

**Space Weather Highlights**  
**16 April - 22 April 2018**

**SWPC PRF 2225**  
**23 April 2018**

Solar activity was very low. Region 2706 (N03, L=281, class/area Dao/130 on 22 Apr) produced the strongest flare of the period, a B5 at 20/1704 UTC. The region continued slow growth through the end of the reporting period. 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 ranged from normal to high levels on 10-20 Apr; high levels on 22 Apr and moderate to high levels for the remaining days of the reporting period. The peak flux observed was 24,100 pfu at 21/2120 UTC.

Geomagnetic field activity was quiet until 20 Apr, when unsettled to G2 (Moderate) geomagnetic conditions were observed in response to CIR ahead of a negative polarity CH HSS. Total field peaked at 23 nT around 20/0510 UTC and slowly declined to around 5 nT by late on 20 Apr. Solar wind speeds were increased from around 290 km/s to a peak of near 620 km/s during the HSS proper late on 20 Apr. The geomagnetic response decreased to quiet to unsettled conditions over 21 Apr and finally to quiet on 22 Apr as influence from the CH HSS waned.

**Space Weather Outlook**  
**23 April - 19 May 2018**

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

No proton events are expected at geosynchronous orbit.

The greater than 2 MeV electron flux at geosynchronous orbit is expected to be at moderate to high levels on 23-30 Apr and 07-19 May; normal to moderate levels are expected from 01-06 May. Elevated levels of electron flux are expected due to the anticipation of multiple, recurrent CH HSSs.

Geomagnetic field activity is expected to reach unsettled levels on 26 Apr, 06 May, 09-10 May and 19 May; active levels are expected on 27 Apr, 07-08 Apr and 18 May; G2 (Moderate) geomagnetic storm conditions are likely on 17 May. All enhancements in geomagnetic field activity are associated with the anticipated influence of multiple, recurrent CH HSSs. The remaining days of the outlook periods are expected to be mostly quiet.



### ***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
16 April	69	0	0	A1.5	0	0	0	0	0	0	0	0
17 April	69	0	0	A1.6	0	0	0	0	0	0	0	0
18 April	71	0	0	A2.7	0	0	0	0	0	0	0	0
19 April	71	14	20	A3.7	0	0	0	0	0	0	0	0
20 April	73	14	40	A5.7	0	0	0	1	0	0	0	0
21 April	77	34	120	A6.2	0	0	0	1	0	0	0	0
22 April	76	20	130	A5.3	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
16 April	6.8e+05	1.7e+04	4.2e+03		1.8e+08	
17 April	9.0e+05	1.7e+04	3.4e+03		1.7e+08	
18 April	7.3e+05	1.7e+04	3.5e+03		1.0e+08	
19 April	8.8e+05	1.7e+04	3.5e+03		3.5e+07	
20 April	2.9e+06	1.6e+04	3.2e+03		2.8e+07	
21 April	8.5e+05	1.6e+04	3.1e+03		5.5e+08	
22 April	1.5e+06	1.7e+04	3.7e+03		8.8e+08	

### ***Daily Geomagnetic Data***

Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
16 April	3	1-1-0-1-2-1-1-0	1	0-0-0-2-0-0-0-0	3	1-1-0-1-1-0-0-1
17 April	3	0-1-1-1-2-1-1-1	1	0-0-1-0-1-0-0-0	4	1-1-1-1-1-1-0-2
18 April	6	1-2-1-2-2-2-2-1	8	1-1-2-3-4-2-1-0	6	1-2-1-2-2-2-1-1
19 April	2	0-0-1-1-2-0-1-0	1	0-0-0-2-0-0-0-0	3	0-1-0-2-1-0-1-0
20 April	29	3-4-6-4-4-3-4-3	56	1-5-7-7-4-5-4-3	47	4-5-6-6-4-4-5-3
21 April	10	3-2-3-1-2-2-3-2	28	3-2-5-5-5-5-2-1	12	3-3-3-2-2-3-3-1
22 April	5	2-2-1-1-2-1-1-2	5	2-1-2-1-2-1-1-1	6	2-2-2-1-2-1-1-2

