

Space Weather Highlights
30 December - 05 January 2020

SWPC PRF 2314
06 January 2020

Solar activity was very low. New Region 2755 (S34, L=355, class/area Bxo/020 on 03 Jan) developed on the SE limb on 01 Jan but was in decay by 04 Jan. 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 normal levels on 30 Dec-04 Jan. Moderate levels were reached on 05 Jan with a maximum flux of 245 pfu observed at 05/1800 UTC.

Geomagnetic field activity was at quiet levels on 30 Dec-02 Jan under nominal solar wind conditions. On 03 Jan, total field increased to 10 nT at 03/0505 UTC with solar wind speed increasing to around 410 km/s. On 04 Jan, a prolonged period of southward Bz was observed reaching a maximum southward deflection of -4 nT. On 05 Jan, total field increased once again to 15 nT at 05/1743 UTC followed by an increase in solar wind speed to near 550 km/s as a negative polarity coronal hole high speed stream (CH HSS) became geoeffective. The geomagnetic field responded with isolated unsettled periods on 03-04 Jan and quiet to active levels on 05 Jan.

Space Weather Outlook
06 January - 01 February 2020

Solar activity is expected to continue 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 normal levels on 08-14 Jan and 23 Jan-01 Feb. Moderate levels are expected on 06-07 Jan and again on 15-22 Jan.

Geomagnetic field activity is expected to reach unsettled levels on 08-10 Jan and 01 Feb. Unsettled to active levels are expected on 06 Jan and 14-15 Jan due to recurrent CH HSS effects.



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	
30 December	71	0	0	A8.0	0	0	0	0	0	0	0	0	0
31 December	71	0	0	A7.9	0	0	0	0	0	0	0	0	0
01 January	72	0	0	A8.0	0	0	0	0	0	0	0	0	0
02 January	72	13	20	A8.3	0	0	0	0	0	0	0	0	0
03 January	71	13	20	A8.6	0	0	0	0	0	0	0	0	0
04 January	72	11	10	A8.5	0	0	0	0	0	0	0	0	0
05 January	72	11	10	A8.5	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
	30 December		8.2e+05	2.2e+04	3.8e+03	
31 December		6.0e+05	2.2e+04	3.8e+03		8.7e+05
01 January		6.5e+05	2.0e+04	3.9e+03		7.8e+05
02 January		5.7e+05	2.1e+04	3.9e+03		7.4e+05
03 January		1.2e+06	2.1e+04	3.9e+03		6.1e+05
04 January		5.4e+05	2.2e+04	3.8e+03		5.1e+05
05 January		1.1e+06	2.1e+04	3.9e+03		2.7e+06

Daily Geomagnetic Data

Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
	30 December	2	0-1-1-0-0-2-1-1	0	0-0-0-1-0-0-0-0	3
31 December	4	1-2-1-0-1-2-1-1	1	0-0-0-1-1-0-1-0	4	1-2-1-1-1-1-1-1
01 January	3	0-0-0-1-2-2-1-0	2	0-0-0-1-1-1-1-0	3	0-0-0-1-1-1-1-1
02 January	2	0-1-0-1-1-1-1-1	2	0-0-1-1-0-1-2-0	3	0-0-1-1-0-1-1-1
03 January	6	0-1-3-2-1-2-1-2	6	0-0-3-4-1-1-0-0	6	1-1-3-2-1-1-1-2
04 January	5	0-0-1-0-2-2-2-2	6	0-0-0-3-3-2-2-1	6	2-1-1-1-1-2-2-3
05 January	7	2-1-2-1-2-1-3-2	10	1-1-1-1-4-2-3-3	7	2-1-2-1-2-2-4-3

