

**Space Weather Highlights**  
**14 March - 20 March 2011**

**SWPC PRF 1855**  
**22 March 2011**

Solar activity ranged from very low to moderate levels during the period. The period began with moderate level activity from Region 1169 (N18, L=060, class/area Dao/360 on 14 March) as it produced an impulsive M4/1n flare at 14/1952 UTC with associated radio bursts at 4995, 8800, and 15400 MHz. Region 1169 continued to produce moderate activity on 15 March with an impulsive M1 at 15/0018 UTC, before conditions decreased to very low for the remainder of the period.

No proton events were observed at geosynchronous orbit.

The greater than 2 MeV electron flux at geosynchronous orbit was at normal levels throughout the period.

Geomagnetic field activity was mostly quiet throughout the period.

**Space Weather Outlook**  
**23 March - 18 April 2011**

Solar activity is forecast to be low for the period with C-class flares expected. There is a chance for M-class flares with the observed return of old Regions 1164 and 1165 (now Region 1176) on 22 March, and the return of old Region 1169 on 31 March.

No proton events are expected at geosynchronous orbit.

The greater than 2 MeV electron flux at geosynchronous orbit is expected to be at normal levels through 30 March. High levels are expected to return between 31 March and 2 April due to a recurrent coronal hole (CH) high speed stream (HSS), and then decrease to normal levels for the remainder of the period.

Geomagnetic field activity is expected to be mostly quiet 23 March. Levels are expected to increase with periods of unsettled and active conditions on 24-25 March due to HSS effects from an isolated CH in the northwest quadrant. Conditions should return to mostly quiet levels 26 March through 5 April, before a recurrent CH is forecast to once again become geoeffective on 7-9 April. Effects are anticipated to be less significant this rotation as the CH appears to have decayed. Conditions are expected to return to quiet conditions from 10 April through 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
14 March	107	51	820	B3.8	5	1	0	8	1	0	0	0
15 March	102	47	500	B3.5	6	1	0	4	1	0	0	0
16 March	95	50	300	B2.9	3	0	0	3	0	0	0	0
17 March	90	45	170	B2.5	0	0	0	0	0	0	0	0
18 March	88	35	50	B1.4	0	0	0	0	0	0	0	0
19 March	89	48	80	B1.2	0	0	0	1	0	0	0	0
20 March	92	47	150	B2.2	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
	14 March	2.0e+05	1.4e+04	3.3e+03		1.4e+07
15 March	1.6e+05	1.3e+04	3.4e+03		2.8e+07	
16 March	2.0e+05	1.3e+04	3.2e+03		4.0e+07	
17 March	7.1e+05	2.1e+04	3.3e+03		3.3e+07	
18 March	6.6e+05	1.4e+04	3.3e+03		1.4e+07	
19 March	6.6e+05	1.4e+04	3.3e+03		1.5e+07	
20 March	2.1e+05	1.4e+04	3.4e+03		8.7e+06	

### *Daily Geomagnetic Data*

Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
	14 March	2	1-1-1-1-0-0-1-0	3	2-2-1-0-0-0-0-1	3
15 March	0	0-0-0-0-0-0-0-0	0	0-1-0-0-0-0-0-0	0	0-0-0-0-0-0-0-0
16 March	1	0-0-0-0-1-0-1-1	0	0-0-0-0-0-0-0-0	0	0-0-0-0-0-0-0-1
17 March	2	0-1-0-0-1-1-2-1	1	0-1-0-0-0-0-2-0	3	0-1-0-0-0-0-3-1
18 March	2	1-0-1-0-1-1-0-0	0	0-0-0-0-0-0-0-0	2	0-0-1-0-0-1-1-1
19 March	2	0-0-1-1-2-1-0-0	4	0-0-1-3-3-0-0-0	4	1-0-1-1-2-2-0-1
20 March	4	0-1-0-1-2-2-1-2	6	0-0-0-2-4-2-0-1	4	0-1-1-1-2-2-0-2



