

**Space Weather Highlights**  
**19 October - 25 October 2015**

**SWPC PRF 2095**  
**26 October 2015**

Solar activity reached low levels. C-class flares were observed on 19-22 and 24 Oct. Region 2436 (N09, L=112, class/area Ekc/260 on 19 Oct) produced a majority of the activity this period with 13 C-class flares. Regions 2434 (S10, L=164, class/area Hax/230 on 19 Oct) and 2437 (S20, L=99, class/area Cao/20 on 21 Oct) also produced a few C-class flares. A partial halo CME associated with a long duration C4 flare originating from Region 2434 erupted off of the southwestern portion of the disk on 22 October.

The greater than 10 MeV proton flux became slightly enhanced late on 22 October through midday on 23 October due to a long duration C4 flare from Region 2434. The greater than 10 MeV proton flux briefly reached a peak of 1.1 pfu at 22/2305 UTC but began a return to background levels shortly thereafter.

The greater than 2 MeV electron flux at geosynchronous orbit was at high levels on 20 October with moderate levels recorded on 19, 21-25 October. The high levels were due to an enhanced solar wind environment caused by coronal hole high speed streams (CH HSS).

Geomagnetic field activity ranged from quiet to active levels. Quiet levels were observed on 19 October and quiet to unsettled levels were observed on 20, 22-25 October under nominal solar wind conditions. Quiet to active levels were observed on 21 October as an equatorial, negative polarity CH HSS moved into a geoeffective position. Wind speed increased to a peak of near 480 km/s by about 21/1900 UTC, total field strength peaked at 13 nT while the Bz component reached a maximum southward extent of -8 nT at about 21/1130 UTC. The CME from 2434 that occurred on 22 October arrived at the ACE spacecraft on 24 October at 1828 UTC. The solar wind became enhanced with the shock passage but only unsettled levels were observed.

**Space Weather Outlook**  
**26 October - 21 November 2015**

Solar activity is expected to be at low 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 normal to moderate levels on 26 - 31 October. Moderate to high levels are expected on 01-13 November as a series of coronal hole high speed streams (CH HSSs) become geoeffective enhancing the solar wind environment. Normal to moderate levels are expected from 14 - 21 November.

Geomagnetic field activity is expected to reach G2 (Moderate) geomagnetic storm levels on 03-04 November with G1 (Minor) storm levels expected on 05, 08-10, and 14 November, all due to the influence of recurrent CH HSSs. Active field conditions are expected on 29 October, 06-07, 13, and 17 November with only quiet to unsettled levels expected 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 October	124	94	580	B4.1	7	0	0	10	0	0	0	0
20 October	123	77	520	B4.3	4	0	0	2	0	0	0	0
21 October	129	73	510	B4.8	8	0	0	8	2	0	0	0
22 October	121	94	470	B4.1	1	0	0	2	0	0	0	0
23 October	115	91	410	B3.6	0	0	0	4	0	0	0	0
24 October	106	74	320	B3.2	3	0	0	4	0	0	0	0
25 October	106	63	280	B3.4	0	0	0	1	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 October	2.1e+05	1.1e+04	2.8e+03	1.4e+07	
20 October	3.2e+05	1.2e+04	2.7e+03	3.4e+07		
21 October	3.9e+05	1.1e+04	2.7e+03	1.3e+07		
22 October	1.6e+06	2.0e+04	2.9e+03	1.4e+07		
23 October	1.2e+07	2.1e+04	2.8e+03	1.1e+07		
24 October	5.2e+06	1.2e+04	2.7e+03	1.1e+07		
25 October	5.4e+05	1.2e+04	2.7e+03	2.7e+06		

### *Daily Geomagnetic Data*

Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
	19 October	3	1-2-1-1-1-1-1-0	1	0-0-0-0-2-1-0-0	5
20 October	8	2-3-2-1-2-2-2-2	20	1-2-3-5-5-4-2-2	9	2-3-2-2-3-2-3-2
21 October	12	1-2-1-3-4-2-2-4	22	2-1-3-5-6-2-2-2	12	1-3-1-4-4-2-2-2
22 October	4	1-0-2-0-1-2-2-2	5	2-0-3-0-1-2-1-1	6	2-1-2-1-1-2-3-2
23 October	5	2-0-1-1-2-1-2-2	7	2-1-1-2-3-3-1-1	7	3-1-1-1-2-2-2-3
24 October	10	2-3-3-1-2-1-3-3	7	2-1-4-0-0-0-3-2	11	3-3-3-1-1-1-3-3
25 October	7	2-1-3-1-3-2-1-1	6	2-1-3-3-2-0-0-0	9	2-2-3-2-3-2-1-1

