

Space Weather Highlights
13 June - 19 June 2016

SWPC PRF 2129
20 June 2016

Solar activity was at very low levels the majority of the period with low levels observed on 13 and 19 June due to a C3 flare at 13/0552 UTC from Region 2552 (N15, L=359, class/area Dao/150 on 11 June) and a C1 flare at 19/1158 UTC from Region 2558 (N13, L=215, class/area Cso/030 on 19 June). The majority of the B-class activity was caused by Region 2555 (S09, L=274, class/area Cao/080 on 17 June). No Earth-directed coronal mass ejections were observed during the period.

No proton events were observed at geosynchronous orbit.

The greater than 2 MeV electron flux at geosynchronous orbit was at normal to moderate levels throughout the period and briefly reached high levels on 19 June with a maximum flux of 1,030 pfu at 19/1640 UTC.

The geomagnetic field ranged from quiet to G2-Moderate storm levels. Solar wind conditions began the period under a waning positive polarity coronal hole high speed stream (CH HSS). Solar wind speeds decreased from approximately 620 km/s to around 420 km/s by midday on 14 June. Total field decreased from 8 nT to 4 nT. By late on 14 June, total field increased to 15 nT with the Bz component mostly southward near -14 nT while solar wind increased to a maximum of 772 km/s at 15/0410 UTC, indicative of a co-rotating interaction region followed by another positive polarity CH HSS. The geomagnetic field responded with quiet to active levels on 13 June, quiet to G2-Moderate storm levels on 14 June and quiet to G1-Minor storm levels on 15 June. By early on 16 June, total field decreased to around 6 nT with solar wind speeds in the 500-600 km/s range. These conditions continued until 19 June when solar wind speeds decreased to nominal levels. Quiet conditions were observed on 16 and 19 June with quiet to unsettled levels on 17-18 June.

Space Weather Outlook
20 June - 16 July 2016

Solar activity is expected to be at very low to low levels for 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 normal to moderate levels with high levels likely on 20-22 June, 26 June-01 July, 04-07 July and again on 16 July due to CH HSS activity.

Geomagnetic field activity is expected to be at unsettled to active levels from 23-27 June, 02-03 July, 07-12 July and 14-15 July. G1-Minor storm levels are likely on 02-03 July and 11 July due to recurrent CH HSS activity.



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		
13 June	91	27	420	B1.8	1	0	0	1	0	0	0	0	
14 June	88	26	390	B1.2	0	0	0	0	0	0	0	0	
15 June	87	22	350	B1.0	0	0	0	0	0	0	0	0	
16 June	88	26	340	B1.1	0	0	0	7	0	0	0	0	
17 June	87	36	410	B1.0	0	0	0	1	0	0	0	0	
18 June	84	46	310	B1.1	0	0	0	1	0	0	0	0	
19 June	85	48	330	A9.7	1	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
	13 June	5.0e+05	1.3e+04	3.0e+03	1.1e+07	
14 June	4.6e+05	1.3e+04	3.0e+03	1.6e+07		
15 June	3.8e+05	1.2e+04	2.8e+03	5.4e+06		
16 June	2.4e+05	1.3e+04	3.0e+03	9.0e+06		
17 June	2.5e+05	1.3e+04	2.9e+03	1.4e+07		
18 June	1.9e+05	1.2e+04	3.0e+03	2.3e+07		
19 June	1.7e+05	1.3e+04	3.3e+03	3.8e+07		

Daily Geomagnetic Data

Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
	13 June	10	3-4-2-2-2-2-1	15	4-4-1-5-2-1-1-0	9
14 June	15	3-2-2-3-2-2-5-3	17	1-2-2-2-2-2-6-3	21	3-2-1-2-2-2-6-4
15 June	15	5-3-2-3-3-2-1-2	21	4-4-2-5-5-2-1-1	14	5-3-2-3-3-2-1-1
16 June	5	1-1-1-2-2-2-1-2	6	2-1-1-2-3-2-1-1	6	2-1-2-2-2-2-1-2
17 June	7	2-2-2-2-2-2-2-1	27	2-3-3-6-6-3-1-1	8	2-2-2-2-3-2-2-1
18 June	10	1-3-3-2-3-2-2-2	17	2-3-3-5-4-2-2-2	8	2-3-2-2-3-1-2-2
19 June	5	1-2-2-2-2-1-1-1	6	2-2-1-1-3-2-1-0	6	2-2-2-1-2-1-1-1