*Alerts and Warnings Issued*

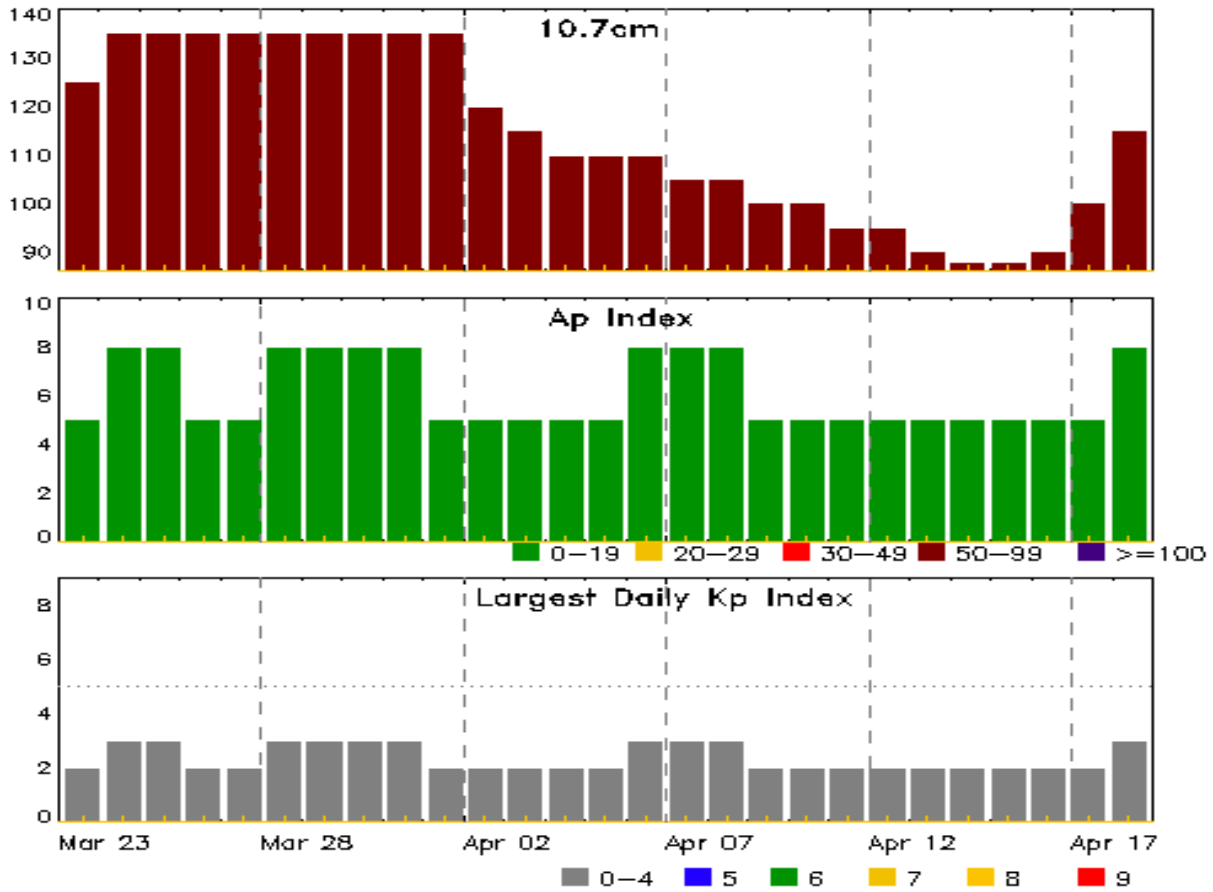
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<b>Date &amp; Time of Issue UTC</b>	<b>Type of Alert or Warning</b>	<b>Date &amp; Time of Event UTC</b>
No Alerts or Warnings Issued		

