

Space Weather Highlights
25 January 2010 – 31 January 2010

SWO PRF 1796
02 February 2010

Solar activity was at very low levels with only B-class activity observed during the period. Region 1041 (S25, L=052, class/area 200/Eso on 22 January) decayed to spotless plage on 31 January. Region 1042 (N22, L=131, class/area 190/Cao on 23 January) quietly rotated off the disk on 27 January. New Region 1043 (N25, L=320, class/area Dso/060 on 31 January) emerged on the disk on 30 January as a beta sunspot group.

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.

Geomagnetic field activity was predominately quiet during the period. The exception consisted of an isolated unsettled period observed at high latitudes from 31/1200 – 1500 UTC. Observations from the ACE spacecraft indicated a solar sector boundary crossing occurred at about 30/1100 UTC. The phi angle changed from a positive (away) angle to a negative (towards) angle, while solar wind velocity increased from 330 km/s at 30/1103 UTC to a maximum of 472 km/s at 31/0759 UTC. During the summary period, density peaked at 18 p/cc at 30/0524 UTC, while the Bz component of the interplanetary magnetic field ranged between +7nT at 30/0527 UTC and -7nT at 30/0156 UTC.

Space Weather Outlook
03 February 2010 – 01 March 2010

Solar activity is expected to be at very low to low levels for 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 the period.

The geomagnetic field is expected to be at predominantly quiet levels for the forecast period. A period of quiet to unsettled activity is expected on 08 – 09 February due to a recurrent coronal hole high speed stream. A period of unsettled to active levels are expected on 16 February as a recurrent coronal hole high speed stream is expected to become geoeffective.



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
25 January	81	34	100	A7.1	0	0	0	0	0	0	0 0
26 January	80	28	150	A6.4	0	0	0	0	0	0	0 0
27 January	78	15	40	A6.3	0	0	0	0	0	0	0 0
28 January	76	13	30	A6.2	0	0	0	0	0	0	0 0
29 January	73	12	20	A2.6	0	0	0	0	0	0	0 0
30 January	75	25	50	A2.4	0	0	0	1	0	0	0 0
31 January	75	14	60	A3.3	0	0	0	2	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
25 January	2.8e+05	1.9e+04	4.5e+03		2.1e+06	
26 January	2.8e+05	1.9e+04	4.3e+03		2.1e+06	
27 January	3.0e+05	2.0e+04	4.4e+03		2.3e+06	
28 January	3.0e+05	2.0e+04	4.5e+03		9.0e+05	
29 January	3.1e+05	2.0e+04	4.3e+03		4.9e+05	
30 January	3.6e+05	2.0e+04	4.4e+03		2.3e+05	
31 January	2.7e+05	2.0e+04	4.3e+03		1.5e+05	

Daily Geomagnetic Data

Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
25 January	3	0-1-2-0-2-2-0-0	2	0-0-2-1-2-0-0-0	3	0-0-1-0-2-0-0-2
26 January	1	1-1-0-0-0-0-0-0	1	0-0-1-0-0-0-1-0	3	2-1-1-0-0-0-1-1
27 January	0	0-0-0-1-0-0-0-0	0	0-0-0-1-0-0-0-0	2	1-0-0-1-1-1-0-1
28 January	2	0-0-0-0-2-1-1-0	0	0-0-0-0-0-1-0-0	3	1-0-0-0-1-1-2-1
29 January	0	0-0-0-0-0-0-0-0	0	0-0-0-1-0-0-0-0	2	0-0-0-1-0-0-0-1
30 January	3	1-1-1-0-1-1-1-2	2	0-0-0-0-2-1-1-1	4	1-1-1-0-1-1-1-2
31 January	3	2-1-0-1-1-1-1-1	4	1-0-0-2-3-2-0-0	3	2-1-0-1-1-0-1-1

