Space Weather Highlights
17 April - 23 April 2017

SWPC PRF 2173
24 April 2017

Solar activity reached low levels on 17-18 Apr due to isolated C-class flare activity from Region 2651 (N12, L=070, class/area=Cso/150 on 23 Apr), but solar activity was at very low levels through the remainder of the period (19-23 Apr). The largest event of the period, a long-duration C5/Sf flare at 18/2010 UTC with both Type-II and IV radio emissions, had an associated CME that was observed in C2 coronagraph imagery beginning at 18/1948 UTC. CME analysis and WSA-Enlil modelling suggested that this event did not have an Earth-directed component, however, it is likely that this event reached Earth late on 21 Apr. No other 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 17-18, 21-23 Apr, moderate levels on 20 Apr, and normal levels on 19 Apr.

Geomagnetic field activity was quiet on 17 Apr and quiet to unsettled on 18 Apr under a nominal solar wind regime. The influence of a recurrent, positive polarity CH HSS caused periods of G1 (Minor) geomagnetic storm conditions on 19 Apr and G1-G2 (Minor-Moderate) storm conditions on 20 Apr. The likely arrival of a CME (from 18 Apr) combined with the onset of a CIR caused G1 (Minor) geomagnetic storm levels late on 21 Apr. The influence of a recurrent, negative polarity CH HSS began early on 22 Apr and caused G1-G2 (Minor-Moderate) geomagnetic storms on 22-23 Apr.

Space Weather Outlook
24 April - 20 May 2017

Solar activity is expected to be very low with a chance for C-class flare activity throughout the outlook period (24 Apr-20 May).

No proton events are expected at geosynchronous orbit.

The greater than 2 MeV electron flux at geosynchronous orbit is likely to reach very high levels on 29-30 Apr with high levels likely on 24-28 Apr and 06-12, 17-20 May. Normal to moderate flux levels are expected for the remainder of the period.

Geomagnetic field activity is likely to reach G2 (Moderate) geomagnetic storm levels on 19-20 May with G1 (Minor) geomagnetic storms likely on 24-27 Apr and 01, 17-18 May due to the influence of multiple, recurrent CH HSSs. Active conditions are likely on 28 Apr and 05-06, 16 May with quiet or quiet to unsettled field activity expected for the remainder of the 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
17 April	75	0	0	B1.1	1	0	0	0	0	0	0	0	0	0
18 April	80	12	20	A9.7	2	0	0	2	0	0	0	0	0	0
19 April	81	14	110	B1.3	0	0	0	0	0	0	0	0	0	0
20 April	81	26	140	B1.1	0	0	0	2	0	0	0	0	0	0
21 April	82	39	180	B1.1	0	0	0	4	0	0	0	0	0	0
22 April	84	29	240	B1.0	0	0	0	2	0	0	0	0	0	0
23 April	83	43	260	A9.9	0	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
17 April	1.6e+07	1.6e+04	3.7e+03	6.7e+07		
18 April	1.7e+07	1.6e+04	3.7e+03	4.4e+07		
19 April	2.0e+07	1.5e+04	3.5e+03	1.7e+06		
20 April	2.2e+07	1.5e+04	3.3e+03	1.5e+07		
21 April	3.3e+07	1.6e+04	3.4e+03	5.1e+07		
22 April	4.6e+07	1.6e+04	3.2e+03	9.9e+07		
23 April	4.7e+07	1.6e+04	3.2e+03	4.0e+08		

Daily Geomagnetic Data

Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
17 April	3	0-0-2-1-2-1-1-1	3	0-0-3-1-1-1-0-0	4	0-1-2-1-1-1-0-1
18 April	6	2-0-1-1-2-1-2-3	7	1-0-0-3-4-1-1-2	7	2-1-1-1-2-1-1-3
19 April	12	3-4-3-2-1-1-3-2	20	3-5-5-4-1-2-2-2	15	3-5-3-2-0-2-3-3
20 April	20	4-5-4-4-2-2-2-2	44	4-6-5-6-6-3-3-2	30	5-6-4-5-3-3-3-3
21 April	11	0-2-1-1-2-3-4-4	19	1-2-2-0-5-5-3-4	19	1-2-1-1-2-4-5-5
22 April	37	6-5-4-4-5-4-3-4	86	4-6-7-8-6-6-3-4	54	5-6-5-5-6-5-4-6
23 April	24	4-4-4-4-4-3-3-4	71	4-3-8-6-6-6-4-3	32	4-4-6-5-5-5-4-4