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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
23 Mar	125	5	2	06 Apr	110	8	3
24	135	8	3	07	105	8	3
25	135	8	3	08	105	8	3
26	135	5	2	09	100	5	2
27	135	5	2	10	100	5	2
28	135	8	3	11	95	5	2
29	135	8	3	12	95	5	2
30	135	8	3	13	90	5	2
31	135	8	3	14	88	5	2
01 Apr	135	5	2	15	88	5	2
02	120	5	2	16	90	5	2
03	115	5	2	17	100	5	2
04	110	5	2	18	115	8	3
05	110	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	Intensity IV
14 Mar	1930	1952	1954	M4.2	0.010	1N	N18W48	1169				
15 Mar	0018	0022	0024	M1.0	0.002			1169				

### *Flare List*

Date	Time			X-ray Class	Imp/ Brtns	Optical		Rgn #
	Begin	Max	End			Location Lat CMD	Rgn #	
14 Mar	0013	0020	0031	C4.0	SF	N10W63		1166
14 Mar	0133	0138	0142	B8.5				1166
14 Mar	0243	0247	0250	B6.3				1166
14 Mar	0504	0508	0513	C1.0				1169
14 Mar	0705	0711	0718	B9.9	SF	N12E46		1172
14 Mar	0807	0815	0825	C1.4				1172
14 Mar	1036	1042	1051	B8.7	SF	N17W42		1169
14 Mar	1339	1342	1346	B9.7				1169
14 Mar	1602	1609	1617	C2.2	SF	N19W46		1169
14 Mar	1842	1849	1855	B7.6				1169
14 Mar	1914	1917	1923	B6.6				1169
14 Mar	1930	1952	1954	M4.2	1N	N18W48		1169
14 Mar	2017	2017	2047		SF	N18W48		1169
14 Mar	2251	2305	2325	B7.4	SF	N18W52		1169
14 Mar	2317	2337	2351	C5.2				1169
14 Mar	2320	2321	2328		SF	N13E36		1172
14 Mar	2332	2334	2349		SF	N18W50		1169
15 Mar	0018	0022	0024	M1.0				1169
15 Mar	0306	0309	0312	B8.9				1169
15 Mar	0415	0420	0430	B7.5				1169
15 Mar	0504	0518	0528	C2.1				1166
15 Mar	0652	0657	0707	C1.4				1169
15 Mar	0807	0811	0814	B6.9				1172
15 Mar	0846	0852	0909	C1.5	SF	N17W54		1169
15 Mar	B0924	U0953	A0958	C2.6	1F	N17W54		1169
15 Mar	1121	1125	1127	C1.1	SF	N19W59		1169
15 Mar	1311	1315	1317	B5.6				1169
15 Mar	1728	1735	1739	C2.9	SF	N18W62		1169
15 Mar	1858	1902	1904	B5.6				1169
15 Mar	1949	1949	1957		SF	N18W63		1169



## *Flare List*

Date	Time			X-ray Class	Optical		Rgn #
	Begin	Max	End		Imp/ Brtns	Location Lat CMD	
15 Mar	2155	2159	2201	B5.3			1169
15 Mar	2213	2217	2219	B6.1			1169
16 Mar	0337	0340	0344	B7.5			1169
16 Mar	0458	0502	0506	B8.3			1169
16 Mar	0835	0847	0849	C1.3			1169
16 Mar	1347	1351	1354	C1.4			1169
16 Mar	1712	1822	1840	C3.7	SF	N17W72	1169
16 Mar	1847	1849	1857		SF	N17W72	1169
16 Mar	1900	1900	1911		SF	N17W73	1169
17 Mar	1150	1153	1158	B4.6			1169
18 Mar	0215	0218	0222	B2.8			
18 Mar	0350	0405	0409	B5.4			
18 Mar	1140	1145	1150	B3.3			1173
19 Mar	1621	1634	1652	B2.7			1172
19 Mar	2013	2016	2019	B3.4			1172
19 Mar	2139	2144	2147	B2.9	SF	N13W31	1172
20 Mar	0116	0258	0437	B4.7			
20 Mar	0725	0733	0747	B7.1			1175



