

Space Weather Highlights
18 March - 24 March 2019

SWPC PRF 2273
25 March 2019

Solar activity was low throughout the period. Region 2736 (N08, L=284, class/area-Eki/420 on 22 Mar) produced multiple C-class events including a C5 flare at 21/0312 UTC. Region 2735 (N03, L=259, class/area-Cro/20 on 19 Mar) provided multiple, low-level, B-class events early in the period before decaying to plage on 22 Mar. An asymmetrical, full-halo CME was observed in SOHO/LASCO coronagraph imagery starting at 20/1100 UTC and was determined to have an earth-directed component. No additional earth-directed CMEs were observed.

No proton events were observed at geosynchronous orbit.

The greater than 2 MeV electron flux at geosynchronous orbit reached high levels on 19 and 24 Mar with moderate levels observed throughout the remainder of the reporting period.

Geomagnetic field activity was at quiet to unsettled levels on 19 Mar with quiet conditions observed throughout the remainder of the period, under a nominal solar wind environment. A sudden impulse summary was issued at 24/2151 UTC for what is believed to be the arrival of the 20 Mar CME mentioned above. A 17 nT deviation was recorded at the Boulder, Colorado magnetometer.

Space Weather Outlook
25 March - 20 April 2019

Solar activity is expected to be very low between 25 Mar-07 Apr. Low levels are expected between 08-20 Apr due to the return of Region 2736.

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 27 Mar-07 Apr with normal to moderate levels expected throughout the remainder of the outlook period.

Geomagnetic field activity is expected to reach active levels on 27-28 Mar and 12 Apr due to influence from multiple, recurrent CH HSSs. Quiet to unsettled levels are expected 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
18 March	70	13	10	A0.0	0	0	0	2	0	0	0	0
19 March	70	15	20	A0.0	0	0	0	0	0	0	0	0
20 March	77	28	60	A1.5	1	0	0	6	1	0	0	0
21 March	80	49	220	A5.5	5	0	0	4	1	0	0	0
22 March	82	27	420	B1.7	6	0	0	17	1	0	0	0
23 March	79	22	280	B1.2	0	0	0	11	0	0	0	0
24 March	75	14	60	A9.6	0	0	0	4	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
18 March	4.1e+05	1.7e+04	3.7e+03	2.7e+07		
19 March	5.0e+05	1.8e+04	3.9e+03	4.2e+07		
20 March	3.8e+05	1.7e+04	3.7e+03	2.6e+07		
21 March	3.7e+05	1.8e+04	3.6e+03	3.6e+07		
22 March	3.9e+05	1.7e+04	3.7e+03	4.0e+07		
23 March	3.5e+05	1.7e+04	3.6e+03	4.5e+07		
24 March	5.9e+05	1.8e+04	3.7e+03	5.3e+07		

Daily Geomagnetic Data

Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
18 March	2	0-1-1-0-1-1-1-1	1	1-0-0-0-1-1-0-0	3	1-1-1-1-1-1-1-1
19 March	5	1-1-1-1-2-2-2-2	8	1-0-2-3-4-2-1-1	7	1-1-1-2-2-1-3-3
20 March	5	1-2-2-1-2-1-1-1	5	1-1-1-3-3-1-0-0	5	1-2-2-1-2-1-1-1
21 March	2	0-1-0-1-1-1-1-0	0	0-0-0-1-0-0-0-0	2	0-1-1-1-1-0-0-0
22 March	2	0-0-1-0-1-1-0-1	0	0-0-1-0-0-0-0-0	1	0-0-1-0-0-0-0-0
23 March	2	0-1-0-1-1-1-1-1	1	0-0-0-2-0-0-0-0	1	0-0-0-1-0-0-0-0
24 March	3	0-0-0-1-1-2-1-2	0	0-0-0-0-0-0-0-1	0	0-0-1-1-0-1-0-2

