

**Space Weather Highlights**  
**19 September - 25 September 2016**

**SWPC PRF 2143**  
**26 September 2016**

Solar activity reached low levels this period due to isolated C-class flare activity. Region 2595 (N11, L=099, class/area=Dao/120 on 20 Sep) was the most productive region this period. In addition to multiple low-level C-class flares Region 2595 produced the largest event of the period, a C5 flare at 22/0547 UTC. Region 2597 (S13, L=349, class/area=Dsc/120 on 24 Sep) developed late in the week and produced an isolated C1 flare at 25/1914 UTC in addition to numerous B-class flares. No Earth-directed coronal mass ejections were observed this period.

No proton events were observed at geosynchronous orbit.

The greater than 2 MeV electron flux at geosynchronous orbit reached high levels on 21 Sep, moderate levels on 22-23 Sep, and was at normal levels throughout the remainder of the period.

Geomagnetic field activity reached G1 (Minor) geomagnetic storm levels on 20 Sep with active levels observed on 21 Sep in response to the influence of a negative polarity coronal hole high speed stream. G1 (Minor) storm levels were observed again on 25 Sep due to prolonged periods of southward interplanetary magnetic field orientation. Quiet conditions were observed on 22-24 Sep and quiet to unsettled levels were observed on 19 Sep under a background solar wind environment.

**Space Weather Outlook**  
**26 September - 22 October 2016**

Solar activity is expected to be at very low levels throughout the period with a chance for C-class flare activity.

No proton events are expected at geosynchronous orbit.

The greater than 2 MeV electron flux at geosynchronous orbit is expected to be very high on 02 Oct with high levels expected on 29 Sep-01 Oct, 03-11 Oct, and 18 Oct following periods of an enhanced solar wind environment associated with coronal hole high speed stream influence. Normal and normal to moderate flux levels are expected throughout the remainder of the period.

Geomagnetic field activity is likely to reach G2 (Moderate) geomagnetic storm levels on 28-30 Sep and G1 (Minor) storm levels on 26 Sep, 01-02 Oct, and 17 Oct due to the anticipated influence of multiple, recurrent coronal hole high speed solar wind streams. Active conditions are expected on 27 Sep, 03 Oct, and 18 Oct with generally quiet and quiet to unsettled conditions likely throughout the remainder of the period.



### *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
19 September	83	56	100	B1.2	0	0	0	3	0	0	0	0
20 September	85	32	170	B1.5	0	0	0	6	0	0	0	0
21 September	86	35	170	B2.0	2	0	0	5	0	0	0	0
22 September	85	30	100	B1.6	5	0	0	0	0	0	0	0
23 September	86	49	130	B1.2	0	0	0	0	0	0	0	0
24 September	85	47	180	B1.0	0	0	0	3	0	0	0	0
25 September	85	18	60	A9.8	1	0	0	4	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
	19 September		2.6e+05	1.4e+04	3.3e+03	
20 September		1.0e+06	1.3e+04	3.1e+03		1.6e+06
21 September		1.1e+06	1.3e+04	3.2e+03		4.5e+07
22 September		6.0e+05	1.4e+04	3.4e+03		2.4e+07
23 September		6.6e+05	1.3e+04	3.3e+03		2.3e+07
24 September		6.4e+05	1.3e+04	3.2e+03		1.3e+07
25 September		6.7e+05	1.5e+04	3.6e+03		4.3e+05

### *Daily Geomagnetic Data*

Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
	19 September	8	1-1-3-2-2-2-2-3	19	1-0-3-5-5-4-1-2	10
20 September	15	4-3-4-3-2-3-2-1	22	3-4-4-6-2-2-2-2	19	5-4-4-4-2-3-2-2
21 September	9	4-2-2-3-1-1-1-1	12	2-2-4-5-2-0-0-1	10	4-3-2-3-1-0-1-1
22 September	4	2-0-2-1-1-2-2-0	5	1-1-4-1-0-0-0-0	4	2-1-2-1-0-0-0-0
23 September	3	0-1-1-1-1-1-1-1	0	0-1-0-0-0-0-0-0	4	1-1-2-1-0-1-1-1
24 September	4	1-0-0-1-2-2-1-2	2	1-0-0-1-0-0-1-1	5	1-0-1-1-1-1-2-2
25 September	12	3-3-1-2-1-2-4-3	17	3-4-1-5-3-2-3-2	27	4-5-1-3-3-3-5-4