Alerts and Warnings Issued

Date & Time of Issue UTC	Type of Alert or Warning	Date & Time of Event UTC
17 Apr 1231	ALERT: Electron 2MeV Integral Flux >= 1000pfu	17/1210
17 Apr 1805	WATCH: Geomagnetic Storm Category G1 predicted	
18 Apr 1241	CONTINUED ALERT: Electron 2MeV Integral Flux >= 1000pfu	17/1210
18 Apr 2109	ALERT: Type II Radio Emission	18/1949
18 Apr 2109	ALERT: Type IV Radio Emission	18/1953
19 Apr 0056	WARNING: Geomagnetic K = 4	19/0100 - 1200
19 Apr 0449	ALERT: Geomagnetic K = 4	19/0449
19 Apr 0527	WARNING: Geomagnetic K = 5	19/0526 - 1200
19 Apr 0601	ALERT: Geomagnetic K = 5	19/0559
20 Apr 0104	WARNING: Geomagnetic K = 4	20/0105 - 0900
20 Apr 0125	ALERT: Geomagnetic K = 4	20/0125
20 Apr 0138	WARNING: Geomagnetic K = 5	20/0138 - 0600
20 Apr 0301	ALERT: Geomagnetic K = 5	20/0259
20 Apr 0337	ALERT: Geomagnetic K = 5	20/0336
20 Apr 0345	WARNING: Geomagnetic K = 6	20/0345 - 0900
20 Apr 0346	EXTENDED WARNING: Geomagnetic K = 4	20/0105 - 1500
20 Apr 0347	EXTENDED WARNING: Geomagnetic K = 6	20/0345 - 1500
20 Apr 0351	EXTENDED WARNING: Geomagnetic K = 5	20/0138 - 1500
20 Apr 0434	ALERT: Geomagnetic K = 6	20/0433
20 Apr 1108	EXTENDED WARNING: Geomagnetic K = 4	20/0105 - 1800
20 Apr 1138	CANCELLATION: Geomagnetic K = 6	
20 Apr 1207	ALERT: Geomagnetic K = 5	20/1159
20 Apr 1755	EXTENDED WARNING: Geomagnetic K = 4	20/0105 - 2359
20 Apr 1959	WATCH: Geomagnetic Storm Category G2 predicted	
21 Apr 1447	ALERT: Electron 2MeV Integral Flux >= 1000pfu	21/1425
21 Apr 1548	WARNING: Geomagnetic K = 4	21/1546 - 2359
21 Apr 1642	ALERT: Geomagnetic K = 4	21/1638
21 Apr 1924	WARNING: Geomagnetic K = 5	21/1920 - 2359

