

Space Weather Highlights **12 April – 18 April 2010**

SWO PRF 1807
20 April 2010

Solar activity was at very low levels. Only a few, low-level B-class flares occurred during the week. Two of these were long duration events at 17/0557 UTC and 18/0218 UTC, apparently from a new region just rotating onto the solar disk at the end of the summary period. The only spotted group at the start of the period was Region 1062 (S18, L=134, class/area Cro/020 on 13 April), but the group decayed to plage on 15 April and the solar disk was spotless for the remainder of the period.

No proton events were observed at geosynchronous orbit.

The greater than 2 MeV electron flux at geosynchronous orbit varied between normal background and moderate levels throughout the period with the exception of a brief interval at high levels between 2000-2200 UTC on 14 April.

The geomagnetic field began the week with a strong substorm between 0000-0300 UTC on 12 April; activity reached major to severe storm levels during the interval. Predominantly active conditions followed from 0300-0900 UTC, unsettled levels from 0900-1800 UTC, after which the field returned to quiet levels. Quiet levels continued until 2100 UTC on 14 April when an interval of active to minor storm levels occurred, followed by unsettled to active levels for 0000-0600 UTC on 15 April. The remainder of the summary period was quiet. The substorm and subsequent activity on 12 April was associated with transient flow observed by the ACE spacecraft, most likely caused by the CME that was observed on 08 April. The enhanced activity late on 14 April and early on 15 April was most likely associated with a co-rotating interaction region leading a high speed stream from a geo-effectively positioned coronal hole.

Space Weather Outlook **21 April – 17 May 2010**

Solar activity is expected to be at very low levels 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 05-08 May.

The geomagnetic field is expected to be mostly unsettled, with a chance for isolated active periods from 21-24 April due to possible effects from a high speed stream from a coronal hole, as well as possible contributions from recent CME activity on 18-19 April. Quiet conditions are expected to prevail from 25 April to 03 May. Generally unsettled levels are expected for 04-05 May due to a recurrent high speed stream. Activity is expected to return to quiet levels during the remainder of the period 06-17 May.



Daily Solar Data

Date	Radio Flux 10.7 cm	Sun spot No.	Sunspot Area (10 ⁻⁶ hemi.)	X-ray Background	Flares						
					X-ray Flux			Optical			
					C	M	X	S	1	2	3 4
12 April	75	14	10	A2.3	0	0	0	0	0	0	0 0
13 April	75	14	20	A2.0	0	0	0	0	0	0	0 0
14 April	75	12	10	A1.9	0	0	0	0	0	0	0 0
15 April	75	0	0	A2.0	0	0	0	0	0	0	0 0
16 April	75	0	0	A1.9	0	0	0	0	0	0	0 0
17 April	74	0	0	A3.4	0	0	0	0	0	0	0 0
18 April	75	0	0	A3.7	0	0	0	0	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
12 April	8.9e+05	1.7e+04	3.5e+03		1.4e+07	
13 April	6.3e+05	1.9e+04	4.5e+03		1.9e+07	
14 April	5.0e+05	1.8e+04	7.3e+03		3.0e+07	
15 April	2.1e+05	1.8e+04	6.8e+03		9.0e+06	
16 April	2.2e+05	1.7e+04	7.1e+03		1.3e+07	
17 April	2.4e+05	1.7e+04	6.7e+03		1.6e+07	
18 April	2.8e+05	1.8e+04	7.2e+03		1.8e+07	

Daily Geomagnetic Data

Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
12 April	18	6-4-3-1-1-2-2-1	17	5-3-4-2-3-3-2-0	22	6-4-3-1-1-3-2-1
13 April	2	0-0-2-1-0-1-0-1	3	0-0-2-2-1-0-0-1	3	1-0-1-1-0-1-0-2
14 April	8	1-0-0-1-0-1-2-5	5	1-1-0-1-1-1-2-3	9	1-1-0-0-1-1-2-5
15 April	5	3-3-1-1-1-1-0-0	6	3-3-1-2-1-1-0-0	8	4-3-1-1-1-1-0-1
16 April	2	1-1-0-0-1-1-1-0	2	2-1-0-0-0-0-1-0	4	2-1-0-0-0-1-1-1
17 April	1	0-0-1-0-0-0-1-1	2	1-0-1-0-0-0-1-1	2	1-0-0-0-0-0-1-1
18 April	1	0-0-0-0-0-0-1-1	1	0-0-0-1-0-0-1-1	2	1-1-0-1-0-1-0-1

