

Space Weather Highlights
05 April – 11 April 2010

SWO PRF 1806
13 April 2010

Solar activity was at very low levels with isolated low-level B-class flares. Three sunspot groups were observed on the visible disk during the period. Region 1059 (S25, L=261, class/area Hax/030 on 05 April) decayed to spotless plage on 07 April. Region 1060 (N25, L=176, class/area Cro/060 on 05 April) produced a B3 flare at 08/0325 UTC, with an associated EIT wave and an Earth-directed full halo CME. Region 1061 (N14, L=232, class/area Dso/110 on 06 April) was the largest group during the period but began to decay on 07 April.

No proton events were observed at geosynchronous orbit.

The greater than 2 MeV electron flux at geosynchronous orbit reached high levels on 05 April and reached very high levels every day from 06-11 April.

Geomagnetic field activity was at quiet to severe storm levels during the period. A shock was observed at ACE at 05/0756 UTC which led to a sudden impulse at Earth at 05/0826 UTC (38 nT was observed at the Boulder magnetometer). The most likely source for the activity was the halo CME observed on 03/0954 UTC. Geomagnetic field activity was at active levels after 05/0300 UTC, with major to severe storm conditions between 05/0900-1200 UTC. Numerous high-latitude stations reported severe storm levels during this interval, as well as several mid-latitude stations in the nighttime sectors. ACE observed wind speeds between 720-800 km/s behind the shock, with Bz reaching values around -15 nT. Activity continued on 06 April with predominantly active to minor storm levels, as well as an interval of minor to major storm levels observed between 06/0000-0600 UTC. Wind speeds at ACE decreased to about 550 km/s at 06/2100 UTC. As the effects of the full halo CME waned on 07 April, a coronal hole high-speed stream moved into geoeffective position with activity levels ranging from unsettled to minor storm levels, with major storm conditions at high latitudes and a rise in the solar wind speeds at ACE from 560- 625 km/s. Quiet to active levels, with isolated minor storm conditions at high latitudes were observed on 08 April. Predominantly quiet conditions were observed on 09-10 April. Geomagnetic activity on the 11 April ranged from quiet to unsettled with some isolated storm periods at high latitudes 11/1500-1800 UTC following a weak shock observed at the ACE spacecraft at 11/1215 UTC followed by a sudden impulse at Earth at 11/1305 UTC (5 nT observed at the Boulder magnetometer). Velocity at the ACE spacecraft jumped from 380 km/s to about 450 km/s and the total magnetic field increased from 4 nT to about 10 nT. The most likely source for this activity was the full halo CME observed on 08/0325 UTC.



Space Weather Outlook

14 April – 10 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 at mostly quiet levels from 14 April – 02 May. Activity is expected to be at quiet to active levels during 03-05 May due to a recurrent coronal hole high-speed stream. Activity is expected to return to quiet levels during the remainder of the period 06-10 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
05 April	79	41	140	A4.1	0	0	0	0	0	0	0	0
06 April	78	41	150	A3.1	0	0	0	0	0	0	0	0
07 April	76	25	80	A3.2	0	0	0	0	0	0	0	0
08 April	76	23	50	A4.1	0	0	0	0	0	0	0	0
09 April	76	11	40	A3.5	0	0	0	1	0	0	0	0
10 April	75	11	10	A4.4	0	0	0	0	0	0	0	0
11 April	75	0	0	A2.7	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
05 April	2.6e+07	1.6e+04	3.3e+03		7.1e+07	
06 April	2.6e+07	1.6e+04	3.1e+03		2.5e+09	
07 April	9.8e+06	1.7e+04	3.6e+03		5.4e+09	
08 April	4.5e+06	1.6e+04	3.6e+03		4.6e+09	
09 April	2.1e+06	1.6e+04	3.6e+03		3.5e+09	
10 April	3.3e+06	1.7e+04	3.6e+03		4.4e+09	
11 April	3.6e+06	1.7e+04	3.6e+03		2.8e+09	

Daily Geomagnetic Data

Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
05 April	28	2-3-4-6-5-3-3-3	75	3-3-6-8-7-6-3-3	49	3-4-4-7-6-5-4-4
06 April	22	5-4-3-3-3-4-3-3	84	4-5-6-7-7-6-6-6	46	6-6-4-5-4-5-5-4
07 April	15	4-2-4-3-3-2-2-3	46	3-2-6-6-6-6-3-2	21	4-2-4-4-4-3-3-3
08 April	9	4-2-2-2-1-1-1-3	20	3-3-4-5-4-2-2-3	11	4-2-2-2-2-1-2-3
09 April	4	2-2-1-1-0-1-2-1	6	3-1-1-3-2-1-0-0	6	3-2-1-1-1-1-1-1
10 April	3	1-1-0-0-2-2-0-0	1	1-1-0-0-0-0-1-0	3	1-1-0-0-0-1-1-1
11 April	8	1-0-1-0-3-3-3-3	13	1-0-1-1-4-5-3-2	8	1-0-1-0-3-3-3-3