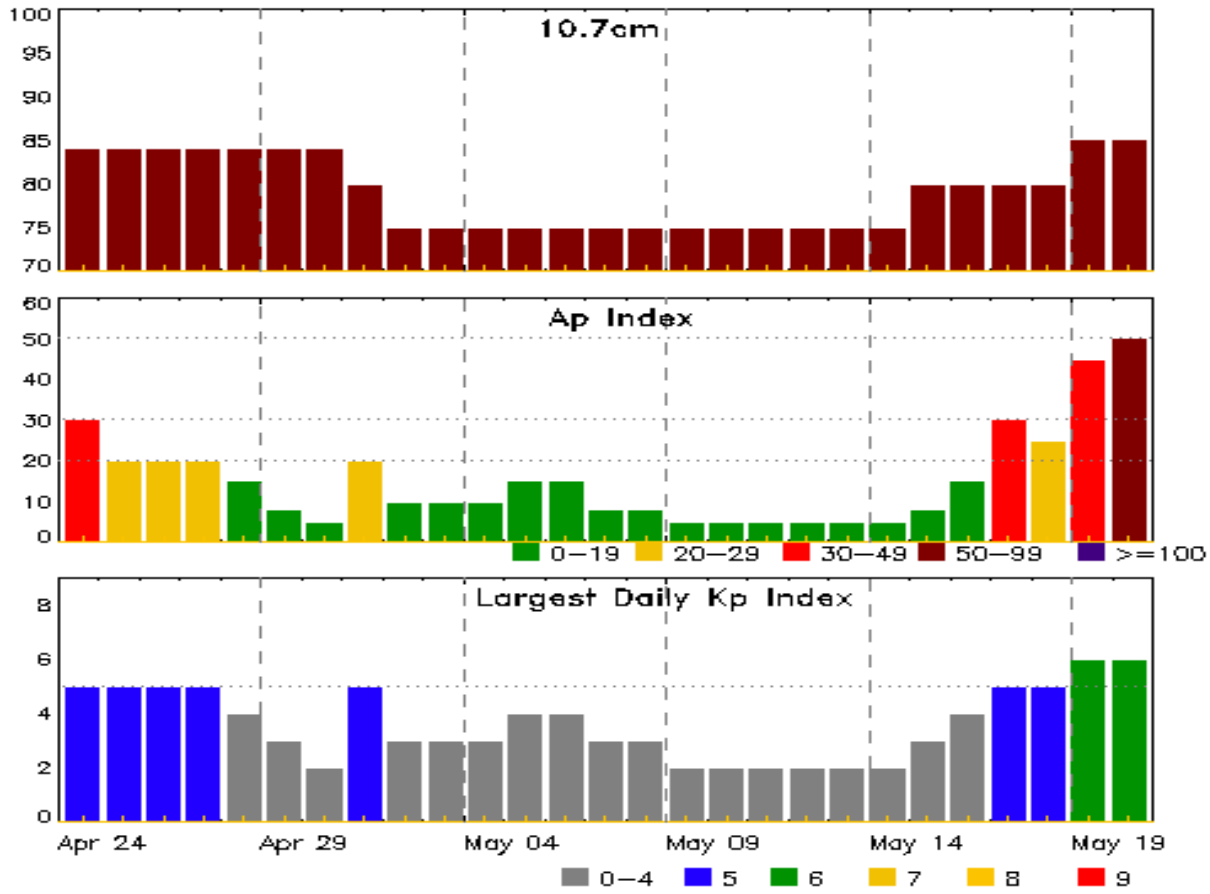
Alerts and Warnings Issued

Date & Time of Issue UTC	Type of Alert or Warning	Date & Time of Event UTC
21 Apr 1925	WATCH: Geomagnetic Storm Category G2 predicted	
21 Apr 2039	ALERT: Geomagnetic K = 5	21/2032
21 Apr 2157	EXTENDED WARNING: Geomagnetic K = 4	21/1546 - 22/1200
21 Apr 2157	EXTENDED WARNING: Geomagnetic K = 5	21/1920 - 22/0900
22 Apr 0001	ALERT: Geomagnetic K = 5	21/2359
22 Apr 0238	ALERT: Geomagnetic K = 5	22/0235
22 Apr 0249	WARNING: Geomagnetic K = 6	22/0245 - 0600
22 Apr 0422	ALERT: Geomagnetic K = 5	22/0421
22 Apr 0559	EXTENDED WARNING: Geomagnetic K = 4	21/1546 - 23/1200
22 Apr 0559	EXTENDED WARNING: Geomagnetic K = 5	21/1920 - 22/1500
22 Apr 0559	EXTENDED WARNING: Geomagnetic K = 6	22/0245 - 0900
22 Apr 0559	ALERT: Geomagnetic K = 6	22/0559
22 Apr 0852	ALERT: Geomagnetic K = 5	22/0852
22 Apr 0852	EXTENDED WARNING: Geomagnetic K = 6	22/0245 - 1200
22 Apr 1022	ALERT: Geomagnetic K = 5	22/1022
22 Apr 1058	EXTENDED WARNING: Geomagnetic K = 5	21/1920 - 22/2100
22 Apr 1058	EXTENDED WARNING: Geomagnetic K = 6	22/0245 - 1500
22 Apr 1348	ALERT: Geomagnetic K = 5	22/1346
22 Apr 1356	CONTINUED ALERT: Electron 2MeV Integral Flux >= 1000pfu	21/1425
22 Apr 1426	ALERT: Geomagnetic K = 6	22/1425
22 Apr 1426	EXTENDED WARNING: Geomagnetic K = 6	22/0245 - 2100
22 Apr 1647	ALERT: Geomagnetic K = 5	22/1641
22 Apr 2046	WATCH: Geomagnetic Storm Category G2 predicted	
22 Apr 2046	EXTENDED WARNING: Geomagnetic K = 5	21/1920 - 23/1200
22 Apr 2240	ALERT: Geomagnetic K = 5	22/2240
22 Apr 2255	WARNING: Geomagnetic K = 6	22/2255 - 23/0900
23 Apr 0001	ALERT: Geomagnetic K = 6	22/2359
23 Apr 0351	CONTINUED ALERT: Electron 2MeV Integral Flux >= 1000pfu	21/1425

