Space Weather Highlights
09 May - 15 May 2016

SWPC PRF 2124
16 May 2016

Solar activity was low and only C-class flare activity was observed. Region 2543 (S05, L=002, class/area=Dao/90 on 10 May) produced a C7 flare at 14/1134 UTC which was the largest event of the period. Region 2544 (N21,L=296, class/area=Dao/150 on 15 May) produced five low-level C-class flares on 15 May, the largest being a C1 at 15/0502 UTC. Region 2542 (N12, L=357, class/area=Dai/150 on 09 May) produced a long-duration C3 flare at 15/1603 UTC with an associated filament eruption and partial-halo coronal mass ejection (CME) that departed off of the west limb. Forecaster analysis and WSA/Enlil modelling determined that the CME did not have an Earth-directed component. There were no Earth-directed CMEs during the period.

No proton events were observed at geosynchronous orbit. However, a slight enhancement was observed on 15 May associated with a long-duration C3 flare and filament eruption near Region 2542. A peak flux of 2 pfu was observed on 15 May at 2315 UTC.

The greater than 2 MeV electron flux at geosynchronous orbit was at very high levels from 09-13 May due to the influences of a negative polarity coronal hole high speed stream (CH HSS). High levels were observed on 14 May and moderate levels rounded out the week on 15 May.

Geomagnetic field activity was at unsettled to G3 (Strong) geomagnetic storm levels on 09 May due to the residual effects of a co-rotating interaction region and subsequent negative polarity coronal hole high speed stream (CH HSS). Mainly quiet to unsettled conditions were observed for 10-14 May with a nominal solar wind. A positive polarity CH HSS became connected with Earths magnetic field on 15 May causing quiet to active conditions.

Space Weather Outlook
16 May - 11 June 2016

Solar activity is expected to be at very low (B-class flares) to low (C-class flares) levels throughout the outlook 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 16-23 May, 30 May-02 Jun, and 06-10 Jun. Moderate flux levels are expected for the remainder of the period.

Geomagnetic field activity is expected to reach G1 (Minor) geomagnetic storm levels on 16, 19-20 May due to the influence of recurrent positive polarity coronal hole high speed streams (CH HSS). G1 (Minor) storm levels are also expected on 29 May and 04-05 June due to the influnce of negative polarity CH HSSs.

Daily Solar Data

Date	Radio Flux 10.7cm	Sun spot No.	Sunspot Area (10^{-6} hemi.)	X-ray Background		Flares						
						X-ray			Optical			
				Flux		C	M	X	S	1	2	3	4
09 May	89	68	210	B2.1	0	0	0	4	0	0	0	0
10 May	89	70	270	B2.6	0	0	0	2	0	0	0	0
11 May	94	72	300	B2.5	0	0	0	1	0	0	0	0
12 May	92	67	350	B1.9	0	0	0	2	0	0	0	0
13 May	93	76	290	B2.3	0	0	0	6	0	0	0	0
14 May	101	88	510	B2.8	3	0	0	5	1	0	0	0
15 May	108	78	770	B3.7	8	0	0	15	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
09 May	1.1e+06	1.3e+04	3.1e+03	3.4e+08		
10 May	1.3e+06	1.3e+04	3.2e+03	1.6e+09		
11 May	4.4e+05	1.3e+04	3.3e+03	2.2e+09		
12 May	3.5e+05	1.3e+04	3.2e+03	2.5e+09		
13 May	3.0e+05	1.4e+04	3.3e+03	1.1e+09		
14 May	3.2e+05	1.3e+04	3.3e+03	6.4e+07		
15 May	3.9e+05	3.4e+04	3.3e+03	6.8e+06		

