

Space Weather Highlights
31 May - 06 June 2010

SWO PRF 1814
08 June 2010

Solar activity was very low. The week's activity consisted of a few, low level B-class flares, primarily from Region 1076 (S19, L=196, class/area Dso/190 on 03 June). Region 1076 emerged on the disk on 31 May and grew steadily for 31 May - 03 June, followed by a general decreasing trend for the remainder of the period.

No proton events were observed at geosynchronous orbit.

The greater than 2 MeV electron flux at geosynchronous orbit was at high levels throughout the period.

The geomagnetic field began the week at unsettled to active levels with minor storm periods at high latitudes. Activity levels decreased to quiet to active levels on 01 June and were mostly quiet for 02 June. An increase to quiet to active levels with some minor storm periods at high latitudes was observed on 03 June and lasted through about mid-day on 04 June. Activity declined to generally quiet levels for the remainder of the period. The elevated activity for 31 May - 01 June and 03 - 04 June was due to a high speed stream from a favorably positioned coronal hole.

Space Weather Outlook
09 June - 05 July 2010

Solar activity is expected to be at very low to low levels.

No proton events are expected at geosynchronous orbit.

The greater than 2 MeV electron flux at geosynchronous orbit is expected to be at high levels at the beginning of the period from 09-10 June. Normal background levels are expected until 26 June when another increase to high levels is expected due to recurrence. Normal background levels are expected to resume after 01 July.

The geomagnetic field is expected to be unsettled for 09 June due to persistent effects from a high speed stream. Quiet levels are expected for 10-14 June, followed by an increase to mostly unsettled levels on 15-17 June in response to a high speed stream from a coronal hole. Quiet levels are expected for 18-24 June, followed by another increase to unsettled to active levels for 25-28 June in response to a recurrent coronal hole. Quiet levels are expected to prevail for 29 June - 05 July



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
31 May	72	39	30	A2.7	0	0	0	0	0	0	0 0
01 June	73	14	20	A4.7	0	0	0	0	0	0	0 0
02 June	74	18	40	A5.3	0	0	0	4	0	0	0 0
03 June	75	17	190	A5.2	0	0	0	1	0	0	0 0
04 June	72	18	70	A5.0	0	0	0	0	0	0	0 0
05 June	70	25	25	A4.8	0	0	0	0	0	0	0 0
06 June	68	12	90	A4.4	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
31 May	1.1e+06	1.5e+04	3.5e+03		1.5e+08	
01 June	4.0e+05	1.5e+04	3.6e+03		7.4e+08	
02 June	3.5e+05	1.5e+04	3.6e+03		7.9e+08	
03 June	7.0e+05	1.5e+04	3.4e+03		5.3e+08	
04 June	8.8e+05	1.5e+04	3.6e+03		8.0e+07	
05 June	7.1e+05	1.4e+04	3.6e+03		3.3e+08	
06 June	4.1e+05	1.5e+04	3.7e+03		3.0e+08	

Daily Geomagnetic Data

Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
31 May	14	3-2-4-3-3-2-2-3	37	3-3-5-6-6-4-3-3	16	3-3-4-3-3-3-2-3
01 June	9	4-2-1-1-2-1-3-1	16	4-3-4-2-3-3-3-2	12	4-3-2-1-2-2-4-2
02 June	4	2-2-1-1-1-1-1-1	6	2-3-1-1-2-1-1-1	6	2-3-0-0-2-2-1-3
03 June	13	1-2-2-4-2-3-3-3	18	2-2-3-5-5-2-2-2	13	1-2-2-4-3-1-3-3
04 June	11	4-3-2-3-1-1-2-2	21	4-3-3-6-3-2-1-2	16	5-4-2-4-2-2-1-2
05 June	6	2-2-1-0-1-1-2-3	5	2-2-3-0-0-1-0-2	6	2-2-2-0-0-1-1-3
06 June	5	2-1-1-1-1-0-2-3	6	2-1-2-3-1-1-2-1	7	2-2-1-1-1-2-2-3

