

**Space Weather Highlights**  
**15 August - 21 August 2016**

**SWPC PRF 2138**  
**22 August 2016**

Solar activity was at low levels on 15 August due to an isolated C1 flare at 15/0023 UTC from Region 2578 (N09, L=084, class/area Cro/020 on 18 Aug). Very low levels were observed from 16-21 August. Although Regions 2574 (N05, L=173, class/area Dho/290 on 09 Aug), 2576 (S15, L=160, class/area Hsx/140 on 10 Aug), 2577 (N03, L=164, class/area Dso/130 on 12 Aug), and 2578 were on the visible disk during the period, the regions appeared to be in slow decay. No Earth-directed coronal mass ejections were observed.

No proton events were observed at geosynchronous orbit.

The greater than 2 MeV electron flux at geosynchronous orbit was at high levels on 15-16 August, moderate levels on 17 and 19-21 August and normal levels on 18 August. The largest flux of the period was 9,570 pfu observed at 15/1605 UTC.

Geomagnetic field activity was at mostly quiet to unsettled levels with an isolated active period observed on 21 August due to a pair of weak, negative polarity coronal hole high speed streams (CH HSS). Quiet levels were observed on 15 August under a nominal solar wind regime. By early on 17 August, solar wind speed increased to 435 km/s while total field increased to near 9 nT. Quiet to unsettled levels were observed from 16-18 August with quiet levels on 19-20 August. Solar wind speed decreased slowly until midday on 21 August when another CH HSS became geoeffective. The geomagnetic field responded with quiet to active levels on 21 August.

**Space Weather Outlook**  
**22 August - 17 September 2016**

Solar activity is expected to be at very low to low levels through the forecast period (22 Aug-17 Sep).

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 26-28 August and from 31 August-12 September as a result of recurrent CH HSS activity.

Geomagnetic field activity is expected to be at unsettled to active levels from 23-25 August, 29 August-08 September, 13-14 September, and again on 17 September with G1 (Minor) storm levels likely on 30-31 August due to recurrent CH HSS activity.



### *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
15 August	88	70	440	A9.9	1	0	0	0	0	0	0	0
16 August	87	81	310	A9.1	0	0	0	1	0	0	0	0
17 August	83	64	270	A8.2	0	0	0	1	0	0	0	0
18 August	82	54	250	A8.2	0	0	0	0	0	0	0	0
19 August	81	37	130	A8.6	0	0	0	0	0	0	0	0
20 August	78	12	10	A9.4	0	0	0	1	0	0	0	0
21 August	77	11	10	A8.3	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
	15 August	8.7e+05	1.3e+04	3.2e+03	4.6e+08	
16 August	6.7e+05	1.3e+04	3.1e+03	2.3e+08		
17 August	2.6e+05	1.3e+04	3.2e+03	4.9e+06		
18 August	2.0e+05	1.3e+04	3.2e+03	1.6e+06		
19 August	1.8e+05	1.3e+04	3.1e+03	5.7e+06		
20 August	1.7e+05	1.3e+04	3.0e+03	7.1e+06		
21 August	4.4e+05	1.4e+04	3.2e+03	8.2e+06		

### *Daily Geomagnetic Data*

Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
	15 August	4	0-1-2-2-2-2-1-0	2	0-0-2-2-1-0-0-0	4
16 August	8	0-0-1-2-3-2-1-4	5	0-0-0-2-3-2-1-2	6	1-0-1-1-2-1-1-3
17 August	12	3-3-2-2-2-1-4-3	10	3-4-2-1-3-0-1-2	9	3-3-2-1-2-0-2-3
18 August	8	2-2-1-3-3-2-1-2	7	2-3-3-2-2-0-0-1	7	2-3-2-2-2-1-1-2
19 August	5	0-0-1-2-3-2-2-0	4	0-0-2-2-2-2-1-0	5	1-1-2-2-2-1-1-1
20 August	4	1-2-2-1-2-1-1-0	3	2-2-2-1-0-0-0-0	4	2-2-2-1-1-0-0-1
21 August	9	0-1-1-2-3-3-3-3	6	0-0-1-1-2-4-1-1	2	0-1-1-1-3-4-3-3