Alerts and Warnings Issued

Date & Time of Issue UTC	Type of Alert or Warning	Date & Time of Event UTC
23 Apr 0754	ALERT: Geomagnetic K = 5	23/0754
23 Apr 0852	EXTENDED WARNING: Geomagnetic K = 6	22/2255 - 23/1500
23 Apr 0852	EXTENDED WARNING: Geomagnetic K = 5	21/1920 - 23/2100
23 Apr 0852	EXTENDED WARNING: Geomagnetic K = 4	21/1546 - 24/1500
23 Apr 0852	ALERT: Geomagnetic K = 6	23/0852
23 Apr 1034	ALERT: Geomagnetic K = 5	23/1034
23 Apr 1444	ALERT: Geomagnetic K = 5	23/1442
23 Apr 1802	ALERT: Geomagnetic K = 5	23/1759
23 Apr 1821	WATCH: Geomagnetic Storm Category G1 predicted	
23 Apr 1821	EXTENDED WARNING: Geomagnetic K = 5	21/1920 - 24/0300

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
24 Apr	84	30	5	08 May	75	8	3
25	84	20	5	09	75	5	2
26	84	20	5	10	75	5	2
27	84	20	5	11	75	5	2
28	84	15	4	12	75	5	2
29	84	8	3	13	75	5	2
30	84	5	2	14	75	5	2
01 May	80	20	5	15	80	8	3
02	75	10	3	16	80	15	4
03	75	10	3	17	80	30	5
04	75	10	3	18	80	25	5
05	75	15	4	19	85	45	6
06	75	15	4	20	85	50	6
07	75	8	3				

Energetic Events

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

No Events Observed

Flare List

	Time				Optical		
Date	Begin	Max	End	X-ray Class	Imp/ Brtns	Location Lat CMD	Rgn #
17 Apr	0128	0139	0146	B3.6			2651
17 Apr	0217	0247	0310	C2.0			2651
17 Apr	0554	0558	0602	B4.0			2651
17 Apr	0713	0721	0727	B7.1			2651
17 Apr	1440	1446	1450	B3.6			2651
17 Apr	1624	1630	1633	B3.2			2651
17 Apr	1846	1853	1906	B5.7			2651
17 Apr	2121	2142	2153	B7.5			2651
17 Apr	2339	2344	2348	B2.0			2651
18 Apr	0024	0028	0032	B2.4			2651
18 Apr	0218	0222	0226	B1.7			2651
18 Apr	0531	0537	0542	B5.6			2651
18 Apr	0551	0554	0600	B2.1			2651
18 Apr	0631	0640	0646	B6.9			2651
18 Apr	0929	0941	0955	C3.3			2651
18 Apr	1921	2010	2049	C5.5	SF	N14E77	2651
18 Apr	2015	2015	2022		SF	N14E77	
19 Apr	1001	1005	1007	B5.4			2651
19 Apr	1231	1234	1237	B2.5			2651
19 Apr	1632	1636	1639	B7.2			2651
19 Apr	1753	1756	1800	B1.6			2651
20 Apr	0649	0656	0704	B8.0	SF	N13E55	2651
20 Apr	0842	0846	0853	B1.9			
20 Apr	1043	1049	1058	B2.6			2651
20 Apr	2117	2122	2134	B3.7	SF	N13E44	2651
21 Apr	0258	0302	0304	B2.4	SF	N12E43	2651
21 Apr	1206	1216	1226	B6.2	SF	N16E35	2651
21 Apr	1705	1710	1717	B2.0			2651
21 Apr	1723	1730	1741	B4.1	SF	N11E34	2651
21 Apr	1935	1941	1944	B4.1	SF	N13E33	2651
21 Apr	2203	2207	2209	B2.2			

