

**Space Weather Highlights**  
**24 – 30 March 2008**

**SEC PRF 1700**  
**01 April 2008**

Solar activity was very low for most of the week with the exception of 25 March which saw a period of moderate levels due to an M1/1f flare from Region 989 (S12, L=206, class/area, Cso/80 on 29 March) at 1856 UTC. The event was accompanied by a type II radio sweep and a coronal mass ejection from the east limb. The remainder of the week's activity consisted of occasional B-class flares from Region 987 (S07, L=260, class/area, Dai/170 on 27 March) and Region 988 (S09, L=234, class/area, Dso/300 on 26 March).

No proton events were observed at geosynchronous orbit.

The greater than 2 MeV electron flux at geosynchronous orbit reached high levels on 25, 27-29 March and reached very high levels on 30 March.

The geomagnetic field was initially quiet on 24-25 March and early on 26 March. However, beginning around 0400 UTC on the 26th solar wind measurements at ACE indicated the onset of a co-rotating interaction region which was subsequently followed by a high speed stream from about 26/1330 UTC and lasting through the remainder of the week. Geomagnetic activity peaked between 26/0600 UTC through 28/1500 UTC with mostly unsettled to active levels at mid-latitudes and mostly minor to major storm levels at high latitudes. The interplanetary magnetic field at ACE was enhanced between about 26/0400 UTC through about 27/0000 UTC with peak Bz values around -7 nT. Peak solar wind velocities were observed on the 28th with maximum values around 680 km/s. Geomagnetic activity declined to mostly quiet to unsettled levels from 28/1500 UTC through the end of the period.

**Space Weather Outlook**  
**02 – 28 April 2008**

Solar activity is expected to be very low for most of the forecast interval. There is a chance for an increase in activity levels with the return of Region 987 (S06, L=262) on 19 April, and Region 988 (S06, L = 237) on 21 April, although it is more likely that these regions will decay on the backside before they return.

No proton events are expected at geosynchronous orbit.

The greater than 2 MeV electron flux at geosynchronous orbit is expected to reach high levels for 06-12 April and for 23-27 April in response to expected recurrent geomagnetic activity.

The geomagnetic field is expected to be quiet for 01-04 April. Activity is expected to increase to unsettled to active levels with a chance for some isolated storm periods for 05-09 April due to a coronal hole high speed stream. Quiet to unsettled levels are expected from 10-21 April, followed by an increase to unsettled to active levels with isolated storm periods for 22-25 April with the arrival of another recurrent high speed stream. Activity should decline to quiet to unsettled levels for the remainder of the period.



**Daily Solar Data**

Date	Radio Flux 10.7 cm	Sun spot No.	Sunspot Area (10 <sup>-6</sup> hemi.)	X-ray Background	Flares							
					X-ray Flux			Optical				
					C	M	X	S	1	2	3	4
24 March	79	35	210	A5.1	0	0	0	4	0	0	0	0
25 March	89	52	380	A8.1	0	1	0	0	1	0	0	0
26 March	82	63	520	A5.2	0	0	0	1	0	0	0	0
27 March	85	57	510	A4.2	0	0	0	1	0	0	0	0
28 March	83	63	410	A3.7	0	0	0	0	0	0	0	0
29 March	83	50	390	A4.1	0	0	0	0	0	0	0	0
30 March	81	41	300	A3.7	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	>.6 MeV	>2MeV	>4 MeV
	24 March	6.2E+5	1.8E+4	3.7E+3		3.0E+7
25 March	1.2E+6	1.8E+4	4.1E+3		6.0E+7	
26 March	3.6E+6	1.8E+4	4.0E+3		6.6E+6	
27 March	4.5E+6	1.7E+4	3.9E+3		5.7E+7	
28 March	1.4E+7	1.7E+4	3.8E+3		1.2E+9	
29 March	3.4E+6	1.7E+4	3.7E+3		1.8E+9	
30 March	1.3E+6	1.6E+4	3.8E+3		1.5E+9	