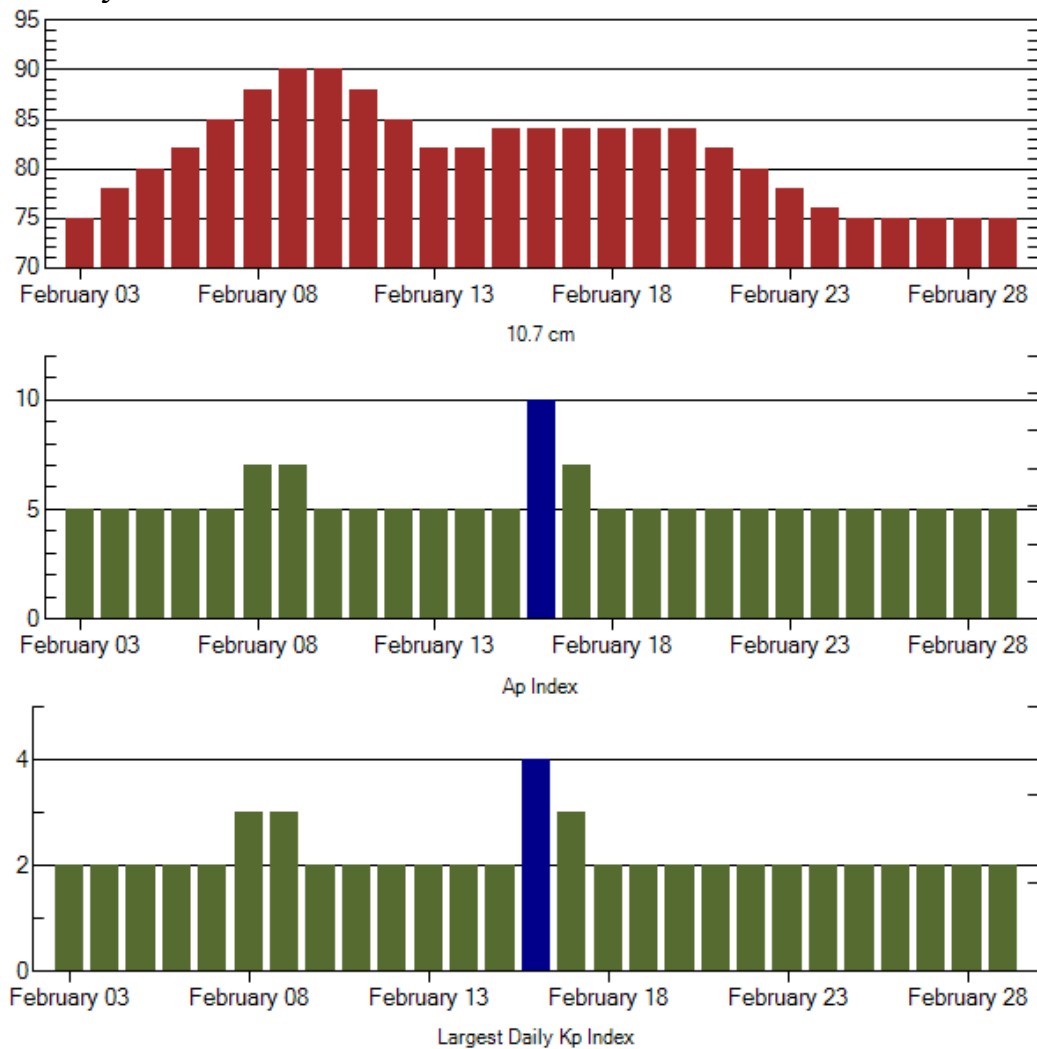
Alerts and Warnings Issued

Date & Time of Issue	Type of Alert or Warning	Date & Time of Event UTC
----------------------	--------------------------	--------------------------

No Alerts Issued



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
03 Feb	75	5	2	17 Feb	84	7	3
04	78	5	2	18	84	5	2
05	80	5	2	19	84	5	2
06	82	5	2	20	84	5	2
07	85	5	2	21	82	5	2
08	88	7	3	22	80	5	2
09	90	7	3	23	78	5	2
10	90	5	2	24	76	5	2
11	88	5	2	25	75	5	2
12	85	5	2	26	75	5	2
13	82	5	2	27	75	5	2
14	82	5	2	28	75	5	2
15	84	5	2	01 Mar	75	5	2
16	84	10	4				