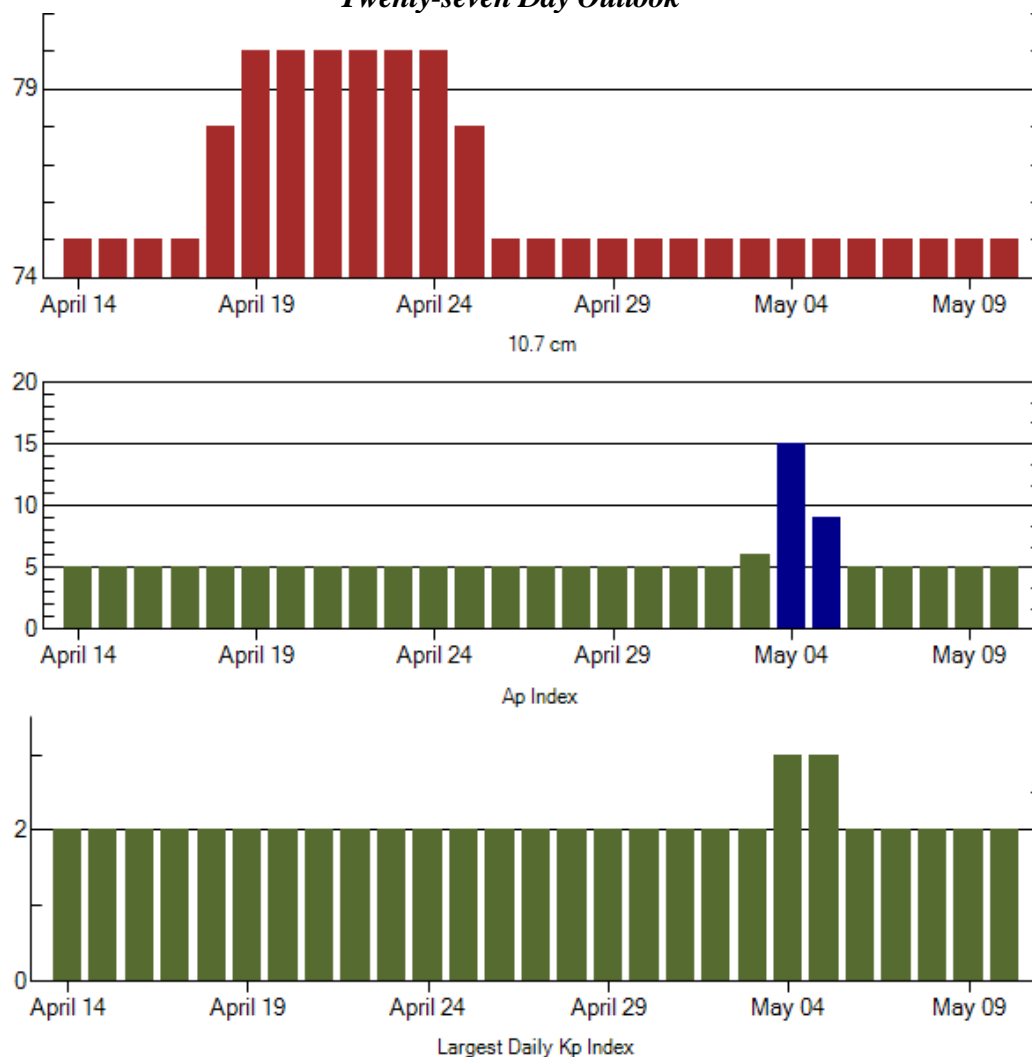


Alerts and Warnings Issued

Date & Time of Issue	Type of Alert or Warning	Date & Time of Event UTC
05 Apr 0533	WARNING: Geomagnetic K = 4	05 Apr 0534 - 1600
05 Apr 0544	ALERT: Geomagnetic K = 4	05 Apr 0543
05 Apr 0804	WARNING: Geomagnetic Sudden Impulse expected	05 Apr 0805 - 0845
05 Apr 0840	SUMMARY: Geomagnetic Sudden Impulse	05 Apr 0826
05 Apr 0916	WARNING: Geomagnetic K = 5	05 Apr 0920 - 1600
05 Apr 0917	ALERT: Geomagnetic K = 5	05 Apr 0916
05 Apr 0922	ALERT: Geomagnetic K = 6	05 Apr 0920
05 Apr 0949	ALERT: Electron 2MeV Integral Flux ≥ 1000 pfu	05 Apr 0915
05 Apr 0956	ALERT: Geomagnetic K = 7	05 Apr 0955
05 Apr 1427	WARNING: Geomagnetic K = 6	05 Apr 1430 - 06/0000
05 Apr 1831	CANCELLATION: Geomagnetic K = 6	
06 Apr 0042	WARNING: Geomagnetic K = 4	06 Apr 0041 - 1600
06 Apr 0044	WARNING: Geomagnetic K = 5	06 Apr 0044 - 1600
06 Apr 0045	ALERT: Geomagnetic K = 4	06 Apr 0045
06 Apr 0052	ALERT: Geomagnetic K = 5	06 Apr 0050
06 Apr 0416	WARNING: Geomagnetic K = 6	06 Apr 0415 - 0600
06 Apr 0423	ALERT: Geomagnetic K = 6	06 Apr 0422
06 Apr 0914	CONTINUED ALERT: Electron 2MeV Integral Flux ≥ 1000 pfu	05 Apr 0915
06 Apr 1556	EXTENDED WARNING: Geomagnetic K = 4	06 Apr 0041 - 07/0000
06 Apr 2303	EXTENDED WARNING: Geomagnetic K = 4	06 Apr 0041 - 07/1600
07 Apr 0849	ALERT: Geomagnetic K = 5	07 Apr 0847
