

Space Weather Highlights
15 March – 21 March 2010

SWO PRF 1803
23 March 2010

Solar activity was very low. This week's activity consisted of numerous B-class flares, a few reaching the upper B-levels. Of note was a B7/Sf at 2308 UTC on 18 March from Region 1054 (N14, L=151, class/area Eai/240 on 15 March) that was associated with a type II radio sweep and a slow CME over the west limb. Region 1054 dominated the disk early in the week but was generally decaying and rotated off the limb quietly on 21 March. New Region 1056 (N18, L=065, class/area Csi/70 on 21 March) emerged on 17 March and showed slow growth. Region 1056 began to produce B-level activity on 20-21 March. A fast CME was observed off the west limb in LASCO C3 imagery beginning at 0418 UTC on 20 March but appeared to be backsided.

No proton events were observed at geosynchronous orbit.

The greater than 2 MeV electron flux at geosynchronous orbit was at high levels at the beginning of the week but showed a downward trend, with peaks at moderate levels on 16-17 March, and a return to normal background levels on 18 March. Normal background levels prevailed through the remainder of the period.

The geomagnetic field began the period at quiet levels. An increase to quiet to unsettled levels was observed on 17 March, accompanied by an active period from 0300-0600 UTC at high latitudes. Mostly quiet levels prevailed for 18-19 March. Another increase to generally quiet to unsettled levels occurred on 20 March with isolated active conditions at some stations from 0600-0900 UTC. Quiet conditions returned for 21 March. Solar wind data from the ACE spacecraft showed the onset of a positive polarity high speed stream around 1200 UTC on 16 March as solar wind speed began to increase. Peak speeds around 530 km/s were observed at about 1100 UTC on 17 March, after which the solar wind speed began to decline. A second, weaker increase was seen to begin on 20 March which reached a maximum of about 430 km/s at 1600 UTC on 20 March and declined thereafter.

Space Weather Outlook
24 March – 19 April 2010

Solar activity is expected to be very low with possible isolated periods of low levels during the forecast 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 levels through most of the period. However, moderate to high flux levels are possible during 08-11 April and 14-16 April.

The geomagnetic field is expected to be predominantly quiet for 24 March – 06 April. An increase to unsettled levels with a chance for isolated active periods is possible on 07-08 April due to a recurrent high-speed stream. Quiet conditions are expected to prevail for the remainder of the interval from 09-19 April.



Daily Solar Data

Date	Radio	Sun	Sunspot	X-ray	Flares							
	Flux	spot	Area	Background	X-ray Flux			Optical				
	10.7 cm	No.	(10 ⁻⁶ hemi.)		C	M	X	S	1	2	3	4
15 March	86	28	240	A5.2	0	0	0	0	0	0	0	0
16 March	85	21	90	A3.8	0	0	0	0	0	0	0	0
17 March	87	28	90	A4.3	0	0	0	0	0	0	0	0
18 March	86	28	90	A4.8	0	0	0	1	0	0	0	0
19 March	84	24	20	A3.8	0	0	0	1	0	0	0	0
20 March	84	25	40	A6.1	0	0	0	1	0	0	0	0
21 March	85	25	70	A6.6	0	0	0	2	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	>.6 MeV	>2MeV	>4 MeV
15 March	1.2e+06	1.9e+04	4.3e+03		1.5e+08	
16 March	6.2e+05	1.9e+04	4.2e+03		3.8e+07	
17 March	1.2e+06	1.9e+04	4.2e+03		1.7e+07	
18 March	1.1e+06	1.8e+04	3.9e+03		2.4e+06	
19 March	8.1e+05	1.9e+04	4.1e+03		1.9e+06	
20 March	6.0e+05	1.8e+04	3.8e+03		2.6e+06	
21 March	5.8e+05	1.9e+04	3.9e+03		3.3e+06	