Flare List

Date	Time			Optical			
	Begin	Max	End	X-ray Class	Imp/ Brtns	Location Lat CMD	Rgn #
22 Apr	0022	0034	0042	B9.6	SF	N14E29	2651
22 Apr	1007	1010	1013	B1.8			2651
22 Apr	1208	1213	1216	B2.0			2653
22 Apr	1452	1458	1501	B2.1	SF	N12E20	2651
23 Apr	0200	0204	0207	B2.2			2651
23 Apr	0302	0306	0309	B3.7			2651
23 Apr	1547	1557	1612	B1.8			

Region Summary

	Location		Sunspot Characteristics					Flares							
		Helio	Area	Extent	Spot	Spot	Mag	X-ray			Optical				
Date	Lat CMD	Lon	10^{-6} hemi.	(helio)	Class	Count	Class	C	M	X	S	1	2	3	4
			Region 2650												
09 Apr	N08E71	188	20	4	Cro	3	B								
10 Apr	N09E56	190	40	6	Cao	3	B				2				
11 Apr	N11E40	193	40	6	Cao	2	B								
12 Apr	N10E27	193	20	7	Cso	3	B								
13 Apr	N08E14	192	20	7	Cso	2	B								
14 Apr	N08W02	194	10		Hrx	1	A								
15 Apr	N08W16	196	10	1	Axx	1	A								
16 Apr	N08W30	197	plage												
17 Apr	N08W44	198	plage												
18 Apr	N08W58	198	plage												
19 Apr	N08W72	199	plage												
20 Apr	N08W86	200	plage												
								0	0	0	2	0	0	0	0

Crossed West Limb.
Absolute heliographic longitude: 194

			Region 2651												
17 Apr	N12E81	72	plage					1							
18 Apr	N12E67	72	20	1	Dso	2	BG	2							
19 Apr	N13E57	69	110	5	Dso	4	BG								
20 Apr	N12E44	70	130	5	Dao	5	B				2				
21 Apr	N12E30	71	130	5	Cao	7	B				4				
22 Apr	N12E17	71	140	5	Cao	7	B				2				
23 Apr	N12E04	70	150	5	Cso	8	B								
								3	0	0	8	0	0	0	0

Still on Disk.
Absolute heliographic longitude: 70

			Region 2652												
20 Apr	N13E60	54	10	1	Hrx	1	A								
21 Apr	N13E45	56	10	1	Hrx	1	A								
22 Apr	N13E31	57	plage												
23 Apr	N14E17	57	10	3	Bxo	3	B								
								0	0	0	0	0	0	0	0