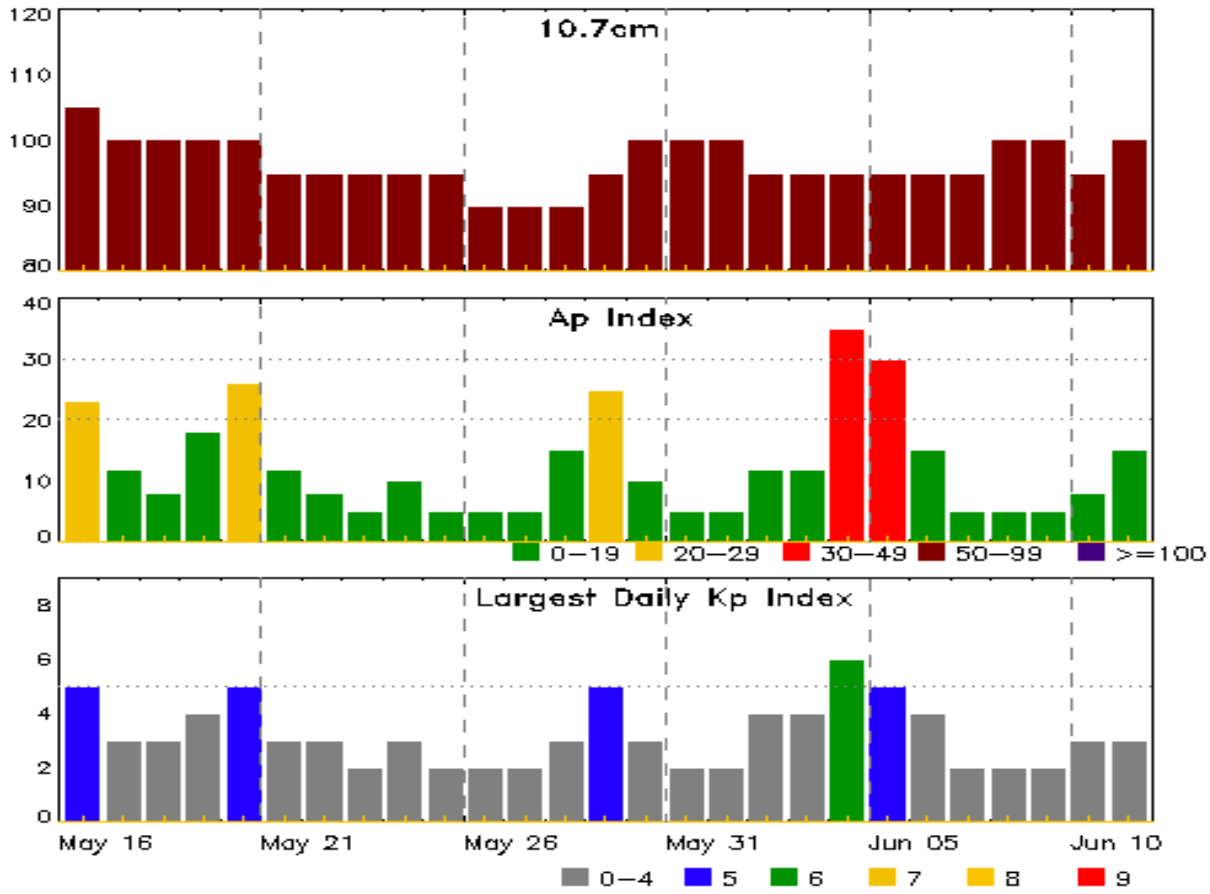
Daily Geomagnetic Data

Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
09 May	21	5-4-3-3-3-3-3-3	41	5-4-5-6-5-5-3-3	33	7-4-3-3-3-3-4-4
10 May	15	3-4-3-3-3-2-3-2	43	3-4-6-6-6-5-2-2	16	3-4-3-3-3-2-3-3
11 May	6	3-2-1-1-1-1-1-2	4	2-2-1-0-0-1-1-2	6	3-2-1-1-1-1-1-2
12 May	4	1-1-1-2-2-0-1-1	5	1-1-1-3-2-0-1-1	4	1-2-1-2-1-0-1-2
13 May	9	1-1-3-2-3-2-3-2	11	1-1-4-3-3-3-2-1	8	1-1-3-2-2-2-3-2
14 May	10	2-2-2-3-2-1-3-3	22	2-3-4-6-3-2-2-3	10	3-2-3-3-2-1-2-3
15 May	12	3-2-3-2-3-3-3-2	25	3-3-3-2-6-5-3-1	15	3-2-2-2-3-3-4-2