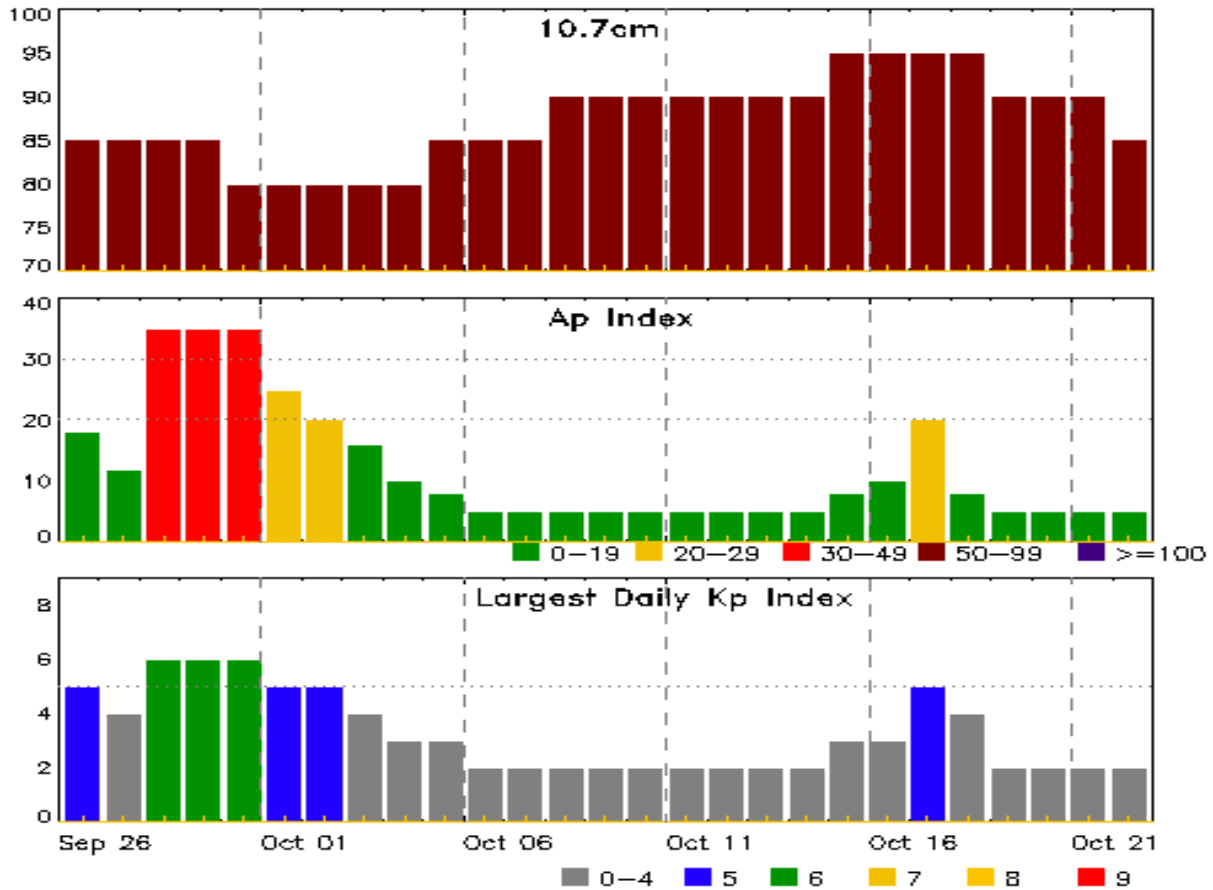


### *Alerts and Warnings Issued*

Date & Time of Issue UTC	Type of Alert or Warning	Date & Time of Event UTC
19 Sep 1536	WARNING: Geomagnetic K = 4	19/1535 - 2300
19 Sep 1926	WARNING: Geomagnetic K = 5	19/1925 - 2300
19 Sep 2240	EXTENDED WARNING: Geomagnetic K = 4	19/1535 - 20/0700
20 Sep 0027	WARNING: Geomagnetic K = 5	20/0030 - 0600
20 Sep 0135	ALERT: Geomagnetic K = 4	20/0135
20 Sep 0301	ALERT: Geomagnetic K = 5	20/0259
20 Sep 0634	EXTENDED WARNING: Geomagnetic K = 4	19/1535 - 20/1600
20 Sep 1536	EXTENDED WARNING: Geomagnetic K = 4	19/1535 - 21/0300
21 Sep 0210	EXTENDED WARNING: Geomagnetic K = 4	19/1535 - 20/1400
21 Sep 0211	CANCELLATION: Geomagnetic K = 4	
21 Sep 0213	WARNING: Geomagnetic K = 4	21/0210 - 1400
21 Sep 0217	WARNING: Geomagnetic K = 5	21/0220 - 0800
21 Sep 0225	ALERT: Geomagnetic K = 4	21/0210
21 Sep 1430	ALERT: Electron 2MeV Integral Flux >= 1000pfu	21/1430
25 Sep 0202	WARNING: Geomagnetic K = 4	25/0200 - 1200
25 Sep 0222	ALERT: Geomagnetic K = 4	25/0220
25 Sep 0417	WARNING: Geomagnetic K = 5	25/0415 - 0900
25 Sep 0559	ALERT: Geomagnetic K = 5	25/0559
25 Sep 2022	WARNING: Geomagnetic K = 4	25/2022 - 26/0600
25 Sep 2028	ALERT: Geomagnetic K = 4	25/2028
25 Sep 2035	WARNING: Geomagnetic K = 5	25/2035 - 2300
25 Sep 2037	ALERT: Geomagnetic K = 5	25/2037
25 Sep 2105	WATCH: Geomagnetic Storm Category G2 predicted	
25 Sep 2330	EXTENDED WARNING: Geomagnetic K = 4	25/2022 - 26/1200
25 Sep 2330	WARNING: Geomagnetic K = 5	25/2330 - 26/0600