## 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	4			
<b>Region 1166</b>																		
02 Mar	N10E77	95	10	1	Hrx	1	A											
03 Mar	N09E65	93	140	6	Dso	3	B											
04 Mar	N09E55	90	490	11	Eac	15	B											
05 Mar	N10E41	90	610	12	Eki	16	BG											
06 Mar	N11E27	91	360	11	Ekc	16	BG	2										
07 Mar	N11E12	93	410	15	Ekc	25	BGD		1			2						
08 Mar	N11W01	93	550	16	Fkc	35	BGD	1				3						
09 Mar	N09W12	92	630	13	Ekc	55	BGD	2	2	1		7			1			
10 Mar	N09W26	92	750	13	Ekc	25	BG	5				5						
11 Mar	N09W39	92	690	13	Ekc	47	BGD	9				7						
12 Mar	N09W52	91	770	13	Ekc	29	BGD	4	1			4	1	1				
13 Mar	N10W65	92	640	11	Ekc	14	BG	2										
14 Mar	N09W78	91	450	10	Dao	9	BG	1				1						
15 Mar	N12W91	92	150	9	Dai	5	BG	1										
								27	4	1		29	1	2	0	0		

Crossed West Limb.

Absolute heliographic longitude: 93

### Region 1169

05 Mar	N22E70	62	plage									1						
06 Mar	N21E56	62	30	4	Bxo	4	B					1						
07 Mar	N20E44	61	50	5	Dsi	7	B											
08 Mar	N19E31	61	170	8	Dso	11	B											
09 Mar	N20E18	61	220	10	Esc	22	BG	2				3						
10 Mar	N20E04	62	160	12	Eai	15	BG							1				
11 Mar	N20W09	62	250	13	Eki	26	BG							1				
12 Mar	N19W22	61	260	13	Ekc	17	BG	4				4						
13 Mar	N20W34	60	290	13	Cro	17	B	1				1						
14 Mar	N18W47	60	360	9	Dao	8	BG	3	1			5	1					
15 Mar	N17W60	60	340	9	Dhc	10	BG	5	1			4	1					
16 Mar	N17W75	62	260	9	Dhi	9	BG	3				3						
17 Mar	N18W89	63	100	3	Hsx	2	A											
								20	2	0		21	2	0	0	0		

Crossed West Limb.

Absolute heliographic longitude: 62



*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	4		
<b>Region 1171</b>																		
08 Mar	S19E69		36		plage							1						
09 Mar	S19E55		25		plage				2									
10 Mar	S19E41		26		plage													
11 Mar	S19E27		26		plage													
12 Mar	S19E13		27		plage													
13 Mar	S19W01		28		plage													
14 Mar	S19W15		29		plage													
15 Mar	S19W29		30		plage													
16 Mar	S19W43		30		plage													
17 Mar	S19W57		31		plage													
18 Mar	S19W71		32		plage													
19 Mar	S19W84		32		plage													
									2	1	0	0	0	0	0	0	0	

Crossed West Limb.  
 Absolute heliographic longitude: 28

<b>Region 1172</b>																		
11 Mar	N11E72		340	10		3	Bxo	2	B									
12 Mar	N12E58		345	20		4	Bxo	2	B	1			1					
13 Mar	N12E44		342	20		7	Bxo	3	B									
14 Mar	N14E30		343	10		8	Bxo	4	B	1			2					
15 Mar	N10E17		345	10		9	Bxo	2	B									
16 Mar	N11E02		345	0		1	Axx	1	A									
17 Mar	N11W12		346		plage													
18 Mar	N13W25		346		plage													
19 Mar	N13W38		346		plage								1					
20 Mar	N13W52		347		plage													
									2	0	0	4	0	0	0	0	0	

Still on Disk.  
 Absolute heliographic longitude: 345

<b>Region 1173</b>																		
16 Mar	S28E39		308	40		6	Cao	10	B									
17 Mar	S29E26		308	60		8	Cao	11	B									
18 Mar	S29E14		307	30		7	Cro	9	B									
19 Mar	S30E01		307	20		6	Bxo	6	B									
20 Mar	S29W13		307	20		4	Bxo	5	B									
									0	0	0	0	0	0	0	0	0	

