

Space Weather Highlights

24 - 30 May 2010

SWO PRF 1813
01 June 2010

Solar activity was very low during the period. The week began with one sunspot group, Region 1072 (S15, L=315, class/area DSI/130 on 23 May), which slowly decayed and quietly exited the disk on 28 May. Region 1072 produced two B flares during the week, a B6 at 25/1550 UTC and a B1 at 27/2315 UTC. A partial halo CME was observed on 24 May, beginning at 1407 UTC (in SOHO LASCO C2 images) and was associated with long-duration B1 x-ray event (maximum at 24/1446 UTC). The CME originated from a filament channel near N15W32. Three small sunspot groups were numbered on 29 May but were very simple and did not produce any flare activity.

No proton events were observed at geosynchronous orbit.

The greater than 2 MeV electron flux at geosynchronous orbit was at normal background or moderate levels for most of the week until 30 May when the flux reached high levels.

The geomagnetic field began the week at quiet levels and continued quiet until early on 28 May when a shock was observed at the ACE spacecraft at 0203 UTC. The shock was followed by a sudden impulse at 0259 UTC and mostly unsettled geomagnetic activity with some active to minor storm periods at high latitudes. The disturbance most likely originated from the 23 May halo CME described in last week's report. A second transient was observed to pass ACE on 29 May and was characterized by strengthening of the interplanetary magnetic field B_t to about 15 nT with a predominantly southward component, B_z , to values around -14 nT. The sustained negative B_z interval lasted about 21 hours and resulted in active to minor storm level activity with some major storm periods at high latitudes. The second transient was likely the result of the halo CME observed on 24 May. A density increase at ACE was followed by a steady increase in solar wind velocity on 30 May which was likely the result of a recurrent co-rotating interaction region followed by a coronal hole high speed stream. The resultant geomagnetic activity consisted of mostly unsettled to active levels with occasional storm periods at the high latitudes.

Space Weather Outlook

02 – 28 June 2010

Solar activity is expected to be at very low to low levels.

No proton events are expected at geosynchronous orbit.

The greater than 2 MeV electron flux at geosynchronous orbit is expected to be at high levels at the beginning of the period from 02–06 June. Normal background levels are expected for 07-09 June followed by another increase to high levels for 10-12 June in response to a recurrent high speed stream. Normal background levels should predominate thereafter until 26 June when another increase to high levels is expected due to recurrence.

The geomagnetic field is expected to be unsettled for 02-03 June due to persistent effects from a high speed stream. Quiet levels are expected for 04-06 June, followed by an increase to mostly unsettled levels on 07-08 June in response to a high speed stream from a coronal hole. Quiet conditions should return for 09-15 June, followed by another interval of unsettled levels on 16-17 June due to another recurrent high speed stream. Quiet levels should prevail for 18-24 June, followed by yet another increase to unsettled to active levels for 25-28 June in response to a recurrent coronal hole.



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
24 May	73	17	90	A3.6	0	0	0	0	0	0	0 0
25 May	73	16	60	A3.1	0	0	0	2	0	0	0 0
26 May	72	11	50	A2.8	0	0	0	0	0	0	0 0
27 May	73	11	40	A2.4	0	0	0	0	0	0	0 0
28 May	73	12	45	A2.9	0	0	0	0	0	0	0 0
29 May	74	43	50	A3.1	0	0	0	0	0	0	0 0
30 May	73	40	40	A2.6	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
24 May	3.5e+05	1.8e+04	7.1e+03		7.1e+06	
25 May	2.4e+05	1.5e+04	3.9e+03		6.3e+06	
26 May	2.3e+05	1.5e+04	4.2e+03		2.1e+06	
27 May	1.1e+05	1.5e+04	4.0e+03		1.8e+06	
28 May	4.4e+05	1.5e+04	3.7e+03		1.7e+06	
29 May	3.6e+05	1.4e+04	3.2e+03		4.8e+06	
30 May	5.2e+05	1.5e+04	3.4e+03		6.7e+07	