**Daily Geomagnetic Data**

Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
	24 March	2	0-1-1-1-1-1-0-1	1	1-1-0-1-0-0-0-0	4
25 March	3	0-0-0-0-2-1-2-1	1	0-0-0-0-1-0-1-1	4	0-0-0-1-1-2-2-2
26 March	16	1-2-3-3-3-3-4-4	45	1-2-5-6-6-6-5-3	27	1-1-4-4-5-4-5-4
27 March	19	5-4-2-3-2-2-3-4	36	5-4-5-5-3-5-4-4	31	6-5-4-3-3-2-4-5
28 March	13	4-3-3-3-3-1-2-2	53	5-4-6-7-6-4-3-2	21	5-4-4-4-4-3-3-3
29 March	6	2-2-2-1-2-1-2-2	20	3-2-4-5-5-2-1-2	8	2-3-2-2-2-1-2-3
30 March	6	3-2-2-1-1-1-1-2	12	3-2-4-2-4-2-1-1	8	4-2-2-2-2-1-1-2

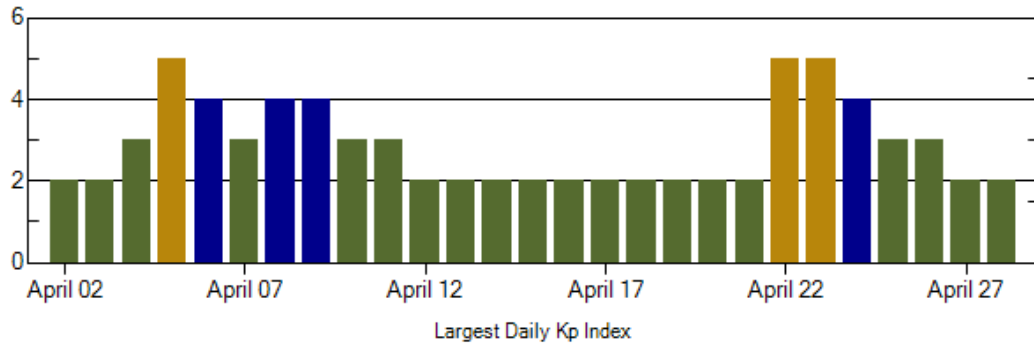
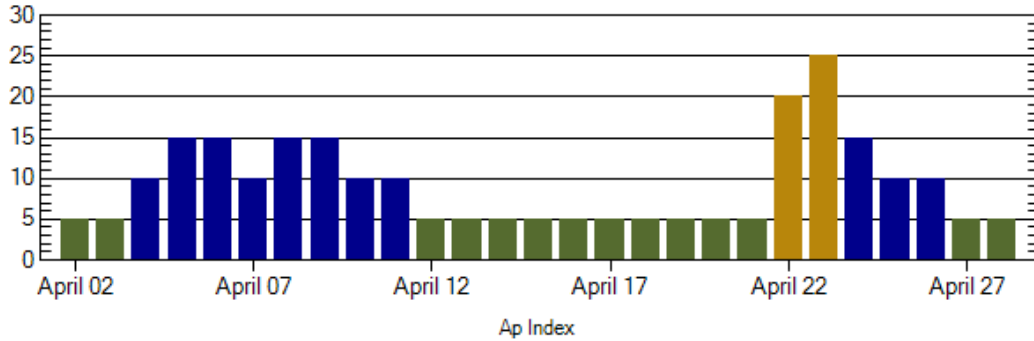
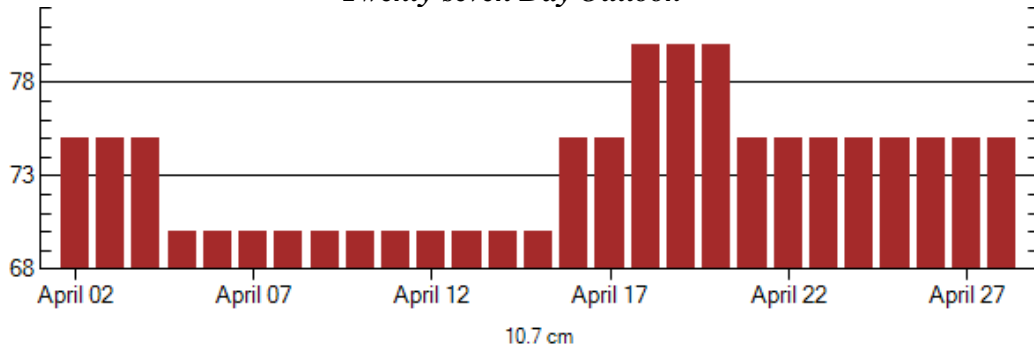