### *Alerts and Warnings Issued*

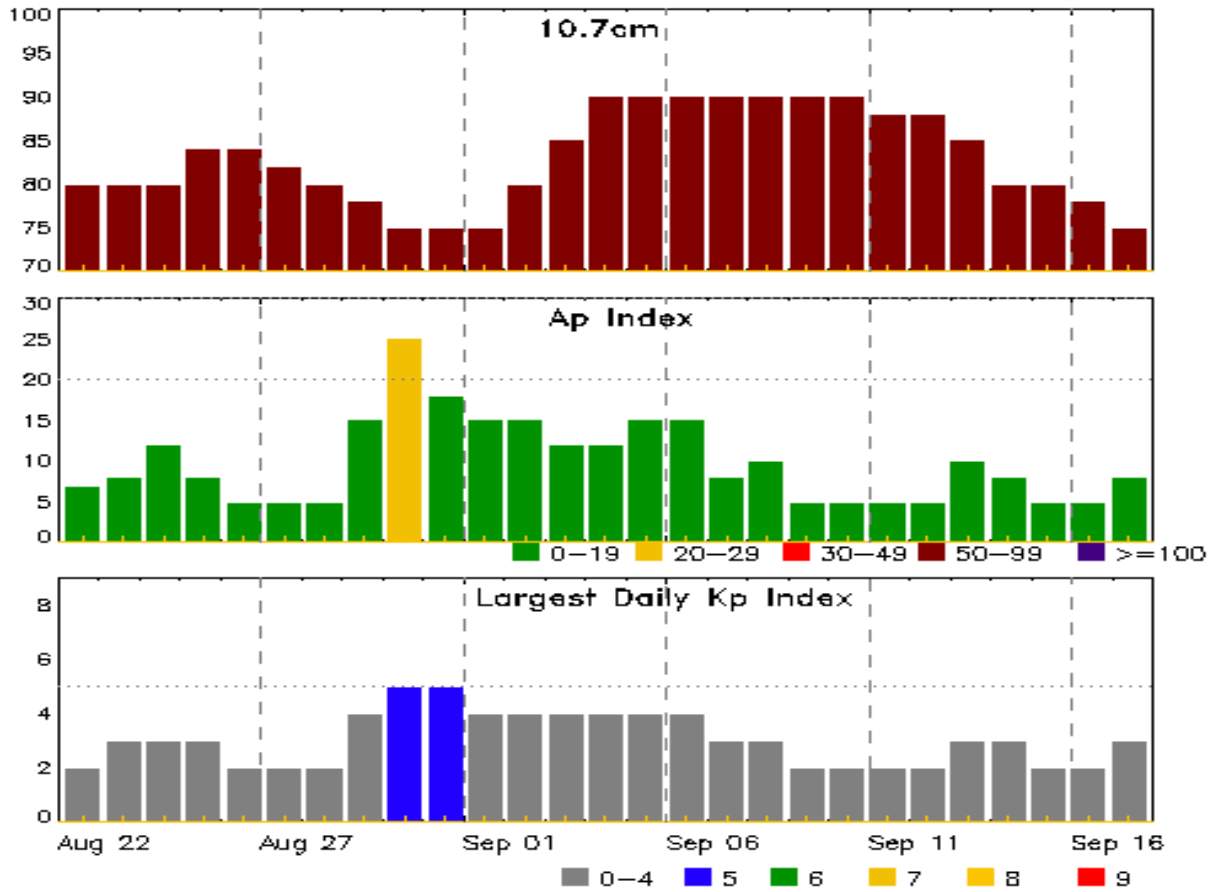
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<b>Date &amp; Time of Issue UTC</b>	<b>Type of Alert or Warning</b>	<b>Date &amp; Time of Event UTC</b>
15 Aug 0500	CONTINUED ALERT: Electron 2MeV Integral Flux $\geq$ 1000pfu	04/1315
16 Aug 0501	CONTINUED ALERT: Electron 2MeV Integral Flux $\geq$ 1000pfu	04/1315
16 Aug 2312	WARNING: Geomagnetic K = 4	16/2311 - 17/0600
21 Aug 1556	WARNING: Geomagnetic K = 4	21/1555 - 2100
21 Aug 1807	ALERT: Geomagnetic K = 4	21/1759

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## 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
22 Aug	80	7	2	05 Sep	90	15	4
23	80	8	3	06	90	15	4
24	80	12	4	07	90	8	3
25	84	8	3	08	90	10	3
26	84	5	2	09	90	5	2
27	82	5	2	10	90	5	2
28	80	5	2	11	88	5	2
29	78	15	4	12	88	5	2
30	75	25	5	13	85	10	3
31	75	18	5	14	80	8	3
01 Sep	75	15	4	15	80	5	2
02	80	15	4	16	78	5	2
03	85	12	4	17	75	8	3
04	90	12	4				



