

Space Weather Highlights
22 February – 28 February 2010

SWO PRF 1800
02 March 2010

Solar activity was at very low levels during the period. Region 1051 (N15, L=321, class/area Cso/040 on 26 February) produced the largest flare of the period, a B3.5 event at 24/0223 UTC. Region 1050 (S19, L=054, class/area Bxo/030 on 26 February) appeared on the disk on 23 February. Region 1051 (N17, L=322, class/area Cao/100 on 24 February) rotated on to the disk on 24 February.

No proton events were observed at geosynchronous orbit.

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

Geomagnetic field activity was at predominantly quiet levels during the period. Real-time solar wind observations from the ACE satellite showed frequent weak fluctuations in the interplanetary magnetic field (IMF). The total field, Bt, varied primarily between 3 and 8 nT, while the southward component, Bz, varied from +8 and -6 nT. Solar wind speeds ranged between 283 km/s and 409 km/s.

Space Weather Outlook
03 March – 29 March 2010

Solar activity is expected to be very low, with isolated periods of low levels, through the 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 predominantly quiet on 03-14 March. Quiet to isolated unsettled levels are expected on 15-16 March due to a recurrent coronal hole. Activity is expected to return to quiet levels 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			Optical					
					C	M	X	S	1	2	3	4	
22 February	84	14	20	A5.9	0	0	0	0	0	0	0	0	0
23 February	84	31	30	A7.6	0	0	0	0	0	0	0	0	0
24 February	83	40	120	A6.8	0	0	0	0	0	0	0	0	0
25 February	83	30	30	A5.9	0	0	0	0	0	0	0	0	0
26 February	81	26	70	A3.8	0	0	0	0	0	0	0	0	0
27 February	79	26	30	A3.2	0	0	0	0	0	0	0	0	0
28 February	78	13	10	A2.3	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
22 February	4.0e+05	1.9e+04	4.2e+03		1.1e+06	
23 February	2.7e+05	2.0e+04	4.3e+03		7.3e+05	
24 February	2.7e+05	1.9e+04	4.4e+03		7.6e+05	
25 February	2.9e+05	1.9e+04	4.3e+03		1.1e+06	
26 February	2.3e+05	2.1e+04	4.7e+03		4.9e+05	
27 February	3.7e+05	2.0e+04	4.5e+03		6.9e+05	
28 February	4.0e+05	1.9e+04	4.5e+03		6.1e+05	

