

Space Weather Highlights
30 November – 06 December 2009

SWO PRF 1788
08 December 2009

Solar activity was very low. No flares occurred during the period. The solar disk was spotless during the period.

No proton events were observed at geosynchronous orbit.

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

The geomagnetic field was quiet throughout the period. Solar wind observations from the ACE spacecraft showed the onset of a co-rotating interaction region early on 06 December, which was followed by the onset of a very weak high speed stream. The high speed stream velocities averaged around 380 km/s, and slowly declined thereafter. The high speed stream was associated with an isolated northern recurrent coronal hole as observed in solar EUV imagery.

Space Weather Outlook
09 December 2009 – 04 January 2010

Solar activity is expected to be predominantly very low with just a slight chance for brief periods of low.

No proton events are expected at geosynchronous orbit.

The greater than 2 MeV electron flux at geosynchronous orbit is expected to be at normal background levels through the period.

The geomagnetic field is expected to be quiet for 9-17 December. An increase to quiet to unsettled levels is expected on 18 December due to a recurrent high speed stream. Quiet levels are expected to predominate for the remainder of the outlook 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			Optical				
					C	M	X	S	1	2	3	4
30 November	72	0	0	<A1.0	0	0	0	0	0	0	0	0
01 December	72	0	0	<A1.0	0	0	0	0	0	0	0	0
02 December	71	0	0	<A1.0	0	0	0	0	0	0	0	0
03 December	72	0	0	<A1.0	0	0	0	0	0	0	0	0
04 December	72	0	0	<A1.0	0	0	0	0	0	0	0	0
05 December	72	0	0	<A1.0	0	0	0	0	0	0	0	0
06 December	72	0	0	<A1.0	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
	30 November	2.7e+05	2.0e+04	4.4e+03		6.0e+05
01 December	3.6e+05	2.0e+04	4.5e+03		1.0e+06	
02 December	4.2e+05	2.0e+04	4.7e+03		9.6e+05	
03 December	3.8e+05	2.0e+04	4.6e+03		5.0e+05	
04 December	4.7e+05	2.0e+04	4.9e+03		5.4e+05	
05 December	6.7e+05	2.0e+04	4.7e+03		4.1e+05	
06 December	5.0e+05	2.0e+04	4.7e+03		3.4e+04	

Daily Geomagnetic Data

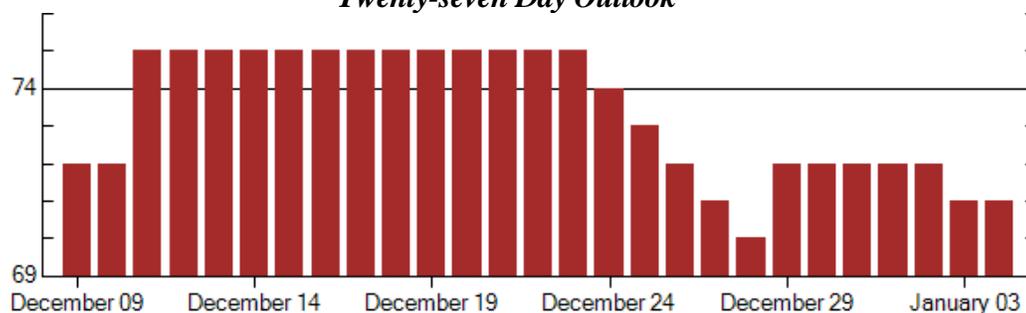
Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
	30 November	1	0-0-1-1-0-0-0-0	1	0-0-0-1-2-0-0-0	2
01 December	0	0-0-0-0-0-1-0-0	0	0-0-0-0-0-0-0-0	0	0-0-0-0-0-0-0-0
02 December	0	0-0-1-0-0-0-0-0	0	0-0-0-0-0-0-0-0	1	0-0-1-0-0-0-0-0
03 December	0	0-0-0-0-0-0-0-0	0	0-0-0-0-0-0-0-0	0	0-0-0-0-0-0-0-0
04 December	0	0-0-0-0-0-0-0-0	0	0-0-0-0-0-0-0-0	0	0-0-0-0-0-0-0-0
05 December	3	0-0-2-0-1-2-1-1	2	0-0-0-2-1-0-1-1	3	0-0-1-0-1-0-2-1
06 December	1	1-1-0-0-0-1-0-0	0	0-0-0-0-0-0-0-0	2	2-1-0-0-0-0-0-0

