Space Weather Highlights **SWO PRF 1749**
02 - 08 March 2009 **10 March 2009**

Solar activity was very low. No flares were observed. Old-cycle-polarity Region 1014 (S01, L=035, class/area Bxo/020 on 07 March) formed on the solar disk on 06 March. It gradually decayed to a spotless plage region on 08 March.

No proton events were observed at geosynchronous orbit.

The greater than 2 MeV electron flux at geosynchronous orbit was at normal levels during the period.

Geomagnetic field activity was at mostly quiet levels during 02 - 07 March. A weak sudden impulse occurred at 0602 UTC on 03 March in response to a discontinuity in the solar wind observed at ACE at 0451 UTC. ACE solar wind velocities increased from 314 km/s at 03/0450 UTC to 413 km/s at 03/1559 UTC. During this period, interplanetary magnetic field Bz values varied from -5 nT at 03/0627 UTC to 9 nT at 03/1229 UTC. Solar wind velocities at ACE decreased to an average of 370 km/s at 03/1928 UTC and continued through 07/0358 UTC. On 08 March, geomagnetic field activity increased to quiet to unsettled levels, with minor to major storm periods at high latitudes, due to a recurrent enhancement in solar wind speed and the interplanetary magnetic field. During this period, solar wind velocities at ACE increased from 301 km/s at 07/2239 UTC to 457 km/s at 08/1855 UTC.

Space Weather Outlook
11 March - 06 April 2009

Solar activity is expected to be at very low levels.

No proton events are expected at geosynchronous orbit.

The greater than 2 MeV electron flux at geosynchronous orbit is expected to increase to high levels during 14 - 18 March. Normal flux levels are expected during the rest of the period.

Geomagnetic field activity is expected to be at predominantly quiet levels through 12 March. Activity is expected to increase to quiet to active levels during 13 - 14 March with a chance for minor to major storm periods at high latitudes due to a recurrent coronal hole high speed stream. Mostly quiet activity is expected for the rest of the period.

Daily Solar Data

Date	Radio Flux 10.7 cm	Sun spot No.	Sunspot Area (10^{-6} hemi.)	X-ray Background	Flares: X-ray Flux C	M	X	Flares: Optical S	1	2	3	4
02 March	69	0	0	<A1.0	0	0	0	0	0	0	0	0
03 March	69	0	0	<A1.0	0	0	0	0	0	0	0	0
04 March	70	0	0	<A1.0	0	0	0	0	0	0	0	0
05 March	69	0	0	<A1.0	0	0	0	0	0	0	0	0
06 March	69	12	20	<A1.0	0	0	0	0	0	0	0	0
07 March	69	12	20	<A1.0	0	0	0	0	0	0	0	0
08 March	69	0	0	<A1.0	0	0	0	0	0	0	0	0

Daily Particle Data

Date	Proton Fluence (protons/cm^2-day-sr) >1 MeV	>10 MeV	>100 MeV	Electron Fluence (electrons/cm^2-day-sr) >.6 MeV	>2MeV	>4 MeV
02 March	2.2E+6	1.9E+4	4.1E+3		5.9E+5	
03 March	1.7E+6	2.0E+4	4.3E+3		4.9E+5	
04 March	9.6E+5	2.0E+4	4.2E+3		3.7E+5	
05 March	7.0E+5	2.0E+4	4.2E+3		9.2E+5	
06 March	6.1E+5	1.9E+4	4.2E+3		1.2E+6	
07 March	7.4E+5	1.9E+4	4.4E+3		1.4E+6	
08 March	1.1E+6	2.0E+4	4.2E+3		5.8E+5	