### *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	Imp/ Brtns	Optical		Rgn #
	Begin	Max	End			Location Lat CMD	Rgn #	
15 Aug	0017	0023	0029	C1.1				2578
16 Aug	0808	0818	0824	B8.1	SF	N11E58		2578
17 Aug	0230	0234	0238	B2.2				
17 Aug	0956	1001	1006	B3.5	SF	S15W30		2576
18 Aug	1411	1414	1417	B1.3				
20 Aug	0551	0600	0607	B4.4	SF	N10E06		2578



## 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

### Region 2573

07 Aug	N04E71	177	60	5	Dso	2	B											
08 Aug	N04E62	173	90	7	Cso	5	B											
								0	0	0	0	0	0	0	0	0	0	0

Died on Disk.

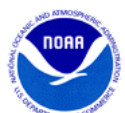
Absolute heliographic longitude: 173

### Region 2574

07 Aug	N08E72	177	60	4	Dso	2	B											
08 Aug	N14E65	170	20	3	Bxo	2	B	3			14	1						
09 Aug	N05E49	173	290	9	Dho	6	B	2			3							
10 Aug	N05E35	175	240	12	Cao	6	B				1							
11 Aug	N04E21	176	240	7	Cao	7	B	1			2							
12 Aug	N04E07	177	200	5	Cao	4	B				4							
13 Aug	N05W04	174	160	5	Cao	6	B											
14 Aug	N05W17	174	170	7	Cso	7	B											
15 Aug	N05W31	175	180	7	Cso	8	B											
16 Aug	N05W43	174	110	4	Hsx	4	A											
17 Aug	N05W58	175	100	4	Hsx	3	A											
18 Aug	N06W71	175	90	5	Hsx	2	A											
19 Aug	N06W84	175	70	4	Hsx	2	A											
								6	0	0	24	1	0	0	0	0		

Crossed West Limb.

Absolute heliographic longitude: 174



**Region Summary - continued**

Date	Location		Sunspot Characteristics				Flares														
	Lat CMD	Lon	Helio 10 <sup>6</sup> hemi.	Extent (helio)	Spot Class	Spot Count	Mag Class	X-ray			Optical										
								C	M	X	S	1	2	3	4						
<b>Region 2575</b>																					
08 Aug	N16E66	170	30	5	Cso	2	B														
09 Aug	N16E52	170	50	6	Cso	2	B														
10 Aug	N15E37	173	10	1	Hrx	1	A														
11 Aug	N14E22	175	10	1	Hrx	2	A														
12 Aug	N14E08	176	10	2	Axx	2	A														
13 Aug	N14W04	174	10	1	Axx	2	A														
14 Aug	N14W18	175	plage																		
15 Aug	N14W32	176	plage																		
16 Aug	N14W40	171	10	5	Bxo	3	B														
17 Aug	N14W56	173	plage																		
18 Aug	N14W70	174	plage																		
19 Aug	N14W84	175	plage																		
										0	0	0	0	0	0	0	0	0	0		

Crossed West Limb.  
 Absolute heliographic longitude: 174

<b>Region 2576</b>																					
08 Aug	S11E74	162	40	1	Hsx	1	A														
09 Aug	S11E60	163	40	1	Hsx	1	A														
10 Aug	S15E50	160	140	5	Hsx	2	A														
11 Aug	S13E35	162	140	3	Hsx	2	A														
12 Aug	S13E21	162	140	3	Hsx	2	A														
13 Aug	S12E10	160	130	3	Hsx	2	A														
14 Aug	S12W03	160	100	3	Hsx	2	A														
15 Aug	S12W17	161	110	3	Hsx	2	A														
16 Aug	S12W29	160	70	3	Hax	3	A														
17 Aug	S12W43	160	60	2	Hax	3	A						1								
18 Aug	S12W56	160	50	3	Hax	3	A														
19 Aug	S11W69	160	40	2	Hax	2	A														
20 Aug	S11W83	161	plage																		
										0	0	0	1	0	0	0	0	0	0		

Crossed West Limb.  
 Absolute heliographic longitude: 160



### *Region Summary - continued*

Date	Location		Sunspot Characteristics				Flares										
	Lat CMD	Lon	Helio 10 <sup>6</sup> hemi.	Extent (helio)	Spot Class	Spot Count	Mag Class	X-ray			Optical						
								C	M	X	S	1	2	3	4		
<b>Region 2577</b>																	
11 Aug	N03E33	164	20	4	Cro	4	B										
12 Aug	N03E19	164	130	5	Dso	10	B										
13 Aug	N04E07	165	90	5	Dao	8	B										
14 Aug	N04W07	164	80	5	Dao	7	B										
15 Aug	N04W21	165	50	5	Dao	4	B										
16 Aug	N04W34	165	10	5	Bxo	3	B										
17 Aug	N04W50	167	10		Axx	1	A										
18 Aug	N04W65	169	plage														
19 Aug	N04W80	171	plage														
								0	0	0	0	0	0	0	0	0	0

Crossed West Limb.

