

Space Weather Highlights
26 April – 02 May 2010

SWO PRF 1809
04 May 2010

Solar activity was at very low to low levels during the week with five new regions being numbered. Region 1063 (N16, L=264, class/area Bxo/010 on 28 April) decayed to spotless plage soon after being numbered on 29 April. Region 1064 (N16, L=223, class/area Cro/010 on 01 May) showed some growth towards the end of the period but remained quiet. Region 1065 (S32, L=241, class/area Axx/000 on 02 May), Region 1066 (S27, L=209, class/area Axx/000 on 02 May), and Region 1067 (N23, L=170, class/area Bxo/020 on 02 May) were all numbered on 02 May. Prior to rotating onto the disk, Region 1067 produced two C-class events from behind the east limb, the biggest being a C5.7 event on 01/0139 UTC. A CME was observed lifting off the west limb on 02/2108 UTC, but does not appear to be Earthward directed.

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 ranged from quiet to major storm levels during the period. The geomagnetic field was initially at quiet levels (26-28 April), but became quiet to unsettled with an isolated active period at mid-latitudes on 29 April due to a co-rotating interaction region (CIR). During the CIR, the ACE spacecraft observed Bz fluctuations of +/- 7 nT and an increase of Bt of 9 nT. Following the CIR, the solar wind speed increased from around 310 to 400 km/s indicating the presence of a coronal hole high-speed stream. Quiet levels prevailed until 02 May, when activity increased to active to minor storm levels at middle latitudes, with major storm periods observed at high latitudes. At about 0900 UTC, observations from the ACE spacecraft indicated increases in temperature, density, and wind velocity, while the Bz component showed strong negative value peaks (at -20 nT). Solar wind speeds increased from 375 km/s to 700 km/s by 1645 UTC.

Space Weather Outlook
05 May – 31 May 2010

Solar activity is expected to be at very low to low levels with a slight chance for M-class events.

No proton events are expected at geosynchronous orbit.

The greater than 2 MeV electron flux at geosynchronous orbit is expected to be at high flux levels on 05-06 May and at moderate levels on 07 May. Normal background levels are expected to prevail for the remainder of the period.

Geomagnetic field activity is expected to be at quiet to unsettled levels with isolated active periods from 05-06 May as the effects of a coronal hole high-speed stream subside. Quiet conditions are expected from 07-19 May. Quiet to unsettled levels are expected for 20-21 May due to a recurrent coronal hole high-speed stream. Quiet levels are expected to return from 22-28 May. Unsettled to active with isolated minor storming levels are expected for 29-31 May due to a recurrent coronal hole high-speed stream.



Daily Solar Data

Date	Radio	Sun	Sunspot	X-ray	Flares							
	Flux	spot	Area	Background	X-ray Flux			Optical				
	10.7 cm	No.	(10 ⁻⁶ hemi.)		C	M	X	S	1	2	3	4
26 April	76	0	0	A3.5	0	0	0	0	0	0	0	0
27 April	75	0	0	A3.1	0	0	0	0	0	0	0	0
28 April	76	12	10	A3.1	0	0	0	0	0	0	0	0
29 April	76	0	0	A4.4	0	0	0	0	0	0	0	0
30 April	79	12	20	A5.1	1	0	0	0	0	0	0	0
01 May	78	13	10	A5.0	1	0	0	2	0	0	0	0
02 May	80	47	20	A5.8	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
26 April	3.9e+05	1.5e+04	3.8e+03		2.0e+06	
27 April	3.5e+05	1.5e+04	4.0e+03		2.7e+06	
28 April	2.5e+05	1.5e+04	4.0e+03		2.2e+06	
29 April	2.1e+05	1.5e+04	3.8e+03		2.6e+06	
30 April	1.3e+05	1.5e+04	3.7e+03		3.8e+06	
01 May	1.8e+05	1.5e+04	3.8e+03		6.5e+06	
02 May	3.7e+05	1.5e+04	3.8e+03		2.0e+06	