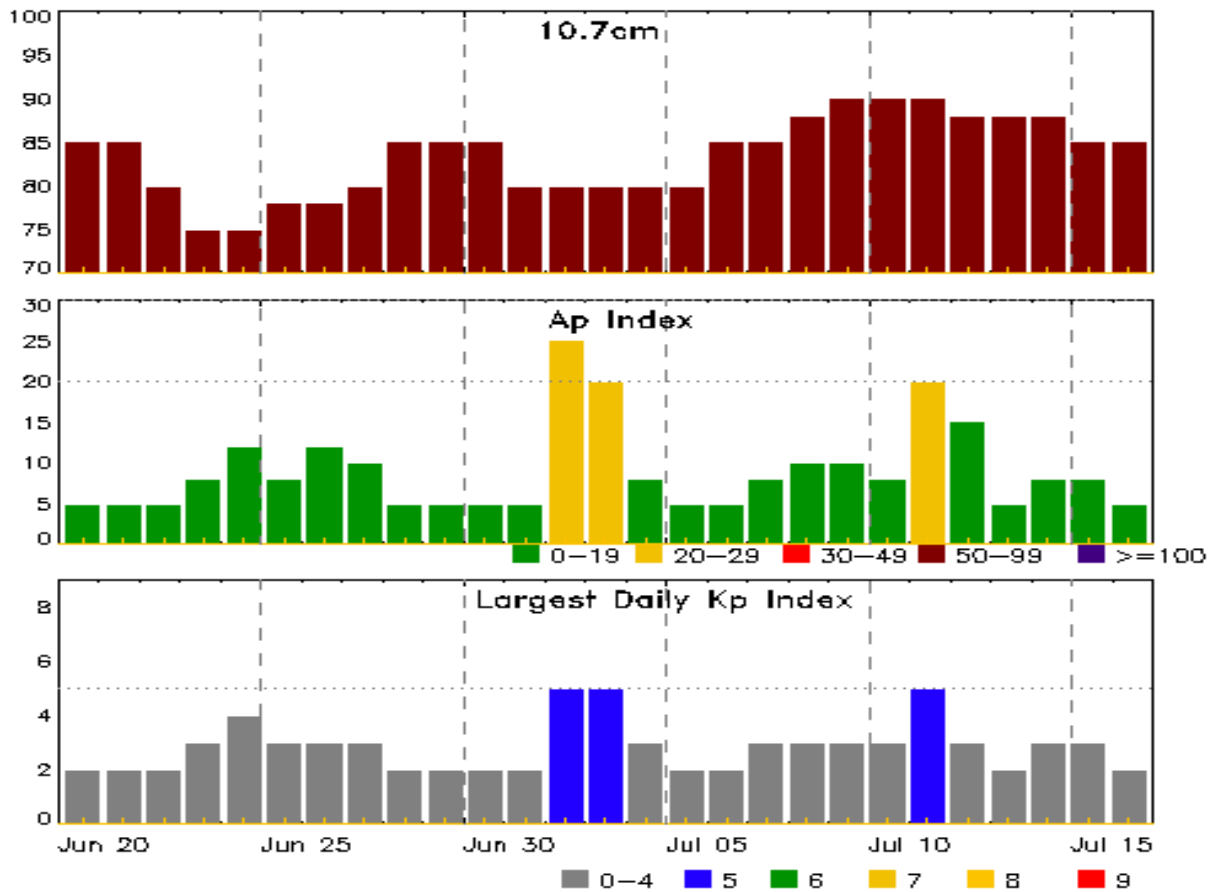


Alerts and Warnings Issued

Date & Time of Issue UTC	Type of Alert or Warning	Date & Time of Event UTC
13 Jun 0504	ALERT: Geomagnetic K = 4	13/0503
13 Jun 1907	ALERT: Type II Radio Emission	13/1836
14 Jun 1822	WARNING: Geomagnetic K = 4	14/1825 - 15/1300
14 Jun 1839	WARNING: Geomagnetic K = 5	14/1838 - 15/2300
14 Jun 1908	ALERT: Geomagnetic K = 4	14/1905
14 Jun 1936	WATCH: Geomagnetic Storm Category G1 predicted	
14 Jun 1943	ALERT: Geomagnetic K = 5	14/1942
14 Jun 1950	WARNING: Geomagnetic K = 6	14/1950 - 2300
14 Jun 1956	ALERT: Geomagnetic K = 6	14/1955
15 Jun 0133	ALERT: Geomagnetic K = 5	15/0128
15 Jun 1122	CANCELLATION: Geomagnetic K = 5	
15 Jun 1252	EXTENDED WARNING: Geomagnetic K = 4	14/1825 - 15/2300
15 Jun 1809	WATCH: Geomagnetic Storm Category G1 predicted	
15 Jun 2255	EXTENDED WARNING: Geomagnetic K = 4	14/1825 - 16/0700



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 Jun	85	5	2	04 Jul	80	8	3
21	85	5	2	05	80	5	2
22	80	5	2	06	85	5	2
23	75	8	3	07	85	8	3
24	75	12	4	08	88	10	3
25	78	8	3	09	90	10	3
26	78	12	3	10	90	8	3
27	80	10	3	11	90	20	5
28	85	5	2	12	88	15	3
29	85	5	2	13	88	5	2
30	85	5	2	14	88	8	3
01 Jul	80	5	2	15	85	8	3
02	80	25	5	16	85	5	2
03	80	20	5				



Energetic Events