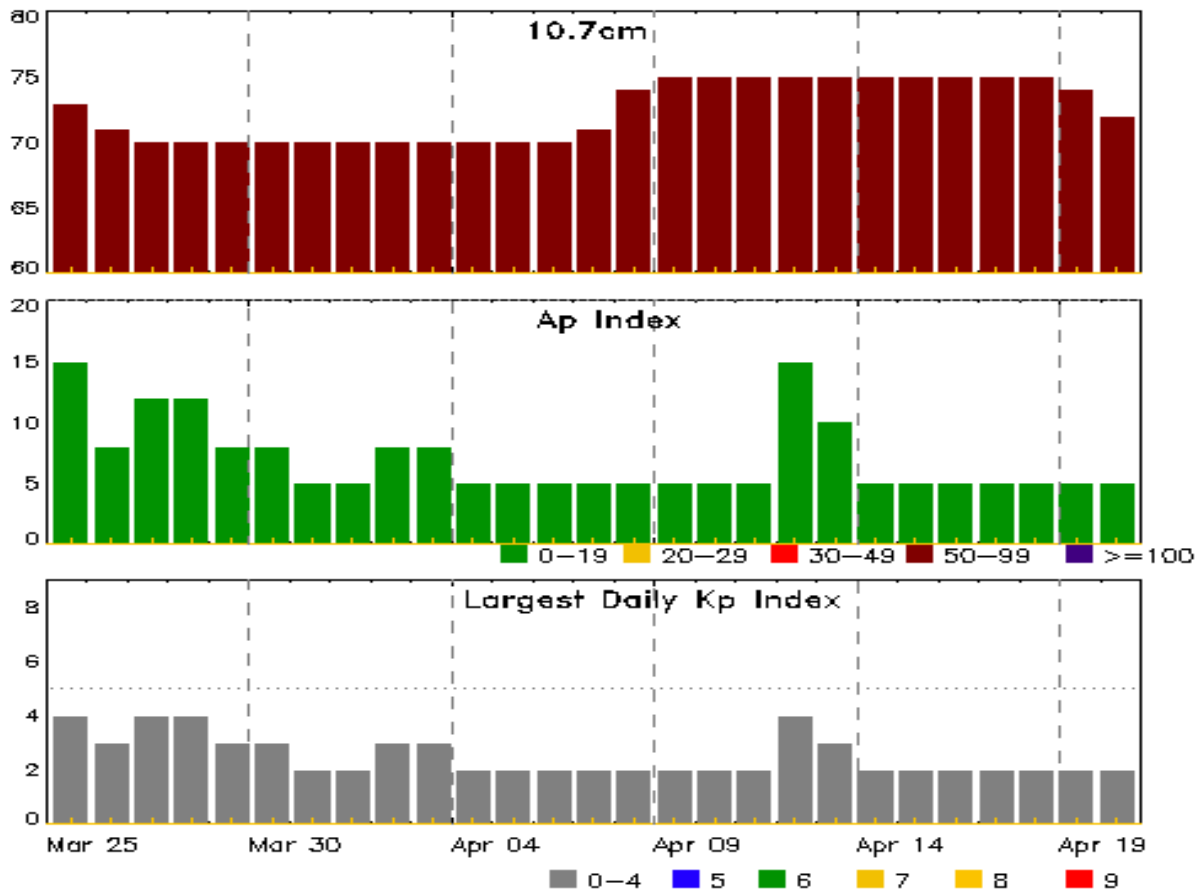


Alerts and Warnings Issued

Date & Time of Issue UTC	Type of Alert or Warning	Date & Time of Event UTC
19 Mar 2056	ALERT: Electron 2MeV Integral Flux \geq 1000pfu	19/2040
20 Mar 1139	ALERT: Type II Radio Emission	20/1120
20 Mar 2151	WATCH: Geomagnetic Storm Category G2 predicted	
21 Mar 0851	WATCH: Geomagnetic Storm Category G2 predicted	
24 Mar 2055	WARNING: Geomagnetic Sudden Impulse expected	24/2130 - 2245
24 Mar 2205	ALERT: Electron 2MeV Integral Flux \geq 1000pfu	24/2150
24 Mar 2209	SUMMARY: Geomagnetic Sudden Impulse	24/2151