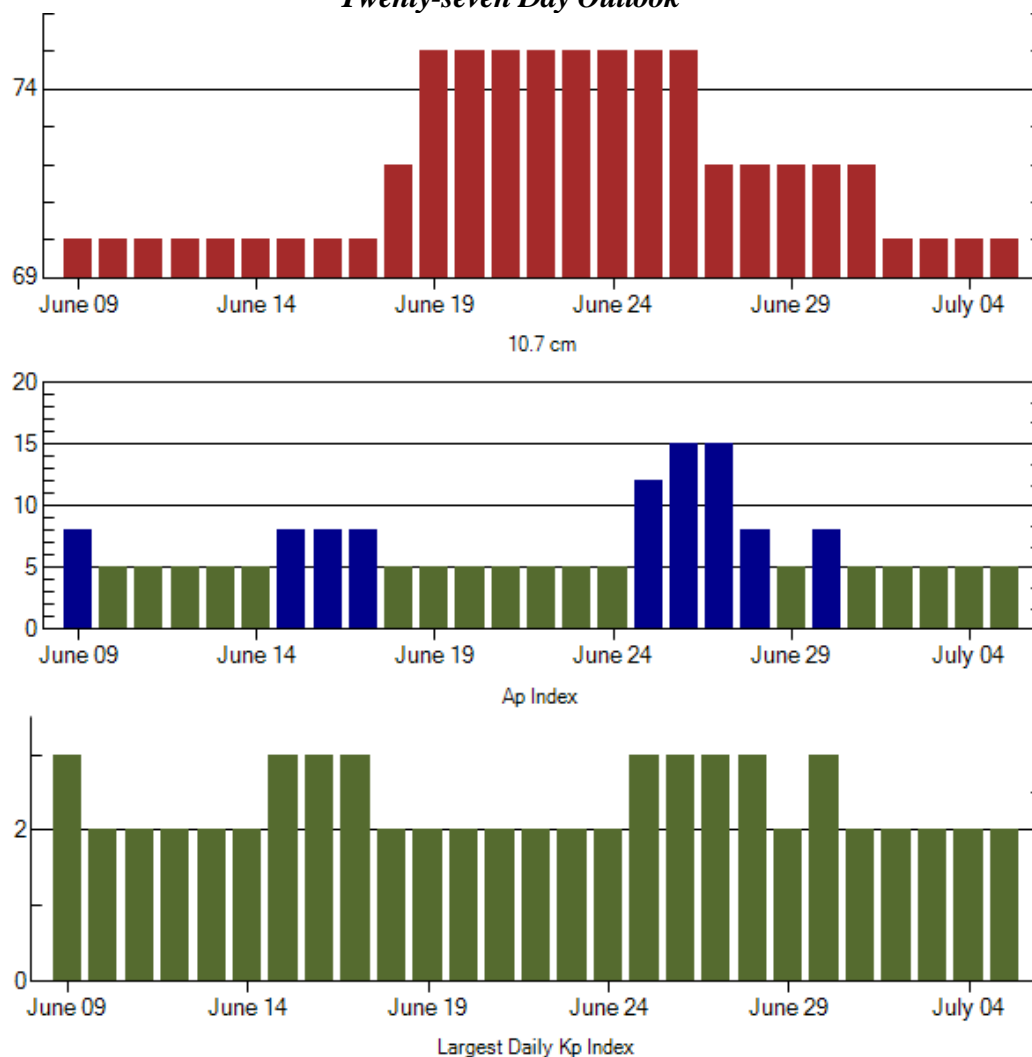


Alerts and Warnings Issued

Date & Time of Issue	Type of Alert or Warning	Date & Time of Event UTC
31 May 0547	ALERT: Geomagnetic K = 4	31 May 0545
31 May 1033	CONTINUED ALERT: Electron 2MeV Integral Flux >= 1000pfu	30 May 1015
31 May 2247	WARNING: Geomagnetic K = 4	31 May 2300 - 01/1600
01 Jun 0047	ALERT: Geomagnetic K = 4	01 Jun 0046
01 Jun 0505	CONTINUED ALERT: Electron 2MeV Integral Flux >= 1000pfu	30 May 1015
02 Jun 0512	CONTINUED ALERT: Electron 2MeV Integral Flux >= 1000pfu	30 May 1015
03 Jun 0506	CONTINUED ALERT: Electron 2MeV Integral Flux >= 1000pfu	30 May 1015
03 Jun 1104	WARNING: Geomagnetic K = 4	03 Jun 1105 - 1600
03 Jun 1140	ALERT: Geomagnetic K = 4	03 Jun 1139
04 Jun 0139	ALERT: Geomagnetic K = 5	04 Jun 0135
04 Jun 0141	WARNING: Geomagnetic K = 4	04 Jun 0145 - 1600
04 Jun 1156	CONTINUED ALERT: Electron 2MeV Integral Flux >= 1000pfu	30 May 1015
04 Jun 1203	ALERT: Geomagnetic K = 4	04 Jun 1200
05 Jun 0501	CONTINUED ALERT: Electron 2MeV Integral Flux >= 1000pfu	30 May 1015
06 Jun 0503	CONTINUED ALERT: Electron 2MeV Integral Flux >= 1000pfu	30 May 1015



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
09 Jun	70	8	3	23 Jun	75	5	2
10	70	5	2	24	75	5	2
11	70	5	2	25	75	12	3
12	70	5	2	26	75	15	3
13	70	5	2	27	72	15	3
14	70	5	2	28	72	8	3
15	70	8	3	29	72	5	2
16	70	8	3	30	72	8	3
17	70	8	3	01 Jul	72	5	2
18	72	5	2	02	70	5	2
19	75	5	2	03	70	5	2
20	75	5	2	04	70	5	2
21	75	5	2	05	70	5	2
22	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