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

No Events Observed

Flare List

Date	Time			X-ray Class	Optical			Rgn #
	Begin	Max	End		Imp/ Brtns	Location Lat CMD	Rgn #	
13 Jun	0145	0153	0158	B4.9			2552	
13 Jun	0249	0253	0257	B5.0			2554	
13 Jun	0404	0415	0423	B9.3			2554	
13 Jun	0435	0449	0502	B9.2			2552	
13 Jun	0533	0552	0618	C3.0			2552	
13 Jun	B0751	U0751	A0828		SF	N07W48	2554	
13 Jun	1843	1855	1907	B4.9				
15 Jun	1053	1056	1058	B1.7				
15 Jun	1300	1311	1330	B4.2				
15 Jun	2043	2047	2049	B2.2				
16 Jun	0020	0025	0034	B3.2	SF	S04E03	2553	
16 Jun	0944	0948	0952	B2.1				
16 Jun	1040	1044	1046	B3.8			2555	
16 Jun	1158	1203	1209	B2.6			2555	
16 Jun	1212	1218	1221	B3.5			2555	
16 Jun	1317	1324	1327	B8.8	SF	S08W50	2555	
16 Jun	1400	1402	1417		SF	S08W50	2555	
16 Jun	1517	1523	1532	B3.8	SF	S08W50	2555	
16 Jun	1553	1554	1556		SF	N05E05	2555	
16 Jun	1609	1613	1617	B2.9				
16 Jun	1746	1753	1806	B4.0			2556	
16 Jun	1959	2000	2006		SF	S08W52	2555	
16 Jun	2042	2043	2044		SF	S08W53	2555	
17 Jun	0404	0421	0428	B2.3				
17 Jun	0456	0519	0540	B2.7			2556	
17 Jun	0825	0831	0838	B3.4			2555	
17 Jun	0916	0926	0934	B4.0			2555	
17 Jun	1224	1229	1234	B3.3			2555	
17 Jun	1310	1314	1316	B1.7			2555	
17 Jun	1400	1403	1405	B1.9	SF	S06W64	2555	
17 Jun	2034	2040	2049	B2.7			2555	