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
25 Mar	73	15	4	08 Apr	74	5	2
26	71	8	3	09	75	5	2
27	70	12	4	10	75	5	2
28	70	12	4	11	75	5	2
29	70	8	3	12	75	15	4
30	70	8	3	13	75	10	3
31	70	5	2	14	75	5	2
01 Apr	70	5	2	15	75	5	2
02	70	8	3	16	75	5	2
03	70	8	3	17	75	5	2
04	70	5	2	18	75	5	2
05	70	5	2	19	74	5	2
06	70	5	2	20	72	5	2
07	71	5	2				

Energetic Events

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

No Events Observed

Flare List

Date	Time			X-ray Class	Imp/ Brtns	Location Lat CMD	Rgn #
	Begin	Max	End				
18 Mar	1209	1213	1216	B1.3			2735
18 Mar	1339	1343	1346	B1.2			2735
18 Mar	1348	1351	1355	B1.6	SF	N02E24	2735
18 Mar	1625	1638	1642	B1.7			2735
18 Mar	1731	1734	1738	B1.3			2735
18 Mar	1832	1835	1838	B1.2	SF	N02E22	2735
20 Mar	0017	0020	0022	B1.1			
20 Mar	0707	0714	0716	B6.1			
20 Mar	0845	0847	0901		SF	N07W27	2736
20 Mar	1035	1118	1134	C4.8	1N	N09W26	2736
20 Mar	1219	1225	1228	B4.4	SF	N09W26	2736
20 Mar	1306	1309	1314	B1.0			2736
20 Mar	1340	1343	1349	B1.0			2736
20 Mar	1423	1432	1448	B2.1	SF	N09W28	2736
20 Mar	1443	1445	1447		SF	N09W28	2736
20 Mar	1736	1759	1812	B3.2	SF	N09W29	2736
20 Mar	2119	2124	2132	B1.8	SF	N10W31	2736
21 Mar	0004	0013	0019	B8.0	SF	N09W34	2736
21 Mar	0252	0300	0304	C1.2	1F	N07W35	2736
21 Mar	0308	0312	0315	C5.6			2736
21 Mar	0756	0759	0801	B1.6			2736
21 Mar	0945	1012	1022	B1.4			2736
21 Mar	1117	1121	1131	B1.1			2736
21 Mar	1440	1444	1447	C1.5	SF	N11W41	2736
21 Mar	1542	1545	1547	B2.2			2736
21 Mar	1558	1601	1603	C1.2			2736
21 Mar	1713	1721	1739	C2.6			2736
21 Mar	1954	1959	2002	B8.8	SF	N08W44	2736
21 Mar	2054	2113	2119	B9.9	SF	N09W49	2736
22 Mar	0027	0034	0038	C2.1			2736
22 Mar	0100	0105	0111		SF	N07W51	2736