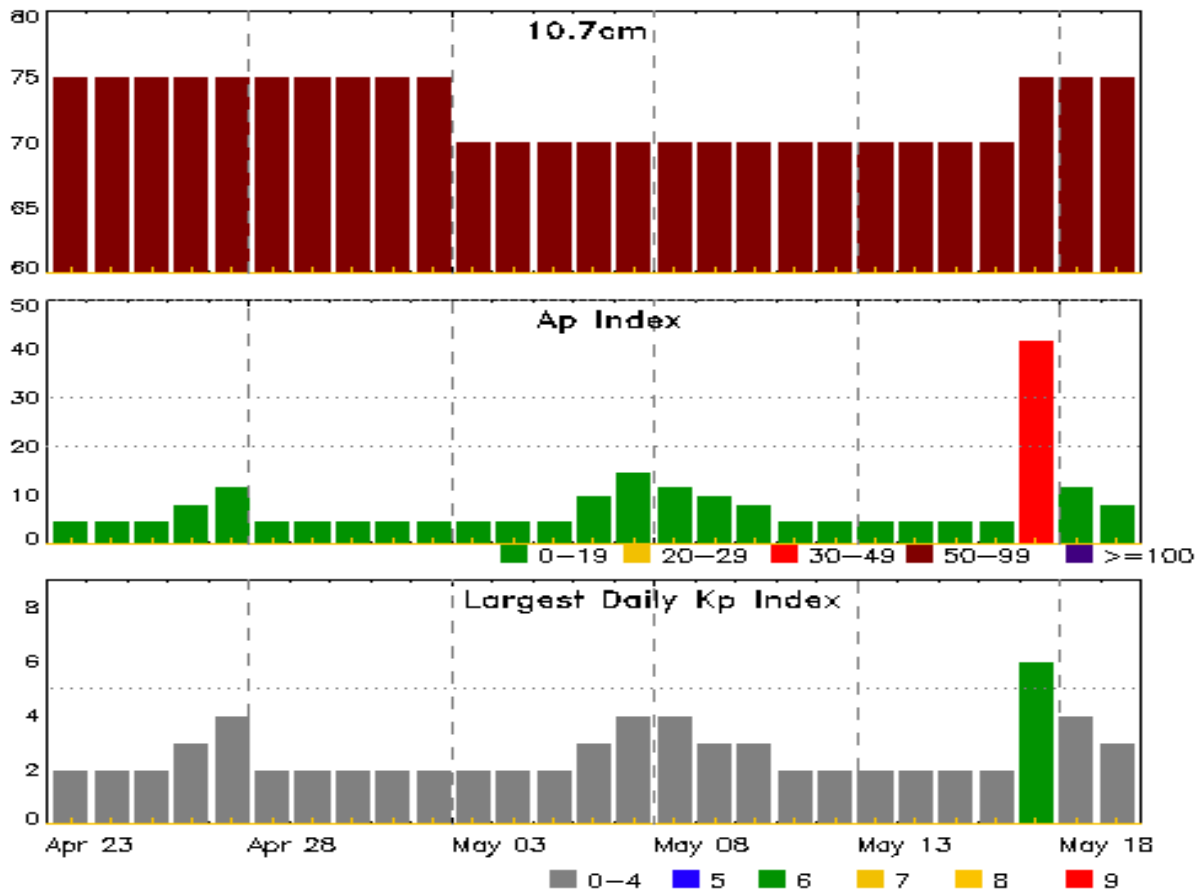


### *Alerts and Warnings Issued*

<b>Date &amp; Time of Issue UTC</b>	<b>Type of Alert or Warning</b>	<b>Date &amp; Time of Event UTC</b>
16 Apr 1141	CONTINUED ALERT: Electron 2MeV Integral Flux $\geq$ 1000pfu	10/1830
17 Apr 1323	CONTINUED ALERT: Electron 2MeV Integral Flux $\geq$ 1000pfu	10/1830
18 Apr 1430	CONTINUED ALERT: Electron 2MeV Integral Flux $\geq$ 1000pfu	10/1830
19 Apr 1816	CONTINUED ALERT: Electron 2MeV Integral Flux $\geq$ 1000pfu	10/1830
20 Apr 0033	WARNING: Geomagnetic K = 4	20/0032 - 0900
20 Apr 0300	ALERT: Geomagnetic K = 4	20/0259
20 Apr 0511	WARNING: Geomagnetic K = 5	20/0510 - 1200
20 Apr 0512	EXTENDED WARNING: Geomagnetic K = 4	20/0032 - 1500
20 Apr 0558	ALERT: Geomagnetic K = 5	20/0558
20 Apr 0651	ALERT: Geomagnetic K = 5	20/0650
20 Apr 0714	WARNING: Geomagnetic K = 6	20/0714 - 1200
20 Apr 0825	ALERT: Geomagnetic K = 6	20/0825
20 Apr 0953	ALERT: Geomagnetic K = 5	20/0953
20 Apr 1045	ALERT: Geomagnetic K = 6	20/1044
20 Apr 1045	EXTENDED WARNING: Geomagnetic K = 5	20/0510 - 1800
20 Apr 1045	EXTENDED WARNING: Geomagnetic K = 4	20/0032 - 2359
20 Apr 1536	WATCH: Geomagnetic Storm Category G1 predicted	
20 Apr 1727	EXTENDED WARNING: Geomagnetic K = 5	20/0510 - 21/0300
20 Apr 1729	EXTENDED WARNING: Geomagnetic K = 4	20/0032 - 21/0600
20 Apr 1939	ALERT: Geomagnetic K = 5	20/1938
20 Apr 2026	CONTINUED ALERT: Electron 2MeV Integral Flux $\geq$ 1000pfu	10/1830
21 Apr 0555	EXTENDED WARNING: Geomagnetic K = 4	20/0032 - 21/1500
21 Apr 1306	CONTINUED ALERT: Electron 2MeV Integral Flux $\geq$ 1000pfu	10/1830
21 Apr 1455	EXTENDED WARNING: Geomagnetic K = 4	20/0032 - 21/2100
22 Apr 0900	CONTINUED ALERT: Electron 2MeV Integral Flux $\geq$ 1000pfu	10/1830



## 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
23 Apr	75	5	2	07 May	70	15	4
24	75	5	2	08	70	12	4
25	75	5	2	09	70	10	3
26	75	8	3	10	70	8	3
27	75	12	4	11	70	5	2
28	75	5	2	12	70	5	2
29	75	5	2	13	70	5	2
30	75	5	2	14	70	5	2
01 May	75	5	2	15	70	5	2
02	75	5	2	16	70	5	2
03	70	5	2	17	75	42	6
04	70	5	2	18	75	12	4
05	70	5	2	19	75	8	3
06	70	10	3				