				Optical			
	Time			X-ray	Imp /	Location	Rgn
Date	Begin	Max	End	Class.	Brtns	Lat CMD	
31 May	No Flares Observed						
01 June	No Flares Observed						
02 June	0910	0916	0918		SF	S20W15	1076
	B0959	1010	1019		SF	S19W15	1076
	1053	1054	1055		SF	S20W16	1076
	1841	1845	1850	B1.0			
	2249	2253	2300	B1.2			
	B0852	U0855	A0900		SF	S20W15	1076
03 June	0158	0158	0201		SF	S20W21	1076
	1128	1131	1145	B1.0			
	1230	1233	1236	B1.1			
	1332	1338	1343	B1.1			
	1349	1355	1402	B1.3			
04 June	No Flares Observed						
05 June	No Flares Observed						
06 June	0250	0255	0301	B1.4			



Region Summary

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

Region 1073

29 May	N13E35	192	20	4	BXO	5	B								
30 May	N13E21	193	20	4	BXO	6	B								
31 May	N12E09	192	10	5	BXO	3	B								
01 Jun	N12W04	192													
02 Jun	N12W17	192													
03 Jun	N12W30	191													
04 Jun	N12W43	191													
05 Jun	N12W56	191													
06 Jun	N12W69	191													

0 0 0 0 0 0 0 0

Still on Disk.

Absolute heliographic longitude: 192

Region 1074

29 May	N19W57	284	10	3	BXO	3	B								
30 May	N17W72	286	10	1	AXX	2	A								
31 May	N17W85	286													

0 0 0 0 0 0 0 0

Crossed West Limb.

Absolute heliographic longitude: 284

Region 1075

29 May	S20W02	229	20	3	BXO	5	B								
30 May	S20W16	230	10	3	BXO	2	B								
31 May	S19W32	233	0	1	AXX	1	A								
01 Jun	S19W45	233													
02 Jun	S19W58	233													
03 Jun	S19W71	233													
04 Jun	S19W84	233													

0 0 0 0 0 0 0 0

Crossed West Limb.