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 IV

No Events Observed

Flare List

Date	Time			X-ray	Imp /	Optical		Rgn
	Begin	Max	End			Location	Lat CMD	
25 January	No Flares Observed							
26 January	0048	0054	0105	B2.9				
	0245	0252	0300	B1.5				
	0303	0306	0309	B1.4				
	1701	1705	1708	B3.2				
	1740	1751	1758	B6.7				
	2050	2056	2107	B4.6				
	2118	2131	2136	B4.8				
	2146	2151	2156	B6.3				
	2252	2259	2309	B2.1				
27 January	0012	0019	0026	B6.2				
	0245	0250	0253	B2.4				
	1907	1912	1930	B1.6				
	2216	2220	2227	B1.5				
28 January	0642	0649	0651	B4.0				
29 January	No Flares Observed							
30 January	1717	1722	1727	B1.1				
	2306	2310	A2311		SF	N25E36		1043
31 January	0151	0154	0201	B1.5	SF	N25E35		1043
	0410	0421	0430	B1.5				
	0500	0502	0514	B4.8	SF	N25E33		1043



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	4
<i>Region 1041</i>															
19 Jan	S27E90	52						5	2		1				
20 Jan	S25E77	52	60	10	CSO	6	B	9	4		6				
21 Jan	S24E61	55	190	11	CAO	7	B	3			2				
22 Jan	S25E50	52	200	14	ESO	7	B								
23 Jan	S24E35	54	190	11	EAI	9	B								
24 Jan	S24E23	53	170	9	DSI	7	B								
25 Jan	S25E12	52	50	11	CAI	11	B								
26 Jan	S24W03	53	60	4	DSO	7	B								
27 Jan	S25W16	53	40	4	CSO	5	B								
28 Jan	S26W32	55	30	2	HSX	3	A								
29 Jan	S27W42	52	20	2	BXO	2	B								
30 Jan	S27W58	55	10	1	AXX	1	A								
31 Jan	S27W71	55													
								17	6	0	9	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 53

<i>Region 1042</i>															
22 Jan	N22W28	130	40	4	CSO	3	B								
23 Jan	N22W42	131	190	7	CAO	11	B								
24 Jan	N21W56	132	160	6	DAI	5	B								
25 Jan	N18W73	137	50	3	CRO	3	B								
26 Jan	N18W86	136	90	5	HSX	1	A								
								0	0	0	0	0	0	0	0

Crossed West Limb.

Absolute heliographic longitude: 130

<i>Region 1043</i>															
30 Jan	N27E35	322	40	3	BXO	4	B				1				
31 Jan	N25E24	320	60	5	DSO	4	B				2				
								0	0	0	3	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 320



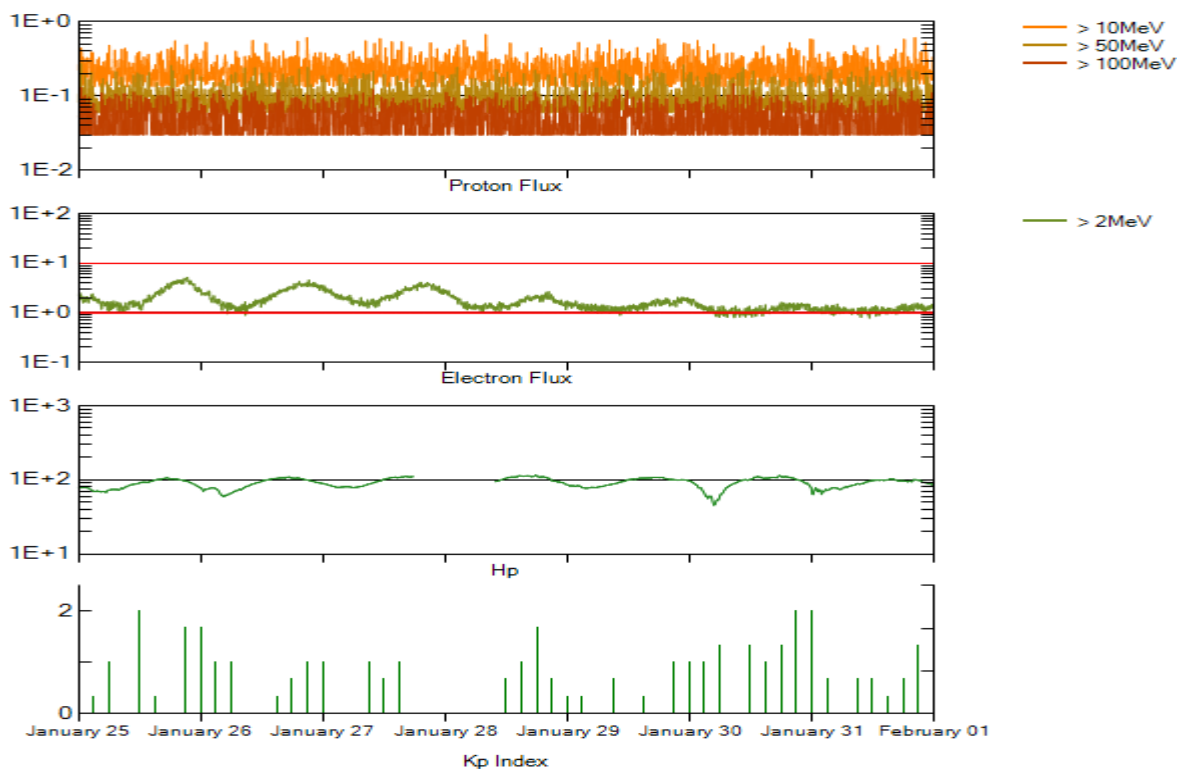
Recent Solar Indices (preliminary)
Of the observed monthly mean values