### *Alerts and Warnings Issued*

Date & Time of Issue	Type of Alert or Warning	Date & Time of Event UTC
24 Mar 1441	WATCH: Geomagnetic A=20	26 Mar
24 Mar 2112	WATCH: Geomagnetic A=20	27 Mar
25 Mar 1305	ALERT: Electron 2MeV Integral Flux >1000pfu	25 Mar 1245
25 Mar 1921	10cm Radio Burst	25 Mar 1851
25 Mar 1922	ALERT: Type II	25 Mar 1852
26 Mar 0652	WARNING: Geomagnetic K=4	26 Mar 0653 - 1600
26 Mar 0657	ALERT: Geomagnetic K=4	26 Mar 0654
26 Mar 0822	WARNING: Geomagnetic K=5	26 Mar 0822 - 1600
26 Mar 0841	ALERT: Geomagnetic K=5	26 Mar 0840
26 Mar 1553	EXTENDED WARNING: Geomagnetic K=4	26 Mar 0653 - 2359
26 Mar 1647	WARNING: Geomagnetic K=5	26 Mar 1650 - 2359
26 Mar 2349	EXTENDED WARNING: Geomagnetic K=4	26 Mar 0653 - 27/2359
26 Mar 2350	EXTENDED WARNING: Geomagnetic K=5	26 Mar 1650 - 27/1600
27 Mar 1447	ALERT: Electron 2MeV Integral Flux >1000pfu	27 Mar 1425
27 Mar 2332	EXTENDED WARNING: Geomagnetic K=4	26 Mar 0653 - 28/2359
28 Mar 0150	WARNING: Geomagnetic K=5	28 Mar 0150 - 1600
28 Mar 0200	ALERT: Geomagnetic K=5	28 Mar 0200
28 Mar 0501	ALERT: Electron 2MeV Integral Flux >1000pfu	28 Mar 0500
28 Mar 2312	EXTENDED WARNING: Geomagnetic K=4	26 Mar 0653 - 29/1600
29 Mar 0501	ALERT: Electron 2MeV Integral Flux >1000pfu	29 Mar 0500
30 Mar 0223	ALERT: Geomagnetic K=4	30 Mar 0220
30 Mar 0500	ALERT: Electron 2MeV Integral Flux >1000pfu	30 Mar 0500



### 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 Apr	75	5	2	16 Apr	75	5	2
03 Apr	75	5	2	17 Apr	75	5	2
04 Apr	75	10	3	18 Apr	80	5	2
05 Apr	70	15	5	19 Apr	80	5	2
06 Apr	70	15	4	20 Apr	80	5	2
07 Apr	70	10	3	21 Apr	75	5	2
08 Apr	70	15	4	22 Apr	75	20	5
09 Apr	70	15	4	23 Apr	75	25	5
10 Apr	70	10	3	24 Apr	75	15	4
11 Apr	70	10	3	25 Apr	75	10	3
12 Apr	70	5	2	26 Apr	75	10	3
13 Apr	70	5	2	27 Apr	75	5	2
14 Apr	70	5	2	28 Apr	75	5	2
15 Apr	70	5	2				



### *Energetic Events*

Date	Time			X-ray		Optical Information			Peak		Sweep Freq
	Begin	Max	½	Class	Flux	Imp/ Brtns	Location Lat CMD	Rgn #	Radio Flux		Intensity II IV
			Max						245	2695	
25 Mar	1836	1856	1913	M1.7	.021	1f	S13E78	989	99	290	3