Flare List

Date	Time			Optical			Rgn #
	Begin	Max	End	X-ray Class	Imp/ Brtns	Location Lat CMD	
22 Mar	0200	0206	0208	B6.7			2736
22 Mar	0306	0306	0309		SF	N05W53	2736
22 Mar	0312	0320	0327		SF	N05W54	2736
22 Mar	0359	0414	0428	B6.5	SF	N05W54	2736
22 Mar	0442	0444	0448		SF	N06W54	2736
22 Mar	0505	0514	0517	C4.8	1F	N06W50	2736
22 Mar	0754	0801	0804	C2.6	SF	N09W50	2736
22 Mar	0813	0819	0822	C1.3	SF	N09W50	2736
22 Mar	1014	1019	1025	C1.0	SF	N10W51	2736
22 Mar	1154	1158	1204	B3.5			2736
22 Mar	1210	1213	1215	B3.7			2736
22 Mar	1231	1239	1242	B8.5	SF	N10W52	2736
22 Mar	1246	1254	1257	B7.0	SF	N10W52	2736
22 Mar	1305	1305	A1323		SF	N10W53	2736
22 Mar	1348	1352	1355	B4.9			2736
22 Mar	1413	1418	1421	B3.5	SF	N10W53	2736
22 Mar	1432	1432	1434		SF	N10W53	2736
22 Mar	1441	1444	1446	B2.1			2736
22 Mar	1456	1456	1459		SF	N10W54	2736
22 Mar	1524	1534	1555	B4.4	SF	N10W59	2736
22 Mar	1638	1642	1646	B2.3			2736
22 Mar	1655	1703	1707	B3.6			2736
22 Mar	1929	1947	1956	B6.3			2736
22 Mar	2016	2023	2033	C1.4	SF	N10W59	2736
22 Mar	2052	2119	2131	B9.7			2736
22 Mar	2111	2119	2126	B9.8	SF	N09W61	2736
22 Mar	2235	2239	2242	B3.2			2736
22 Mar	2357	0004	0015	B8.1	SF	N09W61	2736
23 Mar	0116	0131	0143	B3.2	SF	N07W66	2736
23 Mar	0150	0153	0201	B5.0			2736
23 Mar	0207	0212	0214	B6.1			2736
23 Mar	0257	0302	0305	B2.5	SF	N07W66	2736
23 Mar	0310	0317	0323	B6.6	SF	N07W66	2736
23 Mar	0506	0509	0511	B3.0			2736
23 Mar	0602	0610	0616	B3.4			2736
23 Mar	0911	0912	0914		SF	N10W66	2736
23 Mar	1033	1040	1044	B2.7			2736
23 Mar	1210	1216	1222	B3.1			2736



Flare List

Date	Time			Optical			
	Begin	Max	End	X-ray Class	Imp/ Brtns	Location Lat CMD	Rgn #
23 Mar	1241	1249	1301	B5.7			2736
23 Mar	1418	1422	1424	B3.0	SF	N09W69	2736
23 Mar	1545	1547	1549		SF	N09W69	2736
23 Mar	1716	1717	1718		SF	N10W70	2736
23 Mar	1738	1738	1742		SF	N10W70	2736
23 Mar	1814	1817	1820	B5.7	SF	N10W70	2736
23 Mar	1849	1853	1855	B4.5			2736
23 Mar	1857	1900	1915	B4.5			2736
23 Mar	2048	2051	2054	B2.1			2736
23 Mar	2109	2120	2127	B8.9			2736
23 Mar	2204	2211	2219	B5.3			2736
23 Mar	2236	2239	2241	B8.0			2736
23 Mar	2313	2316	2319		SF	N10W75	2736
23 Mar	2330	2359	0017	B9.9	SF	N10W75	2736
24 Mar	0228	0233	0251	B8.6			2736
24 Mar	0435	0439	0444	B4.8			2736
24 Mar	0713	0720	0727	B4.3	SF	N10W84	2736
24 Mar	0731	0734	0744		SF	N09W84	2736
24 Mar	0750	0751	0759		SF	N10W87	2736
24 Mar	0803	0922	0933	B1.8			2736
24 Mar	1432	1437	1443	B2.6			2736
24 Mar	1916	1931	1940	B9.6			2736

Region Summary

Date	Location		Sunspot Characteristics					Flares							
	Lat CMD	Helio	Area 10 ⁻⁶ hemi.	Extent (helio)	Spot Class	Spot Count	Mag Class	X-ray			Optical				
		Lon						C	M	X	S	1	2	3	4
<i>Region 2735</i>															
18 Mar	N03E17	257	10	3	Bxo	3	B				2				
19 Mar	N03E02	259	20	5	Cro	5	B								
20 Mar	N02W12	260	10	1	Axx	2	A								
21 Mar	N02W25	260	10	1	Axx	1	A								
22 Mar	N02W39	261	plage												
23 Mar	N02W54	262	plage												
24 Mar	N02W69	264	plage												
								0	0	0	2	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 259

<i>Region 2736</i>															
20 Mar	N09W35	283	50	5	Dac	6	B	1			6	1			
21 Mar	N09W48	283	210	9	Dac	28	BGD	5			4	1			
22 Mar	N08W62	284	420	11	Eki	17	BG	6			17	1			
23 Mar	N08W77	285	280	12	Eki	12	B				11				
24 Mar	N08W88	283	60	7	Dso	4	B				4				
								12	0	0	42	3	0	0	0

Still on Disk.