## 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
26 Sep	85	18	5	10 Oct	90	5	2
27	85	12	4	11	90	5	2
28	85	35	6	12	90	5	2
29	85	35	6	13	90	5	2
30	80	35	6	14	90	5	2
01 Oct	80	25	5	15	95	8	3
02	80	20	5	16	95	10	3
03	80	16	4	17	95	20	5
04	80	10	3	18	95	8	4
05	85	8	3	19	90	5	2
06	85	5	2	20	90	5	2
07	85	5	2	21	90	5	2
08	90	5	2	22	85	5	2
09	90	5	2				



## *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	Location Lat CMD	Rgn #
	Begin	Max	End				
19 Sep	0459	0502	0504	B1.8			
19 Sep	0507	0512	0515		SF	N07E10	2593
19 Sep	0732	0742	0752	B5.3			2592
19 Sep	1145	U1148	A1203		SF	N08W52	
19 Sep	1354	1356	1403		SF	N11W50	
19 Sep	1946	1953	2001	B4.5			2595
19 Sep	2106	2111	2114	B3.2			2595
20 Sep	0010	0011	0017		SF	N12W58	2595
20 Sep	0245	0248	0254	B3.5			2595
20 Sep	1327	1328	1333		SF	N11W66	2595
20 Sep	1334	1336	1339		SF	N11W66	2595
20 Sep	1416	1419	1428		SF	N12W68	2595
20 Sep	1429	1431	1440		SF	N12W68	2595
20 Sep	1536	1543	1548		SF	N06W69	2595
21 Sep	0143	0156	0207	B4.4			2595
21 Sep	0909	0914	0924		SF	N07W70	2595
21 Sep	1023	1039	1119	C1.6	SF	N06W24	2593
21 Sep	1145	1151	1154	C1.7			2595
21 Sep	1219	1219	1224		SF	N06W25	2593
21 Sep	1334	1338	1346	B7.2	SF	N07W25	2593
21 Sep	1339	1340	1346		SF	N12W79	2595
21 Sep	1429	1438	1446	B7.2			2595
21 Sep	1945	1950	1958	B4.4			2595
21 Sep	2344	2350	2356	B3.4			2595
22 Sep	0024	0029	0033	B4.6			2595
22 Sep	0055	0059	0103	B6.5			2595
22 Sep	0117	0123	0127	B6.8			2595
22 Sep	0323	0327	0332	B4.7			2595
22 Sep	0342	0408	0417	B4.6			2595
22 Sep	0510	0515	0519	B6.7			2595
22 Sep	0540	0547	0552	C5.6			2595