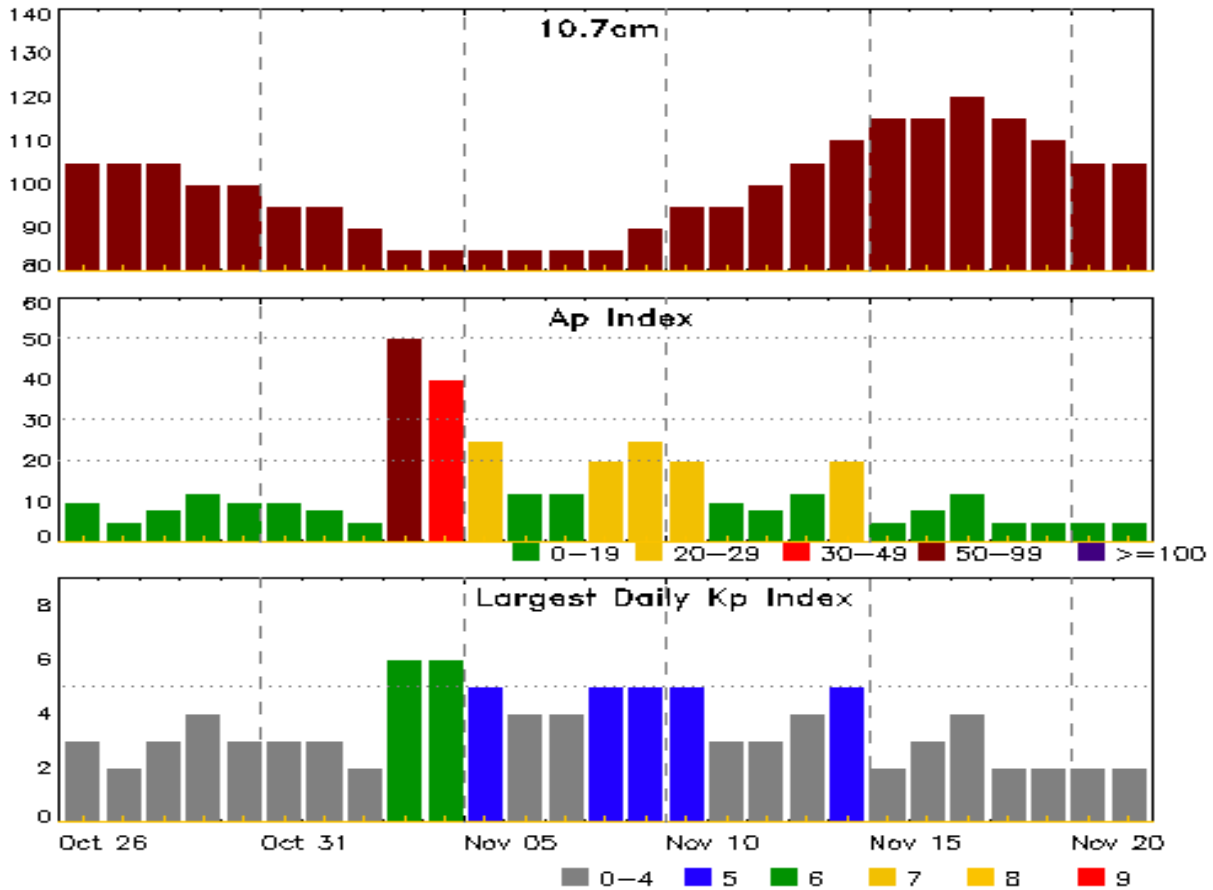


### *Alerts and Warnings Issued*

<b>Date &amp; Time of Issue UTC</b>	<b>Type of Alert or Warning</b>	<b>Date &amp; Time of Event UTC</b>
20 Oct 1440	ALERT: Electron 2MeV Integral Flux $\geq$ 1000pfu	20/1425
21 Oct 1150	WARNING: Geomagnetic K = 4	21/1155 - 1900
21 Oct 1203	ALERT: Geomagnetic K = 4	21/1159
21 Oct 1856	ALERT: Type II Radio Emission	21/1800
22 Oct 1940	WATCH: Geomagnetic Storm Category G1 predicted	
24 Oct 1838	WARNING: Geomagnetic Sudden Impulse expected	24/1900 - 2000
24 Oct 1840	WARNING: Geomagnetic K = 4	24/1900 - 25/1300
24 Oct 1908	SUMMARY: Geomagnetic Sudden Impulse	24/1857
25 Oct 1503	CANCELLATION: Geomagnetic Storm Category G1 predicted	



## 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 Oct	105	10	3	09 Nov	90	25	5
27	105	5	2	10	95	20	5
28	105	8	3	11	95	10	3
29	100	12	4	12	100	8	3
30	100	10	3	13	105	12	4
31	95	10	3	14	110	20	5
01 Nov	95	8	3	15	115	5	2
02	90	5	2	16	115	8	3
03	85	50	6	17	120	12	4
04	85	40	6	18	115	5	2
05	85	25	5	19	110	5	2
06	85	12	4	20	105	5	2
07	85	12	4	21	105	5	2
08	85	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		Intensity	
									245	2695	II	IV

**No Events Observed**

## *Flare List*

Date	Time			X-ray Class	Imp/ Brtns	Location Lat CMD	Rgn #