Daily Geomagnetic Data

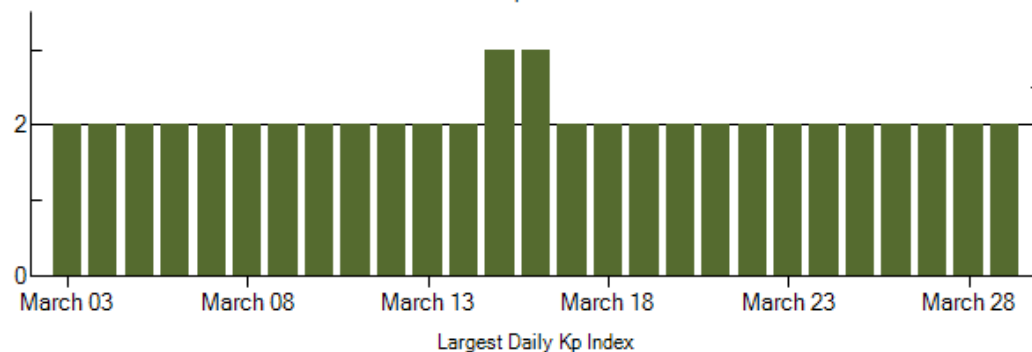
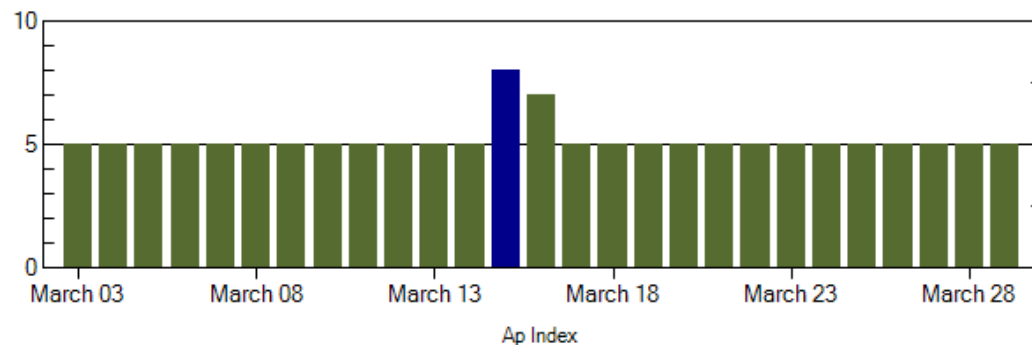
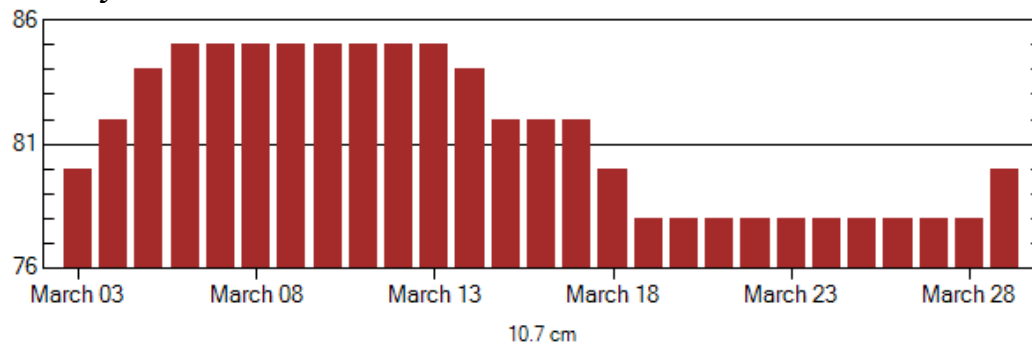
Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
22 February	3	0-1-0-1-1-2-1-1	6	0-0-0-3-2-1-1-1	4	1-1-0-1-1-1-1-2
23 February	2	2-1-0-0-0-1-0-0	2	1-1-0-1-1-0-0-0	2	2-1-0-0-0-0-1-0
24 February	2	0-2-0-1-0-1-0-0	2	0-1-0-1-0-1-1-1	3	1-3-0-0-0-1-0-1
25 February	2	1-0-0-0-0-1-1-2	1	0-0-0-1-0-0-1-1	2	1-0-0-0-0-0-1-2
26 February	1	2-0-0-0-1-0-0-0	0	1-0-0-0-0-0-0-0	2	1-0-0-0-0-0-0-1
27 February	0	0-0-0-0-0-1-0-0	0	0-0-0-0-0-0-1-0	2	0-0-0-0-0-1-1-1
28 February	2	0-0-1-0-2-0-0-1	1	0-0-1-0-1-0-0-0	2	0-0-1-0-1-1-0-1

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



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 Mar	80	5	2	17 Mar	82	5	2
04	82	5	2	18	80	5	2
05	84	5	2	19	78	5	2
06	85	5	2	20	78	5	2
07	85	5	2	21	78	5	2
08	85	5	2	22	78	5	2
09	85	5	2	23	78	5	2
10	85	5	2	24	78	5	2
11	85	5	2	25	78	5	2
12	85	5	2	26	78	5	2
13	85	5	2	27	78	5	2
14	84	5	2	28	78	5	2
15	82	8	3	29	80	5	2
16	82	7	3				



Energetic Events

Date	Time			X-ray		Optical Information			Peak		Sweep Freq	
	$\frac{1}{2}$			Integ		Imp/	Location	Rgn	Radio Flux		Intensity	
	Begin	Max	Max	Class	Flux	Brtns	Lat CMD	#	245	2695	II	IV
<i>No Events Observed</i>												

Flare List

Date	Time			Optical		
	Begin	Max	End	X-ray Class.	Imp / Brtns	Location Lat CMD Rgn
22 February	1313	1323	1332	B2.2		
	1827	1833	1839	B1.5		
	2132	2137	2156	B1.4		
	2256	2300	2304	B2.5		
23 February	2356	0001	0009	B3.0		
24 February	0156	0205	0209	B3.1		
	0218	0223	0226	B3.5		
	1828	1831	1835	B1.5		
25 February	No Flares Observed					
26 February	1223	1231	1232	B1.1		
27 February	1924	1929	1934	B1.6		
	2220	2224	2226	B1.1		
28 February	2336	2340	2346	B1.1		