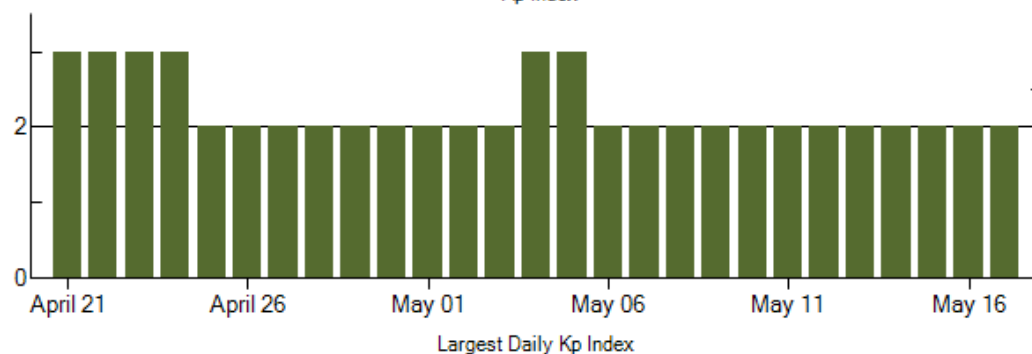
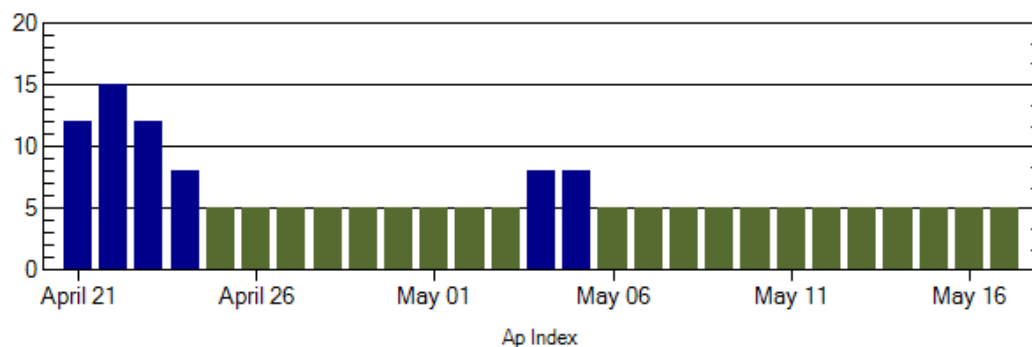
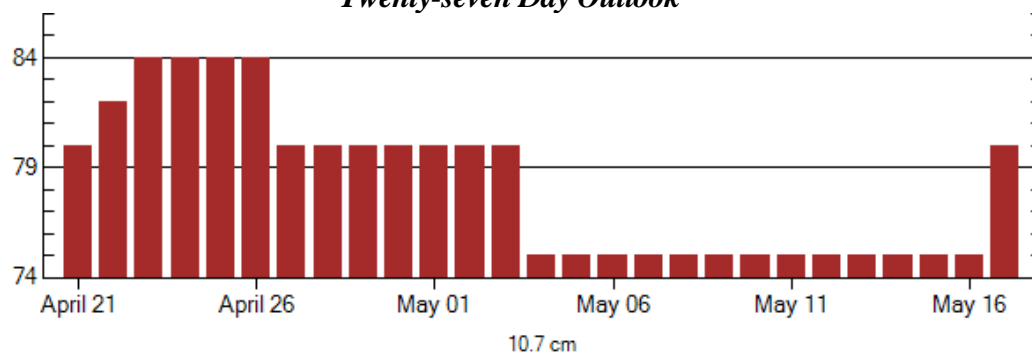


