

**Space Weather Highlights**  
**13 May - 19 May 2019**

**SWPC PRF 2281**  
**20 May 2019**

Solar activity was at very low to low levels, with low-level activity observed on 15 May due to a C2.0/SN flare from Region 2741 (N05 L=272, class/area Hsx/160 on 15 May). Very low-level activity was observed for the remainder of the period. Two eruptions were observed in coronagraph imagery, but were directed east and determined to not be geoeffective.

No proton events were observed at geosynchronous orbit.

The greater than 2 MeV electron flux at geosynchronous orbit was at high levels on 13, 15, and 16 May. Normal to moderate levels were observed for the remaining days in the period.

Geomagnetic field activity reached G3 (Major) storm levels on 14 May due to effects from a CME that erupted on 11 May. G3 storm conditions were observed during the 14/0600-0900 UTC synoptic period, with G2 storm conditions occurring in the 14/0300-0600 UTC period. Active conditions occurred in the 14/0900-1200 and 14/1800-2100 UTC periods. Solar wind parameters at the DSCOVR spacecraft were enhanced with Bt reaching as high as 15 nT accompanied by prolonged periods of southward Bz. Solar wind speed reached a maximum of 568 km/s. Unsettled conditions were observed on 16-17 May. Quiet conditions were observed for the remainder of the summary period.

**Space Weather Outlook**  
**20 May - 15 June 2019**

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

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 on 21-24 May and 29 May - 02 June due to coronal hole high speed stream effects. Normal to moderate levels are expected for the remainder of the period.

Geomagnetic field activity is expected to be at active levels on 29 May due to recurrent coronal hole activity. Quiet to unsettled levels are expected for 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
13 May	75	23	160	A8.8	0	0	0	1	0	0	0	0
14 May	74	24	170	A8.7	0	0	0	0	0	0	0	0
15 May	74	13	150	A8.9	1	0	0	2	0	0	0	0
16 May	74	13	150	A8.3	0	0	0	0	0	0	0	0
17 May	72	13	150	A8.0	0	0	0	0	0	0	0	0
18 May	71	11	140	A7.9	0	0	0	0	0	0	0	0
19 May	68	0	0	A7.3	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
13 May	7.4e+05	1.9e+04	4.2e+03		2.5e+08	
14 May	5.5e+05	1.8e+04	3.5e+03		1.1e+07	
15 May	9.1e+05	1.9e+04	3.6e+03		3.9e+07	
16 May	7.6e+05	1.8e+04	3.5e+03		3.4e+07	
17 May	5.4e+05	1.9e+04	3.6e+03		1.8e+07	
18 May	5.6e+05	1.9e+04	3.6e+03		1.8e+07	
19 May	1.2e+06	2.0e+04	4.1e+03		2.0e+07	

### *Daily Geomagnetic Data*

Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
13 May	5	0-0-1-2-2-2-1-3	9	1-1-1-3-2-4-2-2	6	1-1-1-2-1-2-1-2
14 May	23	3-5-5-4-3-3-3-1	45	3-7-6-5-4-4-3-2	36	3-6-7-4-2-3-4-2
15 May	8	1-2-2-1-3-2-3-1	4	0-2-1-0-1-2-2-1	6	1-2-2-1-2-2-2-1
16 May	9	2-2-2-1-3-2-2-3	5	1-2-1-2-1-1-2-2	8	2-2-2-1-2-1-3-3
17 May	7	3-2-2-1-3-1-1-1	5	3-2-1-1-2-1-0-0	5	3-2-1-1-2-1-0-1
18 May	8	1-1-2-4-2-2-2-1	10	1-1-4-5-0-0-0-0	5	1-1-2-2-1-0-1-0
19 May	3	0-0-1-1-2-1-1-2	1	0-0-1-0-0-0-0-1	2	0-0-1-1-1-1-0-2