Daily Geomagnetic Data

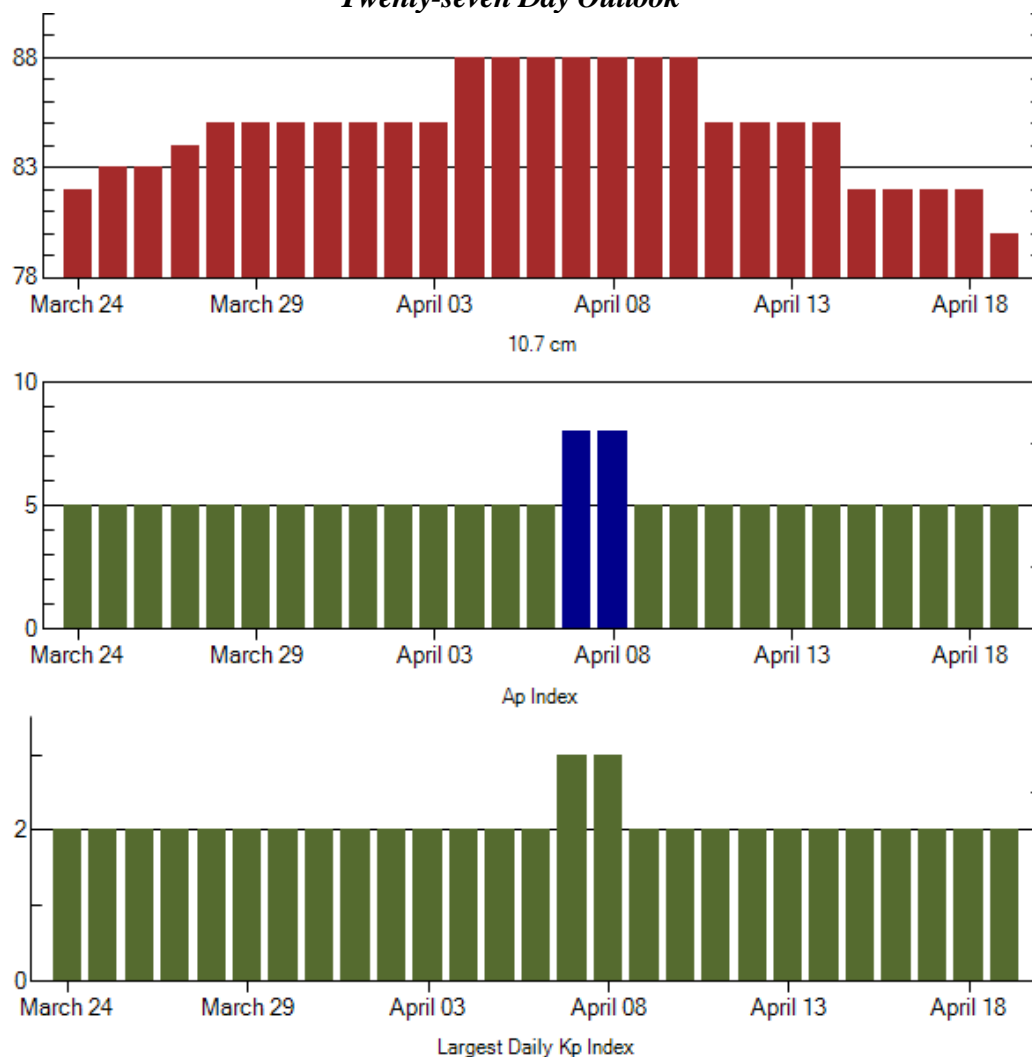
Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
15 March	2	1-0-0-0-1-1-2-1	1	0-0-0-0-0-1-1-0	3	1-0-0-0-0-2-2-1
16 March	3	0-1-2-0-1-1-1-1	2	0-1-0-0-2-0-1-0	4	1-0-1-0-1-1-1-2
17 March	5	1-3-2-1-1-0-1-2	4	1-3-2-0-0-0-0-1	7	1-4-2-1-0-0-1-3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

Alerts and Warnings Issued

Date & Time of Issue	Type of Alert or Warning	Date & Time of Event UTC
15 Mar 1206	ALERT: Electron 2MeV Integral Flux >= 1000pfu	15 Mar 1150
18 Mar 2357	ALERT: Type II Radio Emission	18 Mar 2311
20 Mar 0839	ALERT: Geomagnetic K = 4	20 Mar 0838



Twenty-seven Day Outlook



Date	Radio Flux 10.7 cm	Planetary A Index	Largest Kp Index	Date	Radio Flux 10.7 cm	Planetary A Index	Largest Kp Index
24 Mar	82	5	2	07 Apr	88	8	3
25	83	5	2	08	88	8	3
26	83	5	2	09	88	5	2
27	84	5	2	10	88	5	2
28	85	5	2	11	85	5	2
29	85	5	2	12	85	5	2
30	85	5	2	13	85	5	2
31	85	5	2	14	85	5	2
01 Apr	85	5	2	15	82	5	2
02	85	5	2	16	82	5	2
03	85	5	2	17	82	5	2
04	88	5	2	18	82	5	2
05	88	5	2	19	80	5	2
06	88	5	2				