## *Flare List*

Date	Time			X-ray Class	Optical		Rgn #
	Begin	Max	End		Imp/ Brtns	Location Lat CMD	
22 Sep	0644	0650	0656	B9.7			2595
22 Sep	0824	0829	0832	C1.9			2595
22 Sep	0947	1026	1051	B4.7			2595
22 Sep	1146	1152	1207	C1.5			2595
22 Sep	1530	1536	1547	B4.2			2595
22 Sep	1735	1753	1809	C1.9			2595
22 Sep	1905	1916	1945	C2.6			2595
23 Sep	0033	0042	0058	B2.5			2595
23 Sep	0438	0525	0557	B6.2			2592
23 Sep	1411	1424	1438	B3.3			
23 Sep	2138	2201	2221	B4.2			
24 Sep	0628	0632	0639	B1.9			2597
24 Sep	1400	1401	1403		SF	S14W08	2597
24 Sep	1540	1543	1547	B3.9	SF	S14W08	2597
24 Sep	1810	1816	1821	B6.9	SF	S14W10	2597
25 Sep	0306	0331	0355	B2.8			2593
25 Sep	0412	0422	0429	B3.2			
25 Sep	0713	0717	0728	B2.0	SF	S15W15	2597
25 Sep	1137	1137	1148		SF	S16W17	2597
25 Sep	1447	1451	1457		SF	S14W18	2597
25 Sep	1500	1500	1518		SF	S16W19	2597
25 Sep	1905	1914	1921	C1.3			2597
25 Sep	2325	2337	2349	B5.1			2597



## Region Summary

Date	Location		Sunspot Characteristics				Flares							
	Lat CMD	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 2592

15 Sep	N14E66	27	10	3	Bxo	2	B										
16 Sep	N14E53	27	10	2	Bxo	3	B										
17 Sep	N14E39	29	10	5	Bxo	4	B				1						
18 Sep	N14E27	27	10	6	Bxo	5	B				2	2					
19 Sep	N12E14	27	20	7	Cro	2	B										
20 Sep	N12W00	28	plage														
21 Sep	N12W14	29	plage														
22 Sep	N12W28	30	plage														
23 Sep	N12W42	31	plage														
24 Sep	N12W56	32	plage														
25 Sep	N12W70	32	plage														
										0	0	0	3	2	0	0	0

Still on Disk.

Absolute heliographic longitude: 28

### Region 2593

18 Sep	N07E11	43	20	4	Cri	9	B				1						
19 Sep	N09W04	45	60	5	Dao	8	B				1						
20 Sep	N09W18	46	50	8	Cso	5	B										
21 Sep	N06W32	47	60	8	Dai	11	B	1			3						
22 Sep	N08W45	47	70	9	Dao	7	B										
23 Sep	N09W59	48	50	11	Eao	9	B										
24 Sep	N07W72	48	30	11	Cro	4	B										
25 Sep	N07W84	46	plage														
										1	0	0	5	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 45

### Region 2594

18 Sep	N12E11	43	10	3	Cro	3	B										
19 Sep	N12W03	45	10	1	Axx	1	A										
20 Sep	N12W17	45	plage														
										0	0	0	0	0	0	0	0

Died on Disk.

Absolute heliographic longitude: 45



### *Region Summary - continued*

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

#### *Region 2595*

19 Sep	N11W57	98	10	5	Bxo	5	B											
20 Sep	N11W71	99	120	6	Dao	7	B					6						
21 Sep	N08W90	104	110	8	Dso	4	B	1				2						
								1	0	0		8	0	0	0	0	0	0

Crossed West Limb.  
Absolute heliographic longitude: 98

#### *Region 2596*

22 Sep	N05W58	60	30	4	Cao	3	B											
23 Sep	N05W73	62	50	6	Cao	4	B											
24 Sep	N05W87	63	30	1	Hrx	1	A											
								0	0	0		0	0	0	0	0	0	0