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									
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	1.8	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	3.8
August	0.3	0.0	0.00			67.4		5	
September	6.6	4.3	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	
December	15.7	10.6	0.68			76.8		2	
2010									
January	21.3	13.1	0.62			81.0		2	

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 25 January 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.

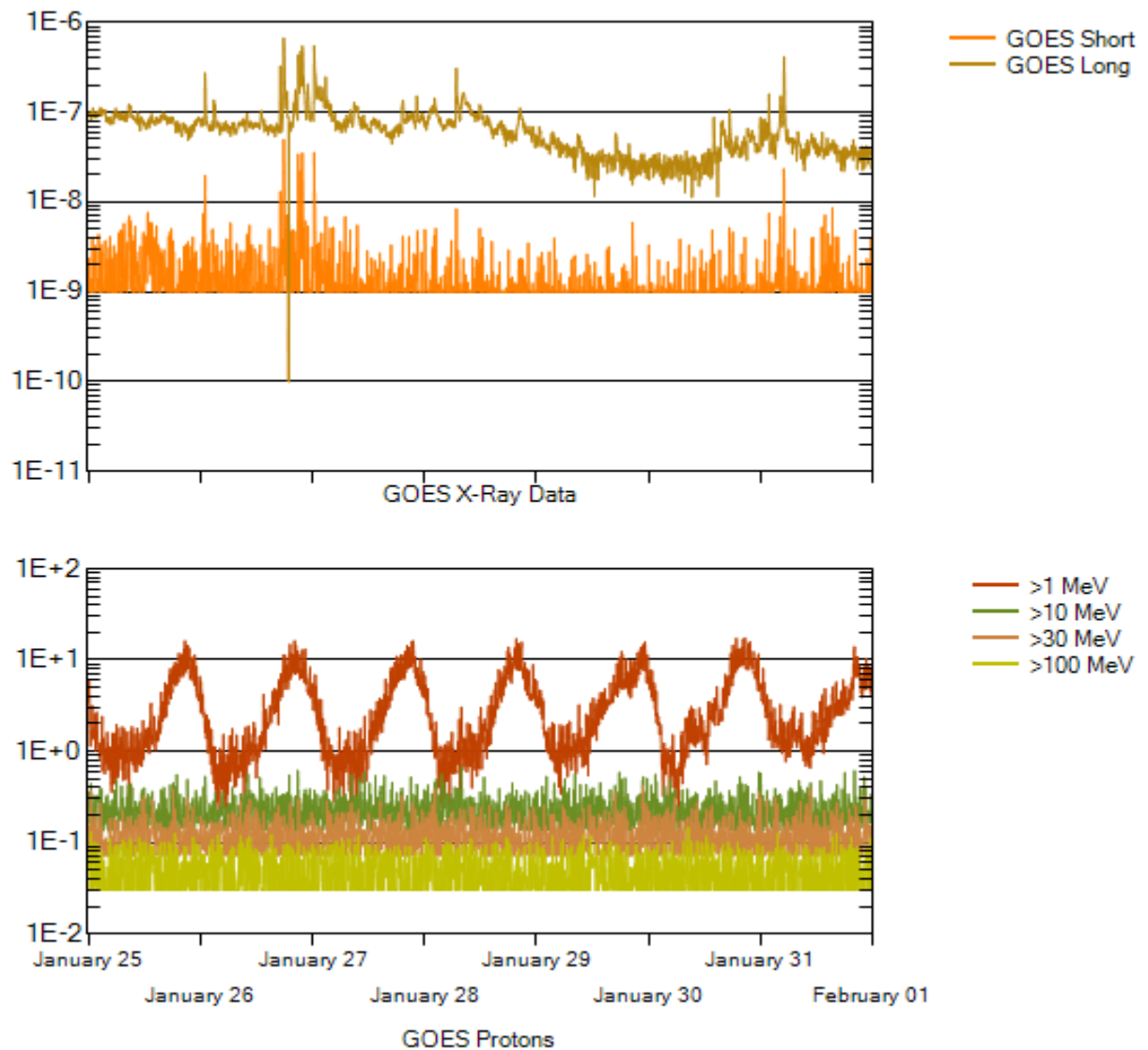
Electrons plot contains the five-minute averaged integral electron flux (electrons/cm²–sec–sr) with energies greater than 2 MeV at GOES-11.

