

Space Weather Highlights
28 June - 04 July 2010

SWO PRF 1818
06 July 2010

Solar activity was at very low levels. An unnumbered plage region near N15W13 produced two B1 flares on 29 June. Region 1085 (S23, L=201, class/area Cro/010, on 29 June) appeared on the disk on 29 June and decayed to spotless plage on 30 June. Region 1084 (S19, L=144, class/area Hsx/110, on 01 July) contained a single spot. This region produced a B1 flare on 01 July.

No proton events were observed at geosynchronous orbit.

The greater than 2 MeV electron flux at geosynchronous orbit reached high levels during 29 June – 04 July.

Geomagnetic field activity was predominantly at quiet levels on 28 June. Activity increased during the remainder of the forecast period, as an extension of the northern CH became geoeffective. Quiet to unsettled levels at mid-latitudes, with active levels and an isolated minor storm at high latitudes, were observed on 29 June. A further increase to quiet to active levels, with minor storm levels at high latitudes was observed on 30 June. During this period, ACE satellite observations showed increased solar wind speed (peak 714 km/s at 30/0347 UTC), with increased IMF total field intensity (peak 11 nT at 29/2147 UTC) and increased density (9 p/cc at 29/2217 UTC). Activity decreased slightly on 01 July to quiet to unsettled levels, with active levels at high latitudes. Quiet to unsettled levels were observed for the remainder of the period.

Space Weather Outlook
07 July – 02 Aug 2010

Solar activity is expected to be at very low levels.

No proton events are expected at geosynchronous orbit.

The greater than 2 MeV electron flux at geosynchronous orbit is expected to reach high levels during 07 – 10 July, 14 – 19 July, and 26 July – 02 Aug. Normal to moderate flux levels are expected during the remainder of the period.

The geomagnetic field is expected to increase to quiet to unsettled levels during 09 – 11 July due to a recurrent CIR/CH-HSS and a weak CME resulting from a filament eruption near N43E25. Activity is expected to decrease to quiet levels during 11 – 13 July as effects from the CH HSS subside. Quiet to unsettled levels, with isolated active levels, are expected during 14 – 16 July, as a second recurrent CH-HSS becomes geoeffective. Activity is expected to return to quiet levels during 17 – 22 July. Activity is expected to increase to unsettled to active levels during 23 – 28 July due to a third recurrent CIR/CH-HSS. Activity is expected to decrease to quiet to unsettled levels on 29 July and then to mostly quiet levels for the remainder of the period as the CH-HSS moves out of geoeffective range.



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
28 June	74	11	90	A4.5	0	0	0	0	0	0	0	0
29 June	74	24	110	A4.4	0	0	0	1	0	0	0	0
30 June	74	11	110	A4.3	0	0	0	0	0	0	0	0
01 July	73	11	110	A4.4	0	0	0	0	0	0	0	0
02 July	73	11	100	A4.4	0	0	0	0	0	0	0	0
03 July	72	11	150	A4.3	0	0	0	0	0	0	0	0
04 July	72	11	110	A4.2	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
28 June	2.5e+05	1.9e+04	7.5e+03		3.0e+07	
29 June	3.4e+05	1.9e+04	7.6e+03		4.3e+07	
30 June	6.9e+05	1.8e+04	7.2e+03		4.5e+07	
01 July	4.3e+05	1.8e+04	7.3e+03		1.8e+08	
02 July	9.2e+05	1.8e+04	6.7e+03		3.6e+08	
03 July	9.6e+05	1.8e+04	6.7e+03		3.9e+08	
04 July	3.6e+05	1.7e+04	6.9e+03		2.9e+08	