Daily Geomagnetic Data

Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
26 April	0	0-0-1-0-0-0-0-0	0	0-0-0-1-0-0-0-0	2	0-1-1-0-1-0-0-1
27 April	3	2-1-0-0-0-1-1-2	2	1-1-0-1-0-0-1-0	4	2-1-0-1-1-2-1-2
28 April	2	1-1-1-1-1-0-0-1	1	0-0-0-1-1-0-0-1	4	1-0-1-0-2-1-1-2
29 April	4	3-2-0-1-1-0-1-1	4	3-3-0-0-0-0-0-0	6	3-3-0-0-1-1-1-1
30 April	2	1-1-1-1-1-0-1-0	3	1-1-0-1-1-1-1-1	4	2-1-1-0-1-1-0-1
01 May	1	0-1-0-0-1-0-0-1	1	0-1-0-1-1-1-0-0	4	0-2-0-1-1-2-1-2
02 May	18	0-1-1-2-5-4-4-4	25	0-1-2-6-4-5-4-3	39	1-1-2-4-6-6-6-5

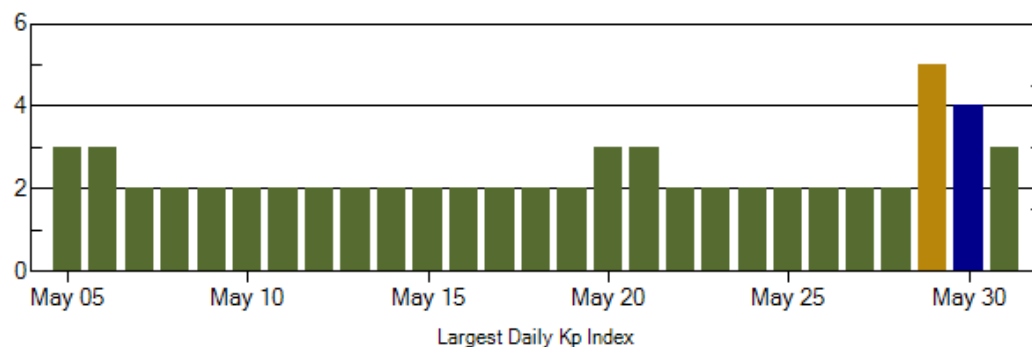
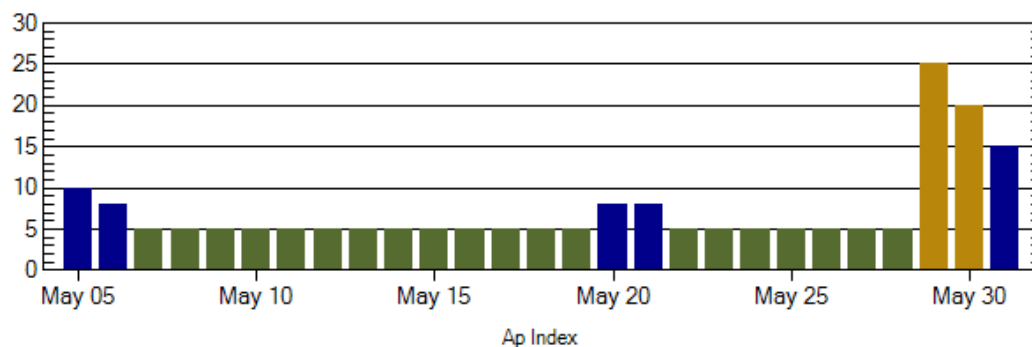
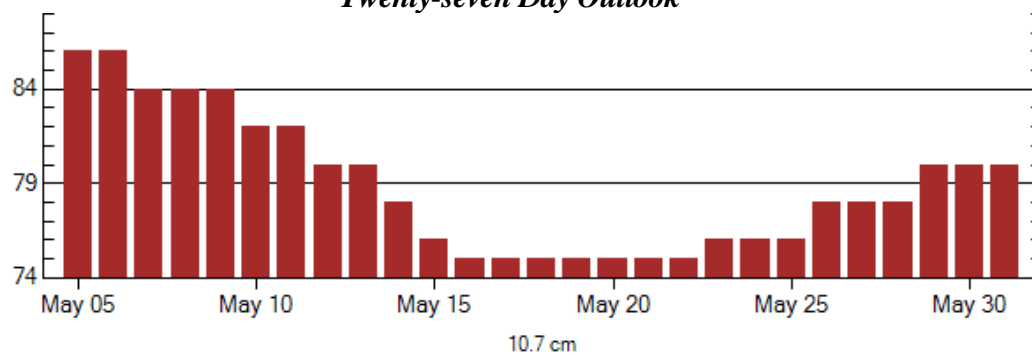