### ***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			Optical			
	Begin	Max	End	X-ray Class	Imp/ Brtns	Location Lat CMD	Rgn #
18 Apr	1250	1304	1350	B3.3			2706
18 Apr	1548	1600	1615	B4.0			2706
18 Apr	1820	1828	1835	B1.4			2706
20 Apr	0816	0819	0823	B1.1			2706
20 Apr	0939	0942	0947	B1.0			2706
20 Apr	1655	1704	1712	B5.3			2706
20 Apr	2212	2219	2225	B3.6	SF	N02E59	2706
21 Apr	0601	0608	0619	B1.1			2706
21 Apr	1045	1051	1058	B2.0			2706
21 Apr	1844	1851	1904	B1.8	SF	N03E48	2706
21 Apr	2055	2058	2100	B1.2			2706
21 Apr	2137	2140	2144	B1.1			2706



## Region Summary

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

### Region 2704

12 Apr	N10E51	30	30	2	Bxo	3	B								
13 Apr	N12E36	33	30	3	Bxo	4	B								
14 Apr	N12E24	31	10		Axx	1	A								
15 Apr	N12E10	33	plage												
16 Apr	N12W04	33	plage												
17 Apr	N12W18	34	plage												
18 Apr	N12W32	35	plage												
19 Apr	N12W46	35	plage												
20 Apr	N12W60	36	plage												
21 Apr	N12W74	37	plage												
22 Apr	N12W88	38	plage												
								0	0	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 33

### Region 2705

16 Apr	N17W12	41	plage												
17 Apr	N17W26	42	plage												
18 Apr	N17W40	43	plage												
19 Apr	N17W54	43	plage												
20 Apr	N17W68	44	plage												
21 Apr	N17W82	45	plage												
								0	0	0	0	0	0	0	0

Crossed West Limb.

Absolute heliographic longitude: 41

### Region 2706

19 Apr	N04E68	281	20	2	Bxo	4	B								
20 Apr	N04E56	280	40	7	Cao	4	B				1				
21 Apr	N04E43	280	110	8	Dao	13	B				1				
22 Apr	N03E29	281	130	9	Dao	10	B								
								0	0	0	2	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 281



### ***Region Summary - continued***

Location		Sunspot Characteristics						Flares							
Date	Lat CMD	Helio	Area	Extent	Spot	Spot	Mag	X-ray			Optical				
		Lon	10 <sup>-6</sup> hemi.	(helio)	Class	Count	Class	C	M	X	S	1	2	3	4
		<i>Region 2707</i>													
21 Apr	S10E29	294	10		Axx	1	A								
22 Apr	S10E15	295	plage												
								0	0	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 295

