

Space Weather Highlights
16 February - 22 February 2009

SWO PRF 1747
24 February 2009

Solar activity was very low. No flares were observed. The visible disk was spotless.

No proton events were observed at geosynchronous orbit.

The greater than 2 MeV electron flux at geosynchronous orbit was at high levels during 16 - 18 February.

Geomagnetic field activity was at quiet levels during most of the period. ACE solar wind velocities decreased from 523 to 282 km/sec during 16 - 18 February as a recurrent coronal hole high-speed stream (CH HSS) subsided. Solar wind velocities gradually increased from 282 to 490 km/sec during 19 - 22 February, possibly due to a recurrent HSS. During this period, IMF Bz varied from +08 to -06 nT and IMF Bt ranged from 01 to 10 nT.

Space Weather Outlook
25 February 2009 - 23 March 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 during 25 February - 12 March. Activity is expected to increase to quiet to active levels during 13 - 14 March with storm periods possible at high latitudes due to a recurrent CH HSS. Activity is expected to decrease to mostly quiet levels during 15 - 23 March.



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	
16 February	70	0	0	<A1.0	0	0	0	0	0	0	0	0	0
17 February	71	0	0	<A1.0	0	0	0	0	0	0	0	0	0
18 February	70	0	0	<A1.0	0	0	0	0	0	0	0	0	0
19 February	69	0	0	<A1.0	0	0	0	0	0	0	0	0	0
20 February	69	0	0	<A1.0	0	0	0	0	0	0	0	0	0
21 February	71	0	0	<A1.0	0	0	0	0	0	0	0	0	0
22 February	70	0	0	<A1.0	0	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
	16 February	1.5E+6	1.8E+4	4.3E+3		8.5E+7
17 February	1.1E+6	1.9E+4	4.1E+3		6.3E+7	
18 February	1.3E+6	2.0E+4	4.2E+3		6.9E+7	
19 February	1.5E+6	2.0E+4	4.4E+3		5.6E+7	
20 February	1.4E+6	1.9E+4	4.4E+3		2.7E+7	
21 February	1.7E+6	2.0E+4	4.3E+3		1.1E+7	
22 February	1.2E+6	1.8E+4	3.9E+3		6.8E+6	