Alerts and Warnings Issued

Date & Time of Issue	Type of Alert or Warning	Date & Time of Event UTC
12 Apr 0208	ALERT: Geomagnetic K = 4	12 Apr 0206
12 Apr 0222	WARNING: Geomagnetic K = 5	12 Apr 0223 - 1600
12 Apr 0224	WARNING: Geomagnetic K = 6	12 Apr 0230 - 1600
12 Apr 0225	ALERT: Geomagnetic K = 5	12 Apr 0224
12 Apr 0226	ALERT: Geomagnetic K = 6	12 Apr 0225
12 Apr 0239	WARNING: Geomagnetic K \geq 7	12 Apr 0240 - 1600
12 Apr 0240	ALERT: Geomagnetic K = 7	12 Apr 0240
12 Apr 0427	CANCELLATION: Geomagnetic K \geq 7	
12 Apr 0911	CANCELLATION: Geomagnetic K = 6	
12 Apr 1302	CANCELLATION: Geomagnetic K = 5	
14 Apr 2119	ALERT: Electron 2MeV Integral Flux \geq 1000pfu	14 Apr 2100
14 Apr 2312	WARNING: Geomagnetic K = 4	14 Apr 2313 - 15/0600
14 Apr 2335	ALERT: Geomagnetic K = 4	14 Apr 2333



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
21 Apr	80	12	3	05 May	75	8	3
22	82	15	3	06	75	5	2
23	84	12	3	07	75	5	2
24	84	8	3	08	75	5	2
25	84	5	2	09	75	5	2
26	84	5	2	10	75	5	2
27	80	5	2	11	75	5	2
28	80	5	2	12	75	5	2
29	80	5	2	13	75	5	2
30	80	5	2	14	75	5	2
01 May	80	5	2	15	75	5	2
02	80	5	2	16	80	5	2
03	80	5	2	17	80	5	2
04	75	8	3				



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	Flux	Brtns	Lat CMD	#	245	2695	II	IV
<i>No Events Observed</i>												

Flare List

Date	Time			X-ray	Imp /	Optical	Rgn
	Begin	Max	End	Class.	Brtns	Location Lat CMD	
12 April	No Flares Observed						
13 April	0439	0443	0449		B3.7		
14 April	No Flares Observed						
15 April	No Flares Observed						
16 April	No Flares Observed						
17 April	0437	0557	0712		B2.1		
	2134	0218	0416		B1.3		
18 April	No Flares Observed						



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		
<i>Region 1060</i>																	
04 Apr	N24E58	176	90	4	DRO	4	B										
05 Apr	N25E45	176	60	5	CRO	4	B										
06 Apr	N26E32	176	30	7	CRO	3	B										
07 Apr	N24E14	181	10	1	AXX	1	A										
08 Apr	N25E00	181		1	AXX	1	A										
09 Apr	N25W13	181										1					
10 Apr	N25W26	181															
11 Apr	N25W39	181															
12 Apr	N25W52	181															
13 Apr	N25W65	181															
14 Apr	N25W78	181															
										0	0	0	1	0	0	0	0

Crossed West Limb.

Absolute heliographic longitude: 181

Region 1062

12 Apr	S18W05	134	10	3	BXO	4	B								
13 Apr	S18W20	135	20	4	CRO	4	B								
14 Apr	S18W34	136	10	2	BXO	2	B								
15 Apr	S18W47	136													
16 Apr	S18W60	136													
17 Apr	S18W73	136													
18 Apr	S18W86	136													
								0	0	0	0	0	0	0	0