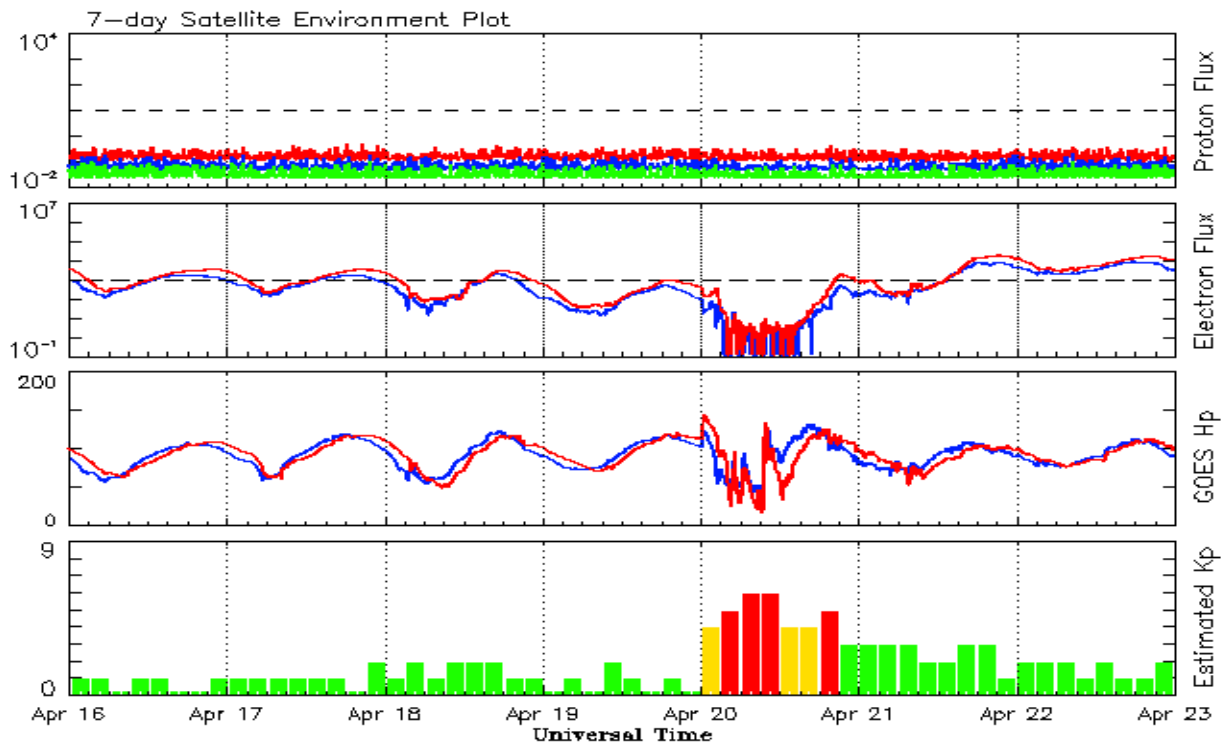
**Recent Solar Indices (preliminary)**  
**Observed monthly mean values**

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>2016</b>									
April	39.2	22.7	0.58	45.0	28.7	93.4	95.3	10	11.8
May	48.9	30.9	0.64	42.1	26.9	93.1	93.2	12	11.7
June	19.3	12.3	0.65	39.0	24.9	81.9	90.4	9	11.4
July	36.8	19.4	0.53	36.5	23.1	85.9	87.7	10	11.2
August	50.4	30.1	0.60	34.2	21.6	85.0	85.5	10	11.2
September	37.4	26.8	0.72	32.1	19.9	87.8	83.7	16	11.3
October	30.0	20.0	0.67	31.1	18.9	86.1	82.5	16	11.6
November	22.4	12.8	0.57	29.4	17.9	78.7	81.1	10	11.6
December	17.6	11.1	0.64	28.1	17.1	75.1	80.0	10	11.4
<b>2017</b>									
January	28.1	15.7	0.55	27.3	16.7	77.4	79.4	10	11.3
February	22.0	15.8	0.71	25.5	15.9	76.9	78.7	10	11.3
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	11.7	77.9	76.3	12	10.7
September	42.2	26.2	0.62	18.6	10.9	92.0	75.9	19	10.3
October	16.0	7.9	0.49			76.4		11	
November	7.7	3.4	0.44			72.1		11	
December	7.6	4.9	0.64			71.5		8	
<b>2018</b>									
January	7.8	4.0	0.51			70.0		6	
February	16.0	6.4	0.40			72.0		7	
March	6.0	1.5	0.25			68.4		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 16 April 2018*

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.