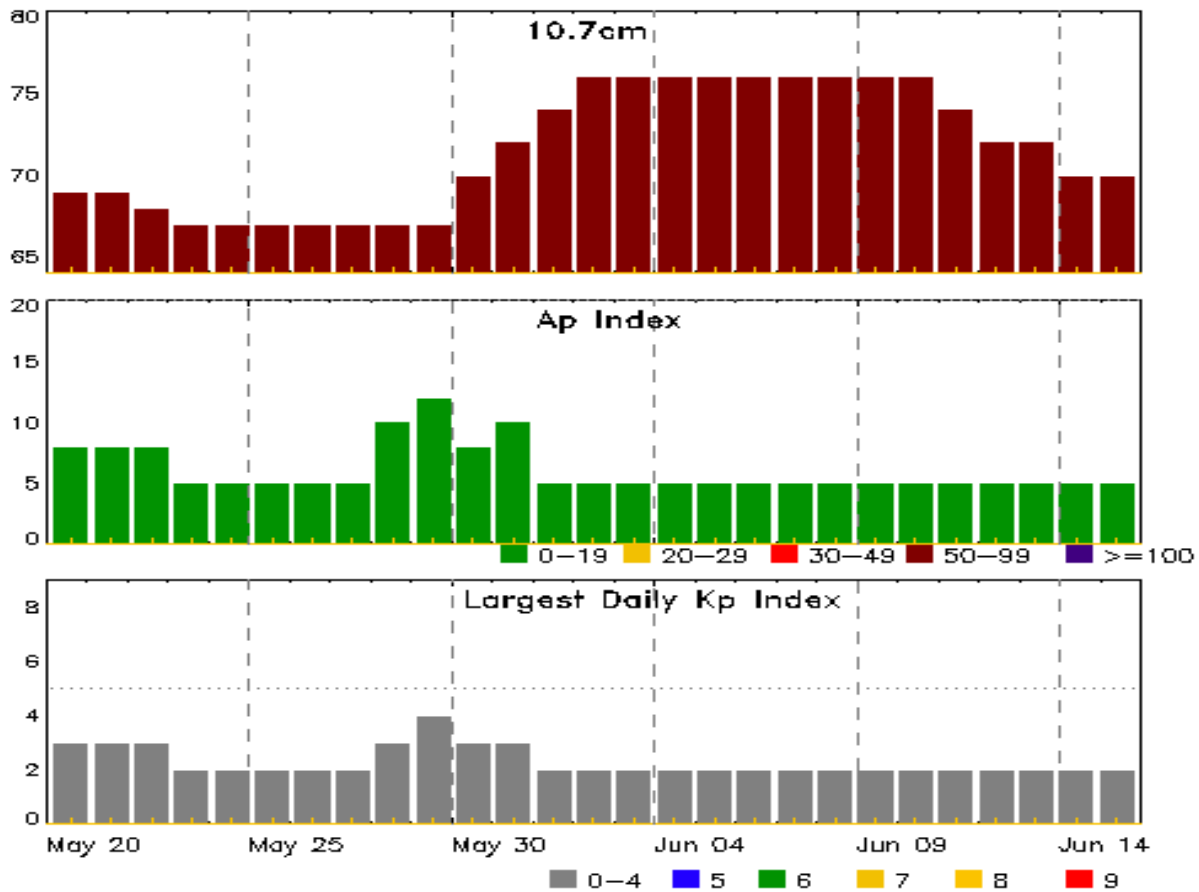


### *Alerts and Warnings Issued*

<b>Date &amp; Time of Issue UTC</b>	<b>Type of Alert or Warning</b>	<b>Date &amp; Time of Event UTC</b>
13 May 0859	CONTINUED ALERT: Electron 2MeV Integral Flux $\geq$ 1000pfu	11/1625
13 May 2004	WATCH: Geomagnetic Storm Category G1 predicted	
14 May 0132	WARNING: Geomagnetic K = 4	14/0132 - 15/0600
14 May 0459	ALERT: Geomagnetic K = 4	14/0500
14 May 0501	WARNING: Geomagnetic K = 5	14/0500 - 1200
14 May 0501	EXTENDED WARNING: Geomagnetic K = 4	14/0132 - 1500
14 May 0512	ALERT: Geomagnetic K = 5	14/0512
14 May 0520	WARNING: Geomagnetic K = 6	14/0521 - 1200
14 May 0545	ALERT: Geomagnetic K = 6	14/0545
14 May 0724	ALERT: Geomagnetic K = 5	14/0724
14 May 0736	ALERT: Geomagnetic K = 6	14/0736
14 May 0840	WARNING: Geomagnetic K $\geq$ 7	14/0839 - 1200
14 May 0901	ALERT: Geomagnetic K = 7	14/0859
14 May 1448	EXTENDED WARNING: Geomagnetic K = 4	14/0132 - 2359
14 May 1838	WATCH: Geomagnetic Storm Category G2 predicted	
15 May 1726	ALERT: Electron 2MeV Integral Flux $\geq$ 1000pfu	15/1710
16 May 1742	CONTINUED ALERT: Electron 2MeV Integral Flux $\geq$ 1000pfu	15/1710



## 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
20 May	69	8	3	03 Jun	76	5	2
21	69	8	3	04	76	5	2
22	68	8	3	05	76	5	2
23	67	5	2	06	76	5	2
24	67	5	2	07	76	5	2
25	67	5	2	08	76	5	2
26	67	5	2	09	76	5	2
27	67	5	2	10	76	5	2
28	67	10	3	11	74	5	2
29	67	12	4	12	72	5	2
30	70	8	3	13	72	5	2
31	72	10	3	14	70	5	2
01 Jun	74	5	2	15	70	5	2
02	76	5	2				

### ***Energetic Events***

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

**No Events Observed**

### ***Flare List***

Date	Time			X-ray	Optical		