Still on Disk.  
 Absolute heliographic longitude: 307





### *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 1174*

17 Mar	N22W36	10	10	3	Bxo	2	B										
18 Mar	N22W50	11	plage														
19 Mar	N23W63	11	0	1	Axx	1	A										
20 Mar	N23W76	11	0	1	Axx	1	A										
								0	0	0	0	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 10

#### *Region 1175*

18 Mar	N13W09	330	20	5	Cro	6	B										
19 Mar	N14W22	330	60	6	Cso	11	B										
20 Mar	N14W36	330	130	8	Csi	11	B										
								0	0	0	0	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 330

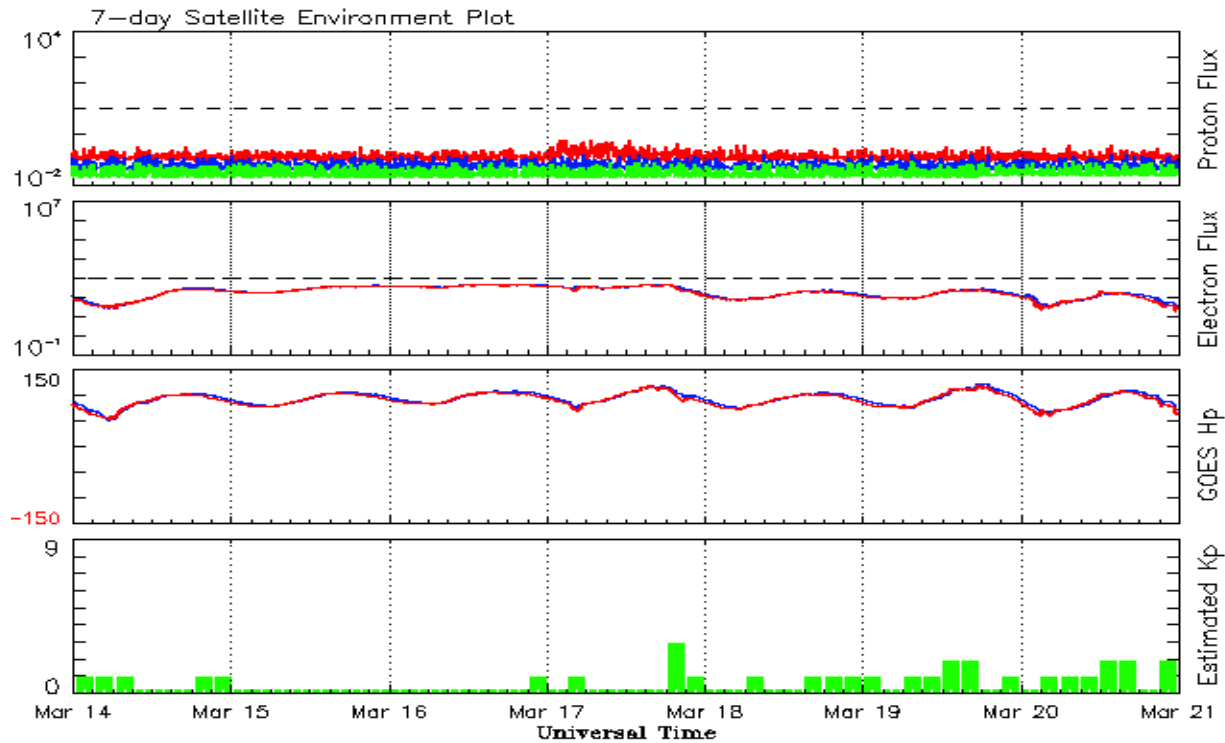


**Recent Solar Indices (preliminary)**  
**Observed monthly mean values**

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>2009</b>									
March	0.7	0.7	1.00	3.4	2.0	69.2	69.0	5	4.6
April	1.2	0.8	1.00	3.7	2.2	69.7	69.3	4	4.3
May	3.9	2.9	0.74	3.8	2.3	70.5	69.7	4	4.1
June	6.6	2.9	0.39	4.4	2.7	68.6	70.2	4	4.0
July	5.0	3.2	0.70	5.8	3.6	68.2	71.0	4	3.9
August	0.3	0.0	0.00	7.7	4.8	67.4	72.1	5	3.8
September	6.6	4.3	0.64	9.9	6.2	70.5	73.3	4	3.8
October	7.0	4.8	0.66	11.3	7.1	72.3	74.1	3	4.1