	Begin	Max	End				
19 Oct	0158	0206	0215	C1.7			
19 Oct	0432	0440	0446	C1.4	SF	S10E06	2434
19 Oct	B0731	U0745	0818		SF	N11E58	2436
19 Oct	0855	U0855	0907		SF	N11E58	2436
19 Oct	0933	0937	0944	C1.2			2436
19 Oct	0936	0936	0944		SF	N09E56	2436
19 Oct	0939	U0939	1001		SF	N12E57	2436
19 Oct	1207	U1228	1241		SF	N11E56	2436
19 Oct	1336	1343	1359	C1.9	SF	S10E05	2434
19 Oct	1639	1642	1644	B8.2			
19 Oct	1723	1727	1729	C3.9	SF	N09E56	2436
19 Oct	1739	1750	1801	C1.3	SF	N10E51	2436
19 Oct	1837	1843	1845	C1.8	SF	S12W04	2434
19 Oct	2148	2152	2157	B9.6			2436
20 Oct	0356	0404	0416	C1.2	SF	S19E46	2437
20 Oct	0458	0501	0503	C1.0			2436
20 Oct	0724	0727	0729	C1.0			2436
20 Oct	1226	1229	1231	B7.6			2436
20 Oct	1323	1326	1328	B8.5			2436
20 Oct	1356	1359	1401	C1.1			2437
20 Oct	1901	1905	1909		SF	N07E30	2436
21 Oct	0012	0019	0023	C1.7	SF	N06E27	2436
21 Oct	0146	0149	0151	B8.0			2436
21 Oct	0200	0209	0214	C1.6	SF	N06E27	2436
21 Oct	0241	0242	0247		SF	S10W23	2434
21 Oct	0429	0434	0436	C6.3	1F	N06E37	2436
21 Oct	0531	0537	0543	C2.7	SF	N06E24	2436
21 Oct	0938	0938	0941		SF	N07E33	2436
21 Oct	1151	1200	1207	C2.6			2436
21 Oct	1352	1358	1404	C1.7			2436
21 Oct	1428	1431	1433	C1.1			2436