Alerts and Warnings Issued

Date & Time of Issue UTC	Type of Alert or Warning	Date & Time of Event UTC
09 May 0115	ALERT: Geomagnetic K = 6	09/0115
09 May 0122	ALERT: Electron 2MeV Integral Flux >= 1000pfu	09/0105
09 May 0301	ALERT: Geomagnetic K = 7	09/0259
09 May 0556	EXTENDED WARNING: Geomagnetic K = 5	08/0135 - 09/1200
09 May 0556	EXTENDED WARNING: Geomagnetic K = 4	07/2340 - 09/1800
09 May 0931	CONTINUED ALERT: Electron 2MeV Integral Flux >= 1000pfu	09/0105
09 May 1705	EXTENDED WARNING: Geomagnetic K = 4	07/2340 - 10/1200
09 May 1933	WARNING: Geomagnetic K = 5	09/1935 - 10/0600
10 May 0500	CONTINUED ALERT: Electron 2MeV Integral Flux >= 1000pfu	09/0105
10 May 0552	EXTENDED WARNING: Geomagnetic K = 5	09/1935 - 10/1500
10 May 0552	EXTENDED WARNING: Geomagnetic K = 4	07/2340 - 10/1800
10 May 1744	EXTENDED WARNING: Geomagnetic K = 4	07/2340 - 11/0600
11 May 0501	CONTINUED ALERT: Electron 2MeV Integral Flux >= 1000pfu	09/0105
12 May 0500	CONTINUED ALERT: Electron 2MeV Integral Flux >= 1000pfu	09/0105
13 May 0500	CONTINUED ALERT: Electron 2MeV Integral Flux >= 1000pfu	09/0105
13 May 1701	WATCH: Geomagnetic Storm Category G1 predicted	
14 May 1146	CONTINUED ALERT: Electron 2MeV Integral Flux >= 1000pfu	09/0105
15 May 0642	WARNING: Geomagnetic K = 4	15/0645 - 1800
15 May 1732	EXTENDED WARNING: Geomagnetic K = 4	15/0645 - 16/1300
15 May 2102	ALERT: Geomagnetic K = 4	15/2059

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
16 May	105	23	5	30 May	100	10	3
17	100	12	3	31	100	5	2
18	100	8	3	01 Jun	100	5	2
19	100	18	4	02	95	12	4
20	100	26	5	03	95	12	4
21	95	12	3	04	95	35	6
22	95	8	3	05	95	30	5
23	95	5	2	06	95	15	4
24	95	10	3	07	95	5	2
25	95	5	2	08	100	5	2
26	90	5	2	09	100	5	2
27	90	5	2	10	95	8	3
28	90	15	3	11	100	15	3
29	95	25	5				