Absolute heliographic longitude: 229



Region Summary - continued

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 1076															
31 May	S19E07	194	20	4	BXO	5	B								
01 Jun	S20W06	193	20	5	BXO	4	B								
02 Jun	S19W22	196	40	6	DAI	8	B					4			
03 Jun	S19W35	196	190	8	DSO	7	B					1			
04 Jun	S19W49	197	70	8	DSO	8	B								
05 Jun	S19W61	196	15	7	BXO	4	B								
06 Jun	S19W74	195	90	5	DRO	2	B								
								0	0	0	5	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 193

<i>Region 1077</i>															
05 Jun	N20W47	181	10	1	AXX	1	A								
06 Jun	N20W59	181													
								0	0	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 181



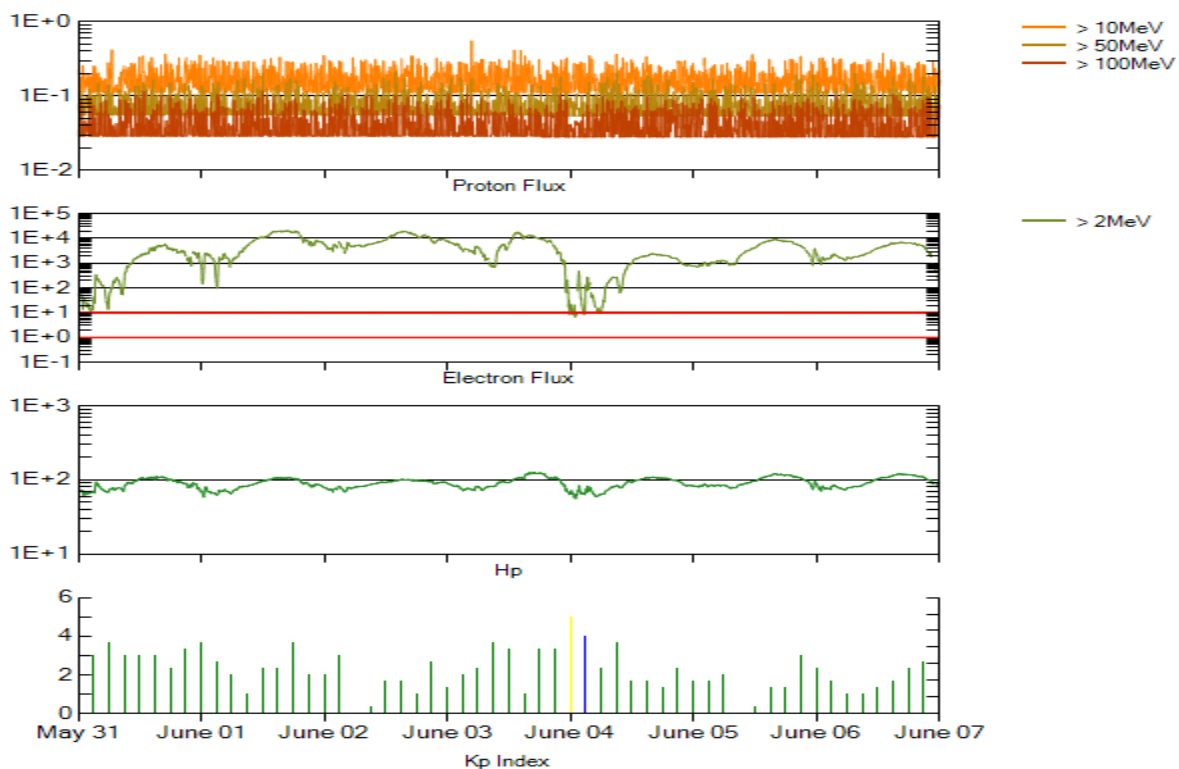
Recent Solar Indices (preliminary)
Of the observed monthly mean values