Daily Geomagnetic Data

Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
24 May	0	0-0-0-0-1-0-0-0	0	0-0-0-0-0-0-0-0	2	1-0-0-0-0-1-1-1
25 May	4	1-1-1-1-1-1-2-2	4	1-1-1-2-2-1-1-2	5	1-1-1-1-1-1-2-3
26 May	5	2-2-1-1-2-1-1-2	4	1-2-2-2-1-1-0-1	6	2-2-1-1-1-1-2-2
27 May	1	1-0-0-0-0-1-1-0	1	1-0-0-2-0-0-0-0	4	2-0-0-0-1-1-1-2
28 May	7	1-3-2-2-2-1-2-2	16	1-3-1-5-5-1-1-2	10	1-3-2-2-3-2-3-3
29 May	15	2-2-4-3-3-3-3-3	53	2-4-7-5-6-6-4-3	33	4-3-5-5-5-4-3-3
30 May	14	2-2-4-2-1-2-4-4	25	3-3-6-4-2-3-4-3	19	3-3-4-2-2-4-5-4

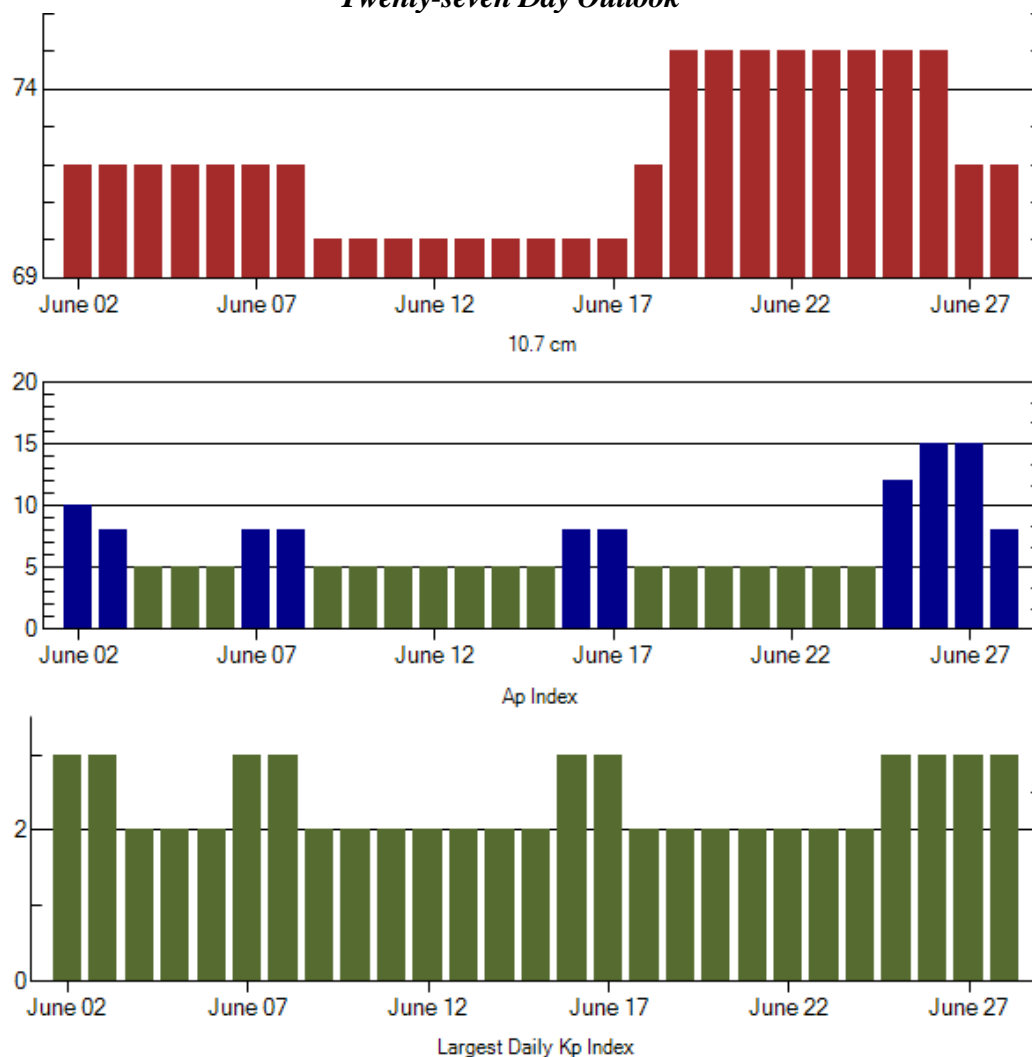


Alerts and Warnings Issued

Date & Time of Issue	Type of Alert or Warning	Date & Time of Event UTC
25 May 2126	WATCH: Geomagnetic A \geq 20	28 May
27 May 2109	WATCH: Geomagnetic A \geq 20	30 May
28 May 0220	WARNING: Geomagnetic Sudden Impulse expected	28 May 0245 - 0345
28 May 0305	WARNING: Geomagnetic K = 4	28 May 0310 - 1600
28 May 0308	SUMMARY: Geomagnetic Sudden Impulse	28 May 0259
29 May 0321	WARNING: Geomagnetic K = 4	29 May 0330 - 1600
29 May 0748	ALERT: Geomagnetic K = 4	29 May 0747
29 May 0751	WARNING: Geomagnetic K = 5	29 May 0753 - 1600
29 May 0757	ALERT: Geomagnetic K = 5	29 May 0754
29 May 0807	WARNING: Geomagnetic K = 6	29 May 0808 - 1200
29 May 1142	EXTENDED WARNING: Geomagnetic K = 6	29 May 0808 - 1600
29 May 1545	EXTENDED WARNING: Geomagnetic K = 4	29 May 0330 - 1900
30 May 0624	WARNING: Geomagnetic K = 4	30 May 0625 - 1600
30 May 0630	ALERT: Geomagnetic K = 4	30 May 0629