Alerts and Warnings Issued

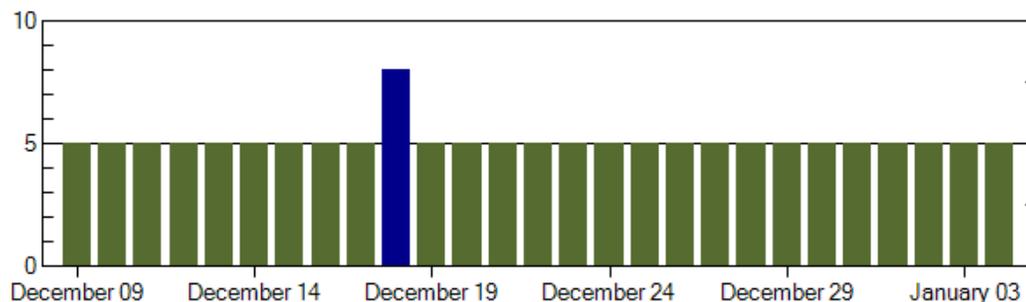
Date & Time of Issue	Type of Alert or Warning	Date & Time of Event UTC
<i>No Alerts Issued</i>		



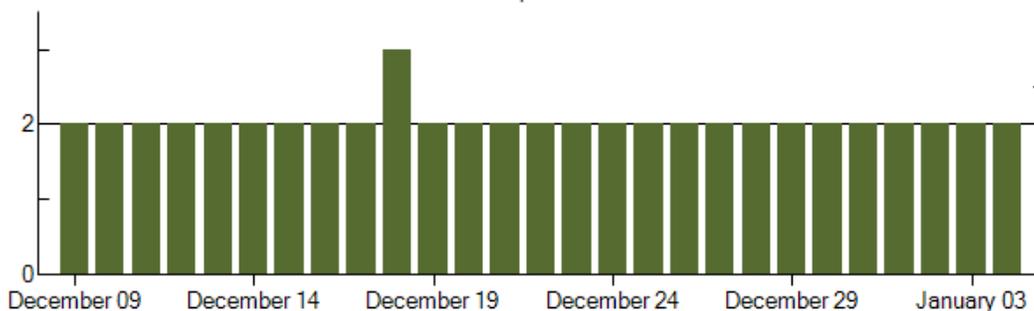
Twenty-seven Day Outlook



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
09 Dec	72	5	2	23 Dec	75	5	2
10	72	5	2	24	74	5	2
11	75	5	2	25	73	5	2
12	75	5	2	26	72	5	2
13	75	5	2	27	71	5	2
14	75	5	2	28	70	5	2
15	75	5	2	29	72	5	2
16	75	5	2	30	72	5	2
17	75	5	2	31	72	5	2
18	75	8	3	01 Jan	72	5	2
19	75	5	2	02	72	5	2
20	75	5	2	03	71	5	2
21	75	5	2	04	71	5	2
22	75	5	2				



Energetic Events

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

No Events Observed

Flare List

Date	Time			X-ray Class.	Imp / Brtns	Optical		Rgn
	Begin	Max	End			Location Lat CMD		