Flare List

Date	Time			X-ray Class	Optical		Rgn #
	Begin	Max	End		Imp/ Brtns	Location Lat CMD	
18 Jun	1144	1148	1151	B3.8			2555
18 Jun	1430	1435	1439	B3.1			2556
18 Jun	1604	1611	1615	B2.7			2555
18 Jun	2031	2045	2050	B3.2	SF	N07W24	
19 Jun	0731	0757	0823	B2.3			2558
19 Jun	1144	1158	1209	C1.7			2558
19 Jun	2308	2347	0113	B5.0			2555



Region Summary

Date	Location		Sunspot Characteristics					Flares									
	Lat	CMD	Helio	Area	Extent	Spot	Spot	Mag	X-ray			Optical					
			Lon	10 ⁻⁶	hemi.	(helio)	Class	Count	Class	C	M	X	S	1	2	3	4
Region 2552																	
07 Jun	N16W22		359	10	1	Bxo	2	B									
08 Jun	N17W35		359	20	1	Cro	5	B									
09 Jun	N15W48		358	140	4	Dac	12	BD	1			4					
10 Jun	N14W62		359	60	4	Dai	7	BD									
11 Jun	N15W75		359	150	5	Dao	5	B	1								
12 Jun	N14W91		2	80	3	Cao	2	B	1								
									3	0	0	4	0	0	0	0	0

Crossed West Limb.
 Absolute heliographic longitude: 359

Region 2553																	
10 Jun	S06E71		226	120	6	Hsx	1	A				1					
11 Jun	S06E56		228	270	4	Hhx	1	A									
12 Jun	S06E43		228	330	3	Hhx	1	A									
13 Jun	S06E31		226	290	3	Hhx	1	A									
14 Jun	S07E18		226	290	4	Hhx	1	A									
15 Jun	S07E06		225	300	3	Hhx	1	A									
16 Jun	S07W09		225	310	4	Hhx	2	A				1					
17 Jun	S07W22		226	300	4	Hhx	1	A									
18 Jun	S07W36		227	250	4	Hhx	1	A									
19 Jun	S07W49		227	260	4	Hhx	1	A									
									0	0	0	2	0	0	0	0	0

Still on Disk.
 Absolute heliographic longitude: 225

Region 2554																	
11 Jun	N08W33		317	20	3	Dro	4	B				2					
12 Jun	N08W45		316	90	4	Dao	6	B									
13 Jun	N08W58		315	130	5	Dao	6	B				1					
14 Jun	N08W72		316	100	6	Dso	5	B									
15 Jun	N08W85		316	50	2	Hsx	1	A									
									0	0	0	3	0	0	0	0	0

Crossed West Limb.
 Absolute heliographic longitude: 317



Region Summary - continued

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 2555

16 Jun	S09W57	273	30	4	Cao	4	B					6					
17 Jun	S09W70	274	80	5	Cao	4	B					1					
18 Jun	S09W83	274	20	6	Bxo	3	B										
								0	0	0	7	0	0	0	0	0	

Crossed West Limb.
Absolute heliographic longitude: 273

Region 2556

17 Jun	N05E72	132	30	1	Hsx	1	A										
18 Jun	N05E57	134	30	1	Hsx	1	A										
19 Jun	N06E43	135	30	2	Hsx	1	A										
								0	0	0	0	0	0	0	0	0	