07 Apr 0902	CONTINUED ALERT: Electron 2MeV Integral Flux ≥ 1000 pfu	05 Apr 0915
07 Apr 1542	WARNING: Geomagnetic K = 4	07 Apr 1600 - 2359
08 Apr 0211	WARNING: Geomagnetic K = 4	08 Apr 0211 - 1600
08 Apr 0214	ALERT: Geomagnetic K = 4	08 Apr 0215
08 Apr 0215	WARNING: Geomagnetic K = 5	08 Apr 0215 - 1600
08 Apr 0900	CONTINUED ALERT: Electron 2MeV Integral Flux ≥ 1000 pfu	05 Apr 0915
09 Apr 0900	CONTINUED ALERT: Electron 2MeV Integral Flux ≥ 1000 pfu	05 Apr 0915
10 Apr 0900	CONTINUED ALERT: Electron 2MeV Integral Flux ≥ 1000 pfu	05 Apr 0915
11 Apr 0749	SUMMARY: Geomagnetic Sudden Impulse	11 Apr 0713
11 Apr 0917	CONTINUED ALERT: Electron 2MeV Integral Flux ≥ 1000 pfu	05 Apr 0915
11 Apr 1320	SUMMARY: Geomagnetic Sudden Impulse	11 Apr 1304
11 Apr 1713	WARNING: Geomagnetic K = 4	11 Apr 1715 - 12/0000
11 Apr 2353	EXTENDED WARNING: Geomagnetic K = 4	11 Apr 1715 - 12/1600



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
14 Apr	75	5	2	28 Apr	75	5	2
15	75	5	2	29	75	5	2
16	75	5	2	30	75	5	2
17	75	5	2	01 May	75	5	2
18	78	5	2	02	75	5	2
19	80	5	2	03	75	6	2
20	80	5	2	04	75	15	3
21	80	5	2	05	75	9	3
22	80	5	2	06	75	5	2
23	80	5	2	07	75	5	2
24	80	5	2	08	75	5	2
25	78	5	2	09	75	5	2
26	75	5	2	10	75	5	2
27	75	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	Flux	Brtns	Lat CMD	#	245 2695	II IV
<i>No Events Observed</i>										