	Begin	Max	End		Class	Imp/ Brtns	Location Lat CMD Rgn #
13 May	1502	1552	1710	B3.5	SF	N02W06	2741
15 May	0832	0840	0849	B3.5			2741
15 May	1642	1656	1703	B2.0	SF	N05W34	2741
15 May	1915	1924	1927	C2.0	SN	N08W36	2741
15 May	1947	1956	2002	B2.3			2741
16 May	0453	0456	0458	B1.4			2741



### ***Region Summary***

Date	Location	Sunspot Characteristics						Flares							
	Lat CMD	Helio	Area 10 <sup>-6</sup> hemi.	Extent (helio)	Spot Class	Spot Count	Mag Class	X-ray			Optical				
		Lon						C	M	X	S	1	2	3	4
<i>Region 2740</i>															
03 May	N12E80	307	260	4	Hhx	1	A	1							
04 May	N09E67	307	270	4	Hhx	2	A	1			1				
05 May	N08E54	307	280	4	Dho	4	BD				5				
06 May	N07E40	308	200	3	Cso	4	BD	7			10	1			
07 May	N08E28	306	240	5	Cso	6	B	2			6	1			
08 May	N08E14	307	160	4	Cao	3	B								
09 May	N08W00	307	120	3	Cao	4	B	1			2				
10 May	N08W13	308	110	3	Hax	3	A								
11 May	N08W27	308	100	3	Hax	3	A								
12 May	N08W40	308	70	3	Hax	2	A								
13 May	N08W53	308	10	1	Hrx	1	A								
14 May	N08W67	309	10	1	Axx	1	A								
								12	0	0	24	2	0	0	0

Died on Disk.

Absolute heliographic longitude: 307

### ***Region 2741***

06 May	N05E81	267	100	2	Hsx	1	A								
07 May	N05E66	268	170	2	Hsx	1	A								
08 May	N05E52	269	160	3	Hsx	1	A								
09 May	N06E38	270	160	3	Hsx	1	A								
10 May	N06E25	270	160	3	Hsx	1	A								
11 May	N06E11	270	160	3	Hsx	3	A								
12 May	N06W02	270	210	3	Hsx	2	A								
13 May	N05W16	271	150	2	Hsx	2	A				1				
14 May	N06W30	272	160	3	Hsx	3	A								
15 May	N05W44	272	150	2	Hsx	3	A	1			2				
16 May	N05W57	272	150	3	Hax	3	A								
17 May	N05W70	272	150	3	Hax	3	A								
18 May	N05W83	272	140	2	Hax	1	A								
								1	0	0	3	0	0	0	0

Crossed West Limb.