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
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	4.8	0.66	11.3	7.0	72.3	74.1	3	4.1
November	7.7	4.1	0.55	12.4	7.6	73.6	74.5	3	4.5
December	15.7	10.8	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		5	
April	11.2	7.9	0.71			75.9		10	
May	19.9	8.8	0.44			73.8		8	

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 31 May 2010

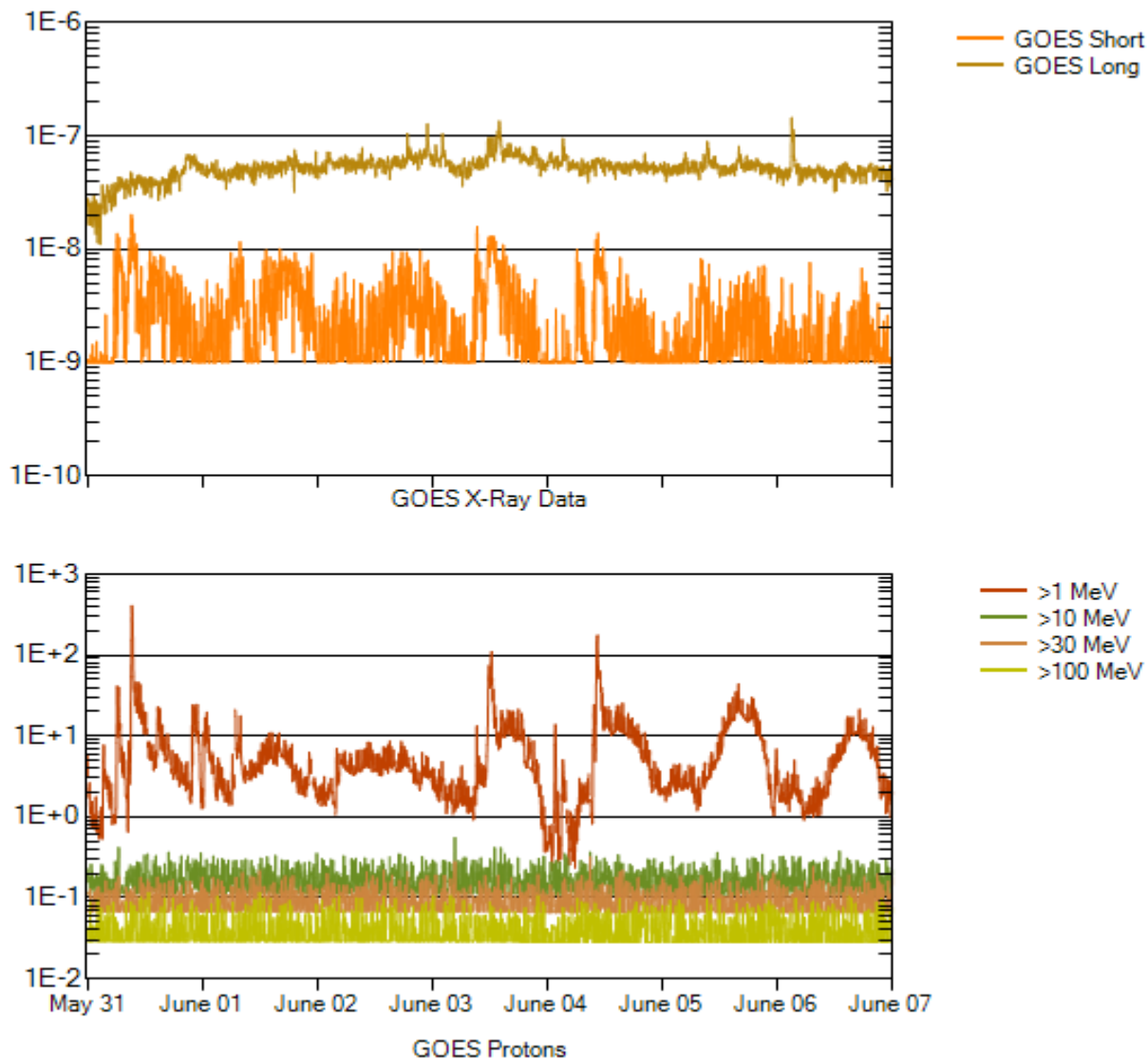
The proton flux plot contains the five-minute averaged integral proton flux (protons/cm²–sec–sr) as measured by GOES-13 (W75) for each of three energy thresholds: greater than 10, 50, and 100 MeV. The electron flux plot contains the five-minute averaged integral electron flux (electrons/cm²–sec–sr) with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