Daily Geomagnetic Data

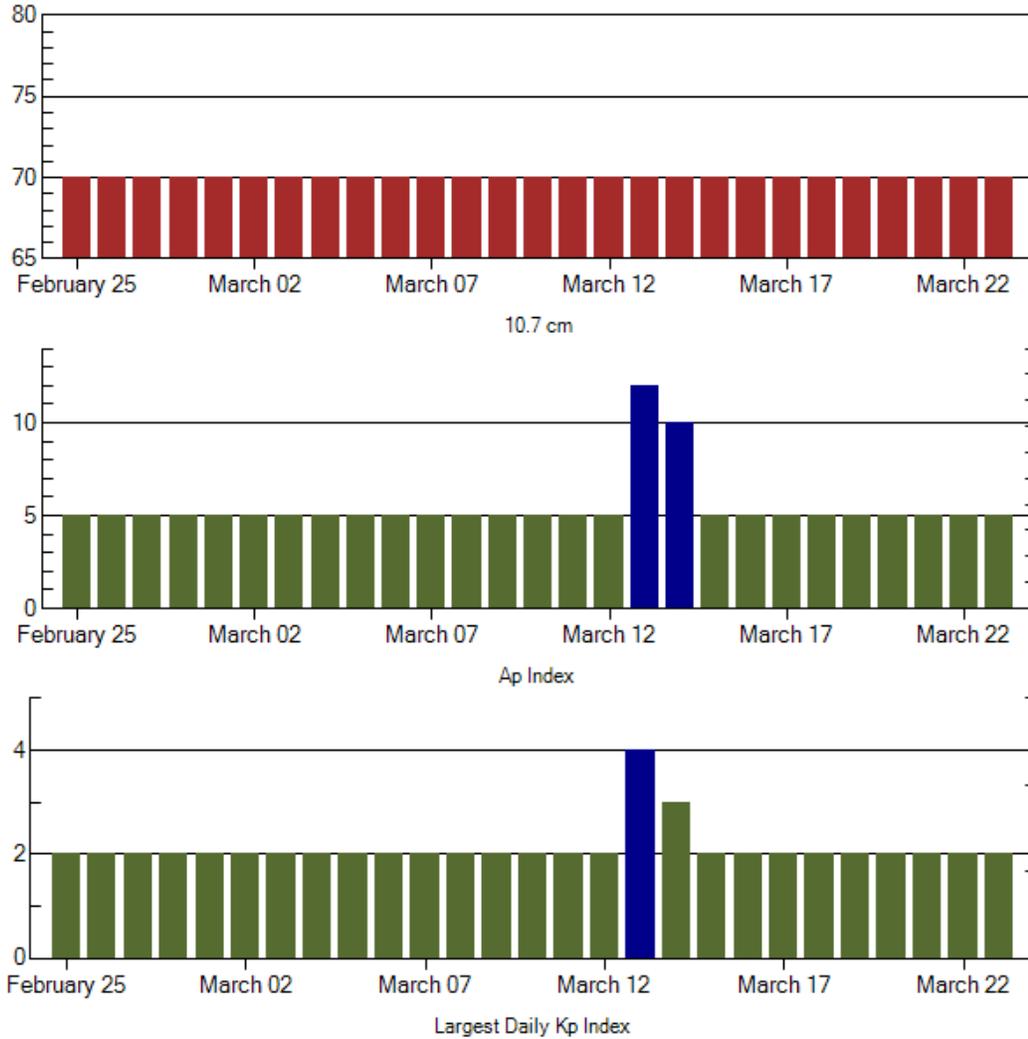
Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
	16 February	2	2-0-0-0-1-1-1-0	2	1-0-0-1-1-1-1-1	3
17 February	1	0-0-0-0-0-0-1-1	0	0-0-0-0-0-0-0-1	1	1-0-0-0-1-0-0-1
18 February	1	1-0-0-0-0-0-0-1	1	1-0-0-0-0-0-1-0	2	2-0-0-0-0-0-1-1
19 February	0	0-0-0-0-0-1-0-0	0	0-0-0-0-0-1-0-0	1	0-0-0-0-0-1-0-1
20 February	3	1-1-0-0-1-1-2-1	3	0-1-0-1-1-0-1-2	3	1-1-0-0-1-0-1-2
21 February	2	0-0-0-1-1-1-1-1	3	1-0-0-3-2-0-0-0	3	0-0-0-1-1-0-1-1
22 February	3	0-0-2-2-1-0-1-1	4	0-0-2-3-2-0-0-0	3	0-0-2-2-1-0-0-1

Alerts and Warnings Issued

Date & Time of Issue	Type of Alert or Warning	Date & Time of Event UTC
16 Feb 1521	ALERT: Electron 2MeV Integral Flux >= 1000pfu	16 Feb 1505
17 Feb 1744	ALERT: Electron 2MeV Integral Flux >= 1000pfu	17 Feb 1725
18 Feb 1742	ALERT: Electron 2MeV Integral Flux >= 1000pfu	18 Feb 1725



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
25 Feb	70	5	2	11 Mar	70	5	2
26	70	5	2	12	70	5	2
27	70	5	2	13	70	12	4
28	70	5	2	14	70	10	3
01 Mar	70	5	2	15	70	5	2
02	70	5	2	16	70	5	2
03	70	5	2	17	70	5	2
04	70	5	2	18	70	5	2
05	70	5	2	19	70	5	2
06	70	5	2	20	70	5	2
07	70	5	2	21	70	5	2
08	70	5	2	22	70	5	2
09	70	5	2	23	70	5	2
10	70	5	2				



Energetic Events

Date	Time		X-ray		Optical Information			Peak		Sweep Freq		
	$\frac{1}{2}$		Integ		Imp/	Location		Radio Flux		Intensity		
	Begin	Max	Max	Class	Flux	Brtns	Lat	CMD	#	245	2695	II

No Events Observed

Flare List

Date	Time			X-ray Class.	Imp / Brtns	Location Lat CMD	Rgn
	Begin	Max	End				
16Feb	No Flares Observed						
17 Feb	No Flares Observed						
18 Feb	No Flares Observed						
19 Feb	No Flares Observed						
20 Feb	No Flares Observed						
21 Feb	No Flares Observed						
22 Feb	No Flares Observed						

Region Summary

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

Region 1012

11 Feb	S06E62	275	0010	01	Axx	001	A										
12 Feb	S05E48	276	0010	01	Axx	001	A										
13 Feb	S06E34	278	0010	01	Axx	001	A										
14 Feb	S06E20	278															
15 Feb	S06E07	278															
16 Feb	S06W06	278															
17 Feb	S06W19	278															
18 Feb	S06W32	278															
19 Feb	S06W45	278															
20 Feb	S06W58	278															
21 Feb	S06W71	278															
22 Feb	S06W84	278															

0 0 0 0 0 0 0 0 0

Still on Disk.