Alerts and Warnings Issued

Date & Time of Issue	Type of Alert or Warning	Date & Time of Event UTC
29 Apr 0357	WARNING: Geomagnetic K = 4	29 Apr 0400 - 0900
29 Apr 0407	ALERT: Geomagnetic K = 4	29 Apr 0405
02 May 1038	WARNING: Geomagnetic K = 5	02 May 1040 - 1600
02 May 1159	ALERT: Geomagnetic K = 4	02 May 1158
02 May 1545	EXTENDED WARNING: Geomagnetic K = 5	02 May 1040 - 1600
02 May 1548	EXTENDED WARNING: Geomagnetic K = 5	02 May 1040 - 03/1600
02 May 1601	ALERT: Geomagnetic K = 5	02 May 1555
02 May 1930	WATCH: Geomagnetic A \geq 20	03 May
02 May 1930	WATCH: Geomagnetic A \geq 20	04 May



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
05 May	86	10	3	19 May	75	5	2
06	86	8	3	20	75	8	3
07	84	5	2	21	75	8	3
08	84	5	2	22	75	5	2
09	84	5	2	23	76	5	2
10	82	5	2	24	76	5	2
11	82	5	2	25	76	5	2
12	80	5	2	26	78	5	2
13	80	5	2	27	78	5	2
14	78	5	2	28	78	5	2
15	76	5	2	29	80	25	5
16	75	5	2	30	80	20	4
17	75	5	2	31	80	15	3
18	75	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 IV

No Events Observed

Flare List

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

26 April	No Flares Observed							
27 April	No Flares Observed							
28 April	No Flares Observed							
29 April	No Flares Observed							
30 April	0017	0021	0027	B1.8				
	1928	1934	1938	C2.2	SF	N23E73		1067
01 May	0137	0138	0154	C5.7	SF	N23E73		1067
	0523	0527	0531	B1.6				
	0618	0622	0625		SF	N23E73		
	0948	0952	0959	B1.0				
02 May	0603	0609	0618	B2.9				
	1002	1009	1015	B3.8				
	1509	1514	1520	B1.1				
	1622	1626	1629	B1.9				
	1755	1759	1810	B1.2				
	2055	2100	2103	B1.4				
	2142	2153	2158	B1.5				



Region Summary

Table 1. Summary of Observations													
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

Region 1063

28 Apr	N16E14	264	10	2	BXO	2	B								
29 Apr	N16E01	264													
30 Apr	N16W12	264													
01 May	N16W25	264													
02 May	N16W38	264													

0 0 00 0 0 0 0

Still on Disk.

Absolute heliographic longitude: 264

Region 1064

30 Apr	N15E28	223	20	2	BXO	2	B								
01 May	N16E15	223	10	3	CRO	3	B								
02 May	N15E02	223		1	AXX	1	A								

0 0 00 0 0 0 0

Still on Disk.

Absolute heliographic longitude: 223

Region 1065

02 May	S32W16	241		1	AXX	1	A								
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0 0 00 0 0 0 0

Still on Disk.

Absolute heliographic longitude: 241

Region 1066

02 May	S27E16	209		1	AXX	1	A								
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0 0 0 0 0 0 0 0

Still on Disk.

Absolute heliographic longitude: 209

Region 1067

30 Apr	N23E84	168						1							
01 May	N23E70	168						1			1				
02 May	N23E55	170	20	5	BXO	4	B								

2 0 0 1 0 0 0 0

Still on Disk.