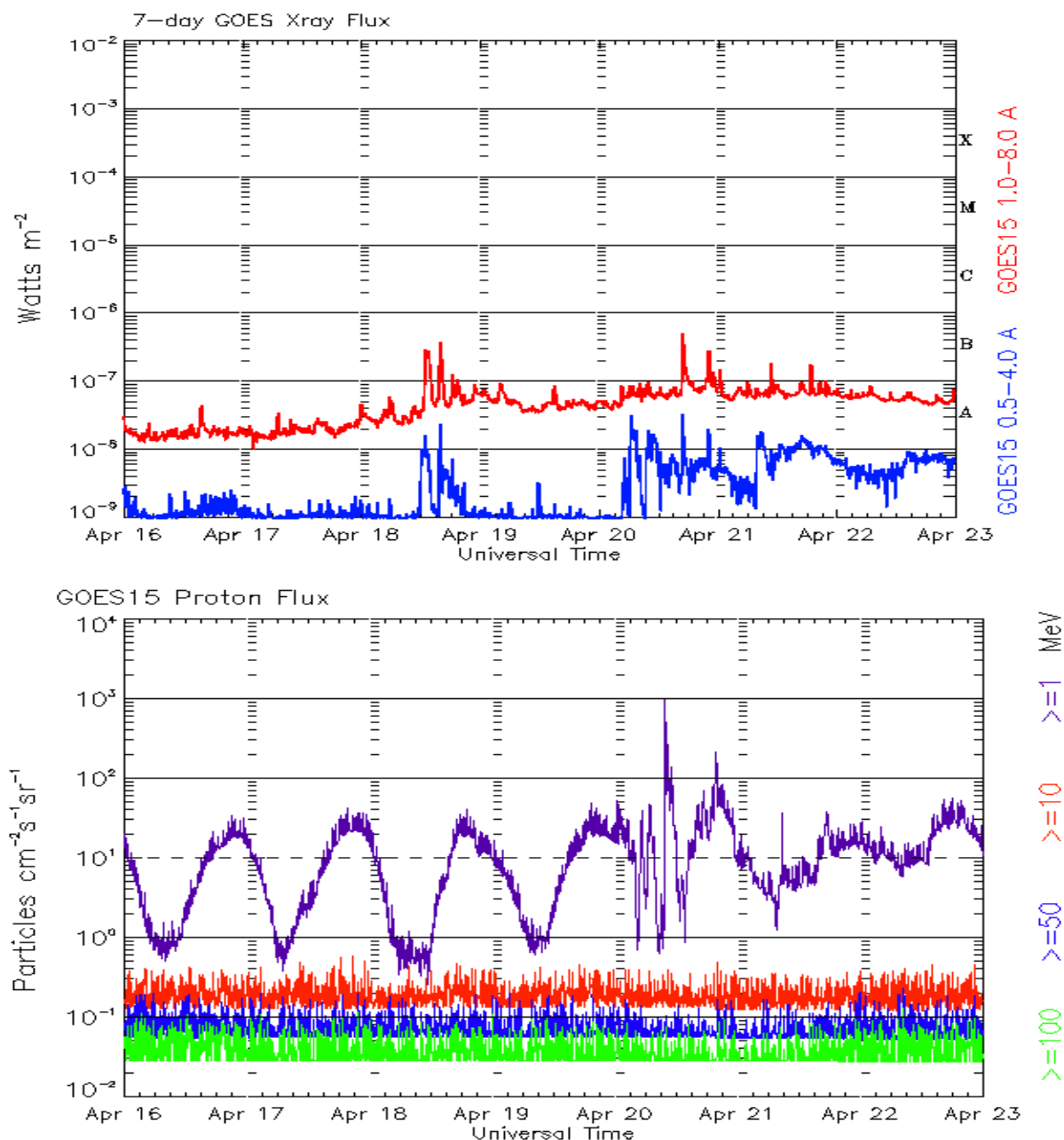
The electron flux plot contains the five-minute averaged integral electron flux (electrons/cm<sup>2</sup>-sec -sr) with energies greater than 2 MeV by the SWPC Primary GOES satellite.

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 16 April 2018*

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 (pfu = protons/ $\text{cm}^2$  -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)***

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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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