Still on Disk.
Absolute heliographic longitude: 57

Region Summary - continued

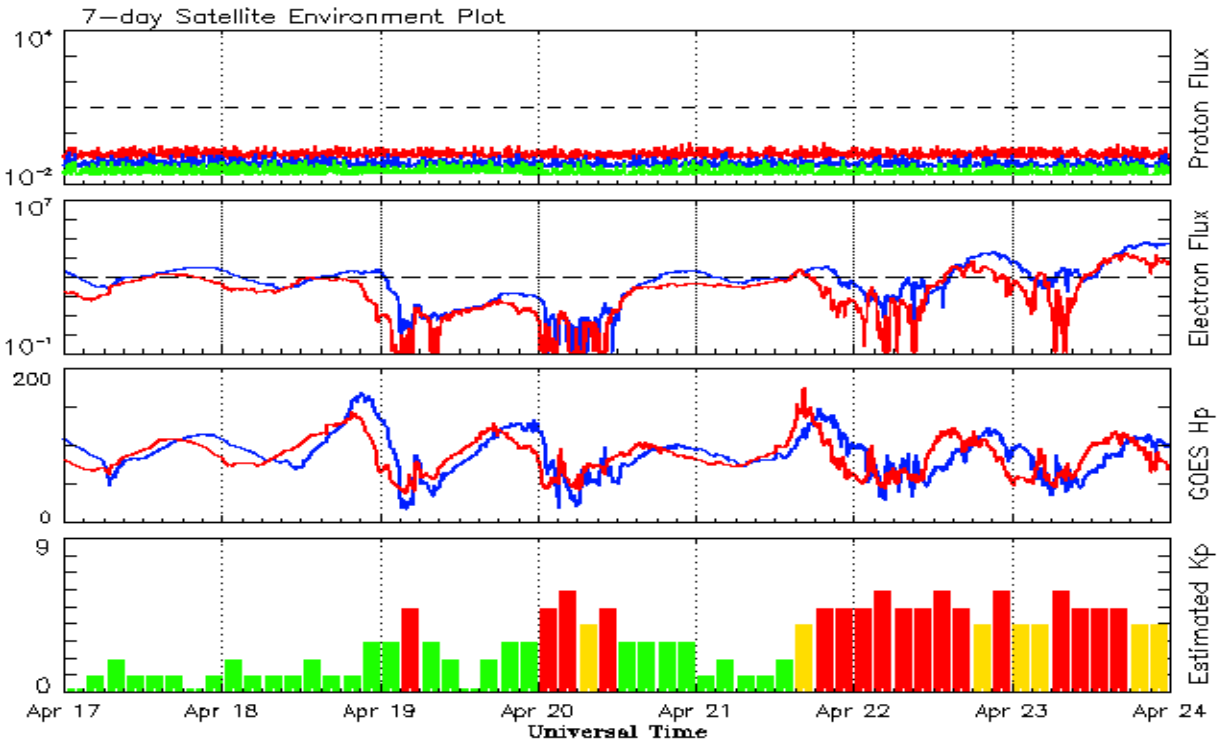
	Location		Sunspot Characteristics					Flares							
		Helio	Area	Extent	Spot	Spot	Mag	X-ray			Optical				
Date	Lat CMD	Lon	10^{-6} hemi.	(helio)	Class	Count	Class	C	M	X	S	1	2	3	4
		Region 2653													
21 Apr	S09E82	19	40	2	Hax	1	A								
22 Apr	S09E57	31	100	4	Hax	2	A								
23 Apr	S09E45	29	100	4	Hax	2	A								
								0	0	0	0	0	0	0	0

Still on Disk.
Absolute heliographic longitude: 29

Recent Solar Indices (preliminary)
Observed monthly mean values

	Sunspot Numbers					Radio Flux		Geomagnetic	
	Observed values		Ratio	Smooth values		Penticton	Smooth	Planetary	Smooth
Month	SEC	RI	RI/SEC	SEC	RI	10.7 cm	Value	Ap	Value
				2015					
April	72.5	45.2	0.75	80.5	47.3	129.2	127.3	12	12.4
May	83.0	53.3	0.71	77.5	45.7	120.1	123.3	9	12.7
June	77.3	39.9	0.53	73.1	43.3	123.2	119.5	14	13.0
July	68.4	39.5	0.58	68.2	41.0	107.0	116.0	10	13.1
August	61.6	38.6	0.63	65.5	39.8	106.2	113.3	16	13.1
September	72.5	47.2	0.65	64.0	39.5	102.1	110.8	16	12.8
October	59.5	38.2	0.62	61.8	38.6	104.1	107.9	15	12.5
November	61.8	37.3	0.61	59.0	36.7	109.6	105.3	13	12.5
December	54.1	34.8	0.64	55.1	34.7	112.8	102.5	15	12.5
				2016					
January	50.4	34.2	0.67	51.4	32.6	103.5	99.9	10	12.3
February	56.0	33.8	0.61	49.6	31.5	103.5	98.1	10	12.0
March	40.9	32.5	0.80	47.7	30.2	91.6	96.6	11	11.8
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			86.1		16	
November	22.4	12.8	0.57			78.7		10	
December	17.6	11.1	0.64			75.1		10	
				2017					
January	28.1	15.5	0.55			77.4		10	
February	22.0	15.7	0.71			76.9		10	
March	25.4	10.6	0.42			74.6		15	