Crossed West Limb.  
Absolute heliographic longitude: 60

#### *Region 2597*

23 Sep	S13W00	349	30	5	Cao	6	B											
24 Sep	S13W13	349	120	6	Dsc	12	BG					3						
25 Sep	S13W25	347	60	8	Dao	8	B	1				4						
								1	0	0		7	0	0	0	0	0	0

Still on Disk.  
Absolute heliographic longitude: 349



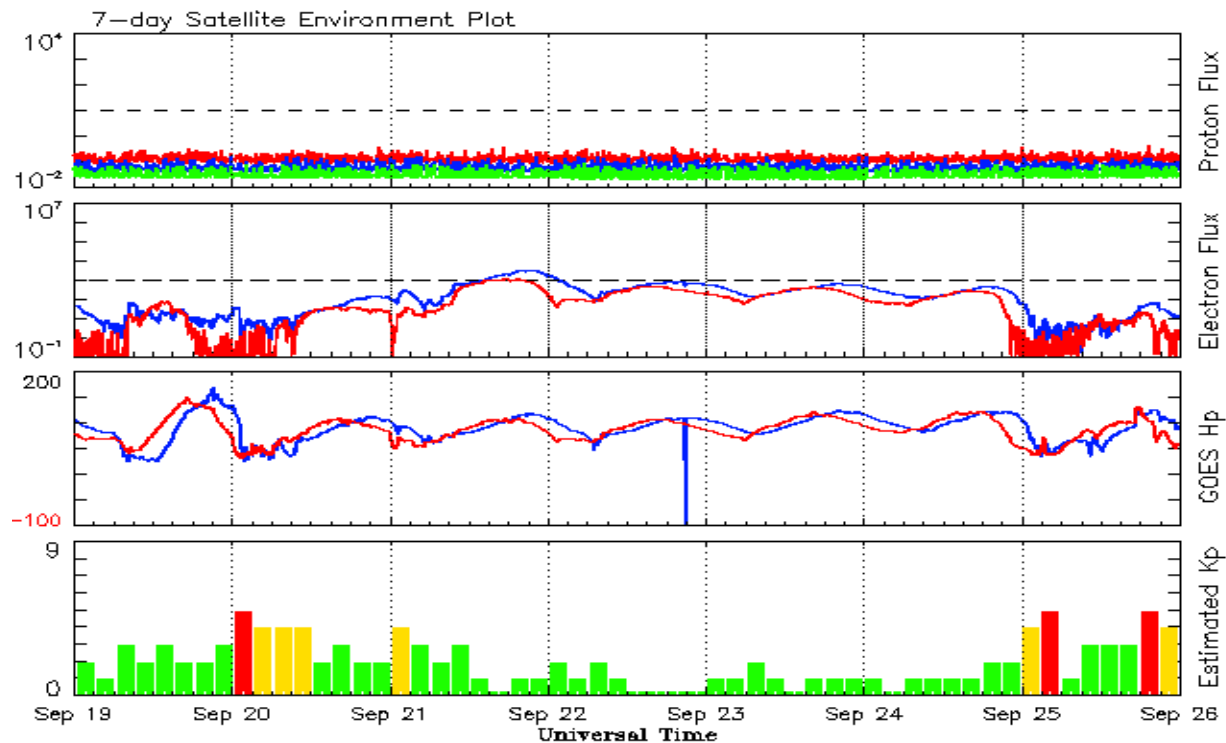


**Recent Solar Indices (preliminary)**  
**Observed monthly mean values**

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>									
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	49.6	31.6	103.5	98.1	10	12.0
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	
August	50.4	30.4	0.60			85.0		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 19 September 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.