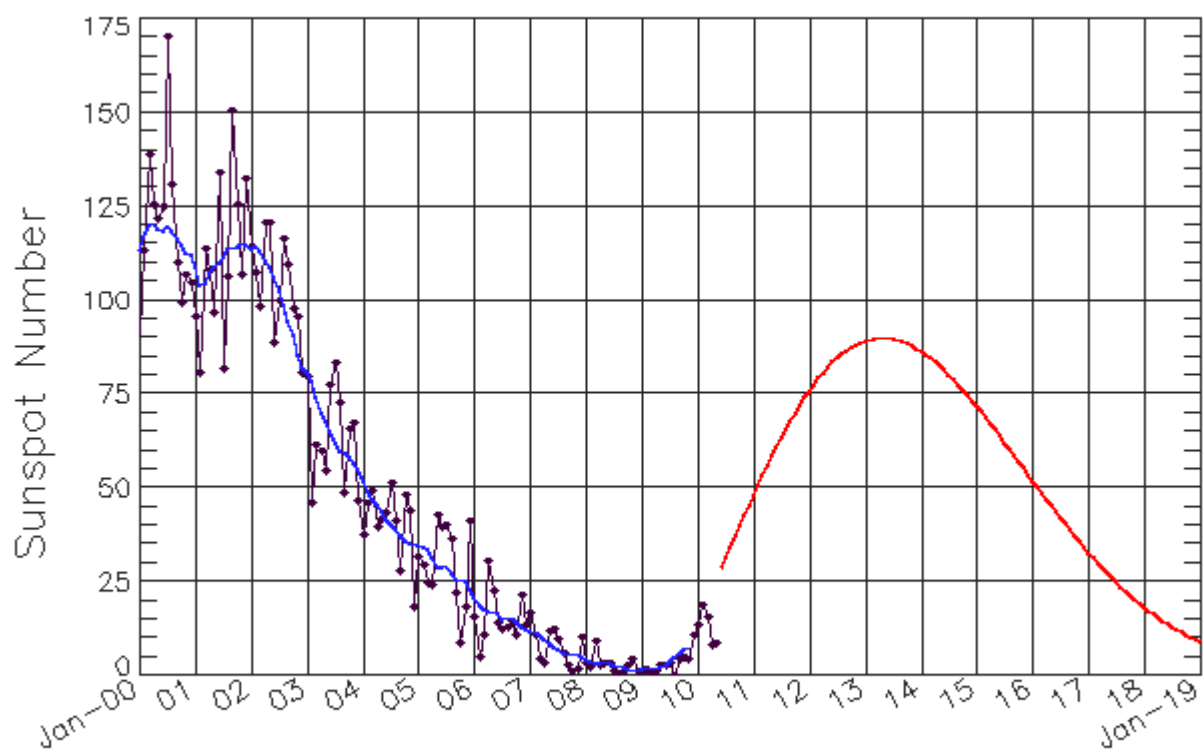
The x-ray plot contains five-minute averaged x-ray flux (Watts/m²) as measured by GOES 14 (W105) in two wavelength bands, 0.05 - 0.4 and 0.1 - 0.8 nm. The letters A, B, C, M and X refer to x-ray event levels for the 0.1 - 0.8 nm band.