Still on Disk.
Absolute heliographic longitude: 135

Region 2557

18 Jun	N10E07	184	10	1	Axx	1	A										
19 Jun	N09W07	185	10	1	Axx	1	A										
								0	0	0	0	0	0	0	0	0	

Still on Disk.
Absolute heliographic longitude: 184

Region 2558

19 Jun	N13W37	215	30	5	Cso	5	B	1									
								1	0	0	0	0	0	0	0	0	

Still on Disk.
Absolute heliographic longitude: 215

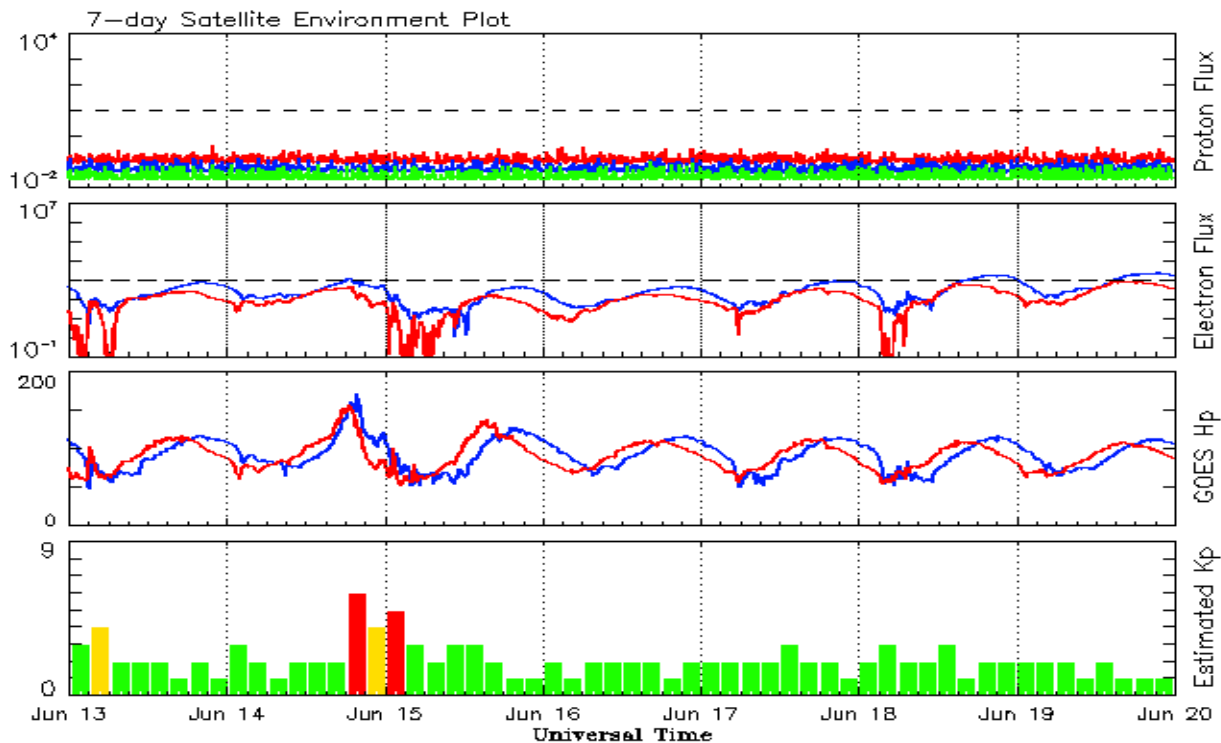


**Recent Solar Indices (preliminary)
Observed monthly mean values**

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
2014									
June	107.7	61.7	0.66	121.4	68.5	122.2	145.5	7	8.4
July	113.6	60.1	0.64	120.4	67.6	137.3	145.2	5	8.8
August	106.2	64.1	0.70	115.1	65.0	124.7	142.8	9	8.9
September	127.4	78.0	0.69	107.4	61.1	146.1	140.1	11	9.3
October	92.0	54.0	0.66	101.7	58.4	153.7	138.4	10	9.9
November	101.8	62.2	0.69	97.9	56.8	155.3	137.4	10	10.1
December	120.0	67.7	0.65	95.2	55.3	158.7	137.0	12	10.5
2015									
January	101.2	55.8	0.66	92.1	53.6	141.7	135.8	10	11.0
February	70.6	40.0	0.63	88.3	51.7	128.8	133.8	10	11.5
March	61.7	32.7	0.62	84.2	49.3	126.0	131.2	17	12.0
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	39.6	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	36.8	109.6	105.3	13	12.5
December	54.1	34.8	0.64			112.8		15	
2016									
January	50.4	34.0	0.67			103.5		10	
February	56.0	34.3	0.61			103.5		10	
March	40.9	32.9	0.80			91.6		11	
April	39.2	22.8	0.58			93.4		10	
May	48.9	31.3	0.64			93.1		12	

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 June 2016*

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.