Flare List

				Optical			
	Time			X-ray	Imp /	Location	Rgn
Date	Begin	Max	End	Class.	Brtns	Lat CMD	
05 April	0043	0048	0053	B1.4			
	0845	0850	0853	B1.1			
	1119	1123	1128	B1.3			
	1244	1249	1254	B1.8			
	1652	1657	1708	B1.1			
06 April	0353	0402	0410	B1.5			
07 April	No Flares Observed						
08 April	0230	0325	0350	B3.7			
09 April	0448	0449	0456	B3.7	SF	N24E01	1060
	2018	2021	2023	B1.0			
	2032	2035	2040	B1.0			
10 April	No Flares Observed						
11 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
Region 1059														
27 Mar	S21E73	267	120	2	HSX	1	A							
28 Mar	S22E61	265	100	2	HAX	1	A							
29 Mar	S23E48	265	150	2	HSX	1	A							
30 Mar	S23E36	264	130	2	HAX	2	A							
31 Mar	S22E23	264	70	2	HAX	1	A							
01 Apr	S22E10	264	50	2	HSX	2	A							
02 Apr	S23W03	264	40	2	CSO	4	B							
03 Apr	S22W15	262	50	4	HSX	4	A							
04 Apr	S23W28	262	30	3	HSX	3	A							
05 Apr	S25W40	261	30	3	HAX	3	A							
06 Apr	S25W51	259	10	2	AXX	2	A							
07 Apr	S25W64	259												
08 Apr	S25W77	259												
09 Apr	S25W90	259												

0 0 0 0 0 0 0 0

Crossed West Limb.

Absolute heliographic longitude: 264

Region 1060

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													

0 0 0 1 0 0 0 0

Still on Disk.

Absolute heliographic longitude: 181

Region 1061

05 Apr	N14W11	232	50	4	DSO	4	B								
06 Apr	N14W24	232	110	6	DSO	6	B								
07 Apr	N13W39	234	70	7	DSO	4	B								
08 Apr	N14W52	233	50	5	CSO	2	B								
09 Apr	N13W69	237	40	1	HSX	1	A								
10 Apr	N13W83	238	10	1	AXX	1	A								

0 0 0 0 0 0 0 0

Crossed West Limb.

Absolute heliographic longitude: 232



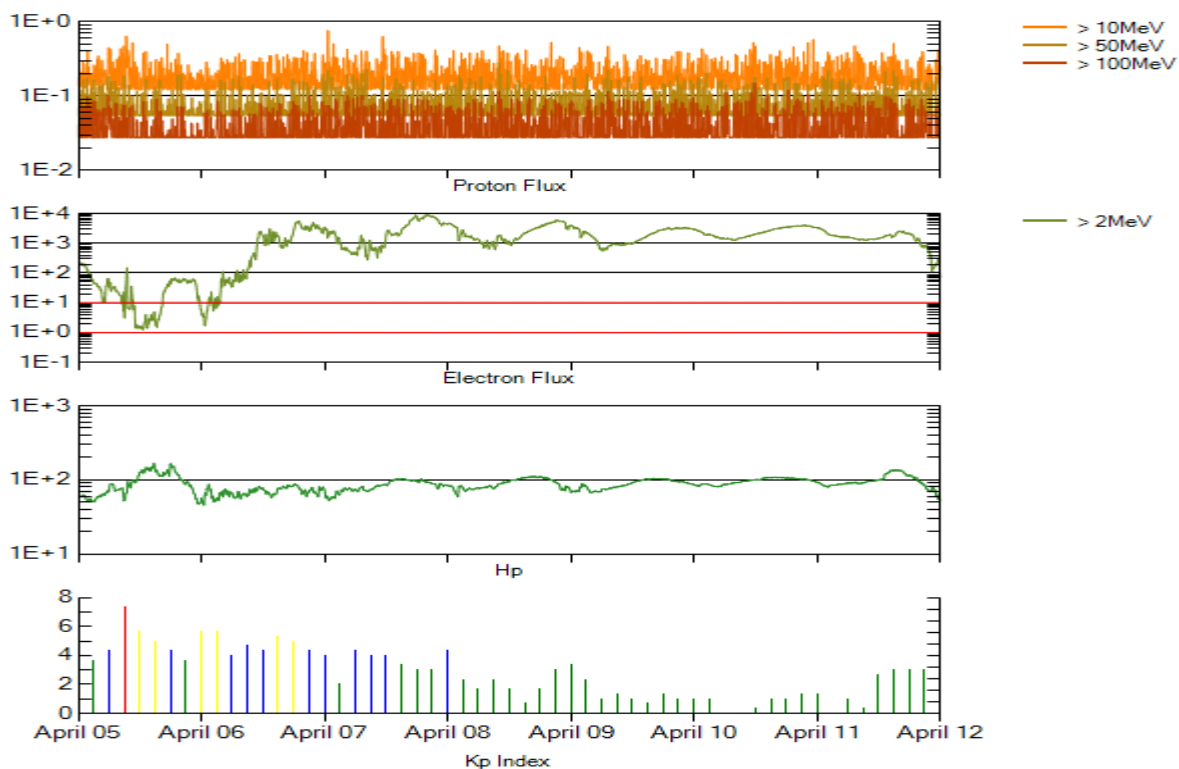
Recent Solar Indices (preliminary)
Of the observed monthly mean values

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 5 April 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.