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 #
09 May	0511	0523	0534	B9.4	SF	N01W15	2541
09 May	1617	1620	1622	B3.3			2542
09 May	1739	1748	1800	B6.8	SF	N09E06	2542
09 May	2151	2151	2203		SF	S21E19	
09 May	2333	2343	2353	B8.1	SF	S06E01	2543
10 May	0127	U0129	A0131		SF	S04E01	2543
10 May	0333	0335	0348		SF	S06E01	2543
11 May	1056	1059	1101	B5.7			2542
11 May	1119	1122	1124	B4.2			2542
11 May	1414	1422	1427	B8.2	SF	N09W19	2542
12 May	0340	0346	0350		SF	N21E33	2544
12 May	0831	0831	0835		SF	N09W28	2542
12 May	1220	1223	1227	B5.3			2544
12 May	1606	1610	1614	B4.7			2542
13 May	0508	0509	0511	B3.1	SF	N08W39	2542
13 May	1616	1621	1624	B7.4	SF	N20E22	2544
13 May	1705	1706	1708		SF	S02W48	2543
13 May	1948	1957	2027		SF	N22E19	2544
13 May	2047	2050	2052	B4.6			2544
13 May	2148	2256	2211		SF	N22E18	2544
13 May	2227	2239	2251	B4.9	SF	N22E11	2544
14 May	0051	0054	0056	B5.8	SF	S04W49	2543
14 May	0342	0345	0348	B4.4			2543
14 May	0534	0537	0539	B3.8			2543
14 May	0618	0622	0625	B6.1			2543
14 May	B0653	U0658	A0659		SF	S07W54	2543
14 May	0744	0752	0758	B7.6	SF	N07W53	2542
14 May	0921	0931	0934	C2.5	SF	S07W56	2543
14 May	0939	0952	1002	B9.0	SF	N20E07	2544
14 May	1052	1056	1059	B6.3			2543
14 May	1125	U1134	1157	C7.4	1N	S07W58	2543

Flare List

Date	Time			Optical			
	Begin	Max	End	X-ray Class	Imp/ Brtns	Location Lat CMD	Rgn #
14 May	1515	1519	1522	C4.8			2543
14 May	1737	1741	1743	B8.4			2543
14 May	1922	1927	1930	B6.3			
14 May	2311	2315	2323	B6.7			
15 May	0247	0255	0302		SF	N21E33	2544
15 May	0325	0332	0334		SF	N21E33	2544
15 May	0340	0345	0352	B9.0			2544
15 May	0357	0359	0402		SF	S21W51	2545
15 May	0358	0409	0416	C4.9			2543
15 May	0359	0407	0430		SF	N21E33	2544
15 May	0403	0407	0414		SF	S05W63	2543
15 May	0457	0502	0505	C1.3	SF	N21E33	2544
15 May	0515	0523	0530		SF	N21E33	2544
15 May	0704	0705	0713		SF	N21E33	2544
15 May	0802	0804	0806		SF	S21W51	2545
15 May	0806	0820	0831		SF	N21E33	2544
15 May	0818	0824	0830	C2.9	SF	S05W63	2543
15 May	0948	0951	0954	C1.3			2544
15 May	B1003	U1003	A1025		SF	N21W06	2544
15 May	1151	1159	1204	C1.2			2544
15 May	1355	1400	1406	C1.1			2544
15 May	1444	1448	1451	B6.1			2544
15 May	1519	1603	1733	C3.2	SF	N10W62	2542
15 May	B1537	U1539	A1543		SF	N20W10	2544
15 May	B1548	U1602	A1633		SF	N20W10	2544
15 May	1910	1913	1917	C1.5			2544

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 2539												
28 Apr	N17E66	80	30	2	Hax	1	A								
29 Apr	N17E51	82	30	2	Cao	2	B								
30 Apr	N17E38	81	50	8	Cao	6	B	1							
01 May	N16E22	84	100	12	Eai	8	B	2							
02 May	N16E07	86	70	13	Eai	7	B				1				
03 May	N16W05	85	50	13	Eao	7	B				1				
04 May	N16W18	85	10	13	Bxo	3	B				1				
05 May	N16W29	82	20	9	Hrx	4	A								
06 May	N17W38	77	10	2	Axx	2	A								
07 May	N16W51	78	0	1	Axx	1	A								
08 May	N16W65	79	plage												
09 May	N16W79	79	plage												
								3	0	0	3	0	0	0	0