Absolute heliographic longitude: 270

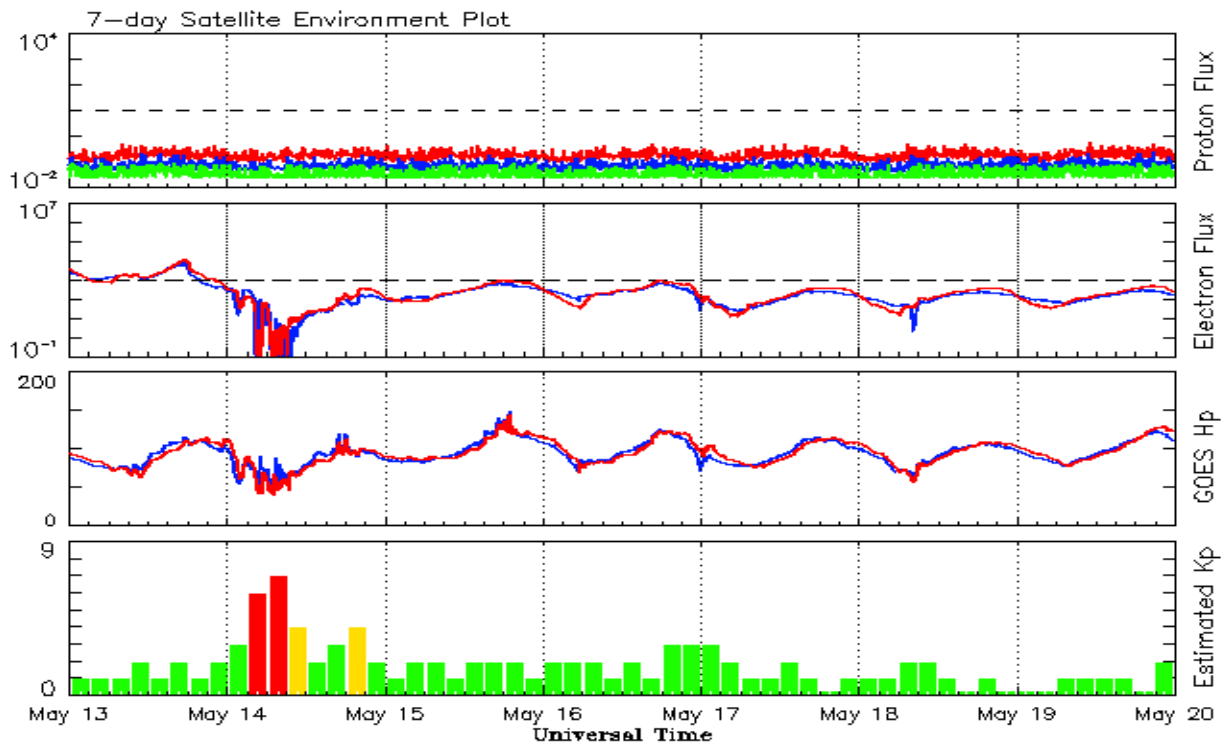


**Recent Solar Indices (preliminary)**  
**Observed monthly mean values**

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>									
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
<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	4.3	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	4.0	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			68.9		6	
December	5.6	1.9	0.34			70.0		7	
<b>2019</b>									
January	16.0	4.7	0.29			71.6		6	
February		0.5				70.6		7	
March	14.8	5.7	0.39			71.5		6	
April	11.5	5.5	0.48			72.4		6	