The proton plot contains the five-minute averaged integral proton flux (protons/cm²-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 (protons/cm²-sec-sr) at greater than 10 MeV.



ISES Solar Cycle Sunspot Number Progression

Observed data through May 2010



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

Updated 2010 Jun 8

NOAA/SWPC Boulder, CO USA

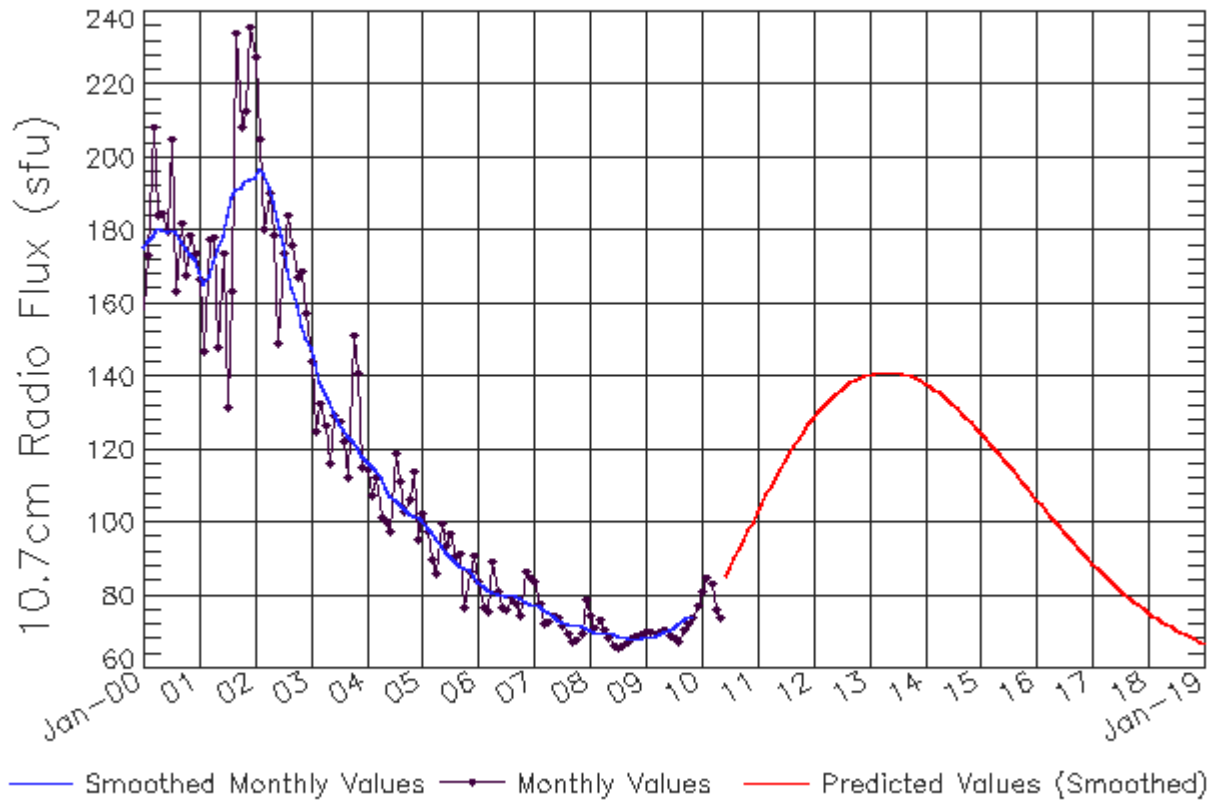
Smoothed Sunspot Number Prediction

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2009	2 (***)	2 (***)	2 (***)	2 (***)	2 (***)	3 (***)	4 (***)	5 (***)	6 (***)	7 (***)	8 (***)	9 (1)
2010	11 (2)	14 (3)	17 (5)	19 (5)	23 (6)	26 (7)	28 (7)	31 (8)	34 (9)	38 (9)	42 (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 May 2010