Energetic Events

Date	Time		X-ray		Optical Information			Peak		Sweep Freq	
	$\frac{1}{2}$		Integ		Imp/	Location	Rgn	Radio Flux		Intensity	
	Begin	Max	Max	Class	Brtns	Lat CMD	#	245	2695	II	IV

No Events Observed

Flare List

Date	Time			X-ray Class.	Imp / Brtns	Optical		Rgn
	Begin	Max	End			Location	Lat CMD	

15 March	0334	0338	0341	B1.4				
	0349	0355	0359	B1.6				
	0834	0840	0846	B1.7				
	1800	1803	1806	B2.4				
	2054	2058	2100	B1.8				
	2149	2153	2156	B2.7				
16 March	No Flares Observed							
17 March	1246	1251	1302	B1.6				
	1521	1524	1528	B1.0				
18 March	0543	0610	0628	B4.0				
	1109	1115	1118	B5.3				
	1233	1253	1306	B7.5				
	1408	1411	1415	B2.1				
	1434	1443	1450	B5.4				
	1800	1812	1820	B3.9				
	2243	2248	2251	B1.2				
	2305	2308	2316	B7.0	SF	N19W57		1054
19 March	0455	0458	0504	B1.4				
	0833	0833	0837	B1.2	SF	N15W61		1054
20 March	2145	2158	2207	B4.2				
	2311	2312	2323	B8.1	SF	N17E06		1056
21 March	0009	0018	0025	B5.5				
	0042	0046	0048	B3.8				
	0122	0123	0127	B6.5	SF	N18E04		1056
	0221	0229	0238	B3.0				
	0447	0504	0518	B4.6				
	0556	0600	0603	B3.2				
	0831	0900	0916	B6.8				
	0903	U0907	A0926		SF	N18E00		1056
	1426	1431	1442	B1.6				
	2006	2014	2017	B1.3				
	1752	1817	1831	B2.2				
	2340	2345	2348	B1.6				



Region Summary

Date	Location		Sunspot Characteristics					Flares							
	(° Lat ° CMD)	Helio	Area (10 ⁻⁶ hemi)	Extent (helio)	Spot Class	Spot Count	Mag Class	X-ray			Optical				
		Lon						C	M	X	S	1	2	3	4
Region 1054															
10 Mar	N12E56	148	10	3	BXO	2	B								
11 Mar	N15E43	148	110	6	DSO	7	B					1			
12 Mar	N15E29	148	190	7	DAO	12	B	1				1			
13 Mar	N15E15	149	230	11	ESC	22	BG	1				2			
14 Mar	N14E01	149	230	13	ESI	20	BG	1				3			
15 Mar	N14W14	151	240	14	EAI	18	BG								
16 Mar	N15W25	149	90	9	DAI	11	B								
17 Mar	N15W37	148	70	7	CAI	4	B								
18 Mar	N16W55	153	40	5	CRO	3	B					1			
19 Mar	N16W71	156	10	1	HSX	1	A					1			
20 Mar	N16W82	154	10	1	AXX	1	A								
								3	0	0	9	0	0	0	0

Crossed West Limb.

Absolute heliographic longitude: 149

<i>Region 1055</i>															
11 Mar	S23W15	206	30	3	CSO	4	B								
12 Mar	S24W27	204	30	3	CSO	4	B								
13 Mar	S24W40	204													
14 Mar	S24W53	204													
15 Mar	S24W66	204													
16 Mar	S24W79	204													
								0	0	0	0	0	0	0	0

Crossed West Limb.

Absolute heliographic longitude: 206

<i>Region 1056</i>															
17 Mar	N17E47	64	20	5	CRO	4	B								
18 Mar	N18E34	64	50	6	CRO	5	B								
19 Mar	N18E22	63	10	2	BXO	3	B								
20 Mar	N18E07	65	30	4	CRO	4	B				1				
21 Mar	N18W06	65	70	7	CSI	15	B				2				
								0	0	0	3	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 65