Daily Geomagnetic Data

Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
28 June	6	2-2-2-2-1-2-2-1	7	2-2-2-2-2-2-2-1	7	3-2-2-2-1-2-2-2
29 June	8	2-2-1-1-2-1-3-3	18	2-3-4-5-3-2-2-3	11	2-3-2-2-1-1-3-4
30 June	15	4-4-3-2-2-2-3-3	29	5-3-5-5-5-3-1-2	19	5-4-4-2-3-3-2-3
01 July	8	2-3-2-1-2-2-2-2	18	3-3-4-4-3-4-2-2	12	3-4-2-2-2-3-3-3
02 July	8	2-1-3-1-2-1-2-3	17	2-2-5-5-2-1-2-2	9	3-2-3-2-1-2-2-3
03 July	6	2-3-0-2-2-1-1-2	9	2-3-0-4-2-2-2-1	7	2-3-0-2-2-2-2-2
04 July	5	2-1-1-1-1-2-2-2	5	2-1-1-3-1-1-1-0	5	2-1-1-1-1-1-2-2

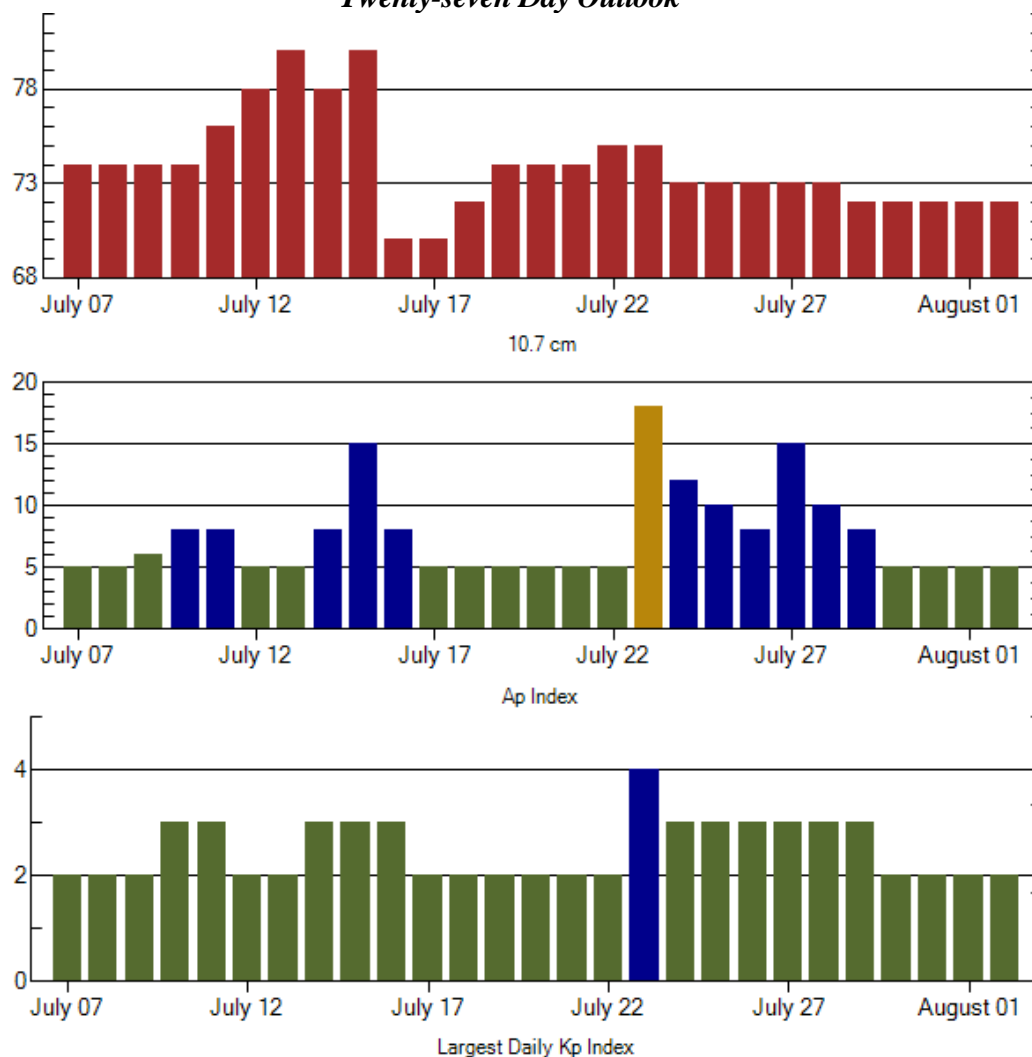


Alerts and Warnings Issued

Date & Time of Issue	Type of Alert or Warning	Date & Time of Event UTC
29 Jun 1457	ALERT: Electron 2MeV Integral Flux \geq 1000pfu	29 Jun 1435
29 Jun 2120	WARNING: Geomagnetic K = 4	29 Jun 2130 - 30/1600
30 Jun 0031	ALERT: Geomagnetic K = 4	30 Jun 0030
30 Jun 0740	WARNING: Geomagnetic K = 5	30 Jun 0740 - 1600
30 Jun 1448	CONTINUED ALERT: Electron 2MeV Integral Flux \geq 1000pfu	29 Jun 1435
01 Jul 0010	CONTINUED ALERT: Electron 2MeV Integral Flux \geq 1000pfu	29 Jun 1435
01 Jul 0212	WARNING: Geomagnetic K = 4	01 Jul 0245 - 1200
01 Jul 0355	ALERT: Geomagnetic K = 4	01 Jul 0354
01 Jul 1042	CONTINUED ALERT: Electron 2MeV Integral Flux \geq 1000pfu	29 Jun 1435
01 Jul 2234	WARNING: Geomagnetic K = 4	01 Jul 2330 - 02/0600
02 Jul 0550	CONTINUED ALERT: Electron 2MeV Integral Flux \geq 1000pfu	29 Jun 1435
02 Jul 0556	EXTENDED WARNING: Geomagnetic K = 4	01 Jul 2330 - 02/1000
02 Jul 0814	ALERT: Geomagnetic K = 4	02 Jul 0810
02 Jul 0949	EXTENDED WARNING: Geomagnetic K = 4	01 Jul 2330 - 02/1600