### *Flare List*

Date	Time			Optical X-ray Class.	Imp/ Brtns	Location Lat CMD	Rgn
	Begin	Max	End				
24 March	0108	0109	0110		Sf	S08E49	987
	0117	0120	0123	B1.7			
	0241	0248	0257	B5.1	Sf	S08E46	987
	0300	0305	0307	B4.2			
	0344	0345	0351		Sf	S11E72	
	0450	0455	0459	B1.7			
	0759	0818	0834	B3.3			
	1013	1017	1021	B1.1			
	B1410	1411	1435	B2.6	Sf	S11E66	988
	1613	1618	1627	B1.2			
25 March	1718	1721	1723	B1.3			
	1947	1951	1953	B1.9			
	0449	0456	0504	B4.7			
	0752	0802	0811	B1.8			
	1118	1125	1132	B1.7			
	1449	1452	1454	B2.3			
	1734	1738	1741	B2.1			
26 March	1826	1829	1831	B1.8			988
	1846	1855	1922	M1.7	1f	S13E78	989
	1121	1125	1130	B1.8			
27 March	1851	1919	1926	B1.3			
	2118	2126	2138	B7.6	Sf	S09E32	988
28 March	0227	0236	0252	B1.9			
	0517	0520	0532	B1.0			
29 March	1634	1635	1641	B4.8	Sf	S10E01	987
	0939	0944	0948	B1.6			
	1149	1203	1216	B1.6			
30 March	1400	1406	1412	B1.2			
	0023	0047	0058	B3.1			
31 March	0718	0722	0726	B1.3			
	0600	0625	0648	B1.2			
	1732	1737	1744	B1.4			



### Region Summary

Location		Sunspot Characteristics											
		Flares						X-ray			Optical		
Date	( ° Lat ° CMD)	Helio	Area (10 <sup>-6</sup> hemi)	Extent (helio)	Spot Class	Spot Count	Mag Class						
		Lon						C	M	X	S	1	2

#### Region 987

23 Mar S08E50	258	0040	03	Cso	004	B						1			
24 Mar S08E36	259	0110	06	Dai	009	B						2			
25 Mar S08E23	259	0130	08	Dac	010	B									
26 Mar S08E09	259	0170	08	Dao	015	B									
27 Mar S07W05	260	0170	08	Dai	011	B						1			
28 Mar S08W18	260	0130	08	Dsi	014	B									
29 Mar S06W31	260	0090	08	Dso	006	B									
30 Mar S06W46	262	0080	07	Dso	005	B									
							0	0	0	0	4	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 260

#### Region 988

24 Mar S09E59	236	0100	07	Dsi	006	B						1			
25 Mar S09E47	235	0200	08	Dao	011	B									
26 Mar S09E34	234	0300	10	Dso	015	B						1			
27 Mar S09E20	235	0280	10	Dsi	014	B									
28 Mar S08E07	235	0230	12	Eai	014	B									
29 Mar S08W06	235	0220	11	Eai	010	B									
30 Mar S06W21	237	0200	07	Cao	004	B									
							0	0	0	0	2	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 235

#### Region 989

25 Mar S10E77	205	0050	02	Hax	001	A			1				1		
26 Mar S12E63	205	0050	04	Dao	003	B									
27 Mar S13E48	207	0060	04	Dso	002	B									
28 Mar S12E36	206	0050	05	Dao	005	B									
29 Mar S12E23	206	0080	04	Cso	004	B									
30 Mar S12E08	208	0020	02	Cso	002	B									
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Still on Disk.