Absolute heliographic longitude: 170



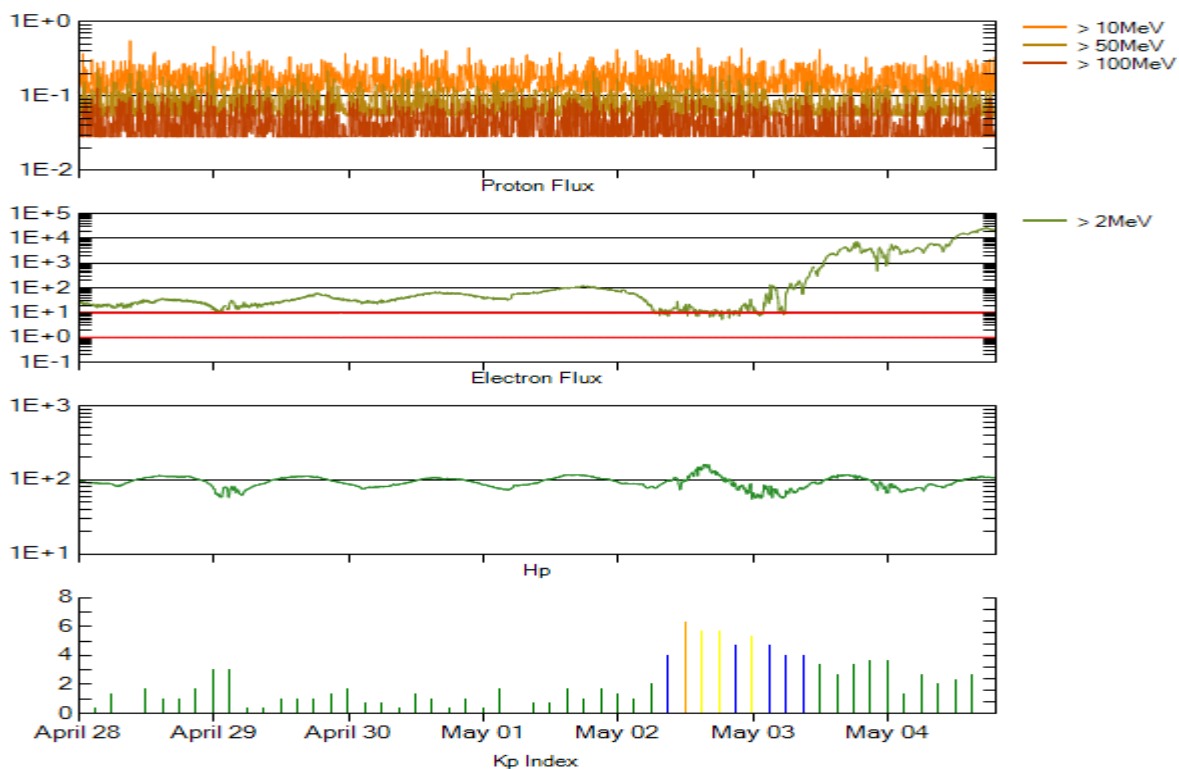
Recent Solar Indices (preliminary)
Of the observed monthly mean values

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									
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	9.9	6.1	70.5	73.3	4	3.8
October	7.0	4.6	0.66	11.3	7.0	72.3	74.1	3	4.0
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		5	
March	24.7	15.4	0.62			83.3		4	
April	11.2	7.9	0.71			75.9		10	

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 26 April 2010

GOES-13 replaced GOES-11 as primary proton and electron satellite and primary magnetometer satellite on 14 April 2010.

The proton flux plot contains the five-minute averaged integral proton flux (protons/cm²–sec–sr) as measured by GOES-13 (W75) for each of three energy thresholds: greater than 10, 50, and 100 MeV.