No Active Regions



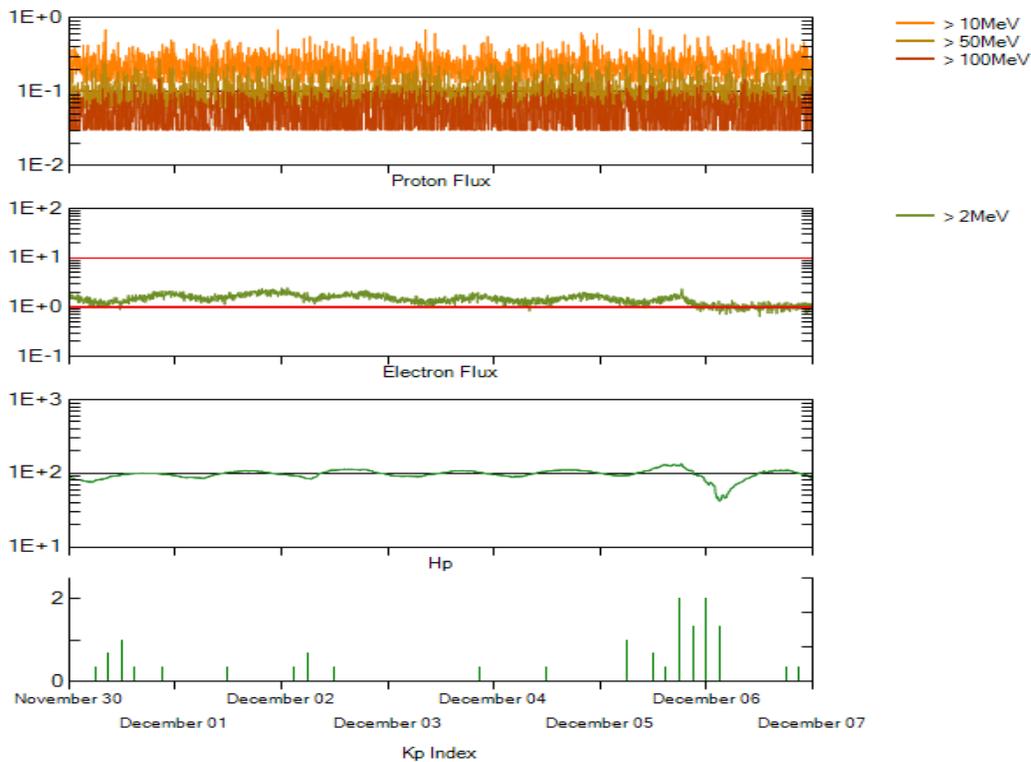
Recent Solar Indices (preliminary)
Of the observed monthly mean values

Month	Sunspot Numbers			Smooth values		Radio Flux		Geomagnetic	
	Observed SEC	values RI	Ratio RI/SEC	SEC	RI	*Penticton 10.7 cm	Smooth Value	Planetary Ap	Smooth Value
2007									
December	16.2	10.1	0.62	8.1	4.9	78.5	70.8	6	7.8
2008									
January	5.1	3.3	0.65	6.9	4.2	74.3	70.3	8	7.8
February	3.8	2.1	0.55	5.9	3.6	71.1	69.9	11	7.6
March	15.9	9.3	0.58	5.3	3.3	72.9	69.8	11	7.5
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	1.9	68.3	68.2	7	5.4
November	6.8	4.1	0.60	2.7	1.8	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	1.2	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	2.6	0.39			68.6		4	
July	5.0	3.5	0.70			68.2		4	
August	0.3	0.0	0.00			67.4		5	
September	6.6	4.2	0.64			70.5		4	
October	7.0	4.6	0.66			72.3		3	
November	7.7	4.2	0.55			73.6		3	

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 less than RI value, so a ratio could not be computed.





*Weekly Geosynchronous Satellite Environment Summary
Week Beginning 30 November 2009*

GOES-11 designated Primary Proton and Electron Satellite : December 1, 2009 the GOES-10 satellite was decommissioned.

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.