## *Flare List*

Date	Time			X-ray Class	Imp/ Brtns	Optical	
	Begin	Max	End			Location Lat CMD	Rgn #
21 Oct	1723	1727	1735		SF	N08E24	2436
21 Oct	1748	1756	1800	C7.7	1N	N08E24	2436
21 Oct	1851	1853	1856		SF	N08E24	2436
21 Oct	1853	1854	1855		SF	S09W30	2434
22 Oct	0213	0340	0515	C4.4	SF	S11W27	2434
22 Oct	2240	2242	2248		SF	S15W79	2431
23 Oct	0535	0536	0538		SF	S15W04	2435
23 Oct	0636	0641	0645	B5.9			2436
23 Oct	0953	0953	0959		SF	N10E01	2436
23 Oct	1428	1435	1442	B9.0	SF	N05W05	2436
23 Oct	1536	1539	1542	B7.1			
23 Oct	1656	1703	1715	B9.3			
23 Oct	1720	1720	1723		SF	N10W03	2436
24 Oct	0420	0428	0432	C1.9			2434
24 Oct	1226	1229	1231	B5.8	SF	S14W68	2434
24 Oct	1320	1330	1343	B7.7	SF	N09W15	2436
24 Oct	1324	1325	1327		SF	S14W68	2434
24 Oct	1429	1516	1550	C1.0			2434
24 Oct	2121	2130	2134	C1.3	SF	S12W72	2434
24 Oct	2329	0003	0041	B9.7			2434
25 Oct	0457	0516	0527	B9.2			2434
25 Oct	0548	0555	0602	B6.8			2434
25 Oct	1427	1430	1439		SF	N09W28	2436



## Region Summary

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	4	
<b>Region 2430</b>																	
08 Oct	S17E60	242	30	1	Hrx	1	A										
09 Oct	S17E47	241	30	1	Hsx	1	A										
10 Oct	S17E33	242	20	1	Hrx	1	A										
11 Oct	S17E19	243	10	1	Hrx	1	A										
12 Oct	S17E08	241	0	1	Axx	1	A										
13 Oct	S17W06	242	plage														
14 Oct	S17W20	242	plage														
15 Oct	S17W34	243	plage														
16 Oct	S17W48	244	plage														
17 Oct	S17W62	245	plage														
18 Oct	S17W76	246	plage														
19 Oct	S17W90	246	plage														
								0	0	0	0	0	0	0	0	0	0

Crossed West Limb.  
Absolute heliographic longitude: 242

<b>Region 2431</b>																	
10 Oct	S17E75	200	30	1	Hax	1	A										
11 Oct	S18E61	201	50	1	Hax	1	A										
12 Oct	S17E46	203	50	1	Hsx	1	A										
13 Oct	S17E34	202	30	1	Hsx	1	A										
14 Oct	S17E20	202	30	1	Hsx	1	A										
15 Oct	S17E07	202	30	1	Hsx	1	A										
16 Oct	S18W07	203	20	1	Hsx	1	A										
17 Oct	S18W19	202	20	2	Cso	3	B										
18 Oct	S19W30	200	10	2	Cao	2	B					1					
19 Oct	S19W44	200	10	1	Axx	1	A										
20 Oct	S19W58	201	plage														
21 Oct	S19W72	202	plage														
22 Oct	S19W86	203	plage									1					
								0	0	0	2	0	0	0	0	0	0

Crossed West Limb.  
Absolute heliographic longitude: 202





### *Region Summary - continued*

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	4			
<b>Region 2432</b>																		
11 Oct	S23E43	219	20	3	Cro	4	B											
12 Oct	S22E30	219	20	4	Cro	5	B						1					
13 Oct	S21E17	219	20	4	Cro	7	B											
14 Oct	S21E03	219	20	6	Dro	5	B						1					
15 Oct	S21W11	220	20	6	Dro	6	B											
16 Oct	S21W23	219	10	7	Bxo	4	B											
17 Oct	S21W38	221	10	7	Bxo	3	B											
18 Oct	S21W52	222	plage															
19 Oct	S21W66	222	plage															
20 Oct	S21W80	223	plage															
									0	0	0		2	0	0	0	0	0

Crossed West Limb.