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
Region 1048															
14 Feb	N20E64	96	10	5	BXO	2	B	1							
15 Feb	N21E50	97	10	5	BXO	3	B								
16 Feb	N21E34	100	10	3	BXO	5	B								
17 Feb	N20E24	97	10	2	AXX	4	A								
18 Feb	N20E11	97													
19 Feb	N20W02	97													
20 Feb	N20W15	97													
21 Feb	N20W28	97													
22 Feb	N20W41	97													
23 Feb	N20W54	97													
24 Feb	N20W67	97													
25 Feb	N20W80	97													
26 Feb	N20W93	97													
								1	0	0	0	0	0	0	0

Crossed West Limb.

Absolute heliographic longitude: 97

<i>Region 1049</i>															
17 Feb	S19E02	119	40	5	DSO	12	B								
18 Feb	S19W13	121	60	7	DAO	7	B								
19 Feb	S19W25	120	60	8	DSI	13	B								
20 Feb	S19W38	120	60	8	DSI	9	B								
21 Feb	S18W53	121	50	10	CSO	7	B								
22 Feb	S18W67	122	20	5	CSO	4	B								
23 Feb	S18W78	120	10	9	BXO	3	B								
24 Feb	S19W91	120	10	5	BXO	2	B								
								0	0	0	0	0	0	0	0

Crossed West Limb.

Absolute heliographic longitude: 119

<i>Region 1050</i>															
23 Feb	S18W12	54	20	4	BXO	8	B								
24 Feb	S19W27	55	10	5	BXO	5	B								
25 Feb	S19W40	55	20	6	BXO	7	B								
26 Feb	S19W52	54	30	2	BXO	3	B								
27 Feb	S18W64	53			AXX	2	A								
28 Feb	S18W77	53													
								0	0	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 54



Region Summary - continued

Date			Location		Sunspot Characteristics			Flares							
			Area (10 ⁻⁶ hemi)	Extent (helio)	Spot Class	Spot Count	Mag Class	X-ray				Optical			
	(° Lat ° CMD)	Helio Lon						C	M	X	S	1	2	3	4

Region 1051

24 Feb	N17E66	322	100	9	CAO	3	B								
25 Feb	N16E54	321	10	6	BXO	3	B								
26 Feb	N15E41	321	40	2	CSO	3	B								
27 Feb	N15E27	322	30	6	CAO	4	B								
28 Feb	N15E12	324	10	1	HSX	3	A								
								0	0	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 324