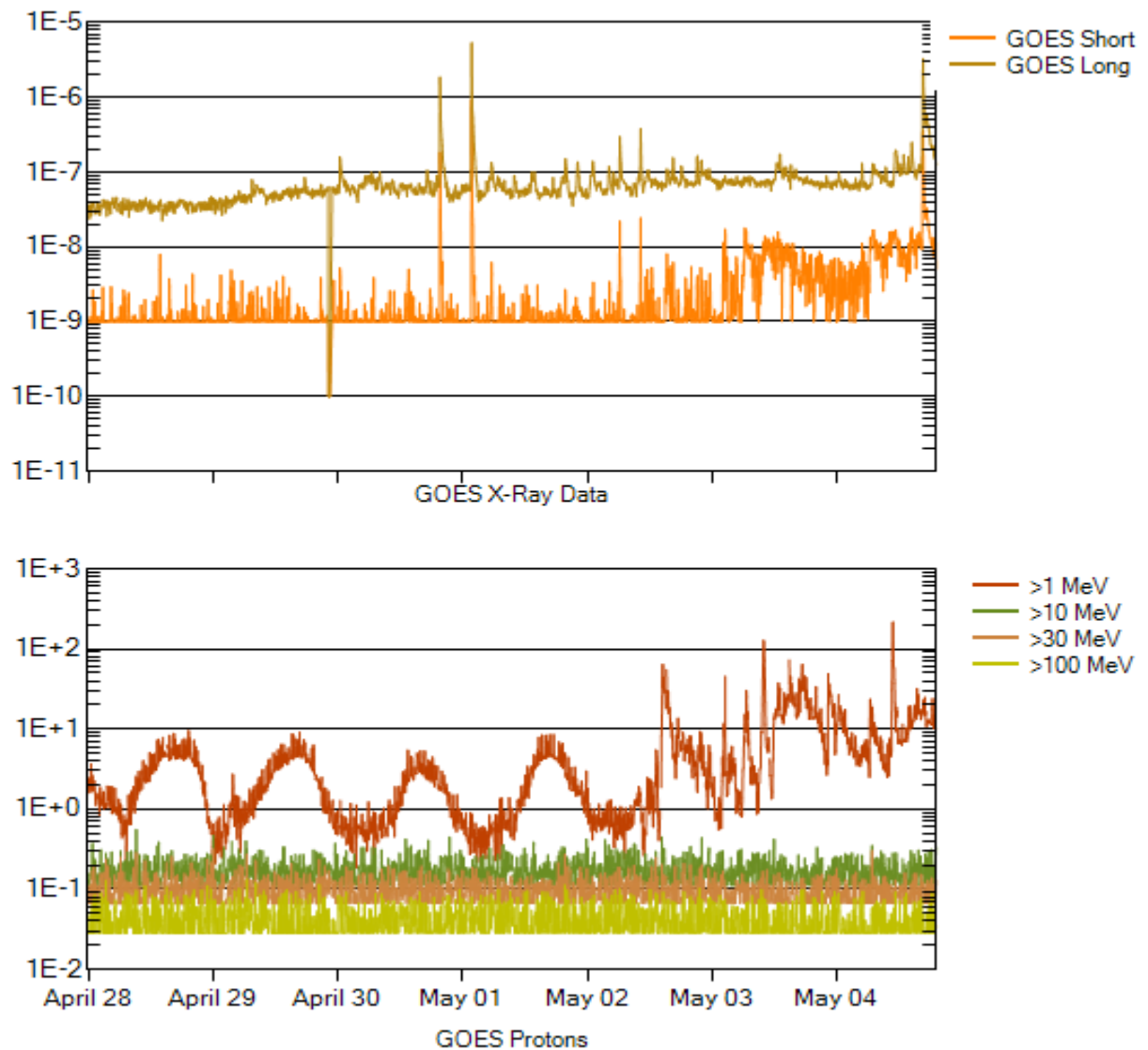
The electron flux plot contains the five-minute averaged integral electron flux (electrons/cm²–sec–sr) with energies greater than 2 MeV at GOES-13.

The Hp plot contains the five minute averaged Hp magnetic field component in nanoteslas (nT) as measured by GOES-13. The Hp 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 Meankook, 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