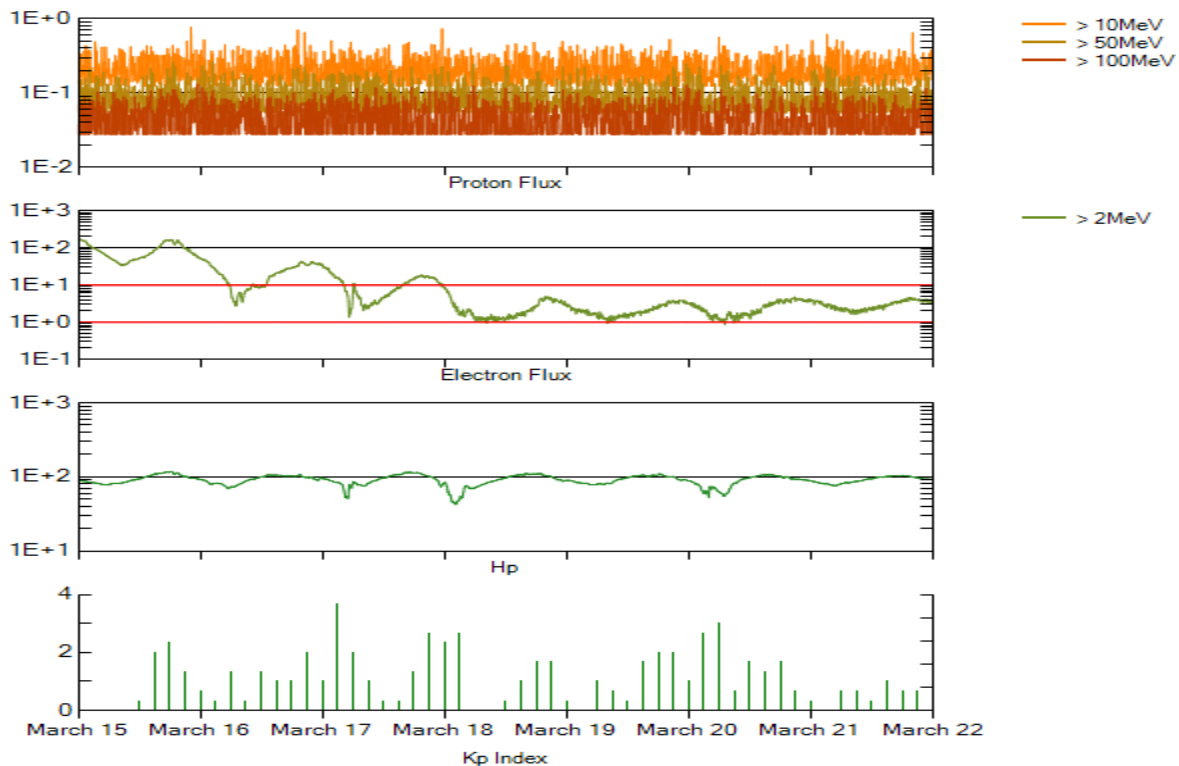
Recent Solar Indices (preliminary)
Of the observed monthly mean values

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
2008									
March	15.9	9.3	0.58	5.3	3.3	72.9	69.8	11	7.5
April	4.9	2.9	0.59	5.3	3.4	70.2	69.8	9	7.3
May	5.7	3.2	0.56	5.7	3.5	68.4	69.8	6	7.2
June	4.2	3.4	0.81	5.2	3.3	65.9	69.4	7	7.0
July	1.0	0.8	0.80	4.5	2.8	65.7	68.8	5	6.8
August	0.0	0.5	**	4.4	2.7	66.3	68.6	5	6.3
September	1.5	1.1	0.73	3.7	2.3	67.1	68.4	6	5.8
October	5.2	2.9	0.56	2.9	1.8	68.3	68.2	7	5.4
November	6.8	4.1	0.60	2.7	1.7	68.6	68.3	4	5.1
December	1.3	0.8	0.62	2.7	1.7	69.2	68.5	4	4.9
2009									
January	2.8	1.3	0.46	3.0	1.8	69.8	68.7	4	4.7
February	2.5	1.4	0.56	3.1	1.9	70.0	68.8	5	4.7
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			70.5		4	
October	7.0	4.6	0.66			72.3		3	
November	7.7	4.2	0.55			73.6		3	
December	15.7	10.6	0.68			76.8		2	
2010									
January	21.3	13.1	0.62			81.1		3	
February	31.0	18.6	0.60			84.7		4	

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.

** SWPC sunspot number was zero so a ratio could not be computed.





Weekly Geosynchronous Satellite Environment Summary
Week Beginning 15 March 2010

GOES-11 designated Primary Proton and Electron Satellite.

Protons plot contains the five-minute averaged integral proton flux (protons/cm²–sec–sr) as measured by GOES-11 (W135) for each of three energy thresholds: greater than 10, 50, and 100 MeV.