November	7.7	4.1	0.55	12.4	7.6	73.6	74.5	3	4.5
December	15.7	10.8	0.68	13.6	8.3	76.8	74.9	2	4.8
<b>2010</b>									
January	21.3	13.2	0.62	14.8	9.3	81.1	75.5	3	5.0
February	31.0	18.8	0.60	16.7	10.6	84.7	76.5	5	5.1
March	24.7	15.4	0.62	19.1	12.3	83.3	77.5	5	5.3
April	11.2	8.0	0.71	21.4	14.0	75.9	78.3	10	5.5
May	19.9	8.7	0.44	23.8	15.5	73.8	79.0	8	5.7
June	17.9	13.6	0.75	25.2	16.4	72.6	79.7	7	5.8
July	23.1	16.1	0.70	25.9	16.8	79.9	80.1	5	6.0
August	28.2	19.6	0.70	27.3	17.4	79.7	80.7	8	6.2
September	35.6	25.2	0.71			81.1		5	
October	35.0	23.5	0.67			81.6		6	
November	36.1	21.6	0.60			82.5		5	
December	22.0	14.5	0.66			84.3		4	
<b>2011</b>									
January	32.1	19.0	0.59			83.7		6	
February	53.2	29.4	0.55			94.5		6	

**Note:** Values are final except for the most recent 6 months which are considered preliminary. Cycle 23 started in May 1996 with an RI=8.0. Cycle 23 maximum was April 2000 with an RI=120.8. Solar minimum for Cycle 23 was December 2008.





*Weekly Geosynchronous Satellite Environment Summary  
Week Beginning 14 March 2011*

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.