Absolute heliographic longitude: 219

<b>Region 2434</b>																		
12 Oct	S08E88	162	plage										1					
13 Oct	S08E74	162	40	1	Cao	4	B						5					
14 Oct	S08E60	162	50	7	Cai	8	BG						2				2	
15 Oct	S10E48	163	50	8	Dao	12	BG	14	1				7					
16 Oct	S10E34	162	150	7	Dai	22	BG	6	1				2					
17 Oct	S10E20	163	260	7	Dki	20	BGD	6					5	1				
18 Oct	S10E06	164	220	8	Dai	11	B											
19 Oct	S10W08	164	230	8	Dac	16	B	3					3					
20 Oct	S10W22	165	210	6	Dai	14	B											
21 Oct	S10W36	166	180	4	Cao	6	B											2
22 Oct	S10W48	165	90	3	Cao	5	B	1					1					
23 Oct	S09W61	165	90	2	Cao	6	B											
24 Oct	S11W75	166	20	2	Cao	4	B	3					3					
25 Oct	S11W89	166	plage															
									41	2	0		25	1	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 164



### *Region Summary - continued*

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	4								
<b>Region 2435</b>																							
16 Oct	S17E74	122	20	2	Hax	1	A	1															
17 Oct	S15E60	123	30	1	Hax	1	A	4				2											
18 Oct	S15E45	125	30	1	Hax	1	A																
19 Oct	S15E31	125	20	1	Hsx	1	A																
20 Oct	S15E17	126	20	1	Hsx	1	A																
21 Oct	S15E03	127	20	1	Cro	2	B																
22 Oct	S15W09	126	10	1	Hrx	1	A																
23 Oct	S15W21	125	10	1	Hrx	1	A					1											
24 Oct	S15W34	125	10	1	Hrx	1	A																
25 Oct	S15W49	126	10	1	Axx	1	A																
								5	0	0	3	0	0	0	0	0							

Still on Disk.

Absolute heliographic longitude: 127

### **Region 2436**

17 Oct	N09E71	112	80	9	Dai	6	BG														
18 Oct	N09E58	112	210	12	Eai	16	BG	2				1									
19 Oct	N09E44	112	260	14	Ekc	20	BG	3				7									
20 Oct	N09E30	113	240	14	Eai	18	BD	2				1									
21 Oct	N08E16	114	290	14	Eki	23	BD	8				6	2								
22 Oct	N08E06	111	280	14	Eki	22	BG														
23 Oct	N09W06	110	250	14	Eki	21	B					3									
24 Oct	N09W19	110	240	14	Eso	17	B					1									
25 Oct	N09W34	111	230	14	Esi	20	B					1									
								15	0	0	20	2	0	0	0	0					

Still on Disk.

Absolute heliographic longitude: 111



**Region Summary - continued**

Date	Location		Sunspot Characteristics					Flares								
	Lat	CMD	Helio	Area	Extent	Spot	Spot	Mag	X-ray			Optical				
			Lon	10 <sup>-6</sup> hemi.	(helio)	Class	Count	Class	C	M	X	S	1	2	3	4
<b>Region 2437</b>																
17 Oct	S19E88	96	plage						3	2						
18 Oct	S19E74	96	60	2	Hax	1	A	1								
19 Oct	S19E60	96	60	6	Cao	6	B									
20 Oct	S20E46	97	50	6	Cao	4	B	2				1				
21 Oct	S20E32	98	20	2	Hsx	2	A									
22 Oct	S20E18	99	20	3	Cao	3	B									
23 Oct	S19E05	99	20	1	Hax	1	A									
24 Oct	S19W08	99	20	1	Hrx	1	A									
25 Oct	S19W21	98	10	1	Hrx	1	A									
									6	2	0	1	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 99

<b>Region 2438</b>																
22 Oct	S18W25	142	10	2	Bxo	2	B									
23 Oct	S18W38	142	10	1	Axx	1	A									
24 Oct	S18W52	143	plage													
25 Oct	S18W66	143	plage													
									0	0	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 142

<b>Region 2439</b>																
22 Oct	N17E76	41	60	2	Hax	1	A									
23 Oct	N17E63	41	30	2	Hsx	1	A									
24 Oct	N17E51	40	30	2	Hax	1	A									
25 Oct	N16E37	40	30	1	Hax	1	A									
									0	0	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 40