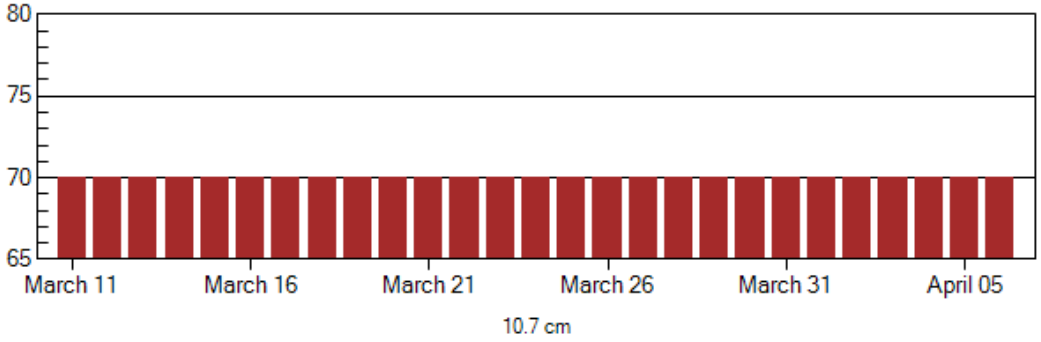
Daily Geomagnetic Data

Date	Middle Latitude Fredericksburg A	K-indices	High Latitude College A	K-indices	Estimated Planetary A	K-indices
02 March	0	0-0-0-0-0-1-0-0	0	0-0-0-0-0-0-0-0	2	0-0-0-0-0-0-1-1
03 March	5	1-0-2-1-2-2-2-2	4	1-0-1-1-0-3-1-1	5	1-0-1-1-1-2-2-2
04 March	5	2-2-2-1-1-0-2-2	6	1-1-3-3-1-1-0-1	7	2-3-2-1-1-1-2-3
05 March	3	1-3-0-0-0-0-0-1	1	1-1-0-1-0-0-0-0	3	2-2-0-0-0-0-0-1
06 March	0	1-0-0-0-0-0-0-1	1	0-0-0-1-0-0-0-1	2	1-0-0-0-0-1-0-1
07 March	0	0-0-0-0-0-0-0-0	0	0-0-0-0-0-0-0-0	1	0-0-0-0-0-1-0-1
08 March	7	1-0-3-3-3-2-1-0	23	1-0-4-6-5-3-2-0	8	2-1-3-3-3-2-1-1

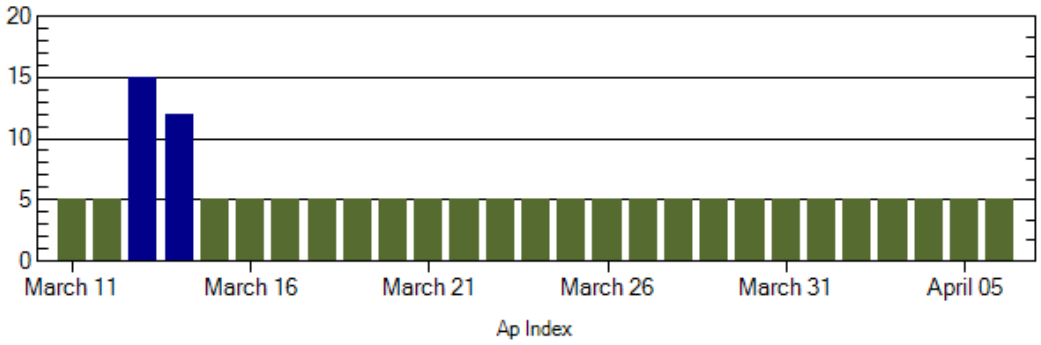
Alerts and Warnings Issued

Date & Time of Issue	Type of Alert or Warning	Date & Time of Event UTC
03 Mar 0613	SUMMARY: Geomagnetic Sudden Impulse	03 Mar 0602

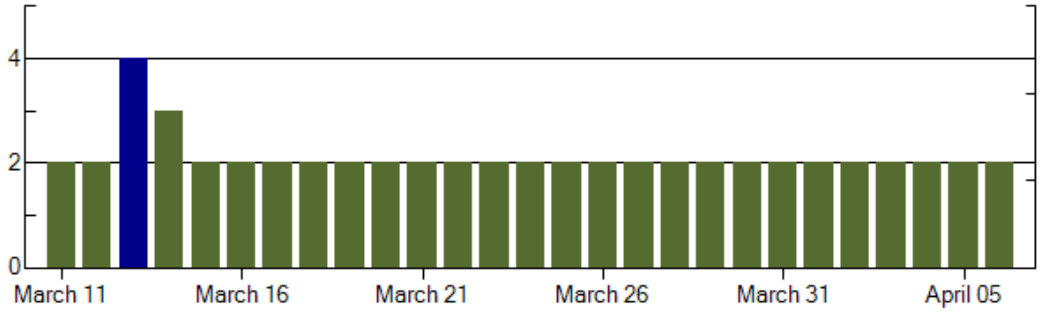
Twenty-seven Day Outlook



10.7 cm



Ap Index



Largest Daily Kp Index

Date	Radio Flux 10.7 cm	Planetary A Index	Largest Kp Index	Date	Radio Flux 10.7 cm	Planetary A Index	Largest Kp Index
11 Mar	70	5	2	25 Mar	70	5	2
12	70	5	2	26	70	5	2
13	70	15	4	27	70	5	2
14	70	10	3	28	70	5	2
15	70	5	2	29	70	5	2
16	70	5	2	30	70	5	2
17	70	5	2	31	70	5	2
18	70	5	2	01 Apr	70	5	2
19	70	5	2	02	70	5	2
20	70	5	2	03	70	5	2
21	70	5	2	04	70	5	2
22	70	5	2	05	70	5	2
23	70	5	2	06	70	5	2
24	70	5	2				