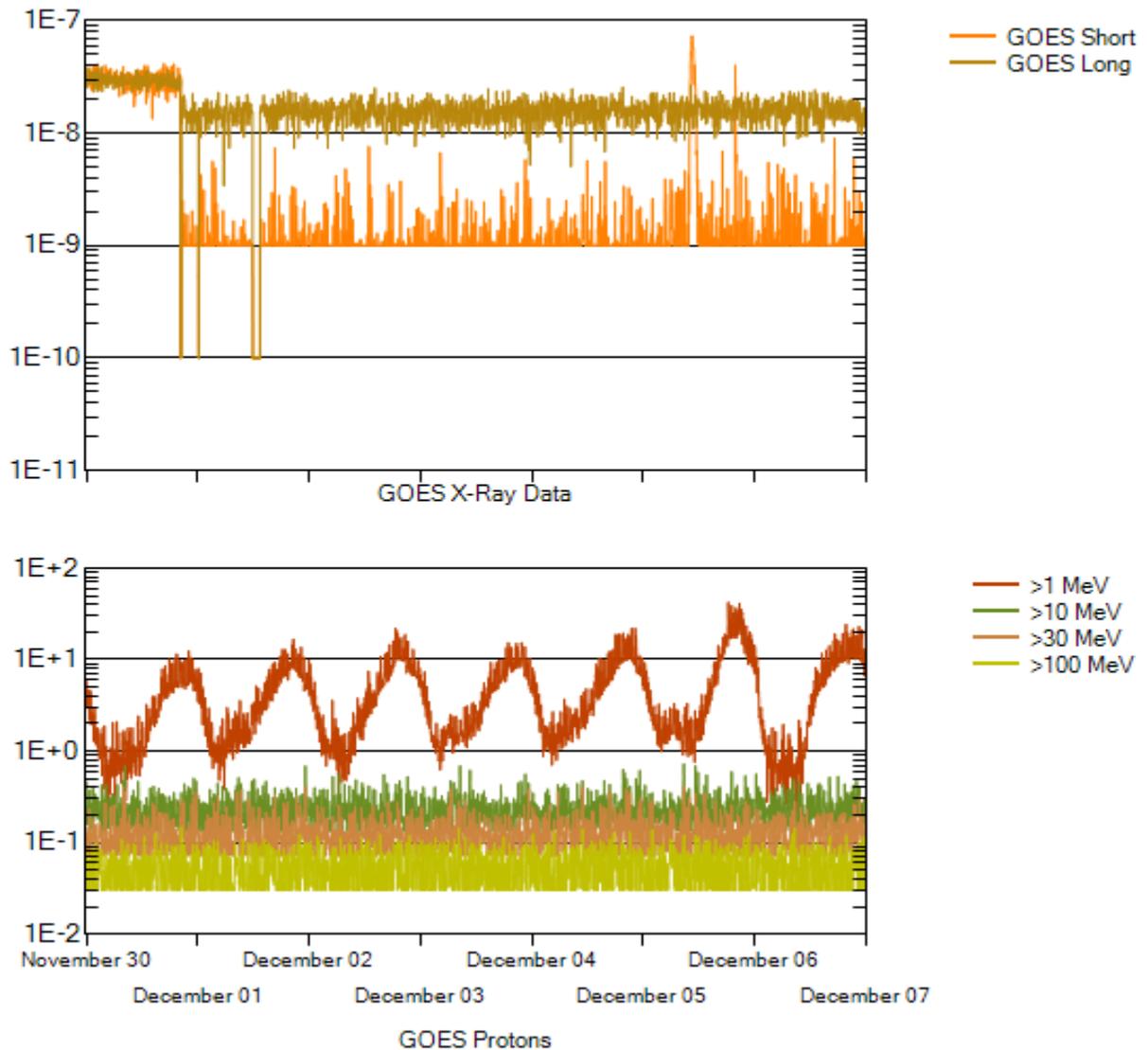
Electrons plot contains the five-minute averaged integral electron flux (electrons/cm²-sec -sr) with energies greater than 2 MeV at GOES-11.

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 10 (W060) and GOES 14 (105) 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.