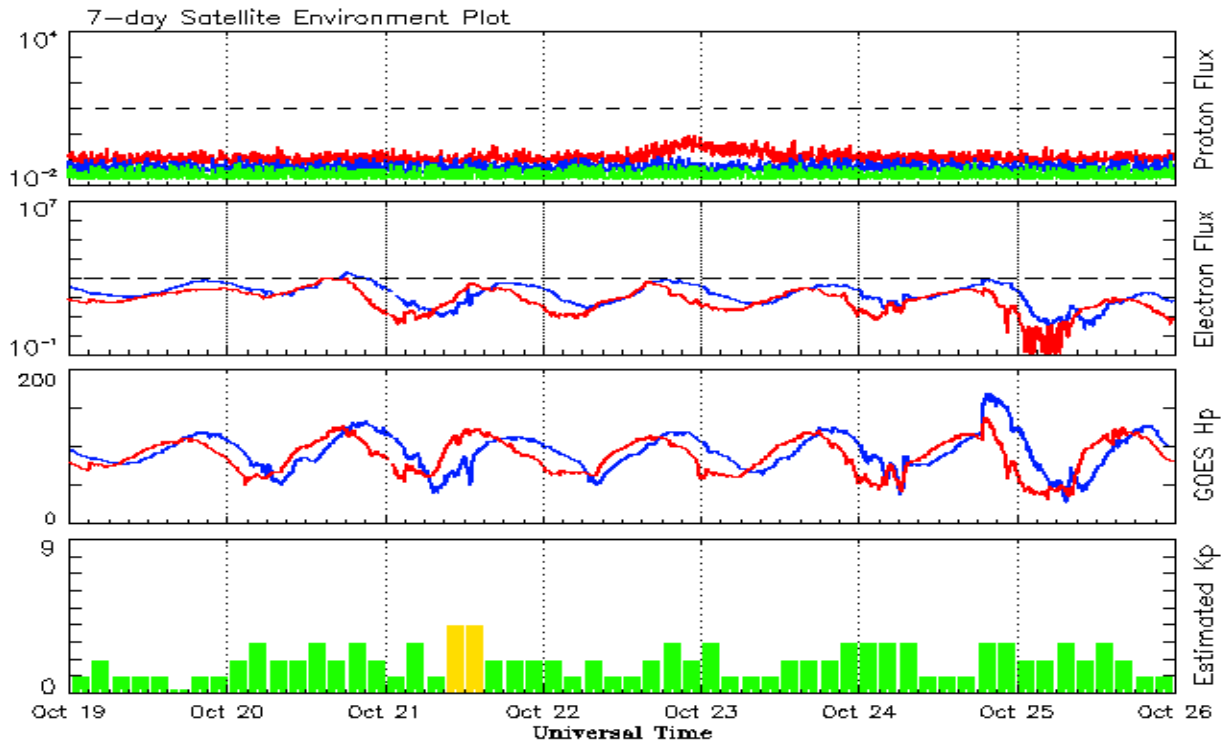


**Recent Solar Indices (preliminary)**  
**Observed monthly mean values**

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>2013</b>									
October	127.1	85.6	0.67	114.3	74.9	132.3	134.7	7	7.8
November	125.7	77.6	0.62	114.6	75.3	148.4	135.4	5	7.9
December	118.2	90.3	0.76	115.4	75.9	147.7	135.9	5	7.5
<b>2014</b>									
January	125.9	81.8	0.65	117.7	77.3	158.6	137.3	6	7.1
February	174.6	102.3	0.59	119.5	78.3	170.3	138.6	12	6.9
March	141.1	91.9	0.65	123.2	80.8	149.9	140.8	6	7.2
April	130.5	67.5	0.65	124.8	69.8	144.3	143.5	9	7.5
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
<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			129.2		12	
May	83.0	53.3	0.71			120.1		9	
June	77.3	39.9	0.53			123.2		14	
July	68.4	39.8	0.58			107.0		10	
August	61.6	38.8	0.63			106.2		16	
September	72.5	46.9	0.65			102.1		16	

**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 October 2015*

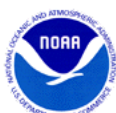
The proton flux plot contains the five-minute averaged integral proton flux (protons/cm<sup>2</sup>-sec -sr) as measured by the SWPC Primary GOES satellite, near West 75, for each of three energy thresholds: greater than 10, 50, and 100 MeV.