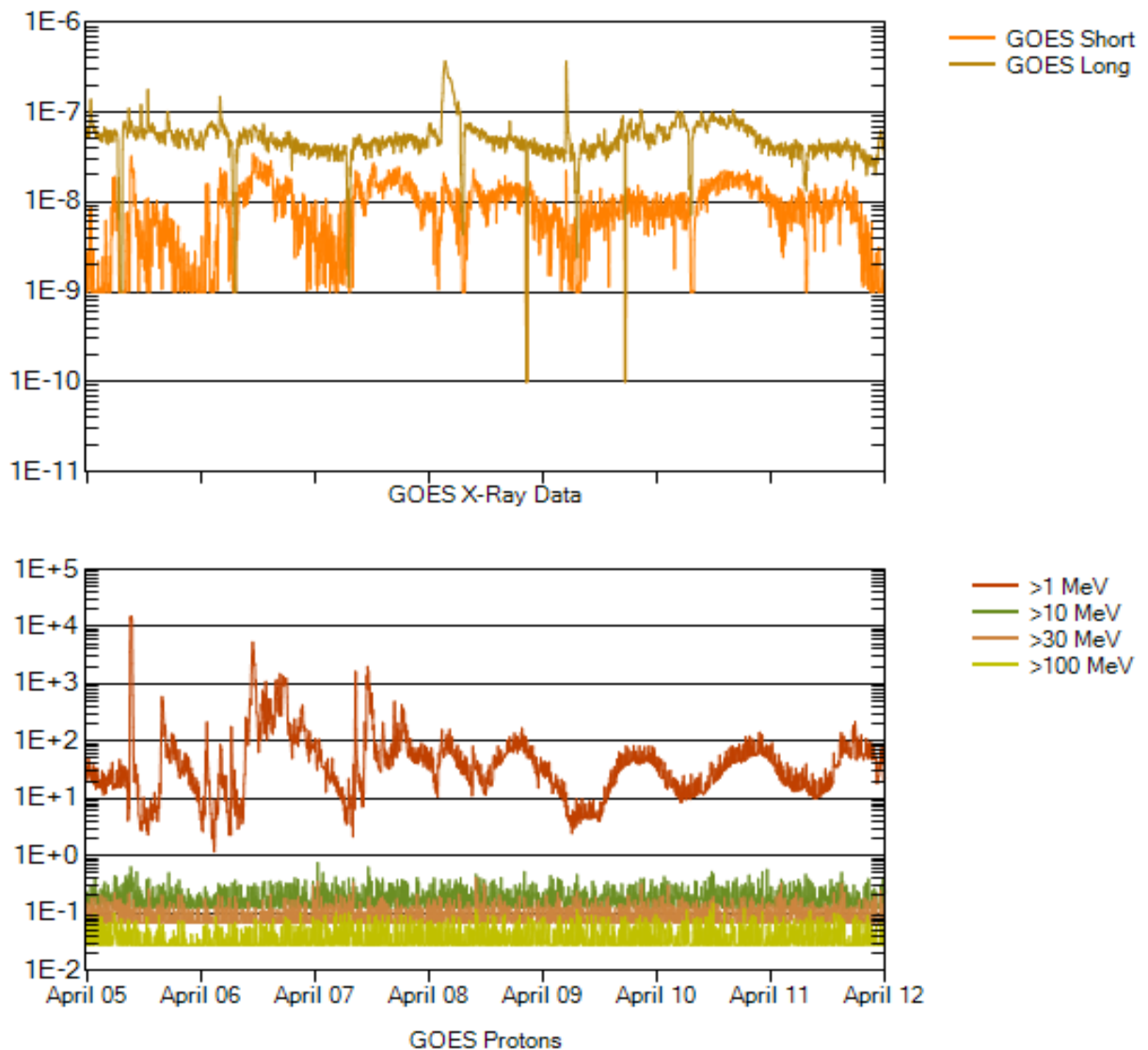
Electrons plot contains the five-minute averaged integral electron flux (electrons/cm²–sec–sr) with energies greater than 2 MeV at GOES-11.

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/m²) 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 (protons/cm²-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 (protons/cm²-sec-sr) at greater than 10 MeV.