Absolute heliographic longitude: 278



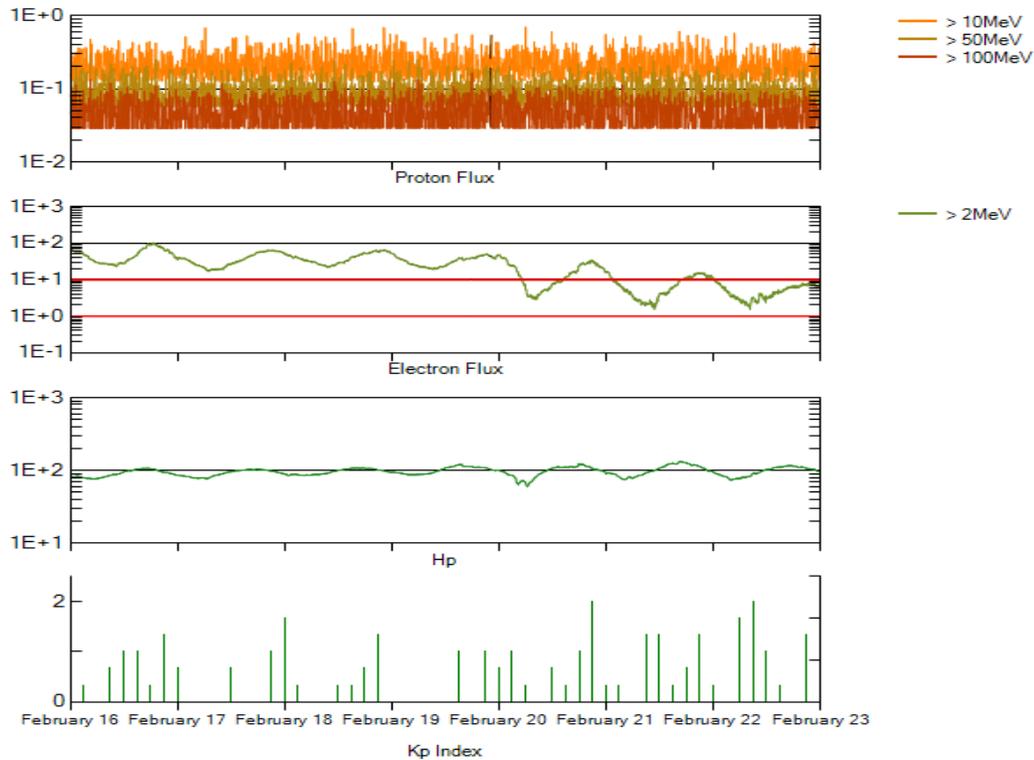
Recent Solar Indices (preliminary)
Of the observed monthly mean values

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
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 16 February 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/cm²-sec-sr) as measured by GOES-11 (W135) for each of three energy thresholds: greater than 10, 50, and 100 MeV.