Crossed West Limb.
Absolute heliographic longitude: 85

			Region 2540												
30 Apr	N21E51	68	20	2	Hrx	2	A								
01 May	N21E38	68	20	2	Hrx	3	A								
02 May	N22E24	69	10	3	Bxo	3	B	1							
03 May	N22E10	70	plage												
04 May	N22W03	70	plage												
05 May	N22W17	70	plage												
06 May	N22W31	71	plage												
07 May	N22W45	72	plage												
08 May	N22W59	73	plage												
09 May	N22W73	73	plage												
10 May	N22W87	74	plage												
								1	0	0	0	0	0	0	0

Crossed West Limb.
Absolute heliographic longitude: 70

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 2541													
02 May	N04E64	29	10	1	Bxo	3	B								
03 May	N04E52	28	20	4	Cro	4	B								
04 May	N04E39	28	20	4	Cro	3	B				1				
05 May	N04E28	25	30	4	Dro	6	B								
06 May	N04E14	25	10	7	Bxi	10	B				2				
07 May	N04W00	27	20	5	Cro	5	B	1			2	1			
08 May	N04W14	28	0	1	Axx	1	A								
09 May	N04W29	29	0		Axx	1	A				1				
10 May	N04W44	31	plage												
11 May	N04W59	33	plage												
12 May	N04W74	35	plage												
13 May	N04W89	37	plage												
								1	0	0	6	1	0	0	0

Crossed West Limb.
Absolute heliographic longitude: 27

		Region 2542													
04 May	N09E70	356	250	3	Cko	2	B	1				1			
05 May	N10E56	357	120	3	Cso	3	B				1				
06 May	N10E42	357	150	4	Cso	3	B								
07 May	N11E28	359	170	5	Hax	4	A								
08 May	N12E16	358	100	5	Cao	8	B								
09 May	N12E03	357	150	5	Dai	16	BG				1				
10 May	N12W11	358	130	6	Cao	15	BG								
11 May	N11W23	357	130	6	Cai	12	B				1				
12 May	N10W36	357	160	6	Dai	11	BG				1				
13 May	N10W50	358	160	5	Dac	16	B				1				
14 May	N10W64	358	140	6	Dac	12	B				1				
15 May	N11W77	358	110	4	Cai	4	B	1							
								2	0	0	6	1	0	0	0

Still on Disk.
Absolute heliographic longitude: 357

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 2543												
08 May	S06E12	2	10	4	Bxo	3	B								
09 May	S05W03	3	30	4	Dso	7	B				1				
10 May	S05W15	2	90	6	Dao	10	BG				2				
11 May	S05W27	1	110	7	Dai	9	B								
12 May	S05W40	1	80	7	Dso	8	B								
13 May	S05W54	2	40	6	Dao	6	B				1				
14 May	S05W69	3	20	6	Cao	4	B	3			3	1			
15 May	S05W80	1	30	5	Cro	3	B	2			2				
								5	0	0	9	1	0	0	0

Still on Disk.
Absolute heliographic longitude: 3

			Region 2544												
09 May	N21E60	300	30	3	Cro	4	B								
10 May	N20E45	302	40	4	Dso	4	B								
11 May	N21E33	301	30	8	Cso	6	B								
12 May	N20E21	300	20	5	Cro	3	B				1				
13 May	N21E11	297	20	7	Cro	6	B				4				
14 May	N21W01	294	40	8	Dao	10	B				1				
15 May	N21W15	296	150	9	Dai	14	BG	5			10				
								5	0	0	16	0	0	0	0

Still on Disk.
Absolute heliographic longitude: 294

			Region 2545												
10 May	S21E05	342	10	1	Hrx	1	A								
11 May	S21W09	343	30	5	Cro	5	B								
12 May	S21W21	342	90	6	Dai	5	B								
13 May	S21W35	343	70	7	Cao	8	B								
14 May	S21W49	343	60	7	Cao	11	B								
15 May	S21W65	346	70	4	Cao	4	B				2				
								0	0	0	2	0	0	0	0