Energetic Events

Date	Time Begin	Time Max	Time ½ Max	X-ray Class	X-ray Integ Flux	Optical Information Imp/ Brtns	Optical Information Location Lat CMD	Optical Information Rgn #	Peak Radio Flux 245	Peak Radio Flux 2695	Sweep Freq Intensity II	Sweep Freq Intensity IV

No Events Observed

Flare List

Date	Time Begin	Time Max	Time End	Optical X-ray Class.	Optical Imp / Brtns	Optical Location Lat CMD	Optical Rgn
02 March	No	Observed					
03 March	No	Observed					
04 March	No	Observed					
05 March	No	Observed					
06 March	No	Observed					
07 March	No	Observed					
08 March	No	Observed					

Region Summary

Date	Location (° Lat ° CMD)	Location Helio Lon	Sunspot Characteristics Area (10^{-6} hemi)	Extent (helio)	Spot Class	Spot Count	Mag Class	Flares X-ray C	X-ray M	X-ray X	Optical S	Optical 1	Optical 2	Optical 3	Optical 4
		Region 1013													
24 Feb	N26E20	146	0020	02	Cso	002	B								
25 Feb	N26E07	146	0010	04	Bxo	004	B								
26 Feb	N26W06	146	0010	02	Bxo	002	B								
27 Feb	N26W19	146													
28 Feb	N26W32	146													
01 Mar	N26W45	146													
02 Mar	N26W58	146													
03 Mar	N26W71	145													
04 Mar	N26W84	145													
05 Mar	N26W97	145													
								0	0	0	0	0	0	0	0

Crossed West Limb.
Absolute heliographic longitude: 146

Date	Location (° Lat ° CMD)	Location Helio Lon	Sunspot Characteristics Area (10^{-6} hemi)	Extent (helio)	Spot Class	Spot Count	Mag Class	Flares X-ray C	X-ray M	X-ray X	Optical S	Optical 1	Optical 2	Optical 3	Optical 4
		Region 1014													
06 Mar	S04E00	034	0020	02	Bxo	002	B								
07 Mar	S01W14	035	0020	02	Bxo	002	B								
08 Mar	S01W27	035													
								0	0	0	0	0	0	0	0

Still on Disk.
Absolute heliographic longitude: 34

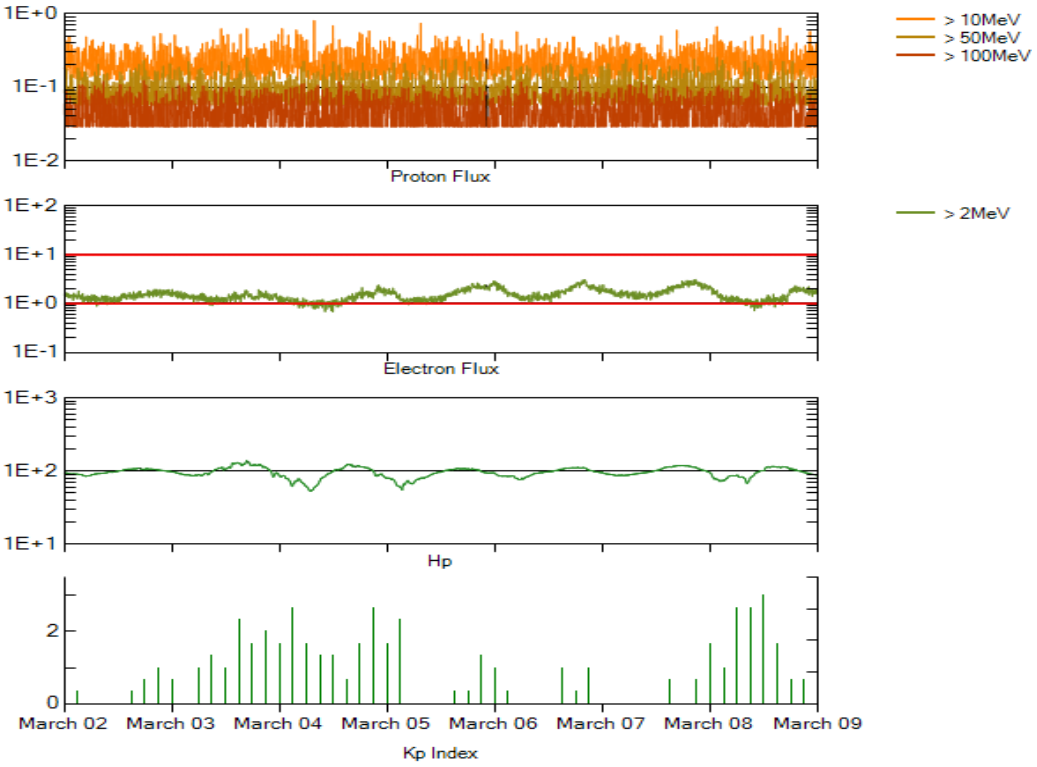
Recent Solar Indices (preliminary)