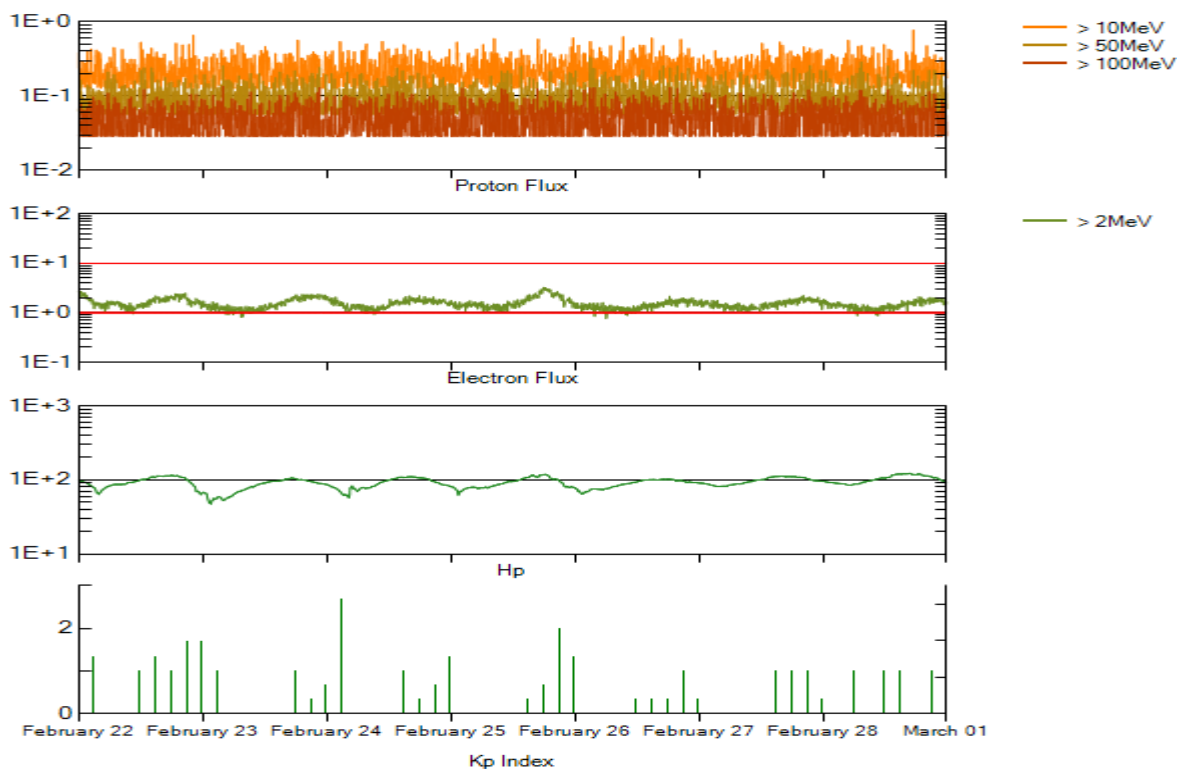
Recent Solar Indices (preliminary)
Of the observed monthly mean values

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									
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	3.9
August	0.3	0.0	0.00	7.7	4.8	67.4	72.1	5	3.8
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			81.1		3	
February	31.0	18.6	0.60			84.7		4	

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 zero so a ratio could not be computed.





Weekly Geosynchronous Satellite Environment Summary
Week Beginning 22 February 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.

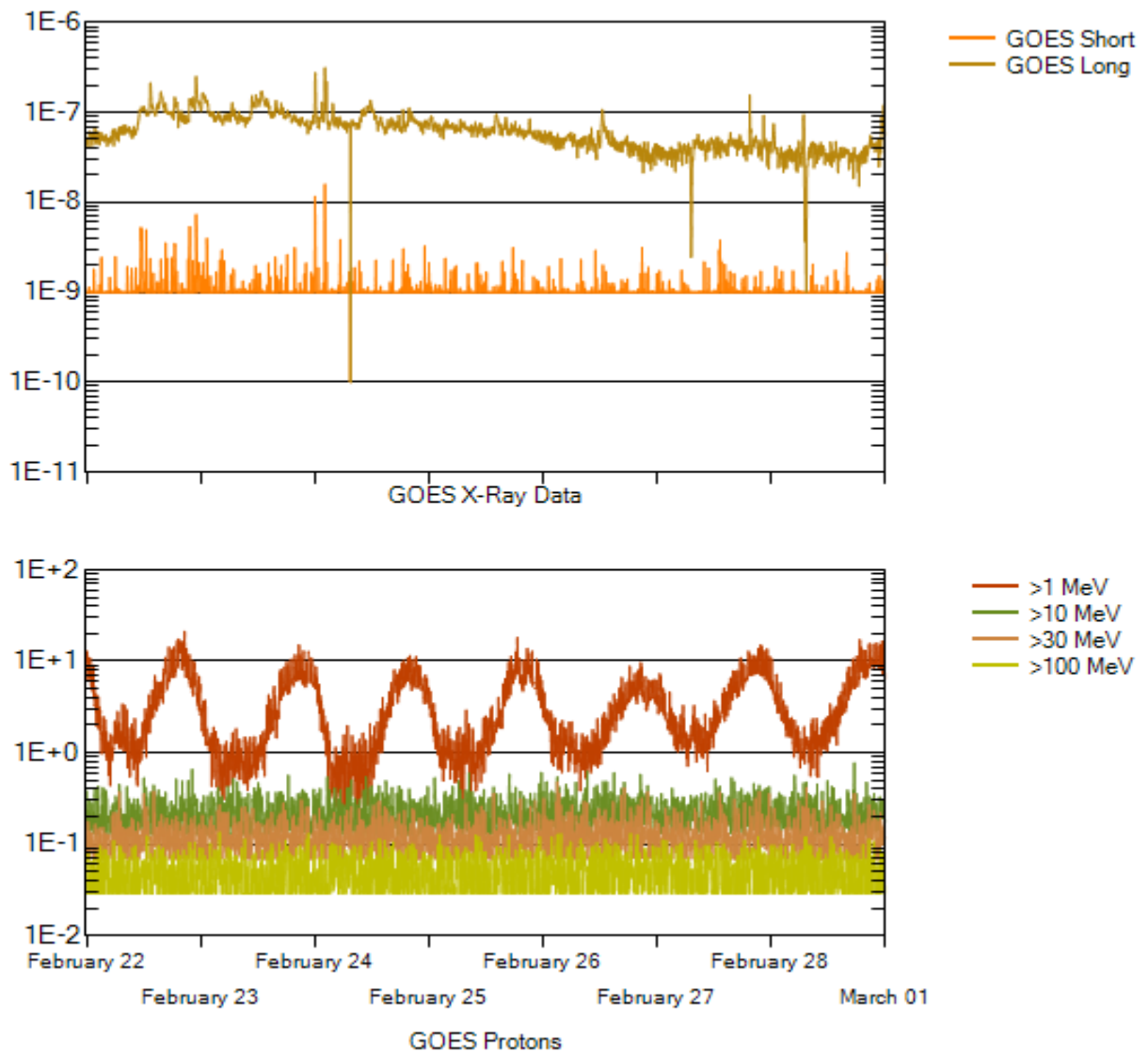
Electrons plot contains the five-minute averaged integral electron flux (electrons/cm²–sec–sr) with energies greater than 2 MeV at GOES-11.