Absolute heliographic longitude: 165

<b>Region 2578</b>																	
14 Aug	N08E75	83	plage					1									
15 Aug	N08E61	83	10	1	Axx	1	A	1									
16 Aug	N08E49	82	20	3	Bxo	3	B				1						
17 Aug	N09E33	84	10	2	Axx	2	A										
18 Aug	N09E20	84	20	4	Cro	4	B										
19 Aug	N09E07	84	20	2	Cro	3	B										
20 Aug	N09W07	85	10	1	Axx	2	A				1						
21 Aug	N09W23	88	10	1	Axx	1	A										
								2	0	0	2	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 84



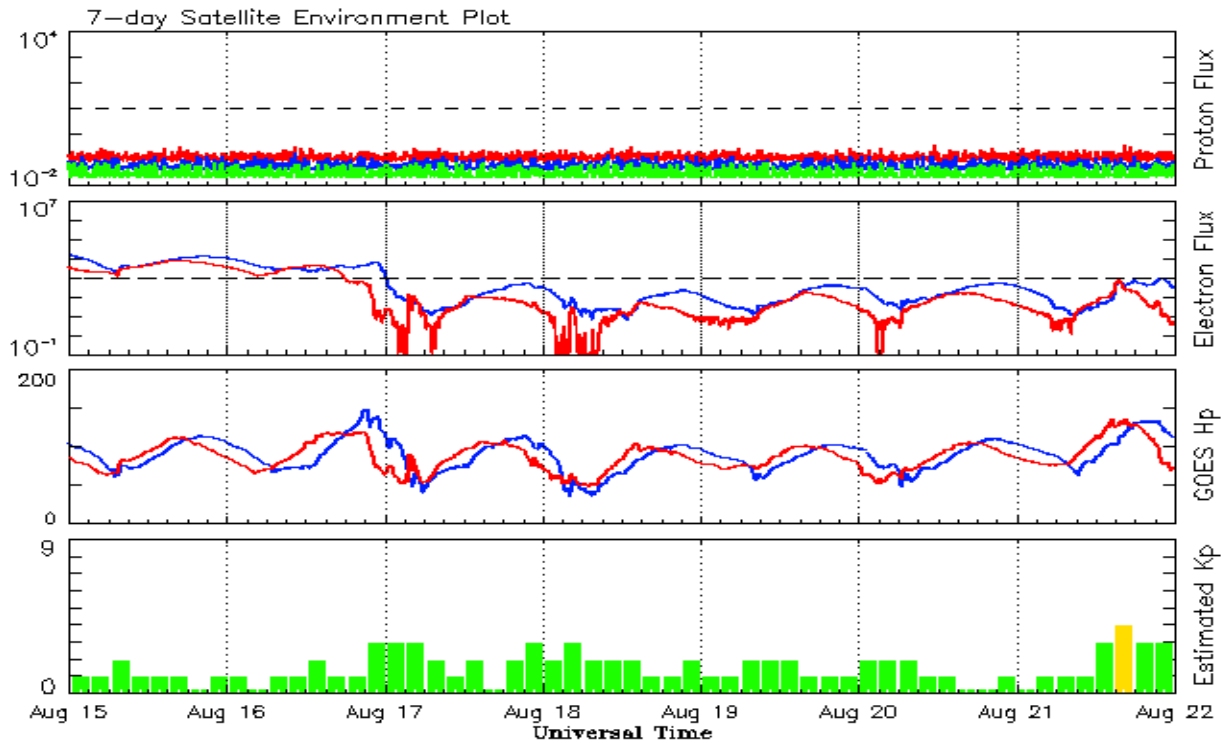


**Recent Solar Indices (preliminary)**  
**Observed monthly mean values**

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>2014</b>									
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
<b>2015</b>									
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	39.5	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	36.8	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
<b>2016</b>									
January	50.4	34.2	0.67	51.4	32.7	103.5	99.9	10	12.3
February	56.0	33.8	0.61			103.5		10	
March	40.9	32.5	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	
June	19.3	12.5	0.65			81.9		9	
July	36.8	19.5	0.53			85.9		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 15 August 2016*

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.