Of the observed monthly mean values

	Sunspot Numbers					Radio Flux		Geomagnetic	
	Observed values		Ratio	Smooth values		*Penticton	Smooth	Planetary	Smooth
Month	SEC	RI	RI/SEC	SEC	RI	10.7 cm	Value	Ap	Value
				2007					
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	9.9	5.9	67.1	71.5	9	7.8
October	1.3	0.9	0.70	10.0	6.1	65.5	71.5	9	7.9
November	2.5	1.7	0.68	9.4	5.7	69.7	71.1	5	7.8
December	16.2	10.1	0.62	8.1	5.0	78.6	70.5	4	7.8
				2008					
January	5.1	3.4	0.67	6.9	4.2	72.1	70.0	6	7.7
February	3.8	2.1	0.55	5.9	3.6	71.2	69.6	9	7.6
March	15.9	9.3	0.58	5.3	3.3	72.9	69.5	10	7.4
April	4.9	2.9	0.59	5.3	3.3	70.3	69.6	9	7.1
May	5.7	2.9	0.51	5.7	3.5	68.4	69.7	6	6.9
June	4.2	3.1	0.74	5.2	3.2	65.9	69.2	7	6.8
July	1.0	0.5	0.50	4.5	2.7	65.8	68.8	6	6.6
August	0.0	0.5	**			66.4		5	
September	1.5	1.1	0.73			67.1		5	
October	5.2	2.9	0.56			68.3		6	
November	6.8	4.1	0.60			68.6		3	
December	1.3	0.8	0.62			69.2		2	
				2009					
January	2.8	1.5	0.54			69.8		3	

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.

**SEC sunspot number was less than RI value, so a ratio could not be done.



Weekly Geosynchronous Satellite Environment Summary
Week Beginning 02 March 2009

GOES-11 designated Primary Electron Satellite and GOES-10 Secondary: December 1, 2008 the GOES-12 Electron sensor began experiencing periods of noise and sensor is unreliable.