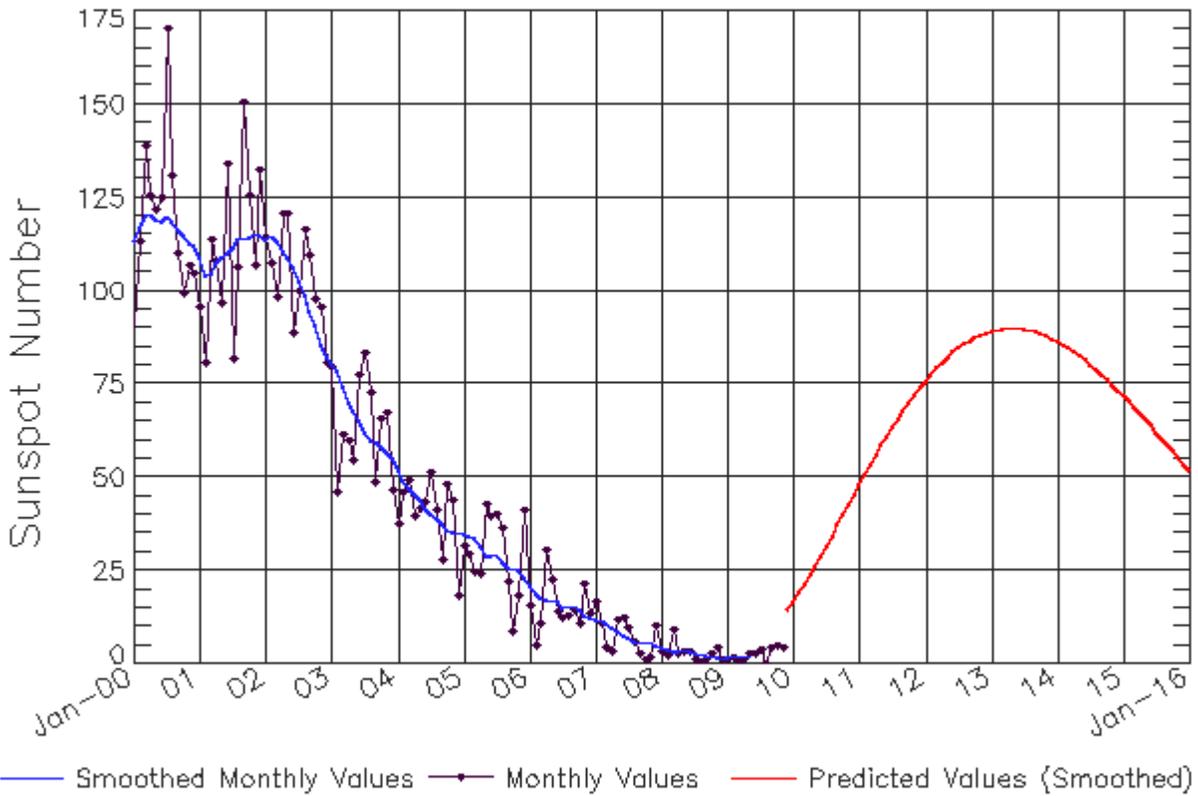
Effective December 01, 2009, GOES 10 satellite was decommissioned. GOES 14 became the primary SWPC GOES x-ray satellite. The GOES 10 and GOES 14 XRS instruments have very different electronics and therefore are some qualitative changes in the appearance of the data. For more information please see <http://www.swpc.noaa.gov/Data/goes.html>

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.