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

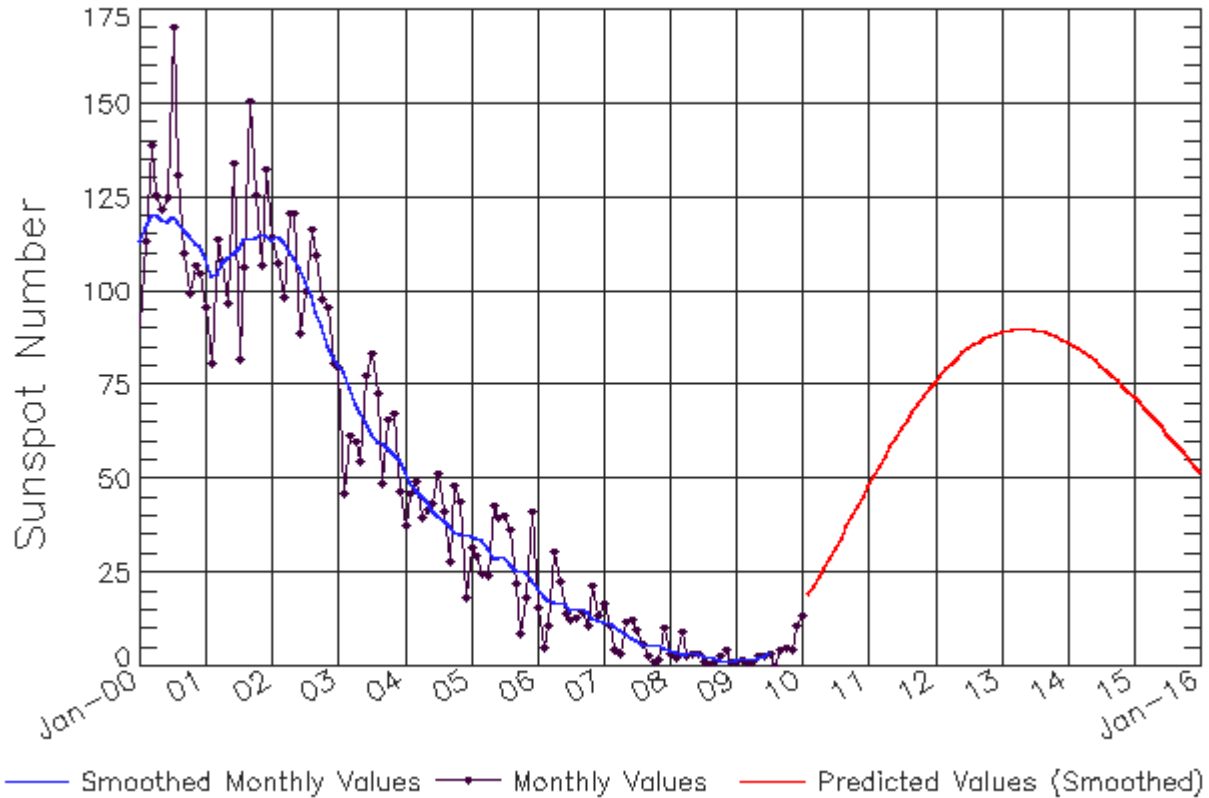
X-ray plot contains five-minute averaged x-ray flux (Watts/m^2) as measured by GOES 14 (W105) in two wavelength bands, 0.05 - 0.4 and 0.1 - 0.8 nm. The letters A, B, C, M and X refer to x-ray event levels for the 0.1 - 0.8 nm band.