03 Jul 0308	WARNING: Geomagnetic K = 4	03 Jul 0345 - 1500
03 Jul 0506	ALERT: Electron 2MeV Integral Flux \geq 1000pfu	02 Jul 0505
03 Jul 0508	CANCELLATION: Electron 2MeV Integral Flux \geq 1000pfu	
03 Jul 0510	ALERT: Electron 2MeV Integral Flux \geq 1000pfu	03 Jul 0505
04 Jul 0503	CONTINUED ALERT: Electron 2MeV Integral Flux \geq 1000pfu	03 Jul 0505



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
07 Jul	74	5	2	21 Jul	74	5	2
08	74	5	2	22	75	5	2
09	74	6	2	23	75	18	4
10	74	8	3	24	73	12	3
11	76	8	3	25	73	10	3
12	78	5	2	26	73	8	3
13	80	5	2	27	73	15	3
14	78	8	3	28	73	10	3
15	80	15	3	29	72	8	3
16	70	8	3	30	72	5	2
17	70	5	2	31	72	5	2
18	72	5	2	01 Aug	72	5	2
19	74	5	2	02	72	5	2
20	74	5	2				



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

No Events Observed

Flare List

Date	Time			Optical			Rgn
	Begin	Max	End	X-ray Class.	Imp / Brtns	Location Lat CMD	
28 June	No Flares Observed						
29 June	0500	0503	0507	B1.4	SF	N15W14	
	1523	1553	1605	B1.3			
30 June	No Flares Observed						
01 July	2054	2058	2101	B1.0			
02 July	No Flares Observed						
03 July	No Flares Observed						
04 July	No Flares Observed						



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 1084</i>															
27 Jun	S19E59	145	90	2	HSX	1	A								
28 Jun	S19E46	144	90	2	HSX	1	A								
29 Jun	S19E34	143	100	2	HSX	1	A								
30 Jun	S19E19	145	110	2	HSX	1	A								
01 Jul	S19E07	144	110	2	HSX	1	A								
02 Jul	S20W06	143	100	2	HSX	1	A								
03 Jul	S19W19	143	150	2	HSX	1	A								
04 Jul	S19W32	143	110	2	HSX	1	A								
								0	0	0		0	0	0	0

Still on Disk.