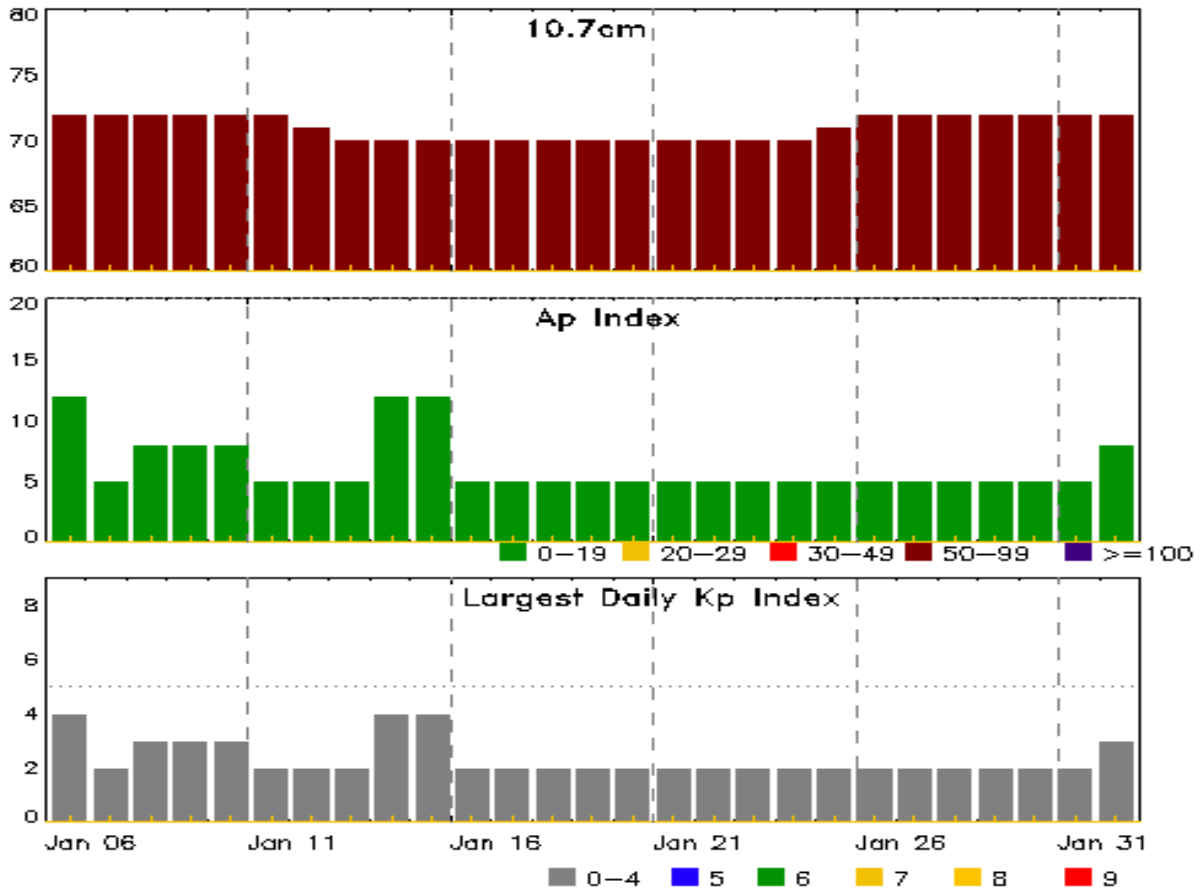


Alerts and Warnings Issued

Date & Time of Issue UTC	Type of Alert or Warning	Date & Time of Event UTC
05 Jan 1903	WARNING: Geomagnetic K = 4	05/1903 - 2359
05 Jan 2103	ALERT: Geomagnetic K = 4	05/2059
05 Jan 2323	EXTENDED WARNING: Geomagnetic K = 4	05/1903 - 06/0900



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
06 Jan	72	12	4	20 Jan	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	5	2
10	72	8	3	24	70	5	2
11	72	5	2	25	71	5	2
12	71	5	2	26	72	5	2
13	70	5	2	27	72	5	2
14	70	12	4	28	72	5	2
15	70	12	4	29	72	5	2
16	70	5	2	30	72	5	2
17	70	5	2	31	72	5	2
18	70	5	2	01 Feb	72	8	3
19	70	5	2				



Energetic Events

Date	Time			X-ray	Optical Information			Peak		Sweep Freq	
	Begin	Max	Half Max	Class	Integ Flux	Imp/ Brtns	Location Lat CMD	Rgn #	245	2695	II

No Events Observed

Flare List

Date	Time			X-ray Class	Optical		
	Begin	Max	End		Imp/ Brtns	Location Lat CMD	Rgn #
03 Jan	2102	2103	2104	A1.0			