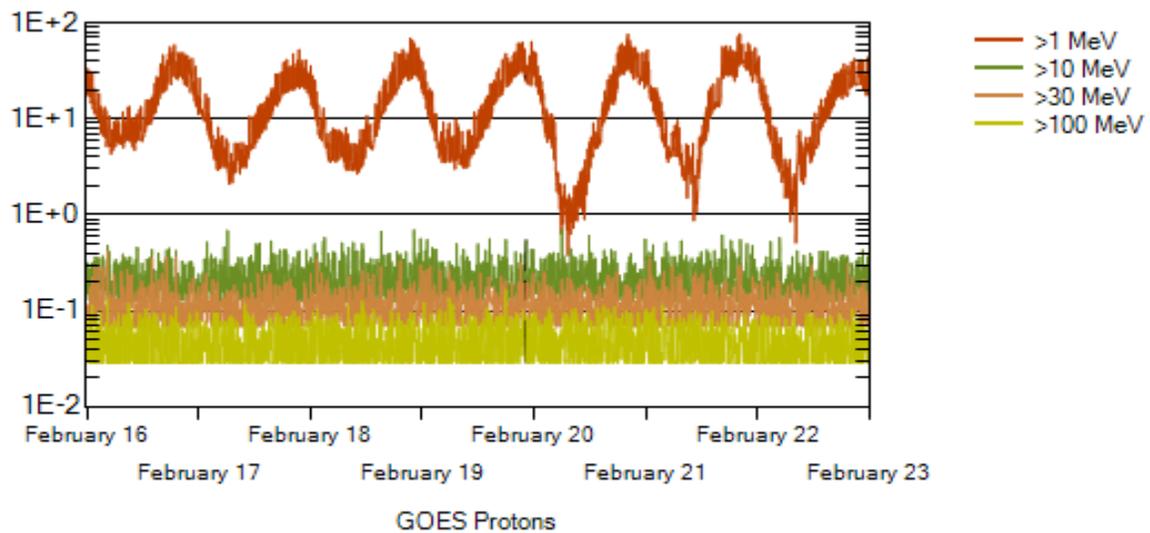
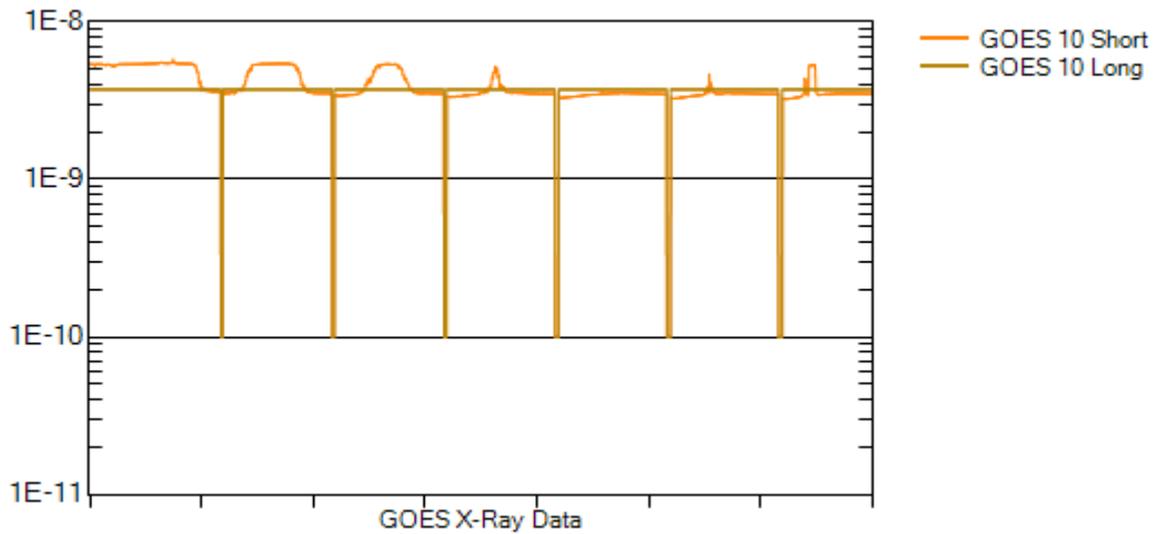
Electrons plot contains the five-minute averaged integral electron flux (electrons/cm²-sec-sr) with energies greater than 2 MeV at GOES-11 (W135).