Absolute heliographic longitude: 283

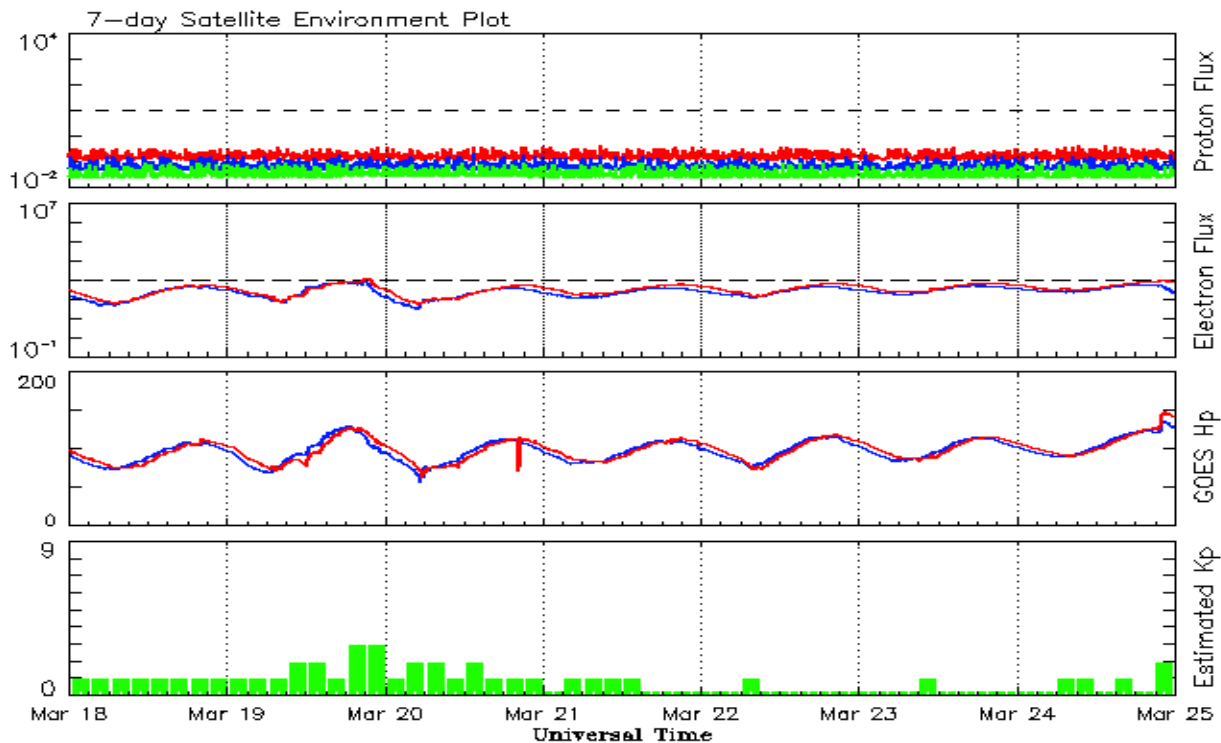


Recent Solar Indices (preliminary)
Observed monthly mean values

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 18 March 2019*

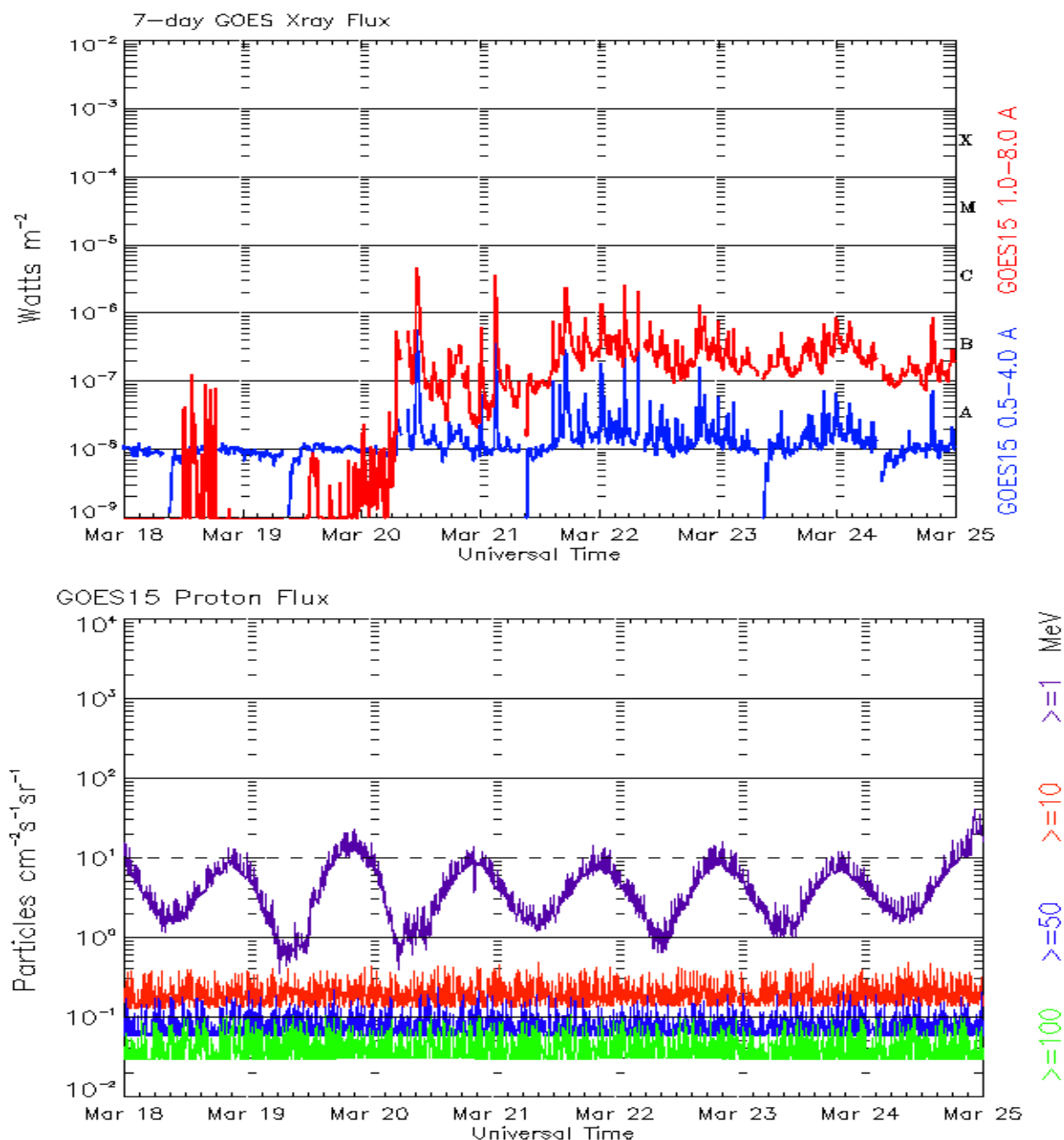
The proton flux plot contains the five-minute averaged integral proton flux (protons/cm²-sec -sr) as measured by the SWPC Primary GOES satellite, near West 75, for each of three energy thresholds: greater than 10, 50, and 100 MeV.

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 18 March 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.



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

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 -- User Guide