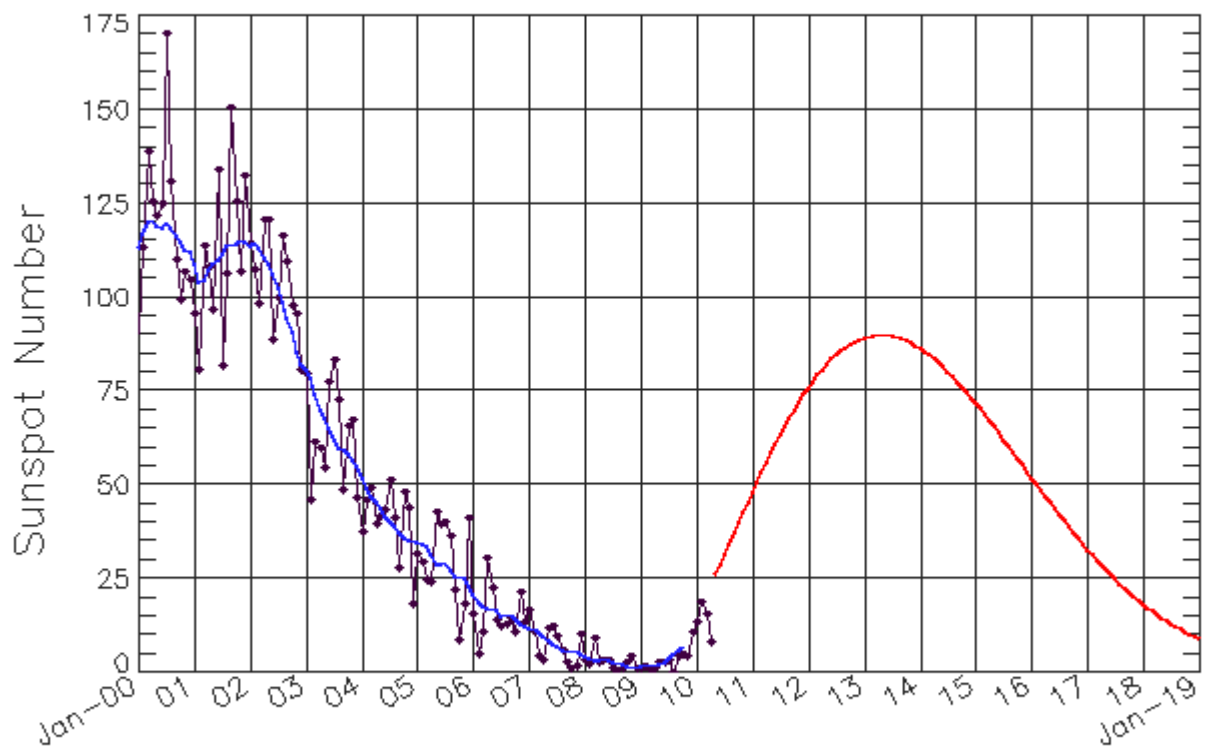
The x-ray plot contains five-minute averaged x-ray flux (Watts/m^2) as measured by GOES 14 (W105) in two wavelength bands, 0.05 - 0.4 and 0.1 - 0.8 nm. The letters A, B, C, M and X refer to x-ray event levels for the 0.1 - 0.8 nm band.

The proton plot contains the five-minute averaged integral proton flux ($\text{protons/cm}^2\text{-sec-sr}$) as measured by GOES-13 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. (GOES-13 replaced GOES-11 as primary for protons on 14 April 2010).



ISES Solar Cycle Sunspot Number Progression

Observed data through Apr 2010



— Smoothed Monthly Values —●— Monthly Values — Predicted Values (Smoothed)