Still on Disk.
Absolute heliographic longitude: 342

Region Summary - continued

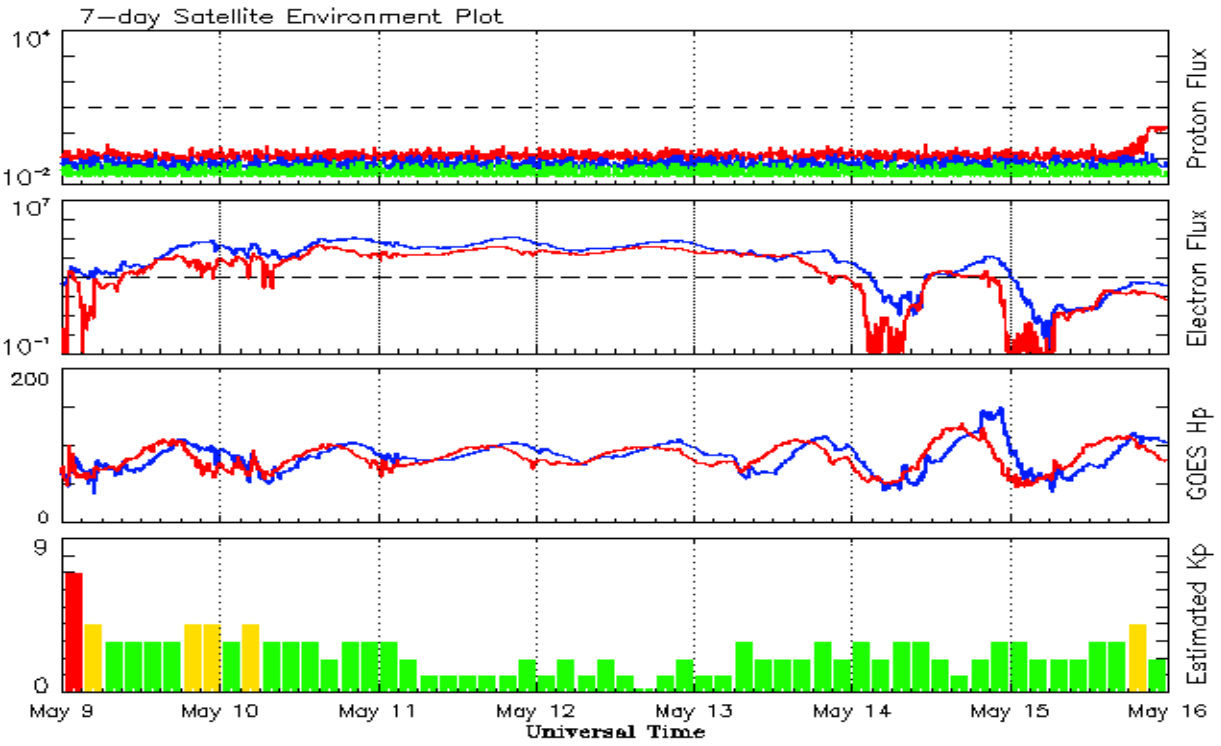
	Location		Sunspot Characteristics					Flares							
		Helio	Area	Extent	Spot	Spot	Mag	X-ray			Optical				
Date	Lat CMD	Lon	10^{-6} hemi.	(helio)	Class	Count	Class	C	M	X	S	1	2	3	4
		Region 2546													
14 May	S07E71	223	250	6	Hhx	1	A								
15 May	S07E57	224	410	5	Hhx	3	A								
								0	0	0	0	0	0	0	0

Still on Disk.
Absolute heliographic longitude: 224

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
				2014					
May	116.8	67.5	0.64	122.3	69.0	130.0	144.7	7	7.9
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			109.6		13	
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	