Absolute heliographic longitude: 208



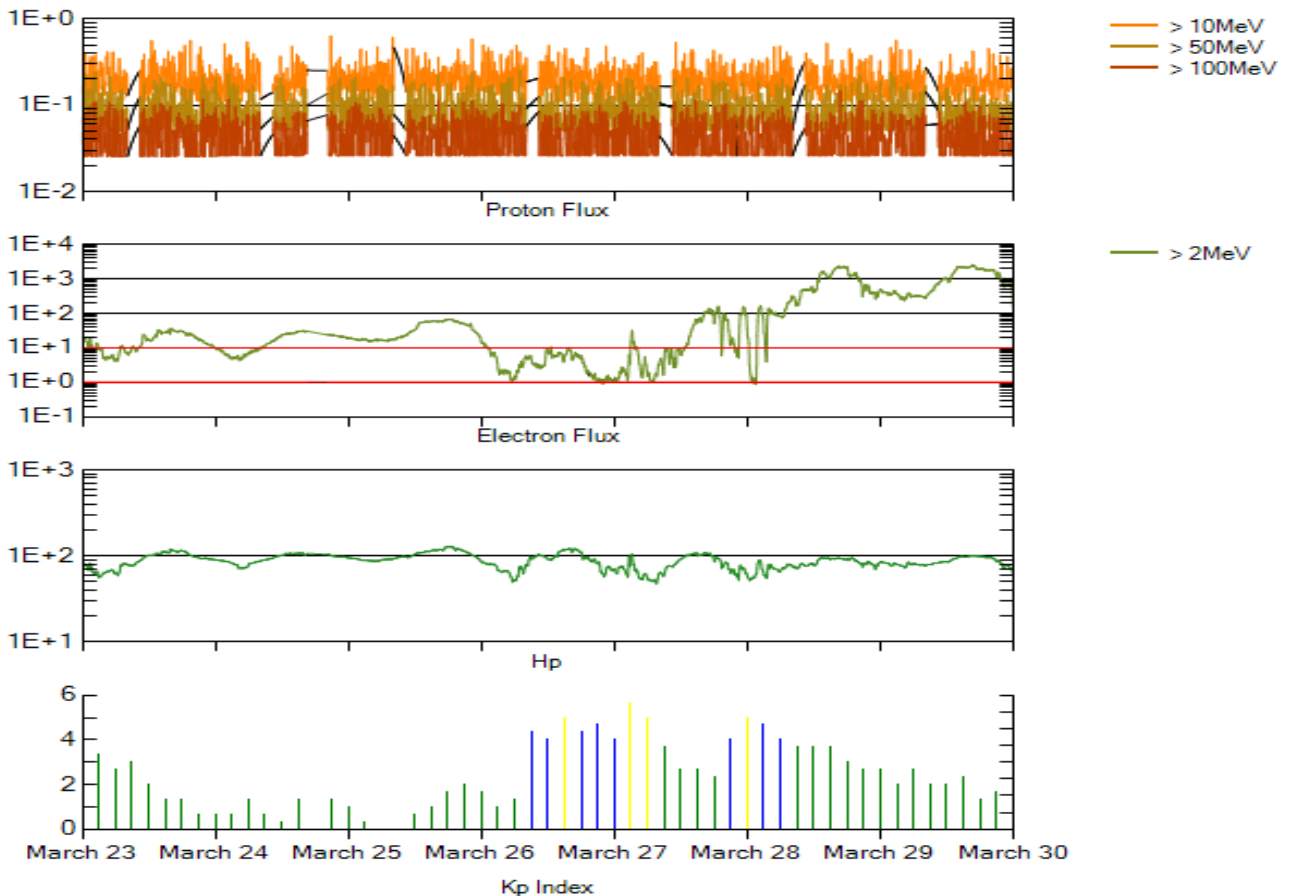
**Recent Solar Indices (preliminary)**  
**Of the observed monthly mean values**