Updated 2010 May 4

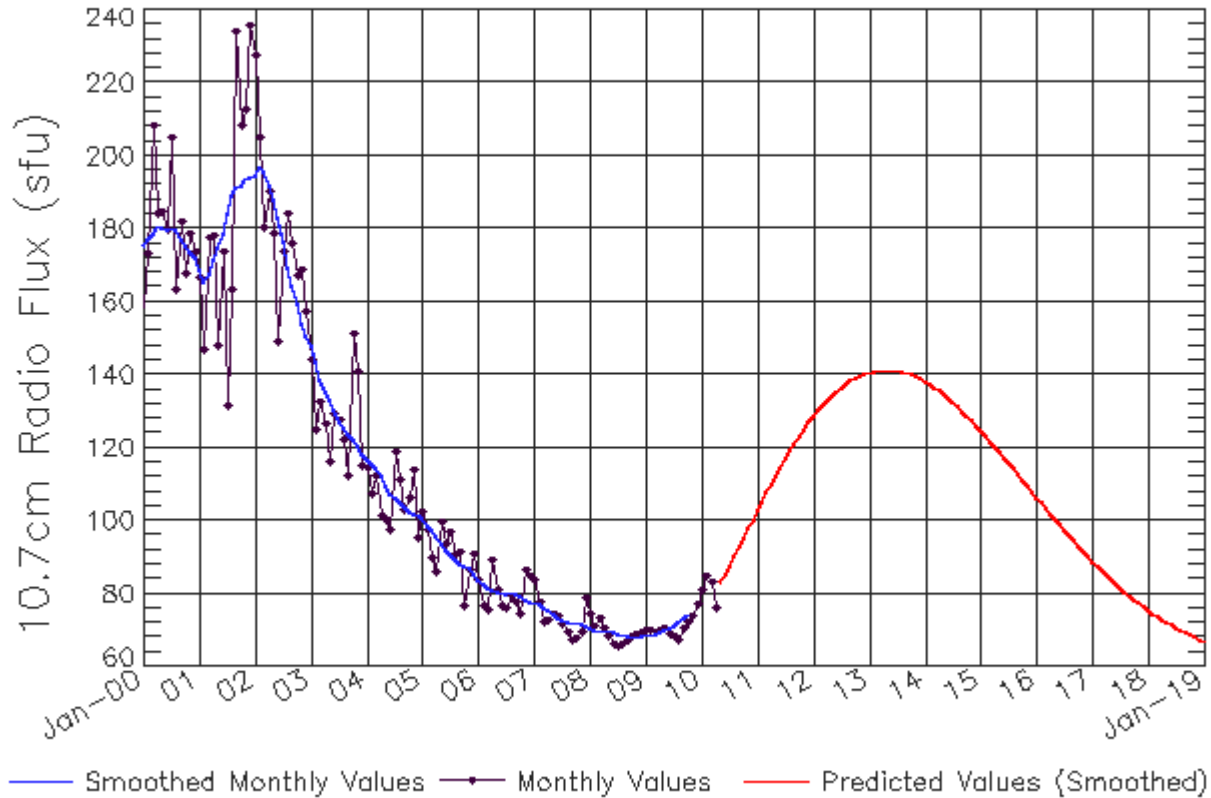
NOAA/SWPC Boulder, CO USA

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2009	2 (***)	2 (***)	2 (***)	2 (***)	2 (***)	3 (***)	4 (***)	5 (***)	6 (***)	7 (***)	8 (1)	10 (2)
2010	13 (3)	15 (5)	18 (5)	21 (6)	24 (7)	27 (7)	30 (8)	33 (9)	36 (9)	39 (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)
2016	52 (10)	50 (10)	49 (10)	47 (10)	45 (10)	44 (10)	42 (10)	40 (10)	39 (10)	37 (10)	36 (10)	34 (10)
2017	33 (10)	31 (10)	30 (10)	29 (10)	27 (10)	26 (10)	25 (10)	24 (10)	23 (10)	21 (10)	20 (10)	19 (10)
2018	18 (10)	17 (10)	16 (10)	15 (10)	15 (10)	14 (10)	13 (10)	12 (10)	12 (10)	11 (10)	10 (10)	10 (10)
2019	9 (10)	8 (10)	8 (10)	7 (10)	7 (10)	6 (10)	6 (10)	6 (10)	5 (10)	5 (10)	4 (10)	4 (10)