ISES Solar Cycle Sunspot Number Progression

Data Through Nov 09



Updated 2009 Dec 8

NOAA/SWPC Boulder, CO USA

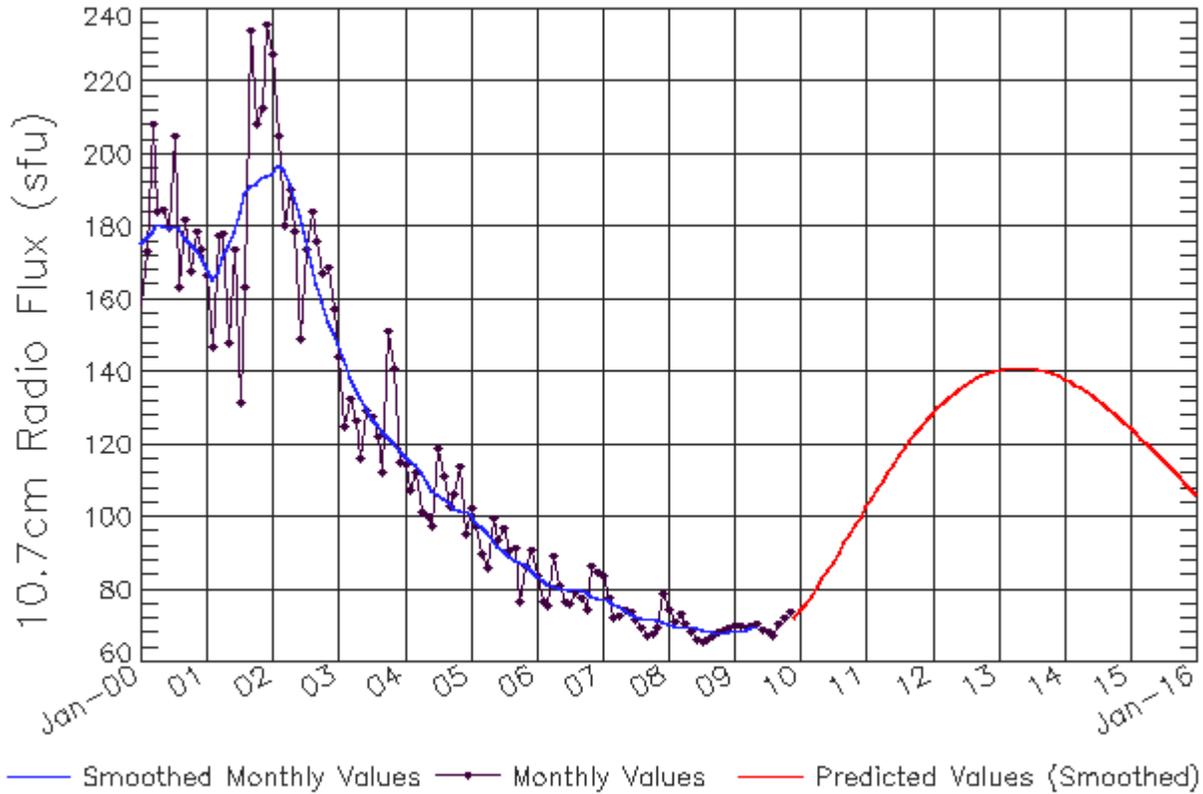
Smoothed Sunspot Number Prediction

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2008	4	4	3	3	4	3	3	3	2	2	2	2
	(***)	(***)	(***)	(***)	(***)	(***)	(***)	(***)	(***)	(***)	(***)	(***)
2009	2	2	2	2	2	3	4	6	7	9	11	13
	(***)	(***)	(***)	(***)	(***)	(1)	(2)	(3)	(5)	(5)	(6)	(7)
2010	15	18	21	23	26	29	32	34	37	40	43	45
	(7)	(8)	(9)	(9)	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)
2011	48	51	53	56	59	61	63	66	68	70	72	74
	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)
2012	76	78	79	81	82	84	85	86	87	88	88	89
	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)
2013	89	90	90	90	90	90	90	89	89	89	88	87
	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)
2014	86	86	85	84	83	81	80	79	78	76	75	73
	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)
2015	72	70	69	67	65	64	62	60	59	57	55	54
	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)