30 May 1034	ALERT: Electron 2MeV Integral Flux \geq 1000pfu	30 May 1015
30 May 1631	WARNING: Geomagnetic K = 4	30 May 1630 - 31/1600



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
02 Jun	72	10	3	16 Jun	70	8	3
03	72	8	3	17	70	8	3
04	72	5	2	18	72	5	2
05	72	5	2	19	75	5	2
06	72	5	2	20	75	5	2
07	72	8	3	21	75	5	2
08	72	8	3	22	75	5	2
09	70	5	2	23	75	5	2
10	70	5	2	24	75	5	2
11	70	5	2	25	75	12	3
12	70	5	2	26	75	15	3
13	70	5	2	27	72	15	3
14	70	5	2	28	72	8	3
15	70	5	2				



Energetic Events

Date	Time			X-ray		Optical Information			Peak		Sweep Freq	
	$\frac{1}{2}$			Integ		Imp/		Rgn	Radio Flux		Intensity	
	Begin	Max	Max	Class	Flux	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	
24 May	1305	1446	1550	B1.1				
25 May	0652	0652	0656		SF	S14W27		1072
	1550	1550	1558	B6.5	SF	S16W32		1072
26 May	No Flares Observed							
27 May	2300	2315	2325	B1.4				
28 May	No Flares Observed							
29 May	No Flares Observed							
30 May	No Flares Observed							



Region Summary

Table 1. Summary of Observations														
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

Region 1072

20 May	S15E31	316	10	2	BXO	2	B								
21 May	S16E14	319	30	4	BXO	5	B								
22 May	S16E08	312	100	6	CAO	10	B				1				
23 May	S15W09	315	130	6	DSI	13	B								
24 May	S15W22	315	90	6	CSO	7	B								
25 May	S15W36	316	60	5	CSO	6	B				2				
26 May	S15W52	319	50	2	HSX	1	A								
27 May	S15W65	318	40	2	HSX	1	A								
28 May	S15W79	319	45	2	HAX	2	B								
								0	0	0	3	0	0	0	0

Crossed West Limb.