Month	Sunspot Numbers			Radio Flux		Geomagnetic			
	Observed values SEC	Ratio RI	Ratio RI/SEC	Smooth values SEC	Smooth values RI	*Penticton 10.7 cm	Smooth Value	Planetary Ap	Smooth Value
<b>2006</b>									
March	21.3	10.8	0.51	31.0	17.4	75.5	81.6	8	8.4
April	55.2	30.2	0.55	30.6	17.1	89.0	80.9	11	7.9
May	39.6	22.2	0.56	30.7	17.3	81.0	80.8	8	7.9
June	37.7	13.9	0.37	28.9	16.3	80.1	80.6	9	8.3
July	22.6	12.2	0.54	27.2	15.3	75.8	80.3	7	8.7
August	22.8	12.9	0.57	27.6	15.6	79.0	80.3	9	8.7
September	25.2	14.5	0.58	27.7	15.6	77.8	80.2	8	8.7
October	15.7	10.4	0.66	25.2	14.2	74.3	79.4	8	8.6
November	31.5	21.5	0.68	22.3	12.7	86.4	78.5	9	8.5
December	22.2	13.6	0.61	20.7	12.1	84.3	77.9	15	8.5
<b>2007</b>									
January	26.6	16.9	0.64	19.7	12.0	83.5	77.5	6	8.4
February	17.2	10.6	0.62	18.9	11.6	77.8	76.9	6	8.4
March	9.7	4.8	0.49	17.5	10.8	72.3	76.0	8	8.4
April	6.9	3.7	0.54	16.0	9.9	72.4	75.2	9	8.5
May	19.4	11.7	0.60	14.2	8.7	74.5	74.2	9	8.4
June	20.0	12.0	0.60	12.8	7.7	73.7	73.2	7	7.8
July	15.6	10.0	0.64	11.6	7.0	71.6	72.5	8	7.4
August	9.9	6.2	0.63	10.2	6.1	69.2	71.8	7	7.6
September	4.8	2.4	0.50			67.1		9	
October	1.3	0.9	0.70			65.5		9	
November	2.5	1.7	0.68			69.7		5	
December	16.2	10.1	0.62			78.6		4	
<b>2008</b>									
January	5.1	3.4	0.67			72.1		6	
February	3.8	2.1	0.55			71.2		9	

**NOTE:** All smoothed values after September 2002 and monthly values after March 2003 are preliminary estimates. The lowest smoothed sunspot index number for Cycle 22, RI = 8.0, occurred in May 1996. The highest smoothed sunspot number for Cycle 23, RI= 120.8, occurred April 2000.

\*After June 1991, the 10.7 cm radio flux data source is Penticton, B.C. Canada. Prior to that, it was Ottawa.





*Weekly Geosynchronous Satellite Environment Summary  
Week Beginning 23 March 2008*

Protons plot contains the five-minute averaged integral proton flux (protons/cm<sup>2</sup>-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/cm<sup>2</sup>-sec -sr) with energies greater than 2 MeV at GOES-12 (W075).

Hp plot contains the five minute averaged magnetic field H - component in nanoteslas (nT) as measured by GOES-12. The H component is parallel to the spin axis of the satellite, which is nearly parallel to the Earth's rotation axis.