Region Summary

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

Region 2753

24 Dec	S29E44	119	10	3	Bxo	2	B										
25 Dec	S29E28	122	10	6	Bxo	2	B										
26 Dec	S29E17	120	10	1	Axx	1	A										
27 Dec	S29E03	120	plage														
28 Dec	S29W11	121	plage														
29 Dec	S29W24	121	plage														
30 Dec	S29W38	122	plage														
31 Dec	S29W52	123	plage														
01 Jan	S29W66	124	plage														
02 Jan	S29W80	124	plage														
									0	0	0	0	0	0	0	0	0

Crossed West Limb.

Absolute heliographic longitude: 120

Region 2754

24 Dec	N24W05	168	10	3	Bxo	2	B										
25 Dec	N25W41	191	10	2	Axx	1	A										
26 Dec	N25W55	192	plage														
27 Dec	N25W69	192	plage														
28 Dec	N25W82	192	plage														
									0	0	0	0	0	0	0	0	0

Crossed West Limb.

Absolute heliographic longitude: 168

Region 2755

02 Jan	S35E51	353	20	3	Bxo	3	B										
03 Jan	S34E36	355	20	4	Bxo	3	B										
04 Jan	S35E21	357	10		Axx	1	A										
05 Jan	S35E09	355	10		Axx	1	A										
									0	0	0	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 355



Recent Solar Indices (preliminary)
Observed monthly mean values

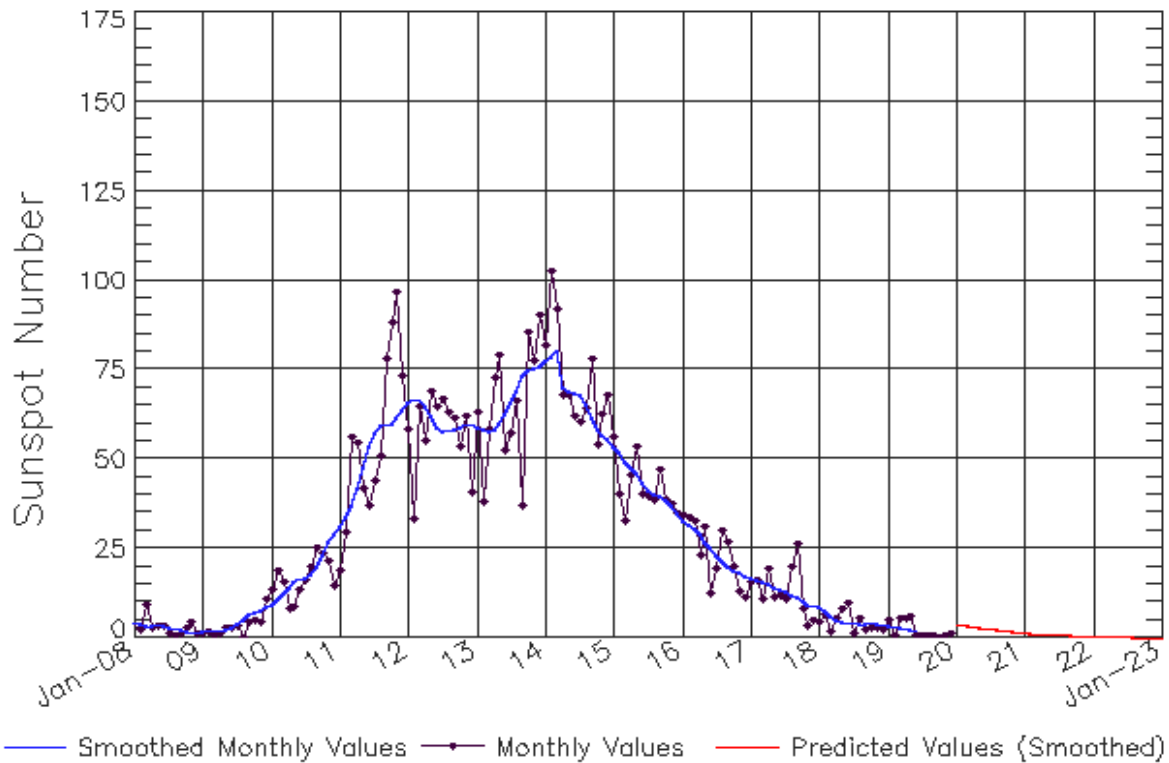
Month	Sunspot Numbers					Radio Flux		Geomagnetic		
	Observed values		Ratio	Smooth values		Penticton	Smooth	Planetary	Smooth	
	SEC	RI	RI/SEC	SEC	RI	10.7 cm	Value	Ap	Value	
2018										
January	7.8	4.1	0.51	15.0	8.5	70.0	74.0	6	9.3	
February	16.0	6.4	0.40	13.7	7.6	72.0	73.3	7	9.1	
March	6.0	1.5	0.25	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	7.4	2.3	71.3	69.6	7	6.7	
June	11.6	0.7	0.06	7.3	2.2	68.1	69.6	5	6.5	
July	1.6	0.5	0.31			67.1		6		
August	2.5	0.3	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		
November	1.1	0.3	0.27			70.2		4		
December	7.2	1.0	0.14			70.9		4		

