feb 2019



Updated 2019 Mar 4

NOAA/SWPC Boulder, CO USA

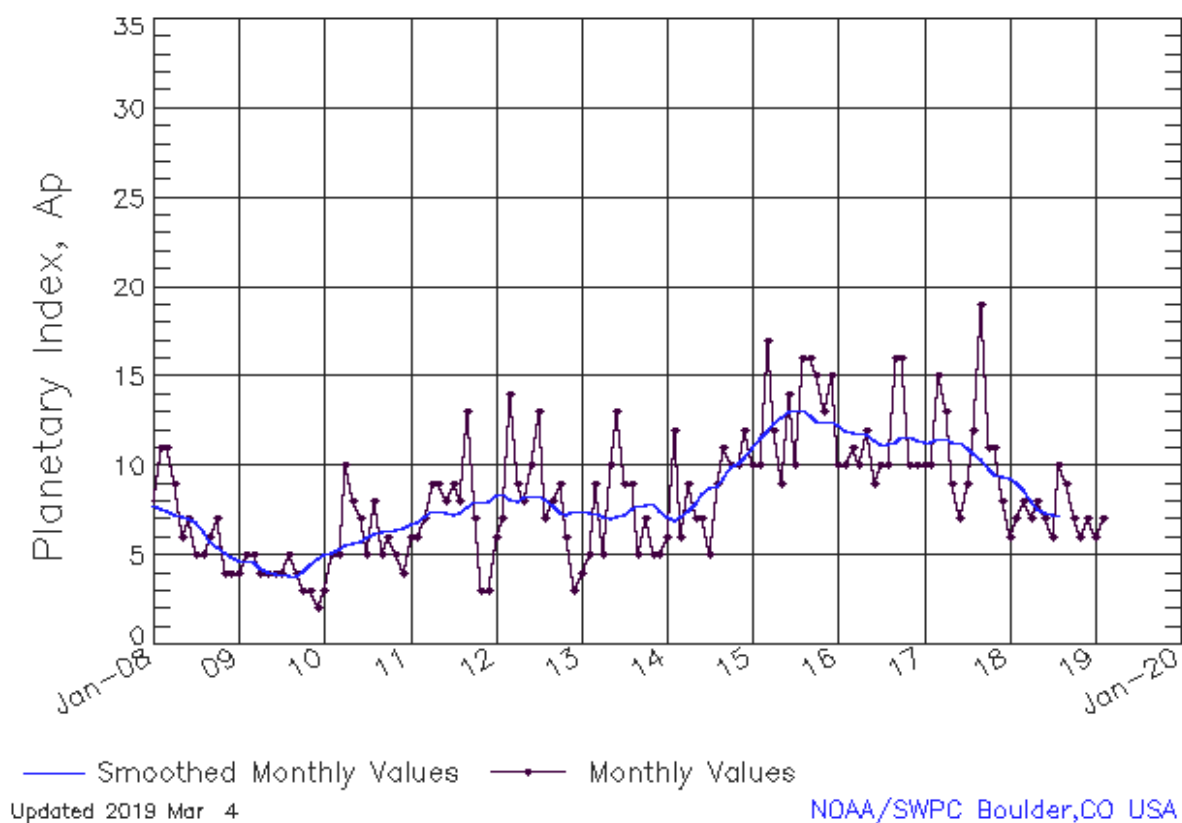
Smoothed F10.7cm Radio Flux Prediction

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 (1)	70 (1)	69 (2)	69 (3)
2019	68 (4)	68 (4)	67 (5)	67 (6)	66 (7)	66 (8)	65 (8)	64 (9)	63 (9)	63 (9)	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 Feb 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