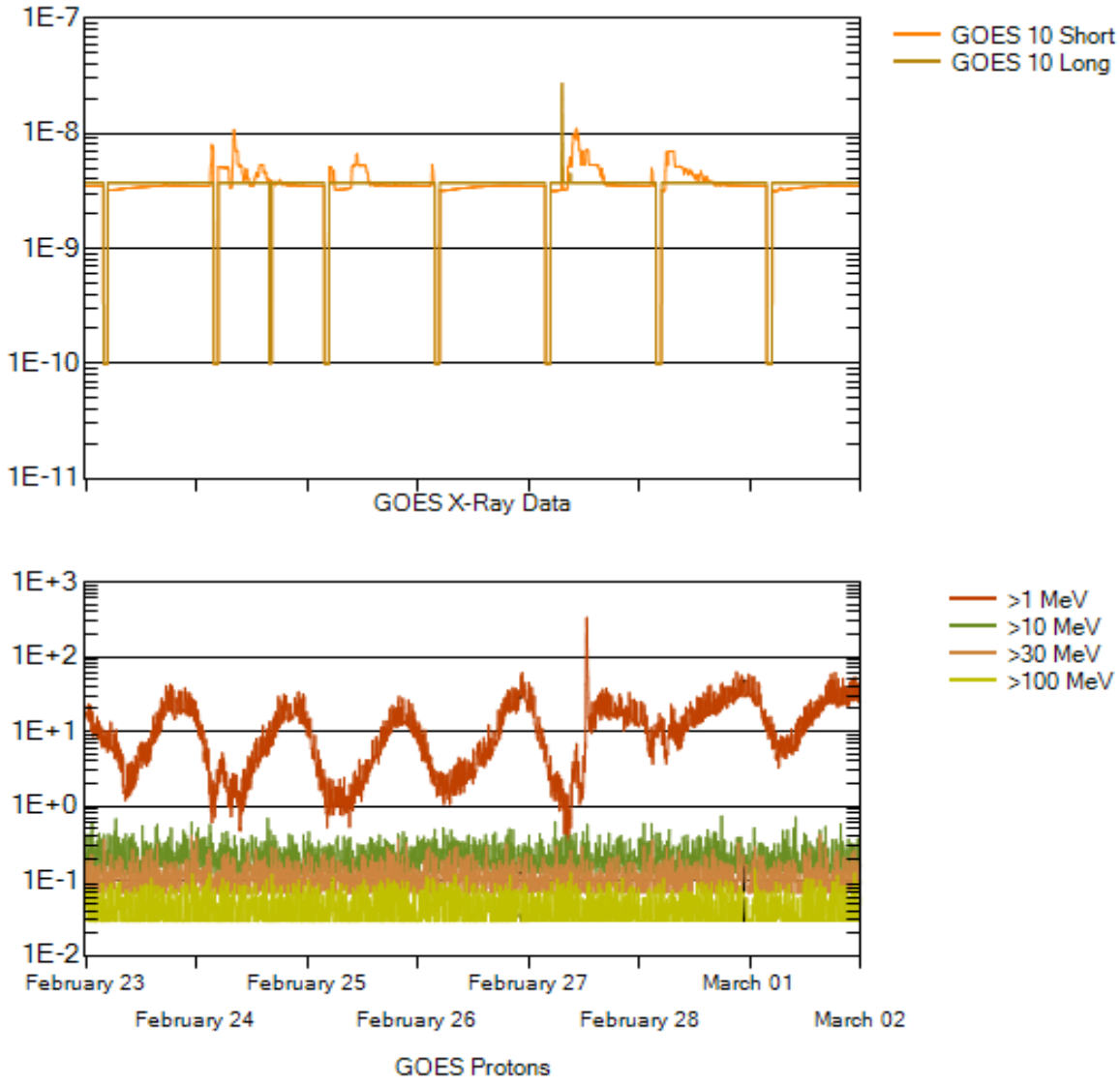
Protons plot contains the five-minute averaged integral proton flux (protons/cm^2 –sec –sr) as measured by GOES-11 (W135) for each of three energy thresholds: greater than 10, 50, and 100 MeV.

Electrons plot contains the five-minute averaged integral electron flux (electrons/cm^2 –sec –sr) with energies greater than 2 MeV at GOES-11 (W135).

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.

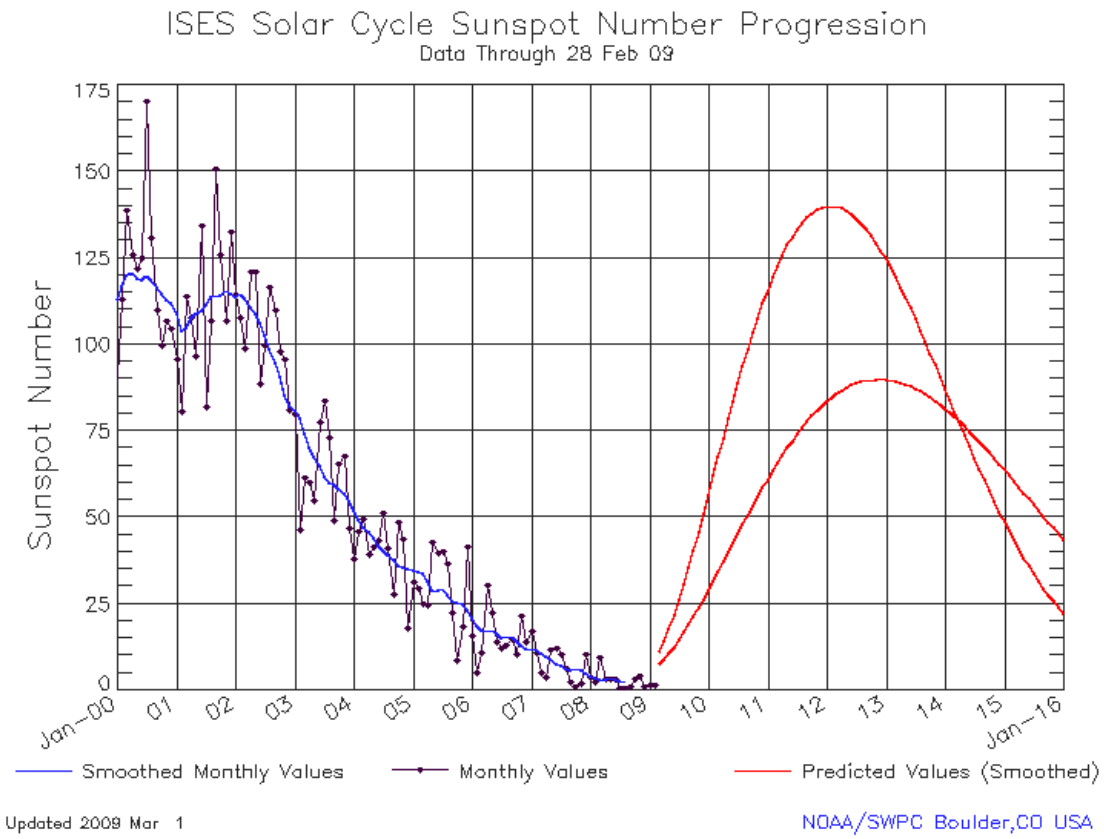
The data included here are those now available in real time at the SWPC and are incomplete in that they do not include the full set of parameters and energy ranges known to cause satellite operating anomalies. The proton and electron fluxes and Kp are "global" parameters that are applicable to a first 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 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.