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.



ISES Solar Cycle Sunspot Number Progression

Observed data through Dec 2019



Updated 2020 Jan 6

NOAA/SWPC Boulder, CO USA

Smoothed Sunspot Number Prediction

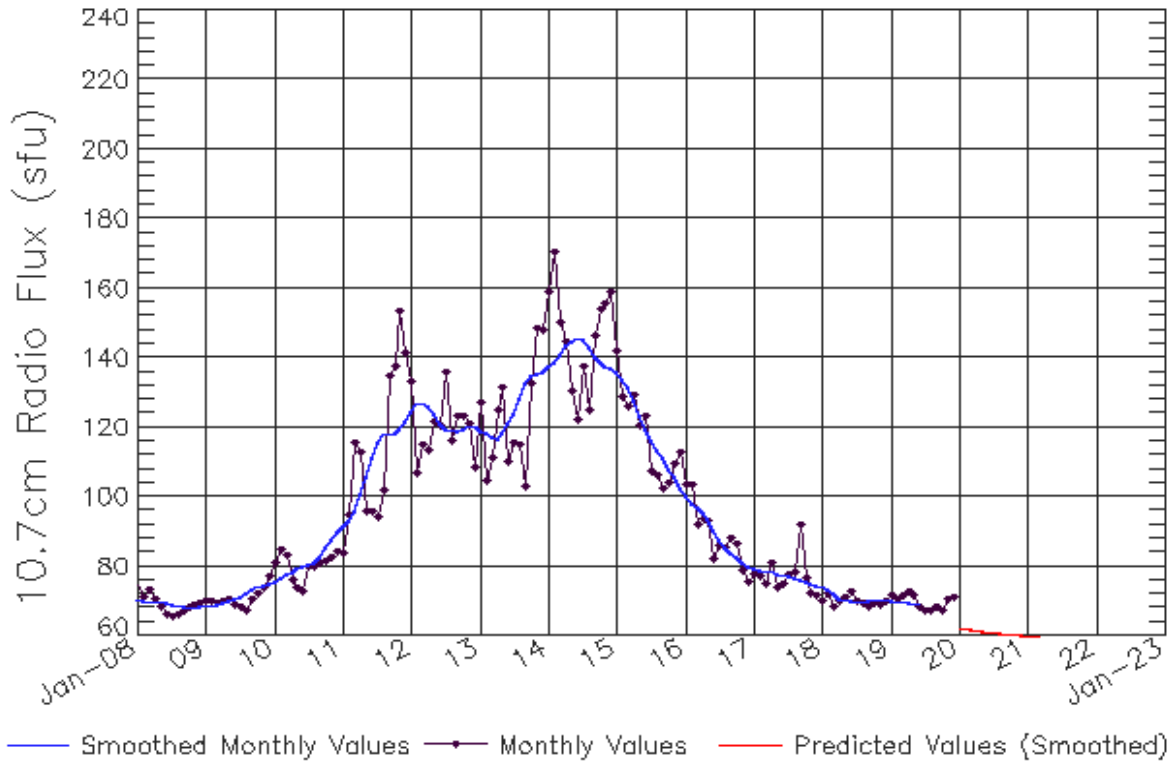
Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2010	7	9	11	13	14	16	17	17	20	23	27	29
	(1)	(2)	(3)	(5)	(5)	(6)	(7)	(7)	(8)	(9)	(9)	(10)
2011	19	30	56	54	42	37	44	51	78	88	97	73
	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)
2012	58	33	64	55	69	65	67	63	61	53	62	41
	(10)	(10)	(10)	(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	0	0	1
	(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 2314 06 January 2020