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



ISES Solar Cycle Sunspot Number Progression

Data Through Jan 10



Updated 2010 Feb 2

NOAA/SWPC Boulder, CO USA

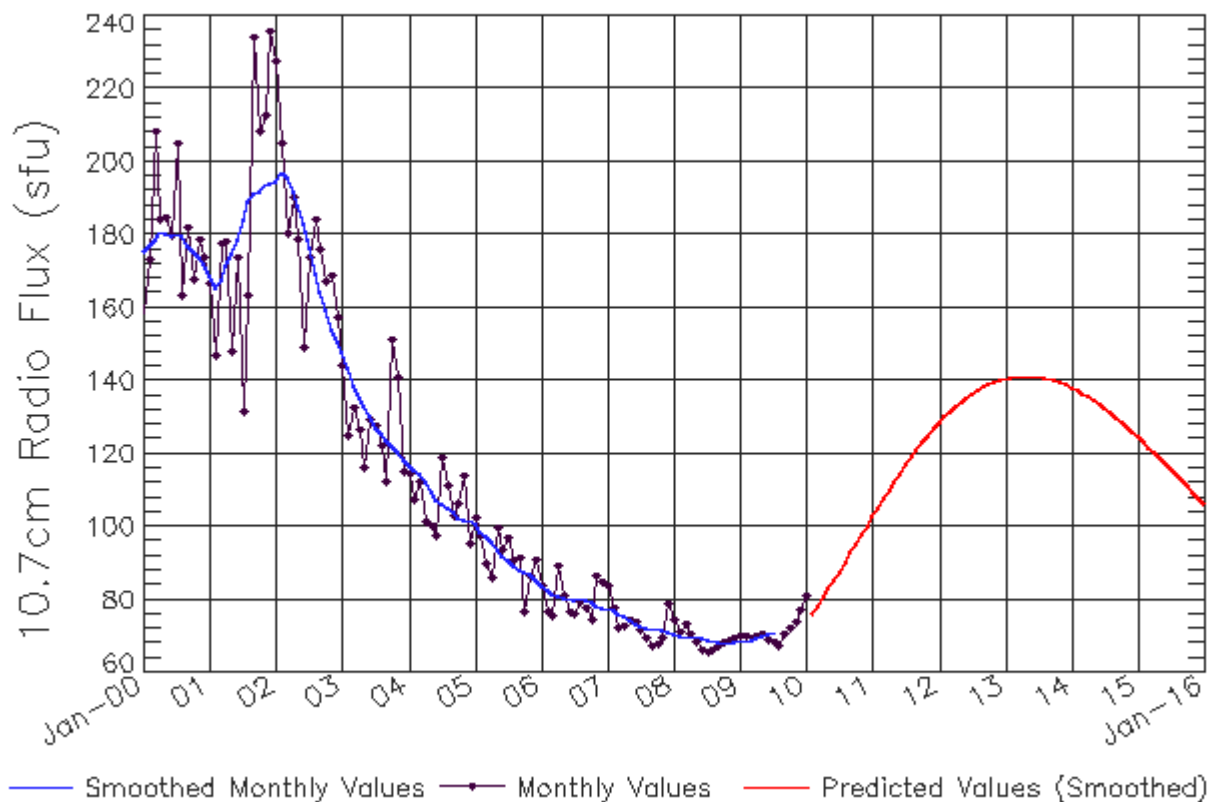
Smoothed Sunspot Number Prediction

	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 (***)	5 (1)	6 (2)	8 (3)	10 (5)	12 (5)
2010	15 (6)	17 (7)	20 (7)	23 (8)	26 (9)	29 (9)	32 (10)	34 (10)	37 (10)	40 (10)	43 (10)	45 (10)
2011	48 (10)	51 (10)	53 (10)	56 (10)	59 (10)	61 (10)	63 (10)	66 (10)	68 (10)	70 (10)	72 (10)	74 (10)
2012	76 (10)	78 (10)	79 (10)	81 (10)	82 (10)	84 (10)	85 (10)	86 (10)	87 (10)	88 (10)	88 (10)	89 (10)
2013	89 (10)	90 (10)	90 (10)	90 (10)	90 (10)	90 (10)	90 (10)	89 (10)	89 (10)	89 (10)	88 (10)	87 (10)
2014	86 (10)	86 (10)	85 (10)	84 (10)	83 (10)	81 (10)	80 (10)	79 (10)	78 (10)	76 (10)	75 (10)	73 (10)
2015	72 (10)	70 (10)	69 (10)	67 (10)	65 (10)	64 (10)	62 (10)	60 (10)	59 (10)	57 (10)	55 (10)	54 (10)