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

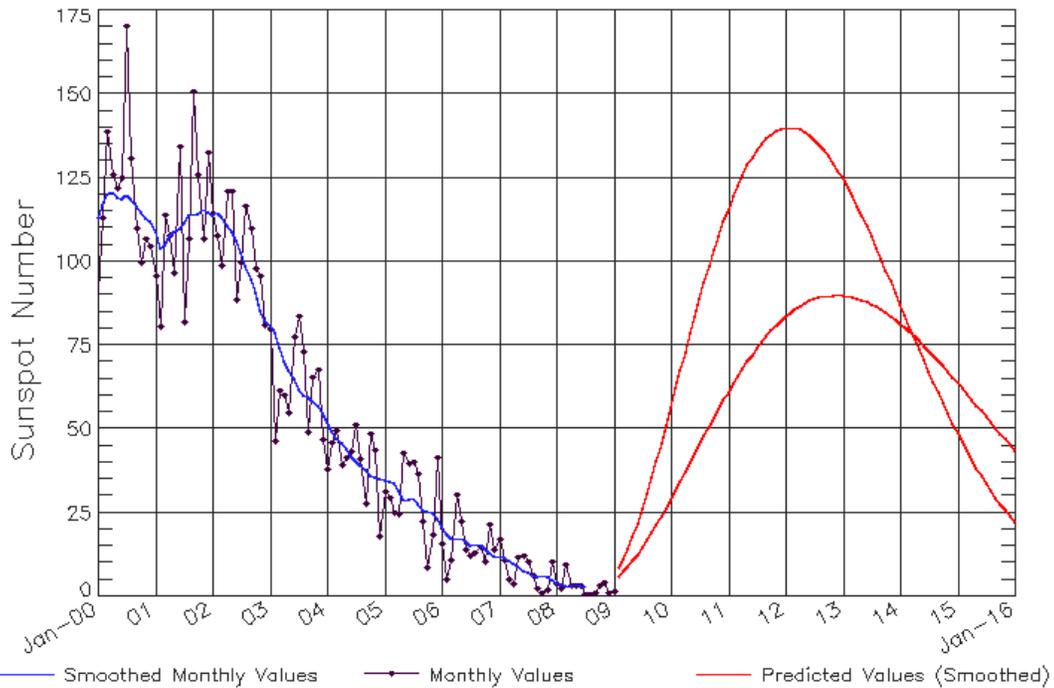
X-ray plot contains five-minute averaged x-ray flux (watts/m^2) as measured by GOES 10 (W060) and GOES 11 (W135) in two wavelength bands, .05 - .4 and .1 - .8 nm. The letters A, B, C, M and X refer to x-ray event levels for the .1 - .8 nm band.

Proton plot contains the five-minute averaged integral proton flux ($\text{protons/cm}^2\text{-sec-sr}$) 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.



ISES Solar Cycle Sunspot Number Progression

Data Through 31 Jan 09



Updated 2009 Feb 24

NOAA/SWPC Boulder, CO USA

SEC Prediction of Smoothed Sunspot Number

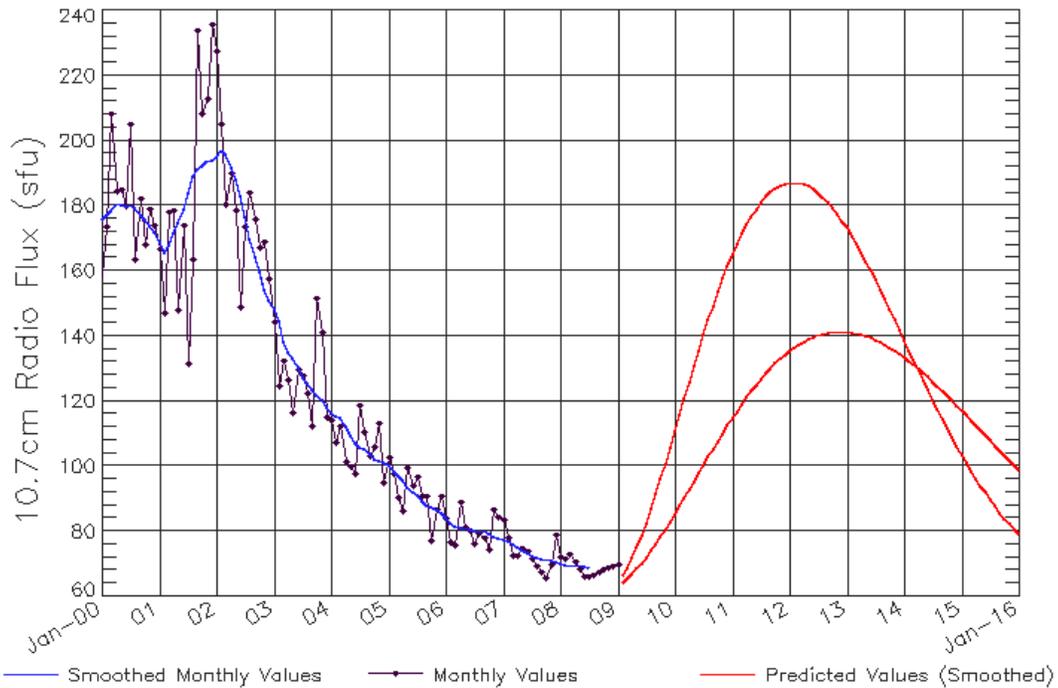
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	Hi/Lo											
2006	21 (***)	19 (***)	17 (***)	17 (***)	17 (***)	16 (***)	15 (***)	16 (***)	16 (***)	14 (***)	13 (***)	12 (***)
2007	12 (***)	12 (***)	11 (***)	10 (***)	9 (***)	8 (***)	7 (***)	6 (***)	6 (***)	6 (***)	6 (***)	5 (***)
2008	4 (***)	4 (***)	3 (***)	3 (***)	4 (***)	3 (***)	3 (***)	2/2 (1)	3/2 (3)	3/2 (5)	4/3 (7)	6/4 (8)
2009	8/5 (9)	10/6 (10)	13/7 (11)	16/9 (12)	19/11 (13)	23/12 (14)	27/15 (15)	30/16 (15)	35/19 (15)	40/21 (15)	45/23 (15)	51/26 (15)
2010	56/29 (15)	62/31 (15)	67/34 (15)	73/37 (15)	78/39 (15)	83/42 (15)	88/45 (15)	93/48 (15)	98/50 (15)	103/53 (15)	107/55 (15)	111/58 (15)
2011	115/60 (15)	119/63 (15)	122/65 (15)	125/67 (15)	128/70 (15)	131/72 (15)	133/74 (15)	135/75 (15)	136/77 (15)	137/79 (15)	138/80 (15)	139/82 (15)
2012	139/3 (15)	139/84 (15)	139/85 (15)	139/86 (15)	138/87 (15)	137/88 (15)	136/88 (15)	134/89 (15)	133/89 (15)	131/89 (15)	129/89 (15)	127/90 (15)
2013	124/89 (15)	122/89 (15)	119/89 (15)	116/89 (15)	113/88 (15)	110/87 (15)	107/87 (15)	104/86 (15)	100/85 (15)	97/84 (15)	94/83 (15)	90/82 (15)
2014	87/81 (15)	83/80 (15)	80/78 (15)	77/77 (15)	73/76 (15)	70/74 (15)	67/73 (15)	63/71 (15)	60/70 (15)	57/68 (15)	54/67 (15)	51/65 (15)
2015	48/63 (15)	46/62 (15)	43/60 (15)	40/58 (15)	38/57 (15)	36/55 (15)	33/53 (15)	31/51 (15)	29/50 (15)	27/48 (15)	25/46 (15)	23/45 (15)