ISES Solar Cycle F10.7cm Radio Flux Progression

Observed data through Dec 2019



Updated 2020 Jan 6

NOAA/SWPC Boulder, CO USA

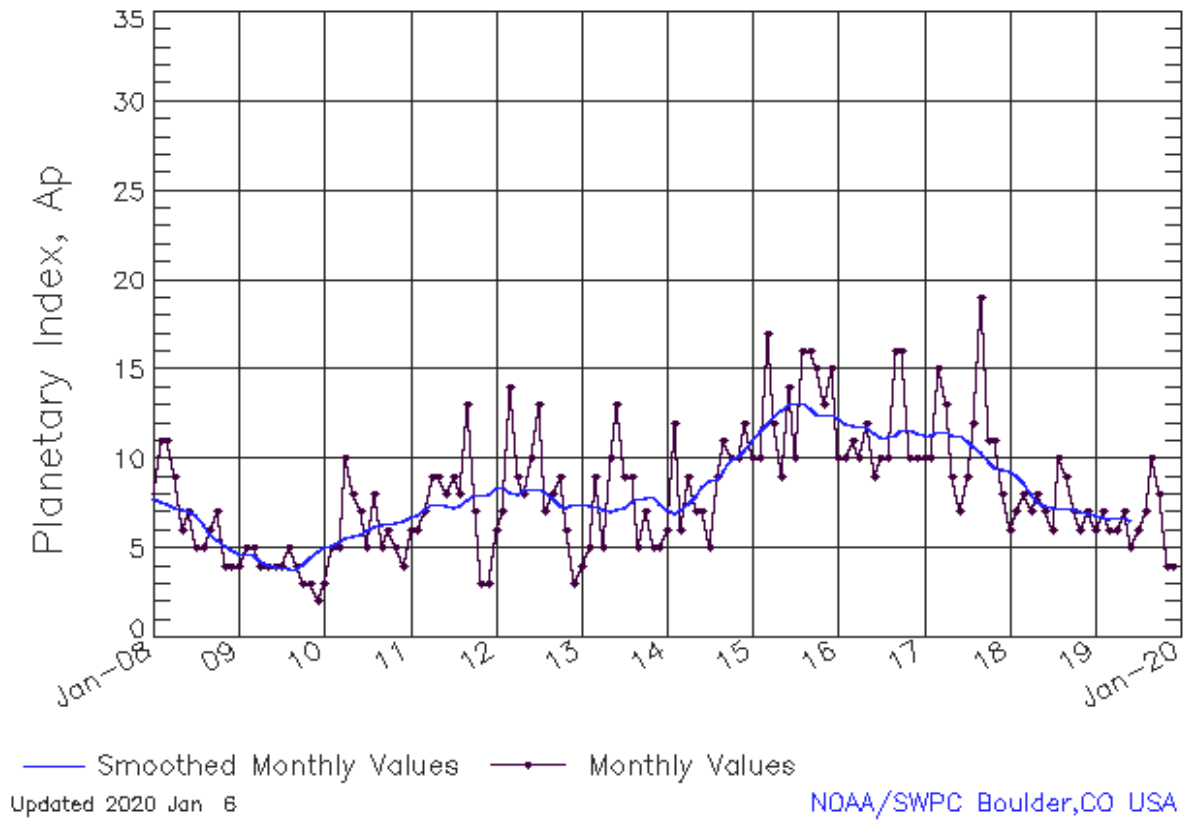
Smoothed F10.7cm Radio Flux Prediction

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 (***)	70 (***)	70 (***)	69 (1)	69 (1)	68 (2)	67 (3)	66 (4)	65 (4)
2020	65 (5)	64 (6)	64 (7)	63 (8)	62 (8)	62 (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 Dec 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

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<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 -- User Guide