ISES Solar Cycle F10.7cm Radio Flux Progression

Data Through Nov 09



Updated 2009 Dec 8

NOAA/SWPC Boulder, CO USA

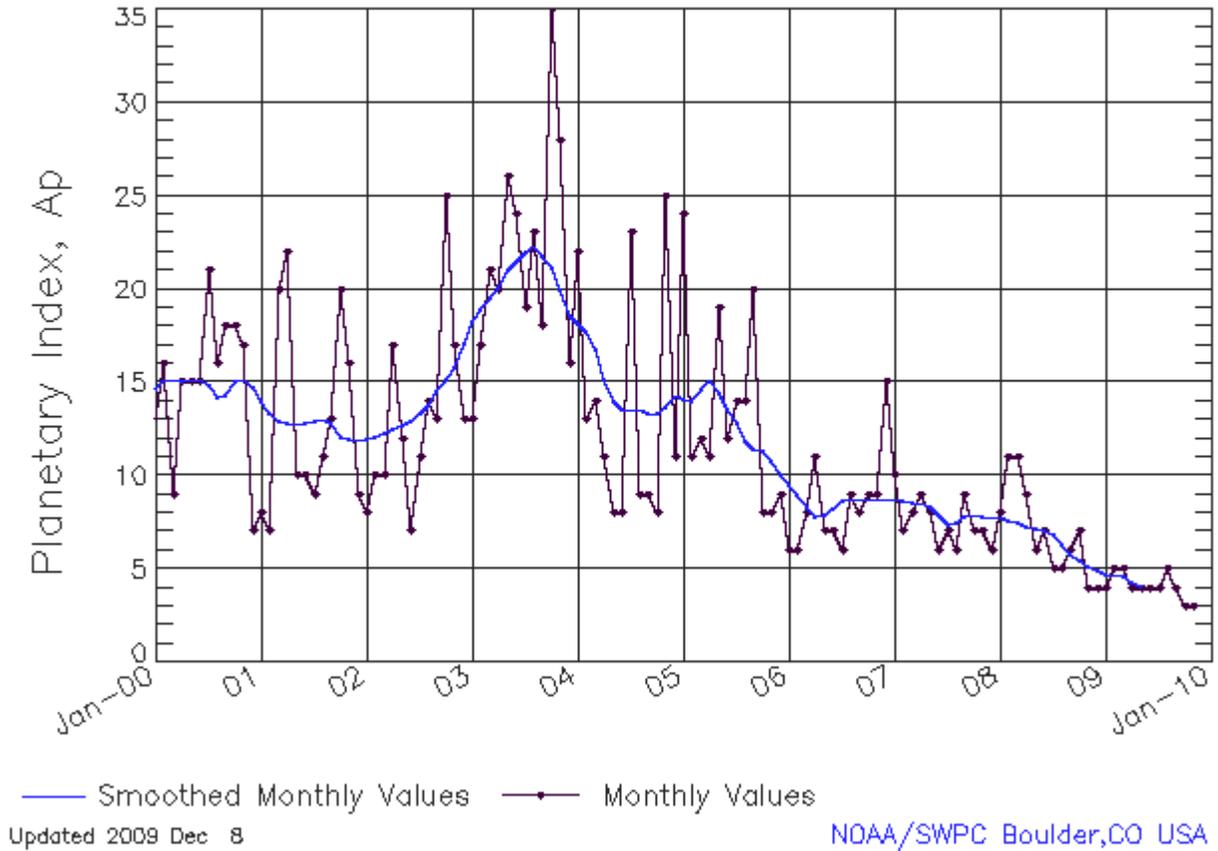
Smoothed F10.7 Radio Flux Prediction

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2008	70 (***)	70 (***)	70 (***)	70 (***)	70 (***)	69 (***)	69 (***)	69 (***)	68 (***)	68 (***)	68 (***)	69 (***)
2009	69 (***)	69 (***)	69 (***)	69 (***)	70 (***)	70 (1)	70 (1)	71 (2)	71 (3)	72 (4)	73 (4)	74 (5)
2010	76 (6)	78 (7)	80 (8)	81 (8)	83 (9)	85 (9)	88 (9)	90 (9)	93 (9)	95 (9)	98 (9)	100 (9)
2011	103 (9)	105 (9)	108 (9)	110 (9)	112 (9)	115 (9)	117 (9)	119 (9)	121 (9)	123 (9)	125 (9)	127 (9)
2012	128 (9)	130 (9)	132 (9)	133 (9)	134 (9)	135 (9)	136 (9)	137 (9)	138 (9)	139 (9)	140 (9)	140 (9)
2013	141 (9)	140 (9)	140 (9)	139 (9)	139 (9)							
2014	138 (9)	137 (9)	136 (9)	136 (9)	135 (9)	134 (9)	132 (9)	131 (9)	130 (9)	129 (9)	127 (9)	126 (9)
2015	125 (9)	123 (9)	122 (9)	120 (9)	119 (9)	117 (9)	116 (9)	114 (9)	113 (9)	111 (9)	110 (9)	108 (9)



ISES Solar Cycle Ap Progression

Data Through Nov 09





Geomagnetic Activity (Ap)

October 2009
(Month 157)

Comparison of Cycles at current month in cycle