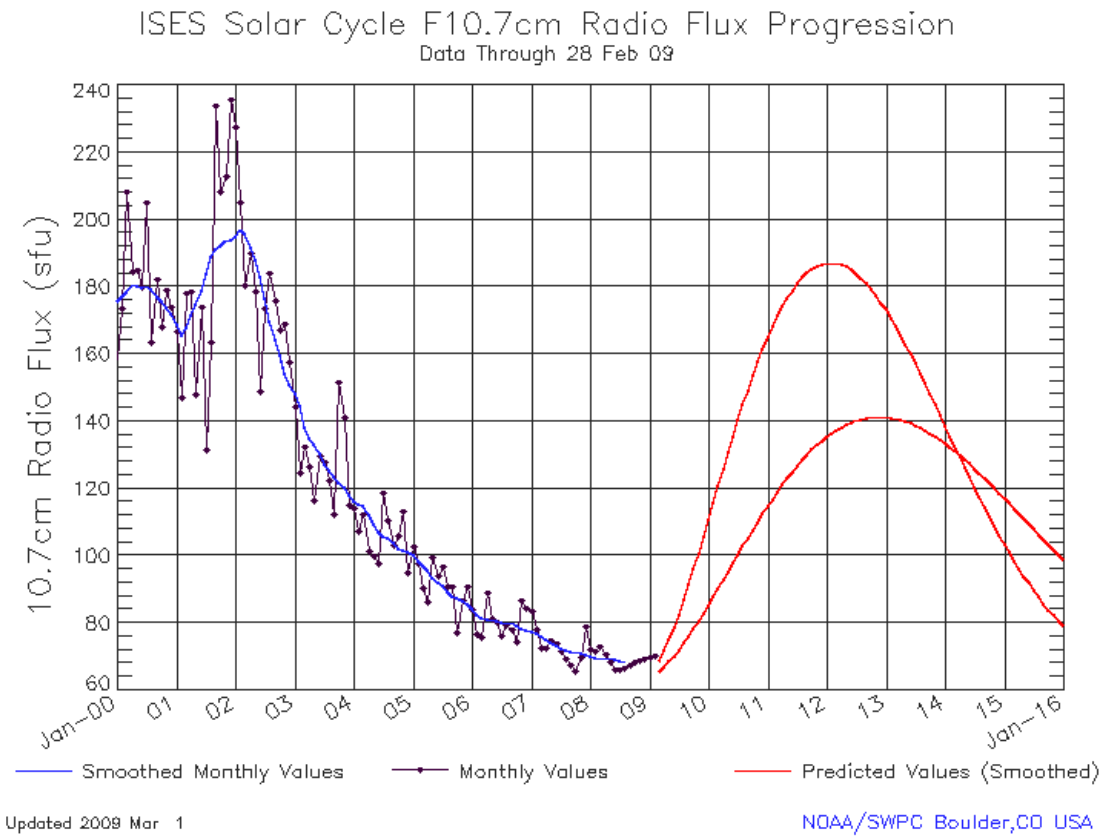
Proton plot contains the five-minute averaged integral proton flux (protons/cm^2 –sec-sr) as measured by GOES-11 (W135) for each of the energy thresholds: >1, >10, >30 and >100 MeV. P10 event threshold is 10 pfu (protons/cm^2-sec-sr) at greater than 10 MeV.