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



ISES Solar Cycle F10.7cm Radio Flux Progression

Data Through 31 Jan 09



Updated 2009 Feb 24

NOAA/SWPC Boulder, CO USA

SEC Prediction of Smoothed F10.7cm Radio Flux

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	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 (***)	68/62 (1)	68/62 (3)	68/61 (5)	68/61 (7)	69/61 (9)
2009	70/62 (11)	71/62 (13)	73/63 (15)	75/64 (17)	78/65 (19)	81/66 (21)	84/70 (22)	86/74 (23)	91/76 (23)	95/78 (23)	100/80 (23)	105/82 (23)
2010	110/85 (23)	115/87 (23)	120/90 (23)	125/92 (23)	130/95 (23)	135/97 (23)	140/100 (23)	144/102 (23)	149/105 (23)	153/107 (23)	157/110 (23)	161/112 (23)
2011	165/114 (23)	168/116 (23)	171/119 (23)	174/121 (23)	176/123 (23)	179/124 (23)	181/126 (23)	182/128 (23)	184/130 (23)	185/131 (23)	186/132 (23)	186/134 (23)
2012	187/135 (23)	187/136 (23)	187/137 (23)	186/138 (23)	185/139 (23)	185/139 (23)	183/140 (23)	182/140 (23)	181/140 (23)	179/141 (23)	177/141 (23)	175/171 (23)
2013	173/141 (23)	170/141 (23)	168/140 (23)	165/140 (23)	162/139 (23)	160/139 (23)	157/138 (23)	154/138 (23)	151/137 (23)	148/136 (23)	145/135 (23)	141/134 (23)
2014	138/133 (23)	135/132 (23)	132/131 (23)	129/129 (23)	126/128 (23)	123/127 (23)	120/126 (23)	117/124 (23)	114/123 (23)	111/121 (23)	108/120 (23)	106/118 (23)
2015	103/117 (23)	101/115 (23)	98/114 (23)	96/112 (23)	93/111 (23)	91/109 (23)	89/107 (23)	87/106 (23)	85/104 (23)	83/103 (23)	82/101 (23)	80/100 (23)



ISES Solar Cycle Ap Progression

Data Through 31 Jan 09