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 09 May 2016

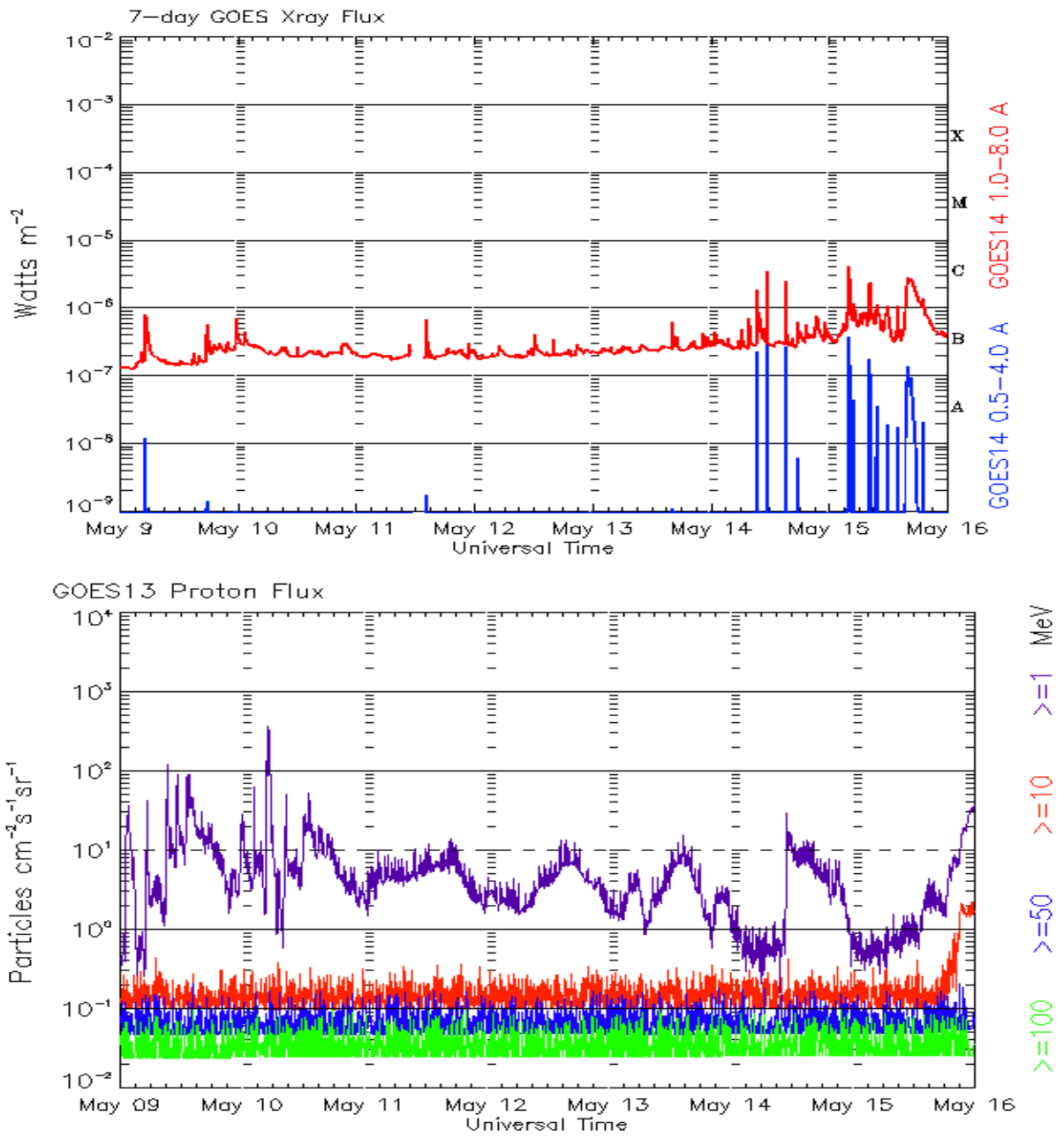
The proton flux plot contains the five-minute averaged integral proton flux (protons/cm^2-sec -sr) as measured by the SWPC Primary GOES satellite, near West 75, for each of three energy thresholds: greater than 10, 50, and 100 MeV.

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 09 May 2016

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.

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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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