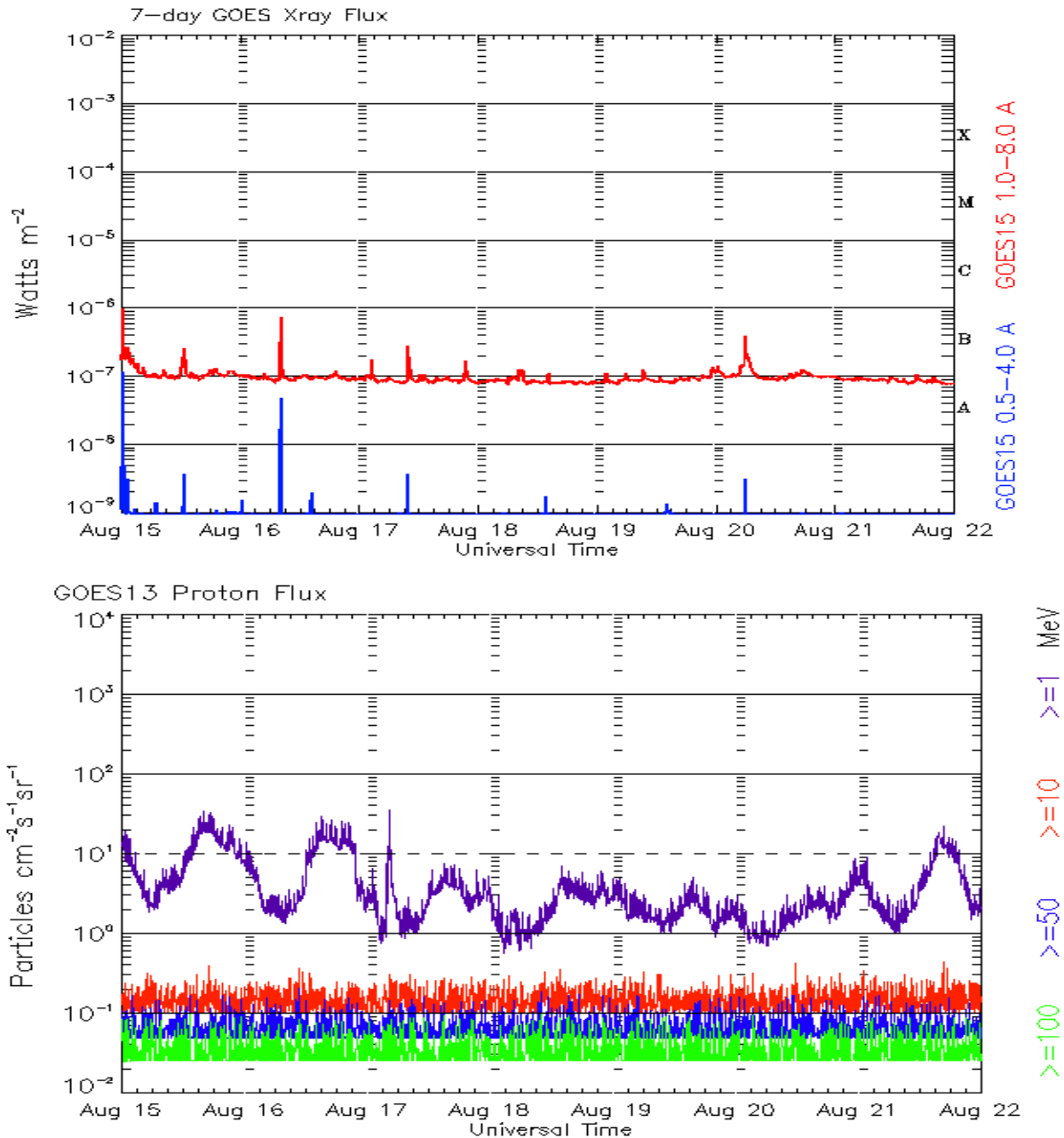
The electron flux plot contains the five-minute averaged integral electron flux (electrons/cm<sup>2</sup>-sec -sr) with energies greater than 2 MeV by the SWPC Primary GOES satellite.

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 15 August 2016*

The x-ray plots contains five-minute averages x-ray flux (Watt/m<sup>2</sup>) 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<sup>2</sup> -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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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

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