Still on Disk

Absolute heliographic longitude: 134



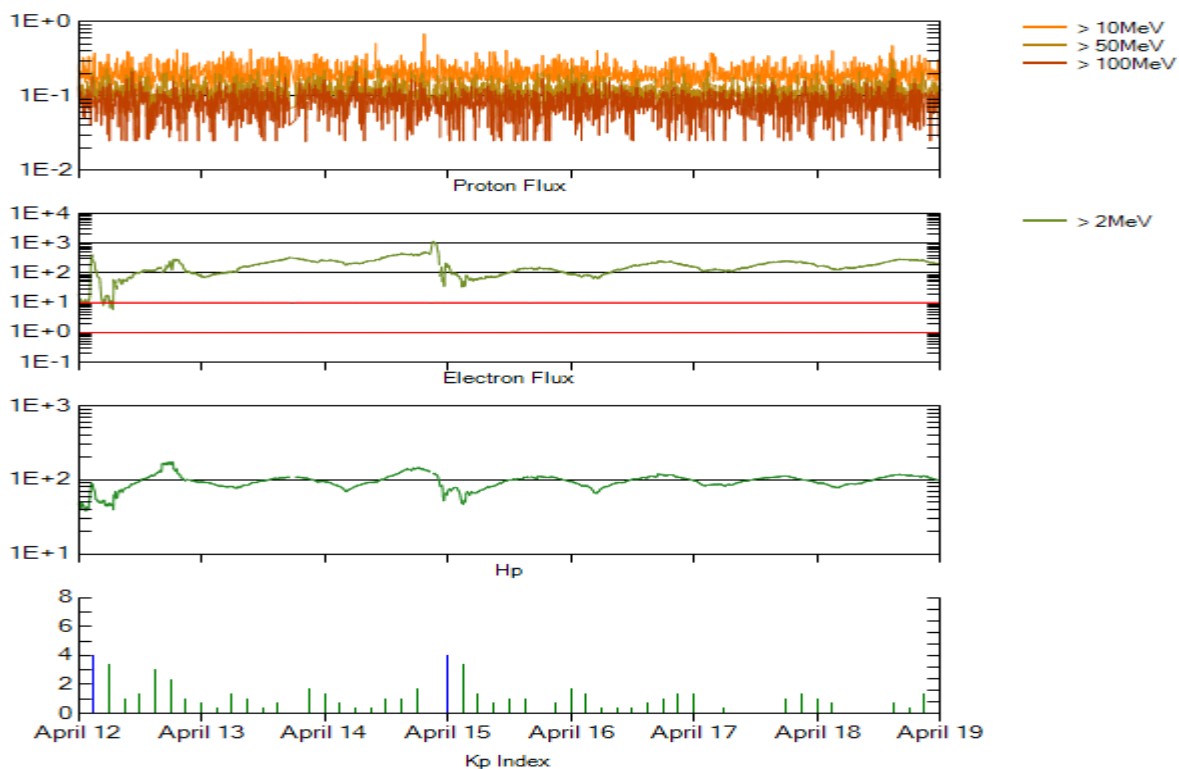
Recent Solar Indices (preliminary)
Of the observed monthly mean values

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									
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	9.9	6.1	70.5	73.3	4	3.8
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		5	
March	24.7	15.4	0.62			83.3		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 12 April 2010

GOES-13 replaces GOES-11 as Primary Proton and Electron Satellite and Primary Magnetometer Satellite.

GOES-13 replaced GOES-11 as primary proton and electron satellite and primary magnetometer satellite on 14 April 2010.

The proton flux plot contains the five-minute averaged integral proton flux (protons/cm²–sec–sr) as measured by GOES-13 (W75) for each of three energy thresholds: greater than 10, 50, and 100 MeV.