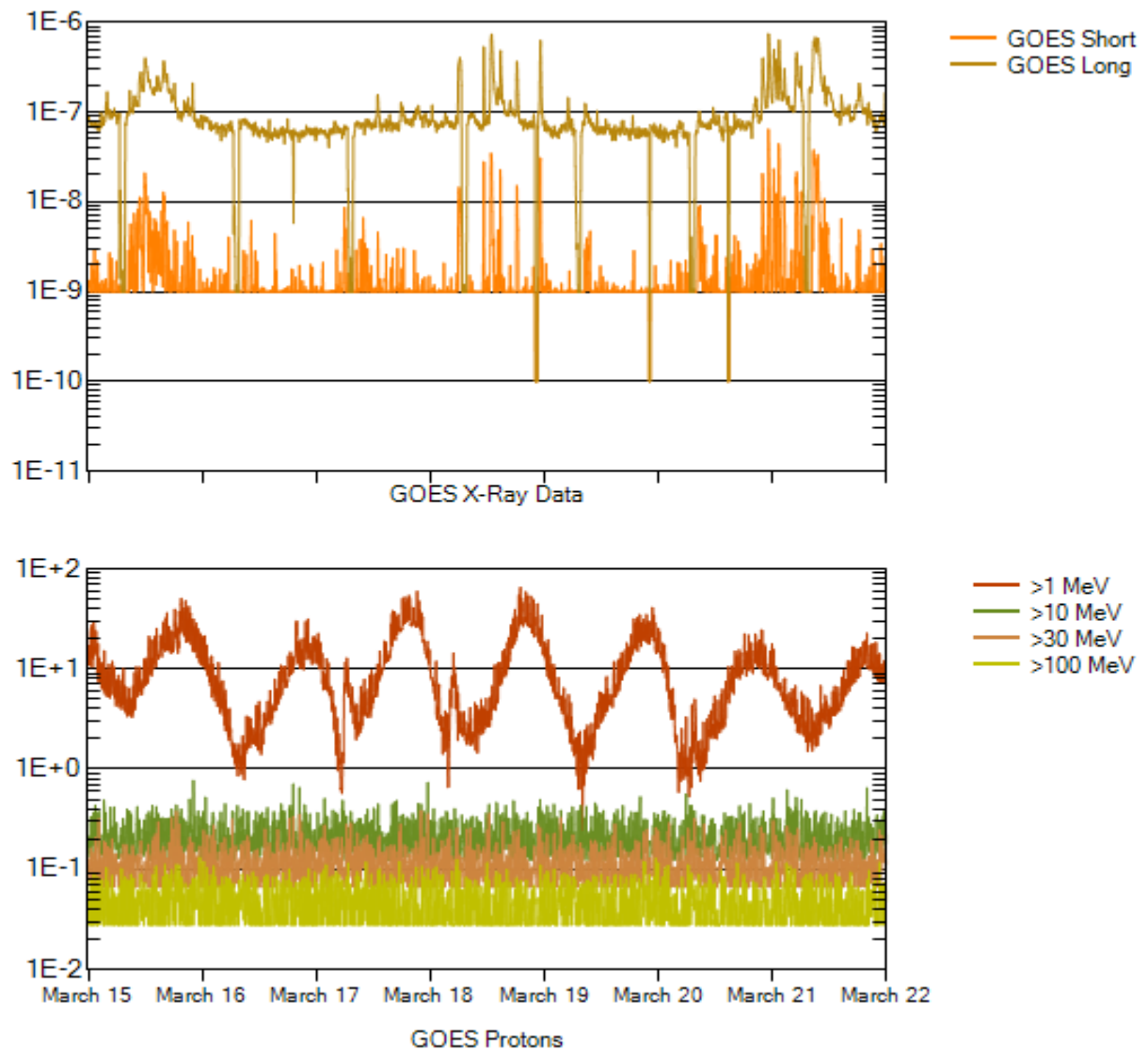
Electrons plot contains the five-minute averaged integral electron flux (electrons/cm²–sec–sr) with energies greater than 2 MeV at GOES-11.

Hp plot contains the five minute averaged magnetic field H - component in nanoteslas (nT) as measured by GOES-11. The H 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

X-ray plot contains five-minute averaged x-ray flux (Watts/m^2) as measured by GOES 14 (W105) 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.

Proton plot contains the five-minute averaged integral proton flux ($\text{protons/cm}^2\text{-sec-sr}$) as measured by GOES-11 for each of the energy thresholds: >1, >10, >30 and >100 MeV. P10 event threshold is 10 pfu ($\text{protons/cm}^2\text{-sec-sr}$) at greater than 10 MeV.