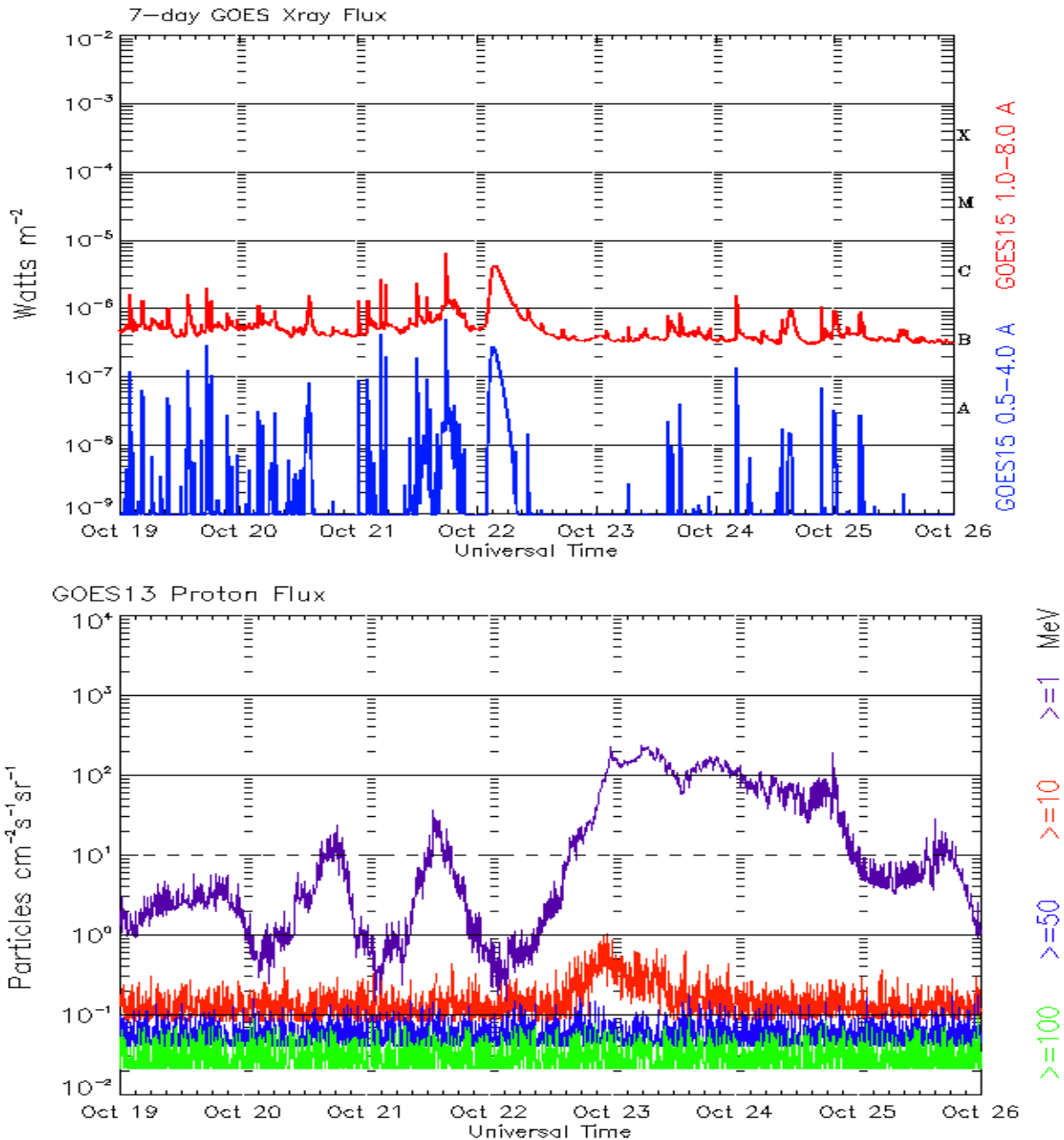
The electron flux plot contains the five-minute averaged integral electron flux (electrons/cm<sup>2</sup>-sec -sr) with energies greater than 2 MeV by the SWPC Primary GOES satellite.

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 October 2015*

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 integral 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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**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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