SEC Prediction of Smoothed Sunspot Number

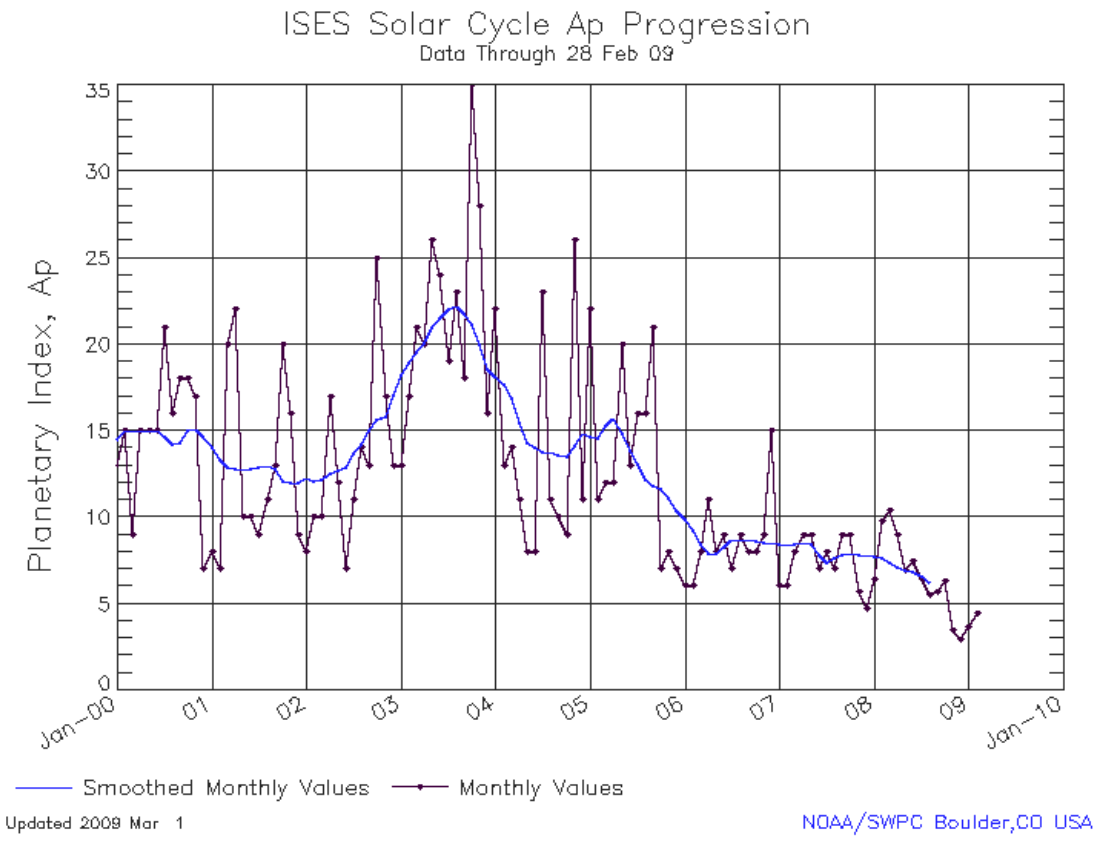
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	Hi/Lo	Hi/Lo	Hi/Lo	Hi/Lo	Hi/Lo	Hi/Lo	Hi/Lo	Hi/Lo	Hi/Lo	Hi/Lo	Hi/Lo	Hi/Lo
2006	21	19	17	17	17	16	15	16	16	14	13	12
	(***)	(***)	(***)	(***)	(***)	(***)	(***)	(***)	(***)	(***)	(***)	(***)
2007	12	12	11	10	9	8	7	6	6	6	6	5
	(***)	(***)	(***)	(***)	(***)	(***)	(***)	(***)	(***)	(***)	(***)	(***)
2008	4	4	3	3	4	3	3	3	**3/2**	**3/3**	**4/3**	**6/4**
	(***)	(***)	(***)	(***)	(***)	(***)	(***)	(***)	(3)	(5)	(7)	(8)
2009	**8/5**	**10/6**	**13/8**	**16/9**	**19/11**	**23/13**	**27/15**	**32/17**	**36/19**	**41/21**	**46/24**	**51/26**
	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(15)	(15)	(15)	(15)	(15)
2010	**57/29**	**62/32**	**68/34**	**73/37**	**78/40**	**84/43**	**89/45**	**94/48**	**99/51**	**103/53**	**108/56**	**112/59**
	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)
2011	**116/70**	**119/72**	**123/74**	**126/76**	**129/78**	**131/79**	**133/81**	**135/82**	**140/84**	**140/85**	**140/86**	**139/87**
	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)
2012	**139/88**	**138/88**	**136/89**	**135/89**	**133/90**	**131/90**	**129/90**	**127/90**	**125/90**	**122/90**	**119/89**	**116/89**
	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)
2013	**114/89**	**110/88**	**107/87**	**104/86**	**101/86**	**97/85**	**94/84**	**91/83**	**87/81**	**84/80**	**80/79**	**77/78**
	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)
2014	**74/76**	**70/75**	**67/73**	**64/72**	**61/70**	**58/69**	**55/67**	**52/65**	**49/64**	**46/62**	**44/60**	**41/59**
	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)
2015	**38/57**	**36/55**	**34/54**	**32/52**	**30/50**	**28/49**	**26/47**	**24/45**	**22/44**	**21/42**	**19/40**	**18/39**
	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)