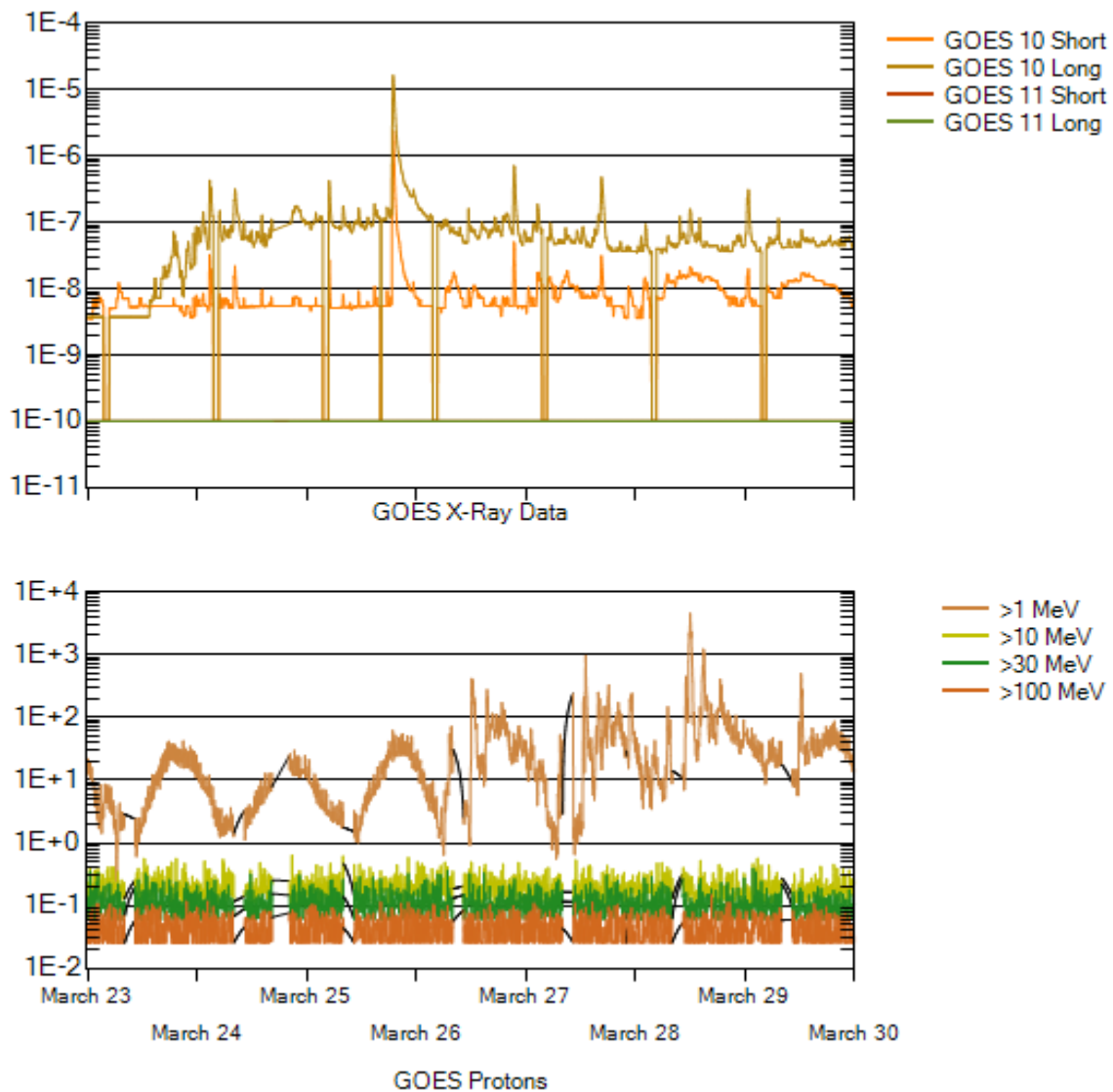
Kp plot contains the estimated planetary 3-hour K-index (derived by the Air Force Weather Agency) in real time from magnetometers at Meanook, Canada; Sitka, AK; Glenlea, Canada; St. Johns, Canada; Ottawa, Canada; Newport, WA; Fredericksburg, VA; Boulder, CO; Fresno, CA and Hartland, UK. These data are 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 SEC 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 ( $\text{watts/m}^2$ ) as measured by GOES 10 (W060) and GOES 11 (W135) in two wavelength bands, .05 - .4 and .1 - .8 nm. The letters A, B, C, M and X refer to x-ray event levels for the .1 - .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 (W135) 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.