ISES Solar Cycle F10.7cm Radio Flux Progression

Observed data through Apr 2010



Updated 2010 May 4

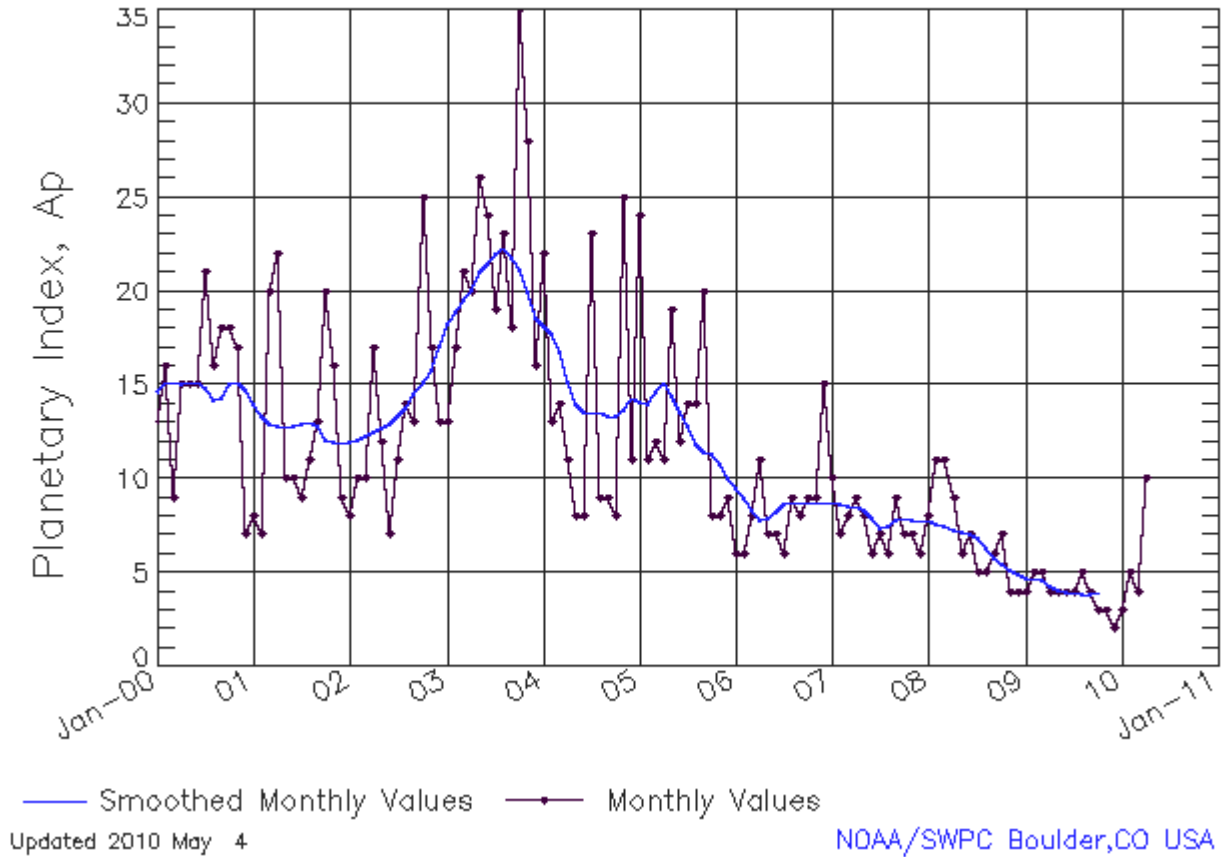
NOAA/SWPC Boulder, CO USA

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2009	69 (***)	69 (***)	69 (***)	69 (***)	70 (***)	70 (***)	71 (***)	72 (***)	73 (***)	74 (***)	75 (1)	76 (1)
2010	78 (2)	79 (3)	81 (4)	83 (4)	85 (5)	87 (6)	89 (7)	91 (8)	93 (8)	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)
2016	106 (9)	105 (9)	103 (9)	102 (9)	100 (9)	99 (9)	97 (9)	96 (9)	94 (9)	93 (9)	92 (9)	90 (9)
2017	89 (9)	88 (9)	86 (9)	85 (9)	84 (9)	83 (9)	82 (9)	80 (9)	79 (9)	78 (9)	77 (9)	76 (9)
2018	75 (9)	75 (9)	74 (9)	73 (9)	72 (9)	71 (9)	71 (9)	70 (9)	69 (9)	69 (9)	68 (9)	67 (9)
2019	67 (9)	66 (9)	66 (9)	65 (9)	65 (9)	65 (9)	64 (9)	64 (9)	63 (9)	63 (9)	63 (9)	63 (9)



ISES Solar Cycle Ap Progression

Observed data through Apr 2010



The Solar Cycle Comparison charts are temporarily unavailable. 2010 charts will be published at a later date. 02 Feb 2010