ISES Solar Cycle F10.7cm Radio Flux Progression

Data Through Jan 10



Updated 2010 Feb 2

NOAA/SWPC Boulder, CO USA

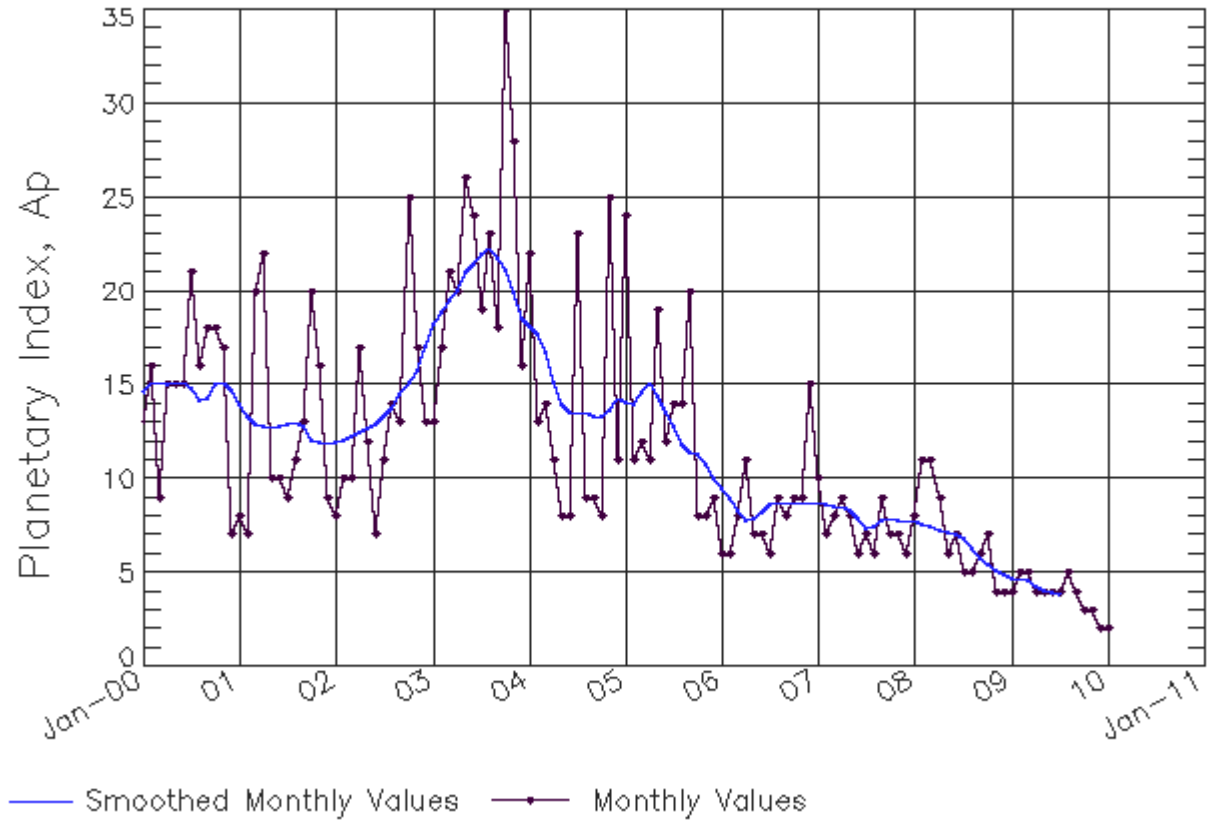
Smoothed F10.7cm Radio Flux Prediction

	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 (***)	71 (***)	72 (1)	72 (1)	73 (2)	74 (3)	75 (4)
2010	77 (4)	79 (5)	81 (6)	82 (7)	84 (8)	86 (8)	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)	141 (9)	141 (9)	141 (9)	141 (9)	141 (9)	141 (9)	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 Jan 10



Updated 2010 Feb 2

NOAA/SWPC Boulder, CO USA

Note: The Solar Cycle Comparison charts are temporarily unavailable. 2010 charts will be published at a later date.

02 February 2010