Updated 2010 Jun 8

NOAA/SWPC Boulder, CO USA

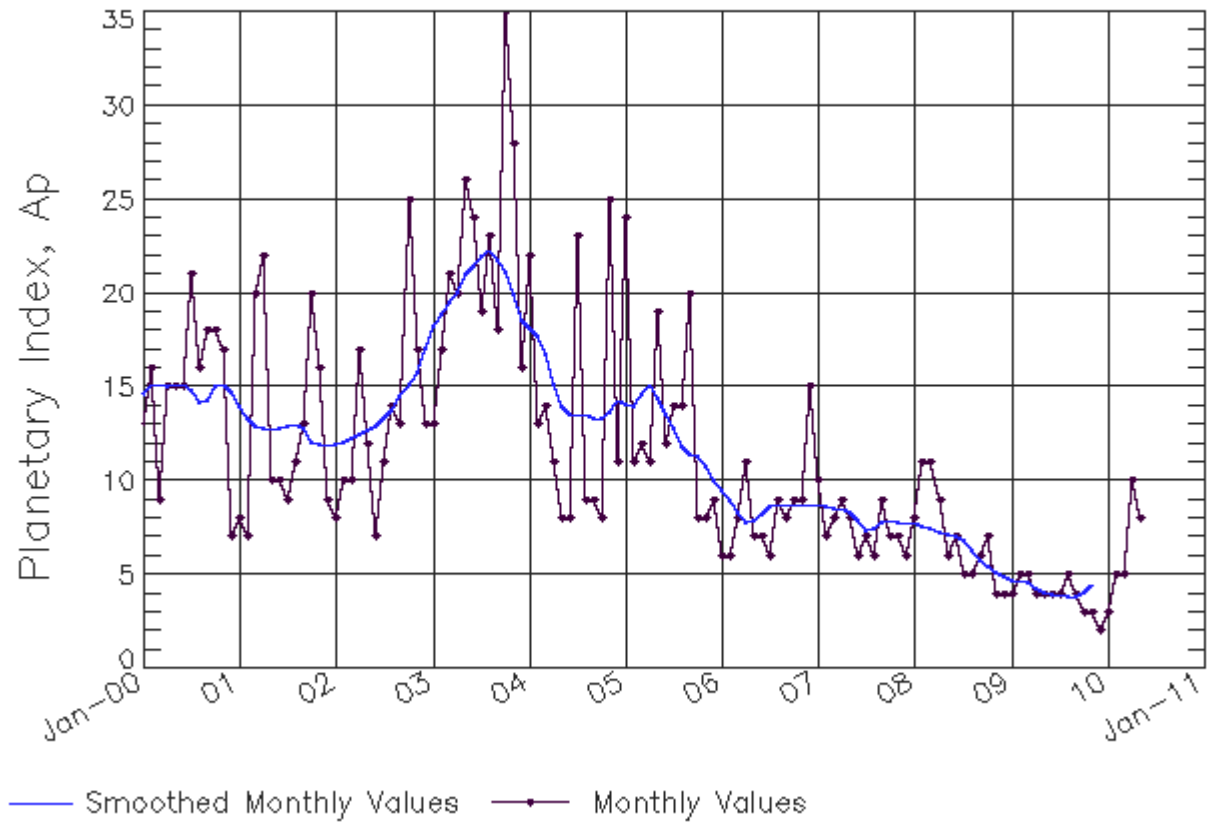
Smoothed F10.7cm Radio Flux Prediction

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2009	69 (***)	69 (***)	69 (***)	69 (***)	70 (***)	70 (***)	71 (***)	72 (***)	73 (***)	74 (***)	75 (***)	75 (1)
2010	77 (1)	79 (2)	81 (3)	82 (4)	84 (4)	86 (5)	88 (6)	90 (7)	92 (8)	94 (8)	97 (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 May 2010



Updated 2010 Jun 8

NOAA/SWPC Boulder, CO USA