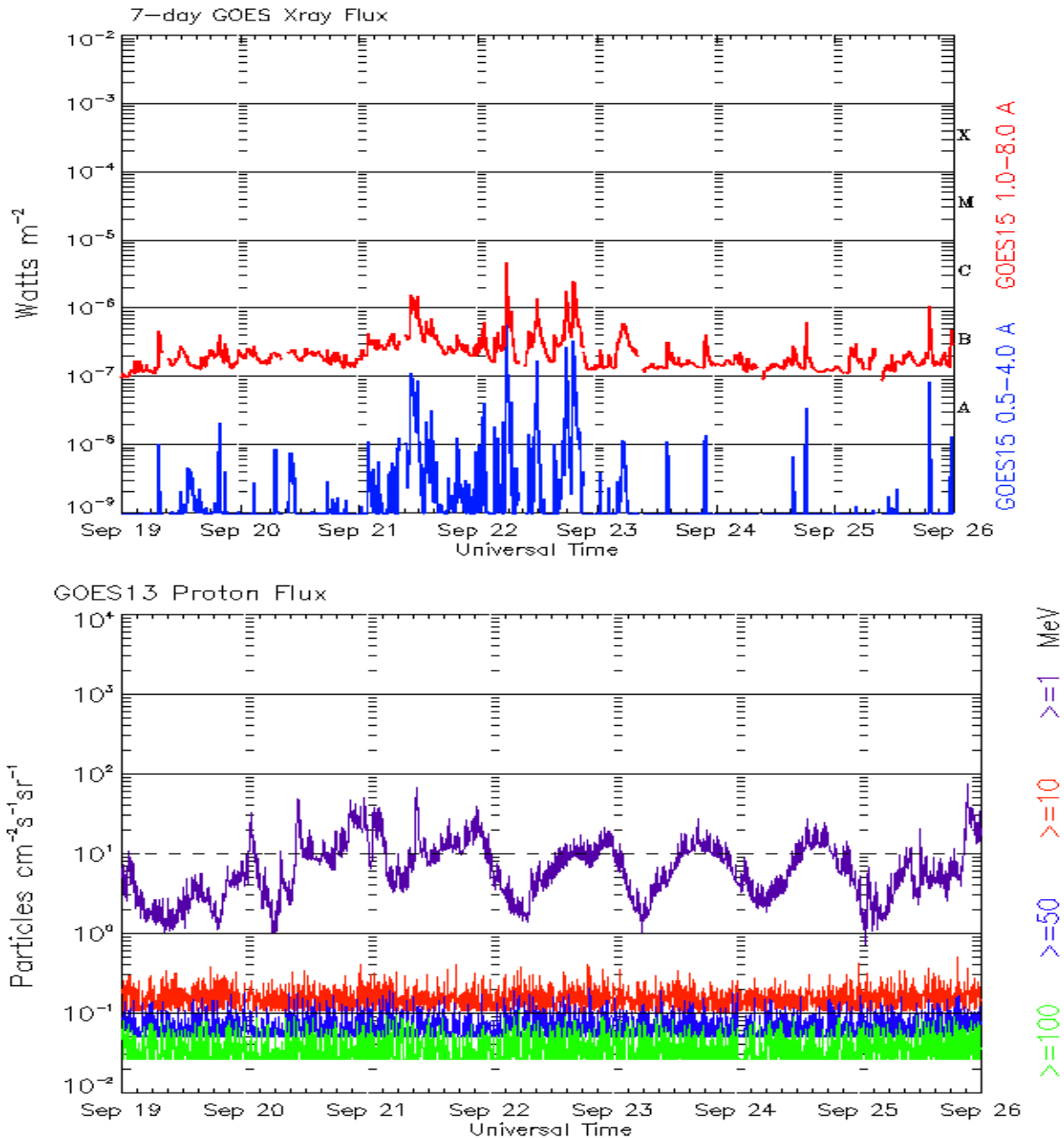
The electron flux plot contains the five-minute averaged integral electron flux (electrons/cm<sup>2</sup>-sec -sr) with energies greater than 2 MeV by the SWPC Primary GOES satellite.

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 19 September 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)***

Published every Monday by the Space Weather Prediction Center.

U.S. Department of Commerce  
NOAA / National Weather Service  
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

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 archive from 1997

<http://spaceweather.gov/ftpmenu/> -- Some content as ascii text

<http://spaceweather.gov/SolarCycle/> -- Solar Cycle Progression web site

<http://spaceweather.gov/contacts.html> -- Contact and Copyright information

[http://spaceweather.gov/weekly/Usr\\_guide.pdf](http://spaceweather.gov/weekly/Usr_guide.pdf) -- User Guide