Note: *Hi is for the larger solar cycle prediction, Lo is for the smaller solar cycle prediction*



SEC Prediction of Smoothed F10.7cm Radio Flux

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	Hi/Lo	Hi/Lo	Hi/Lo	Hi/Lo	Hi/Lo	Hi/Lo	Hi/Lo	Hi/Lo	Hi/Lo	Hi/Lo	Hi/Lo	Hi/Lo
2006	84	83	82	81	81	81	80	80	80	79	79	78
	(***)	(***)	(***)	(***)	(***)	(***)	(***)	(***)	(***)	(***)	(***)	(***)
2007	78	77	76	75	74	73	73	72	72	72	71	71
	(***)	(***)	(***)	(***)	(***)	(***)	(***)	(***)	(***)	(***)	(***)	(***)
2008	70	70	70	70	70	69	69	69	**68/62**	**68/62**	**69/62**	**69/62**
	(***)	(***)	(***)	(***)	(***)	(***)	(***)	(***)	(3)	(5)	(7)	(9)
2009	**71/63**	**72/63**	**74/64**	**76/65**	**79/65**	**82/67**	**85/68**	**88/72**	**91/76**	**96/78**	**101/81**	**106/83**
	(11)	(13)	(15)	(17)	(19)	(21)	(22)	(23)	(23)	(23)	(23)	(23)
2010	**111/95**	**116/98**	**121/100**	**126/103**	**131/105**	**136/108**	**158/110**	**161/112**	**165/115**	**168/117**	**171/119**	**174/121**
	(23)	(23)	(23)	(23)	(23)	(23)	(23)	(23)	(23)	(23)	(23)	(23)
2011	**177/123**	**179/125**	**181/127**	**183/128**	**184/130**	**185/132**	**186/133**	**187/134**	**187/135**	**187/136**	**187/137**	**187/138**
	(23)	(23)	(23)	(23)	(23)	(23)	(23)	(23)	(23)	(23)	(23)	(23)
2012	**186/139**	**185/140**	**184/140**	**183/141**	**181/141**	**179/141**	**177/141**	**175/141**	**173/141**	**171/141**	**168/141**	**166/140**
	(23)	(23)	(23)	(23)	(23)	(23)	(23)	(23)	(23)	(23)	(23)	(23)
2013	**163/140**	**160/139**	**157/139**	**154/138**	**151/137**	**148/136**	**145/136**	**142/135**	**139/134**	**136/132**	**133/131**	**129/130**
	(23)	(23)	(23)	(23)	(23)	(23)	(23)	(23)	(23)	(23)	(23)	(23)
2014	**126/129**	**123/127**	**120/126**	**117/125**	**115/123**	**112/122**	**109/120**	**106/119**	**104/117**	**101/116**	**99/114**	**96/113**
	(23)	(23)	(23)	(23)	(23)	(23)	(23)	(23)	(23)	(23)	(23)	(23)
2015	**94/111**	**92/110**	**90/108**	**88/106**	**86/105**	**84/103**	**82/102**	**81/100**	**79/99**	**78/97**	**76/96**	**75/94**
	(23)	(23)	(23)	(23)	(23)	(23)	(23)	(23)	(23)	(23)	(23)	(23)


ISES Solar Cycle Ap Progression
Data Through 28 Feb 09
Planetary Index, Ap
35
30
25
20
15
10
5
0
Jan-00
01
02
03
04
05
06
07
08
09
Jan-10
Smoothed Monthly Values
Monthly Values
Updated 2009 Mar 1
NOAA/SWPC Boulder,CO USA