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

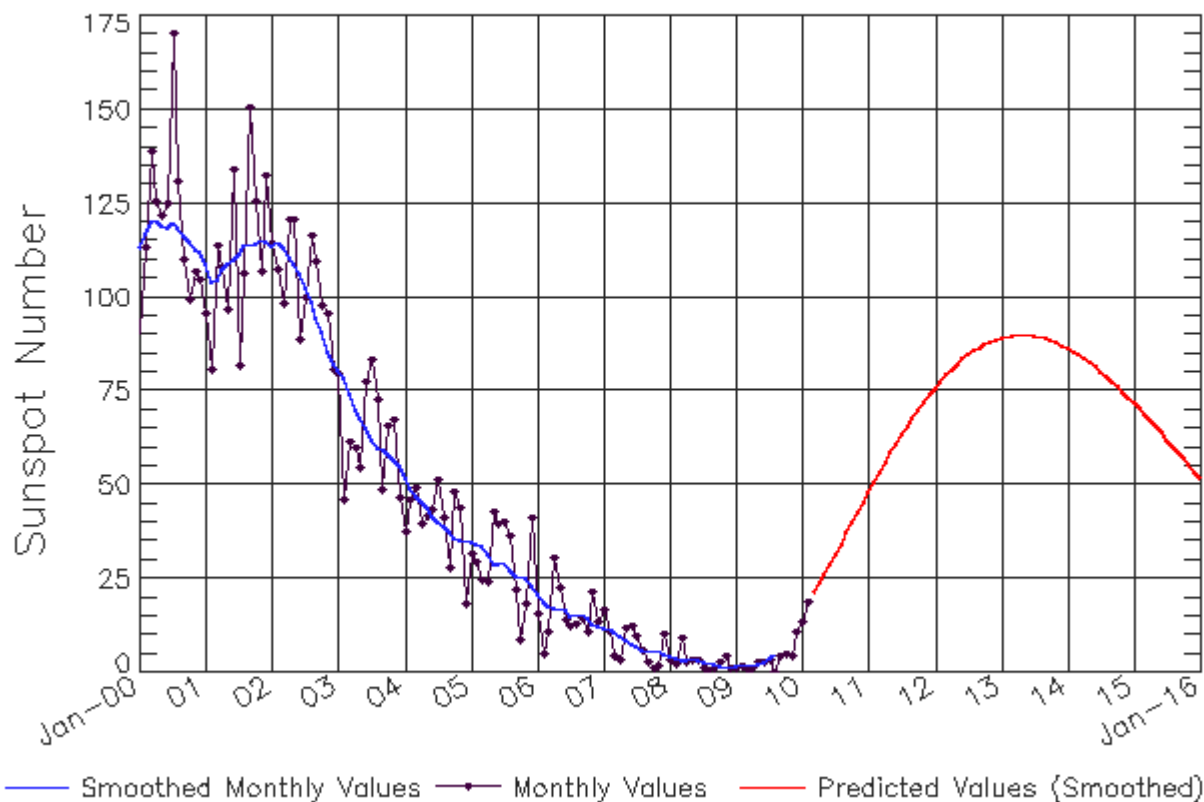
X-ray plot contains five-minute averaged x-ray flux (Watts/m^2) as measured by GOES 14 (W105) in two wavelength bands, 0.05 - 0.4 and 0.1 - 0.8 nm. The letters A, B, C, M and X refer to x-ray event levels for the 0.1 - 0.8 nm band.