Absolute heliographic longitude: 312

Region 1073

29 May	N13E35	192	20	4	BXO	5	B								
30 May	N13E21	193	20	4	BXO	6	B								
								0	0	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 193

Region 1074

29 May	N19W57	284	10	3	BXO	3	B								
30 May	N17W72	286	10	1	AXX	2	A								
								0	0	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 284

Region 1075

29 May	S20W02	229	20	3	BXO	5	B								
30 May	S20W16	230	10	3	BXO	2	B								
								0	0	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 229



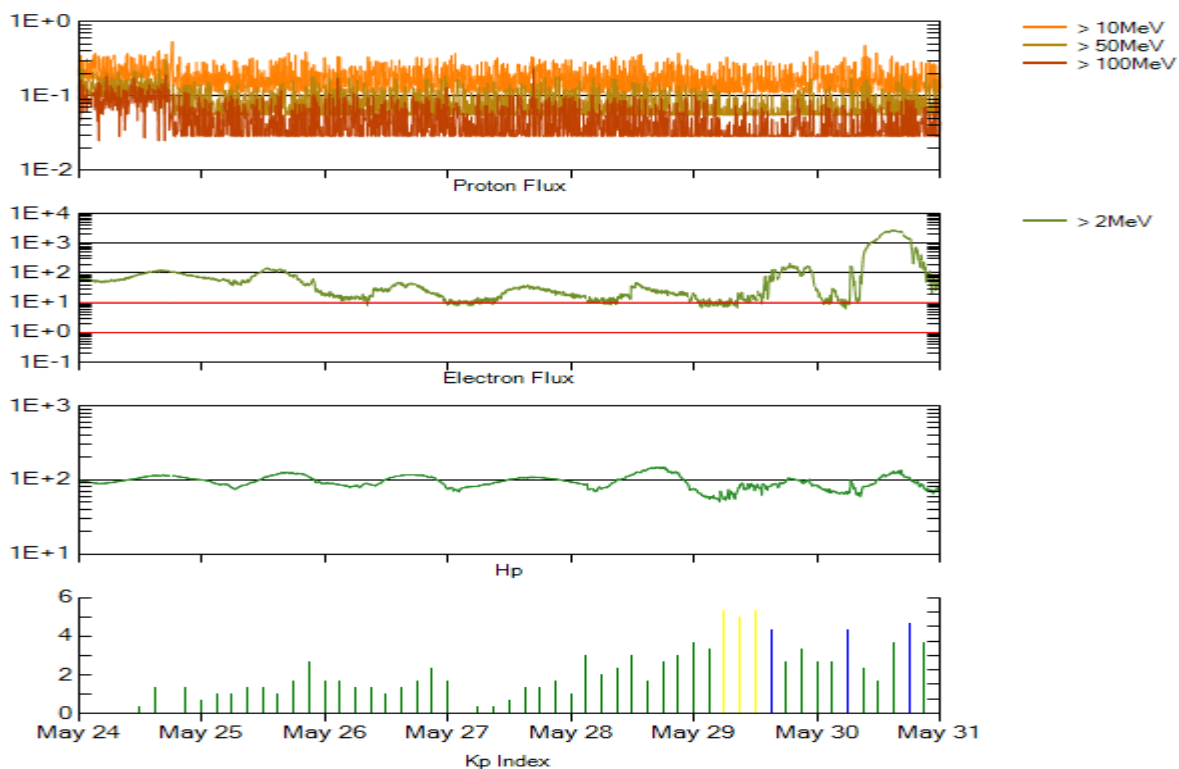
Recent Solar Indices (preliminary)
Of the observed monthly mean values

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									
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	4.8	0.66	11.3	7.0	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			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		5	
April	11.2	7.9	0.71			75.9		10	
May	19.9	8.8	0.44			73.8		8	