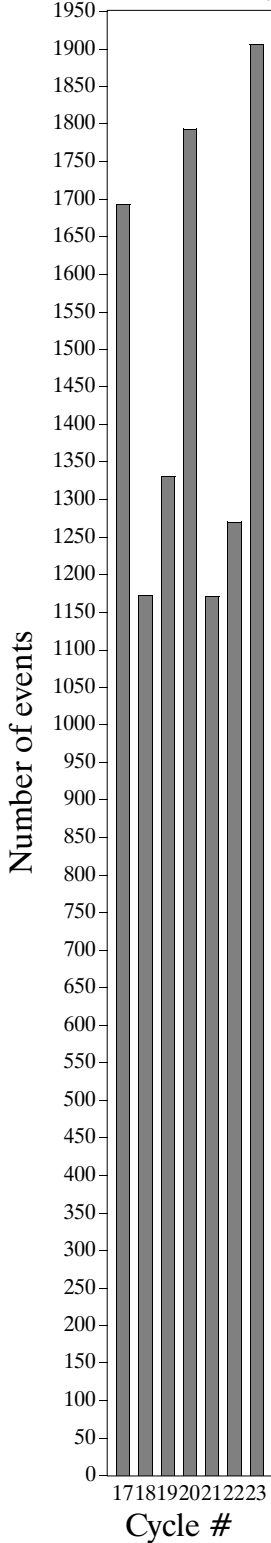


# Quiet ( $A_p \leq 7$ ) Geomagnetic Conditions

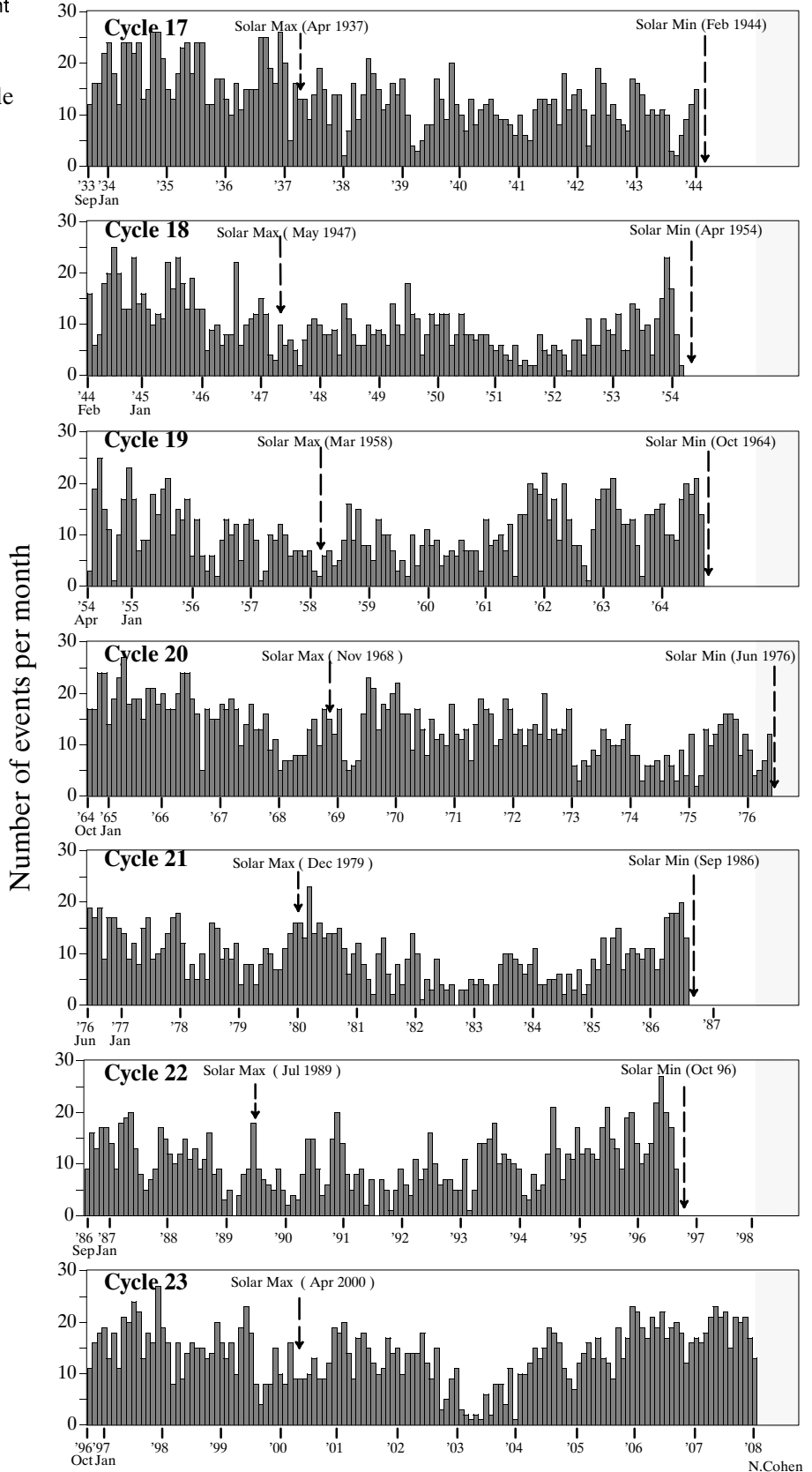


Space Environment Center

Comparison of Cycles at current month in cycle



February 2008  
(Month 137)



N.Cohen