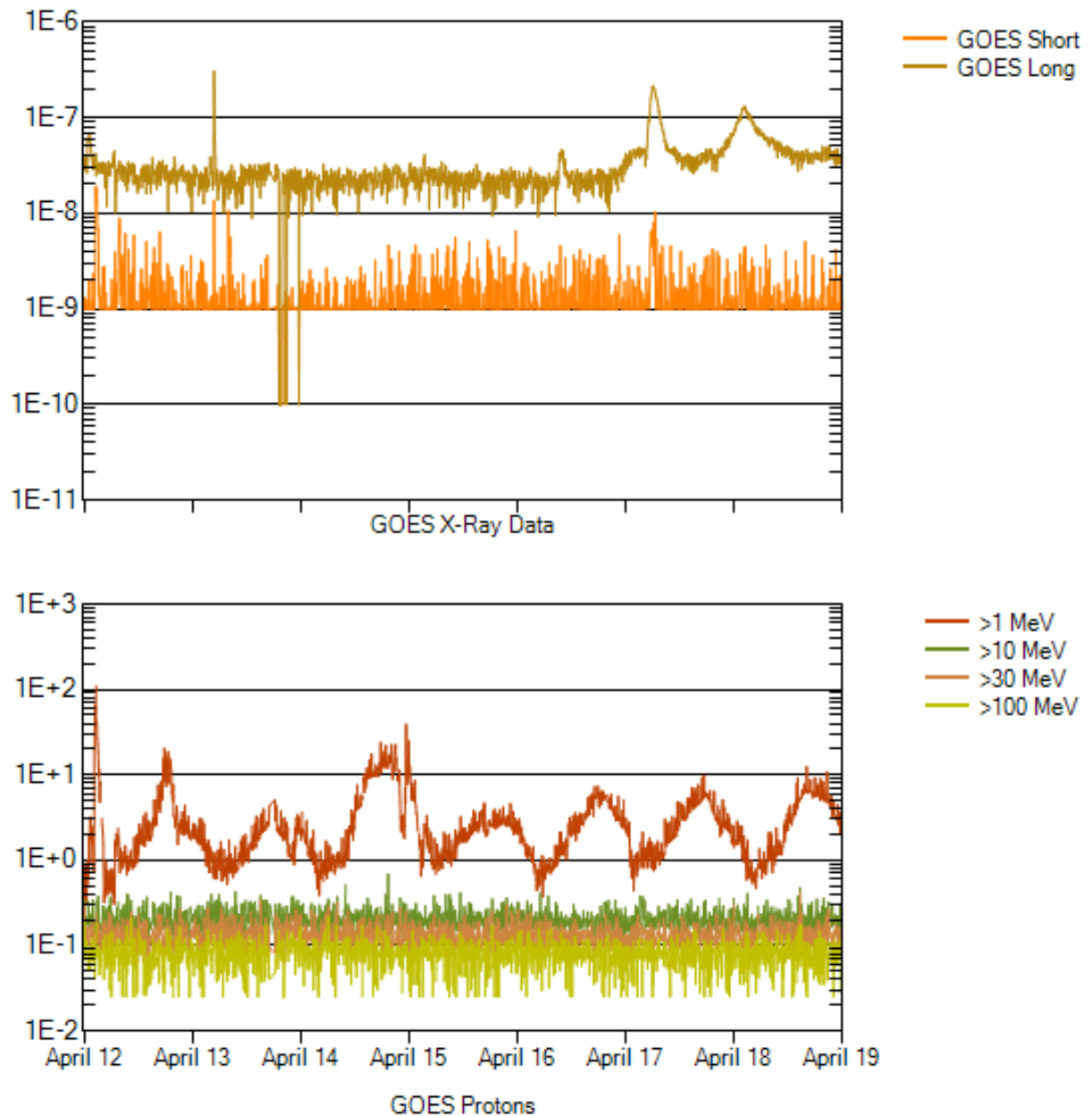
The electron flux plot contains the five-minute averaged integral electron flux (electrons/cm²–sec–sr) with energies greater than 2 MeV at GOES-13.

The Hp plot contains the five minute averaged Hp magnetic field component in nanoteslas (nT) as measured by GOES-13. 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

The 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.

The proton plot contains the five-minute averaged integral proton flux ($\text{protons/cm}^2\text{-sec-sr}$) as measured by GOES-13 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. (GOES-13 replaced GOES-11 as primary for protons on 14 April 2010).