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 Feb 10



Updated 2010 Mar 2

NOAA/SWPC Boulder, CO USA

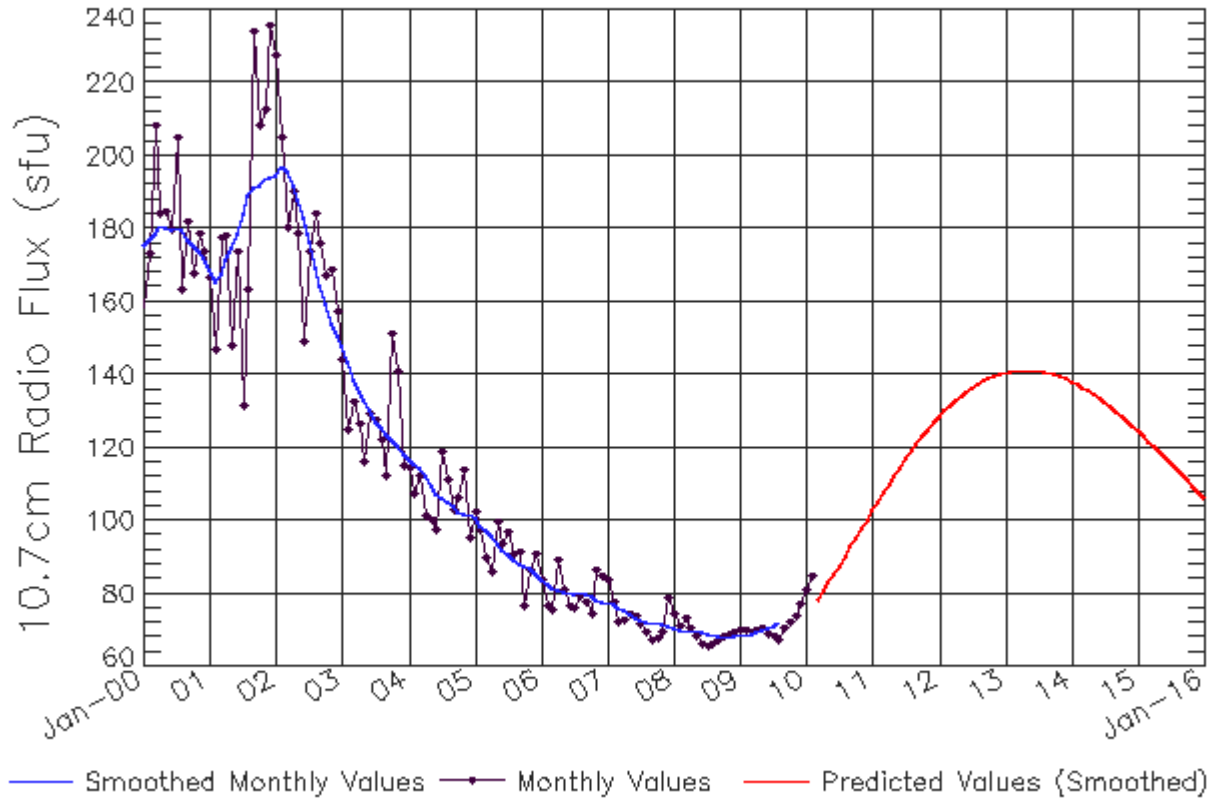
Smoothed Sunspot Number Prediction

	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 (***)	6 (1)	8 (2)	10 (3)	12 (5)
2010	15 (5)	17 (6)	20 (7)	23 (7)	26 (8)	29 (9)	32 (9)	35 (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 Feb 10