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 24 May 2010

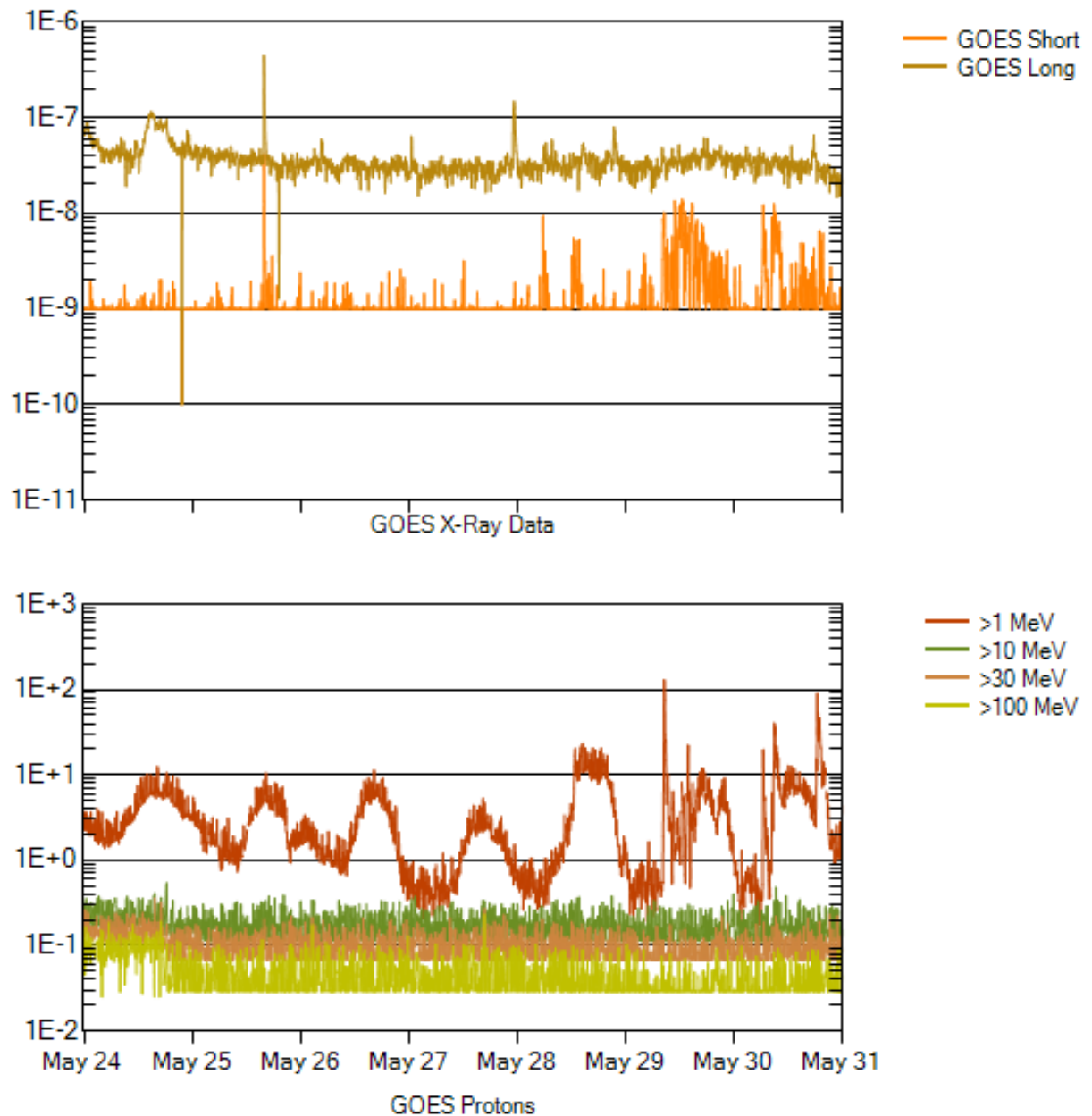
The proton flux plot contains the five-minute averaged integral proton flux (protons/cm²–sec–sr) as measured by GOES-13 (W75) for each of three energy thresholds: greater than 10, 50, and 100 MeV. The electron flux plot contains the five-minute averaged integral electron flux (electrons/cm²–sec–sr) with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