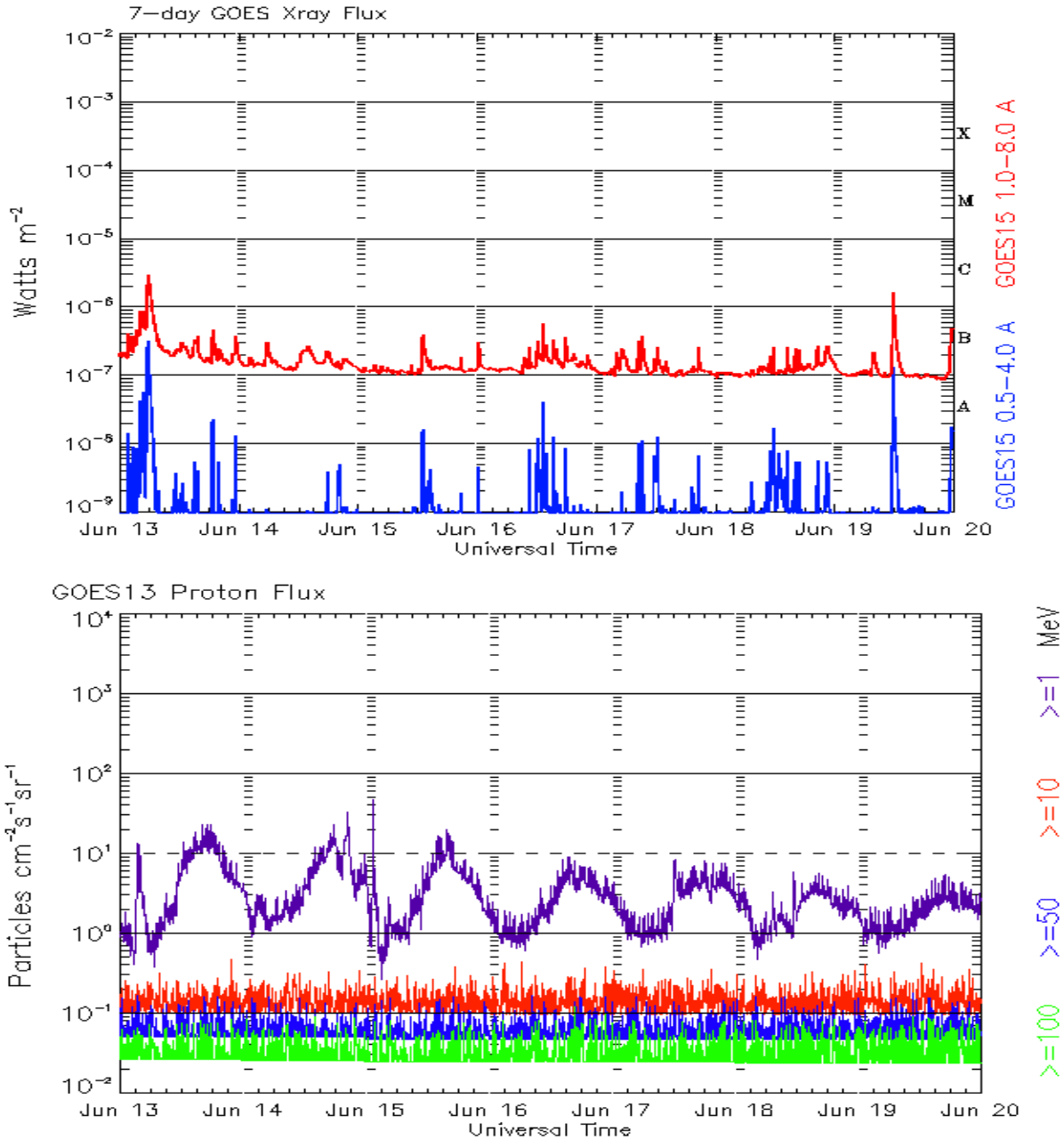
The electron flux plot contains the five-minute averaged integral electron flux (electrons/cm²-sec -sr) with energies greater than 2 MeV by the SWPC Primary GOES satellite.

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 13 June 2016*

The x-ray plots contains five-minute averages x-ray flux (Watt/m²) 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/cm² -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

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