Updated 2010 Mar 2

NOAA/SWPC Boulder, CO USA

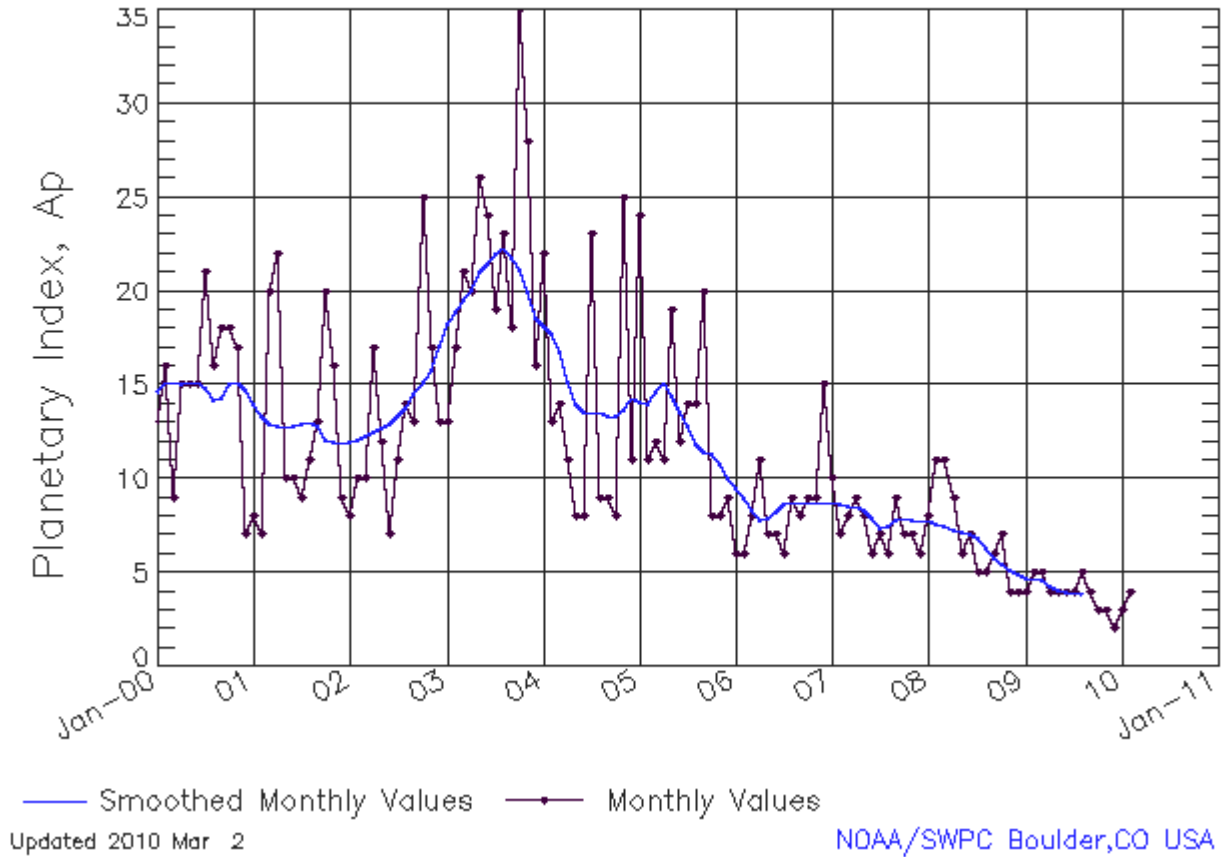
Smoothed F10.7cm Radio Flux Prediction

	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 (***)	73 (1)	74 (1)	75 (2)	76 (3)
2010	78 (4)	79 (4)	81 (5)	83 (6)	85 (7)	87 (8)	89 (8)	91 (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 Feb 10



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