**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 13 May 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.

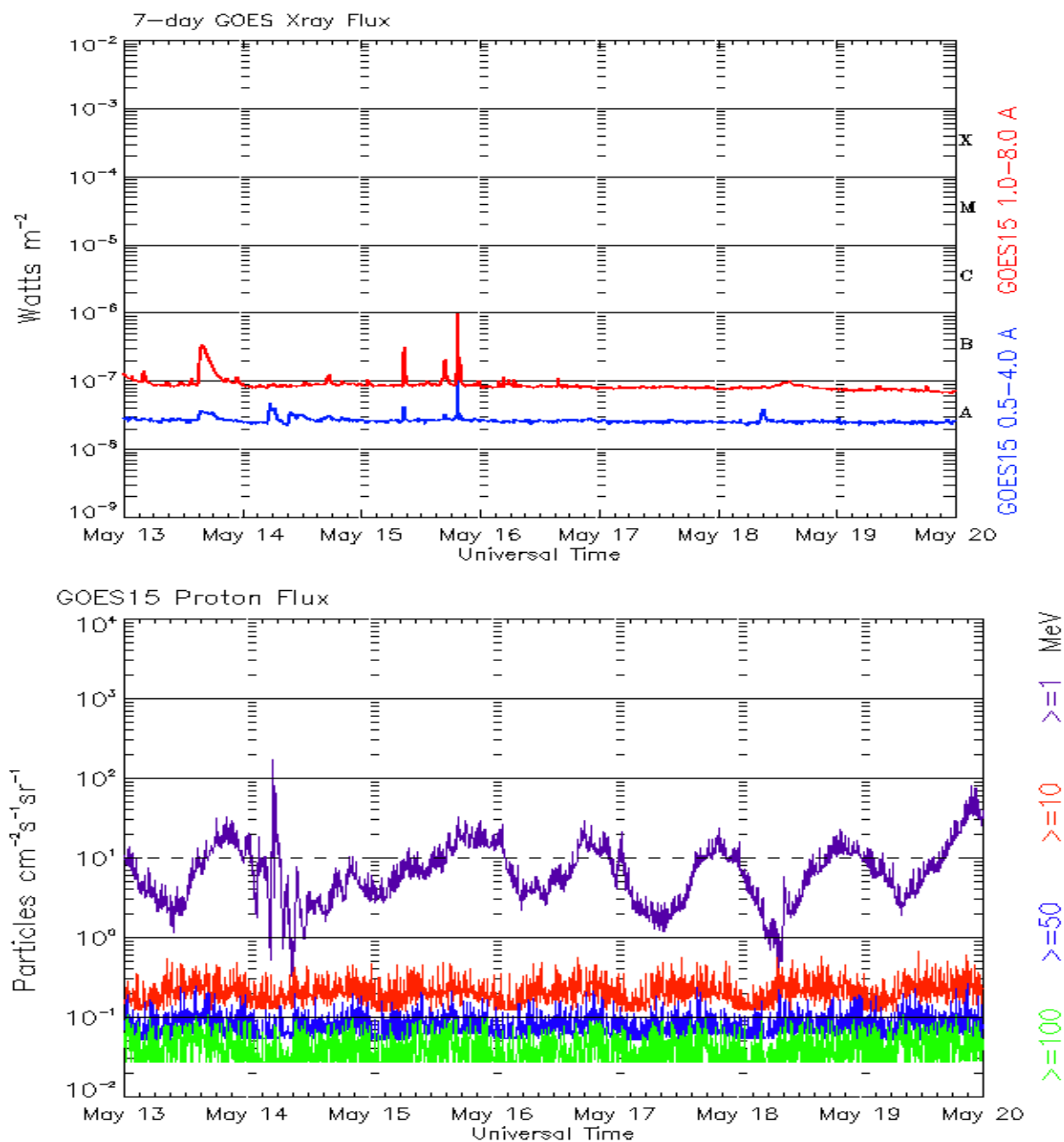
The electron flux plot contains the five-minute averaged integral electron flux (electrons/cm<sup>2</sup>-sec -sr) with energies greater than 2 MeV by the SWPC Primary GOES satellite.

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 13 May 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 ( $\text{pfu} = \text{protons/cm}^2\text{-sec -sr}$ ) 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.



## ***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](mailto:SWPC.Webmaster@noaa.gov)

The Weekly has been published continuously since 1951 and is available online since 1997.

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