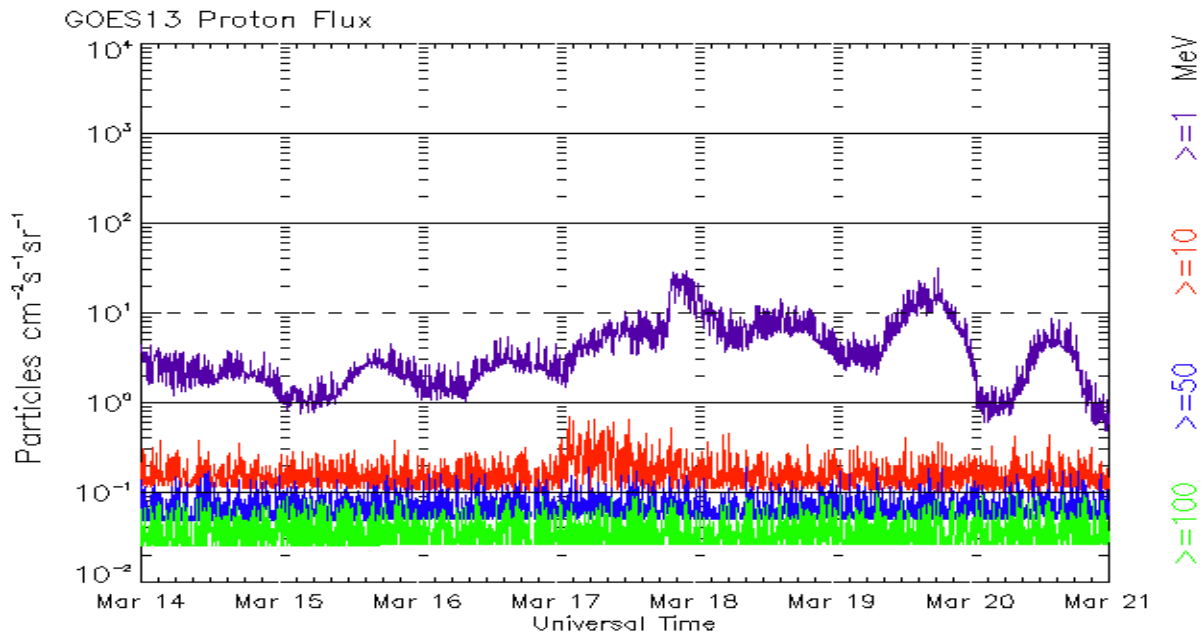
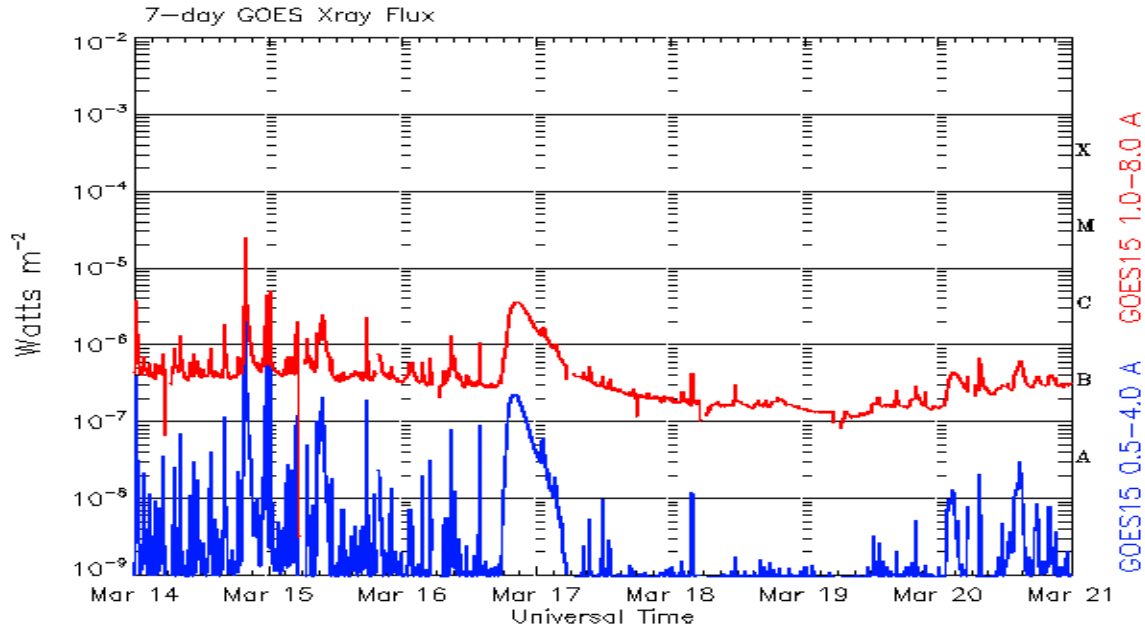
The electron flux plot contains the five-minute averaged integral electron flux (electrons/cm<sup>2</sup>-sec -sr) with energies greater than 2 MeV by the SWPC Primary GOES satellite.

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.

Kp plot contains the estimated planetary 3-hour K-index (derived by the Air Force Weather Agency) in real time from magnetometers at Meanook, Canada; Sitka, AK; Glenlea, Canada; St. Johns, Canada; Ottawa, Canada; Newport, WA; Fredericksburg, VA; Boulder, CO; Fresno, CA and Hartland, UK. These data are made available through cooperation from the Geological Survey of Canada (GSC), British Geological Survey (BGS) and the US Geological Survey. These may differ from the final Kp values derived from a more extensive network of magnetometers.

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 14 March 2011*

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.



## ***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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