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 17 April 2017

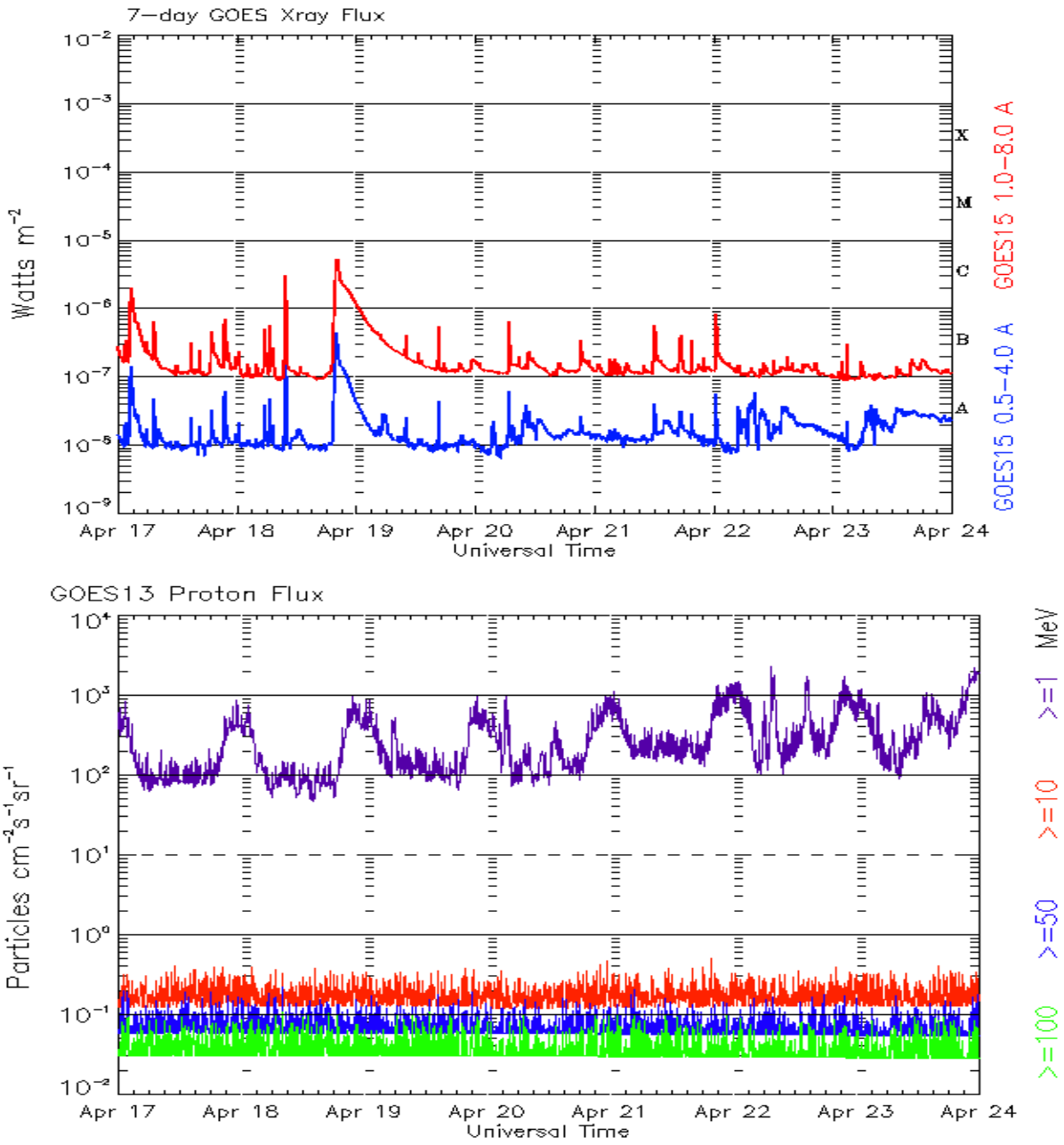
The proton flux plot contains the five-minute averaged integral proton flux (protons/cm^2-sec -sr) as measured by the SWPC Primary GOES satellite, near West 75, for each of three energy thresholds: greater than 10, 50, and 100 MeV.

The electron flux plot contains the five-minute averaged integral electron flux (electrons/cm^2-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 17 April 2017

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 intergral 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
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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.

http://spaceweather.gov/weekly/ -- Current and previous year
http://spaceweather.gov/ftpmenu/warehouse.html -- Online achive from 1997
http://spaceweather.gov/ftpmenu/ -- Some content as ascii text
http://spaceweather.gov/SolarCycle/ -- Solar Cycle Progression web site

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http://spaceweather.gov/weekly/Usr_guide.pdf -- User Guide