Absolute heliographic longitude: 143

<i>Region 1085</i>															
29 Jun	S23W24	201	10	3	CRO	3	B								
30 Jun	S23W37	201													
01 Jul	S23W50	201													
02 Jul	S23W63	201													
03 Jul	S23W76	201													
04 Jul	S23W89	201													
								0	0	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 201



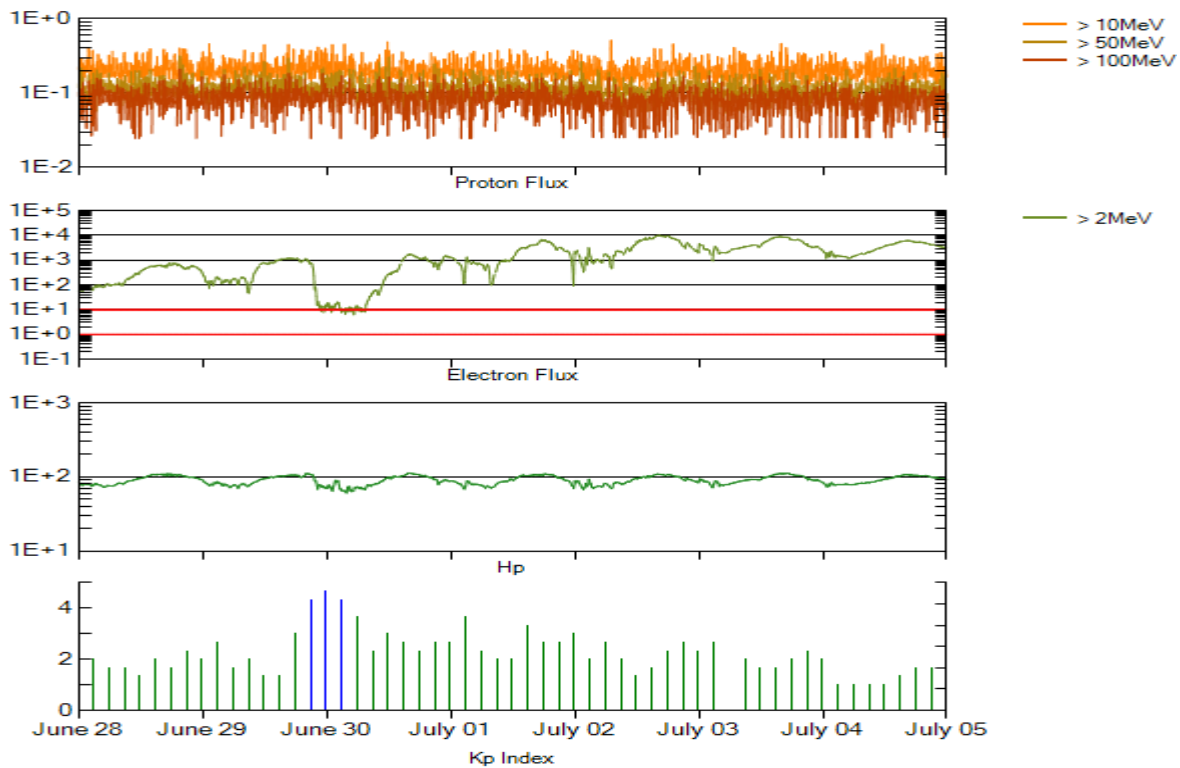
Recent Solar Indices (preliminary)
Of the observed monthly mean values

by the observed monthly mean values									
Sunspot Numbers						Radio Flux		Geomagnetic	
	Observed values		Ratio	Smooth values		*Penticton	Smooth	Planetary	Smooth
Month	SEC	RI	RI/SEC	SEC	RI	10.7 cm	Value	Ap	Value
2008									
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	13.6	8.3	76.8	74.9	2	4.8
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	
June	17.9	13.5	0.75			72.6		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 28 June 2010

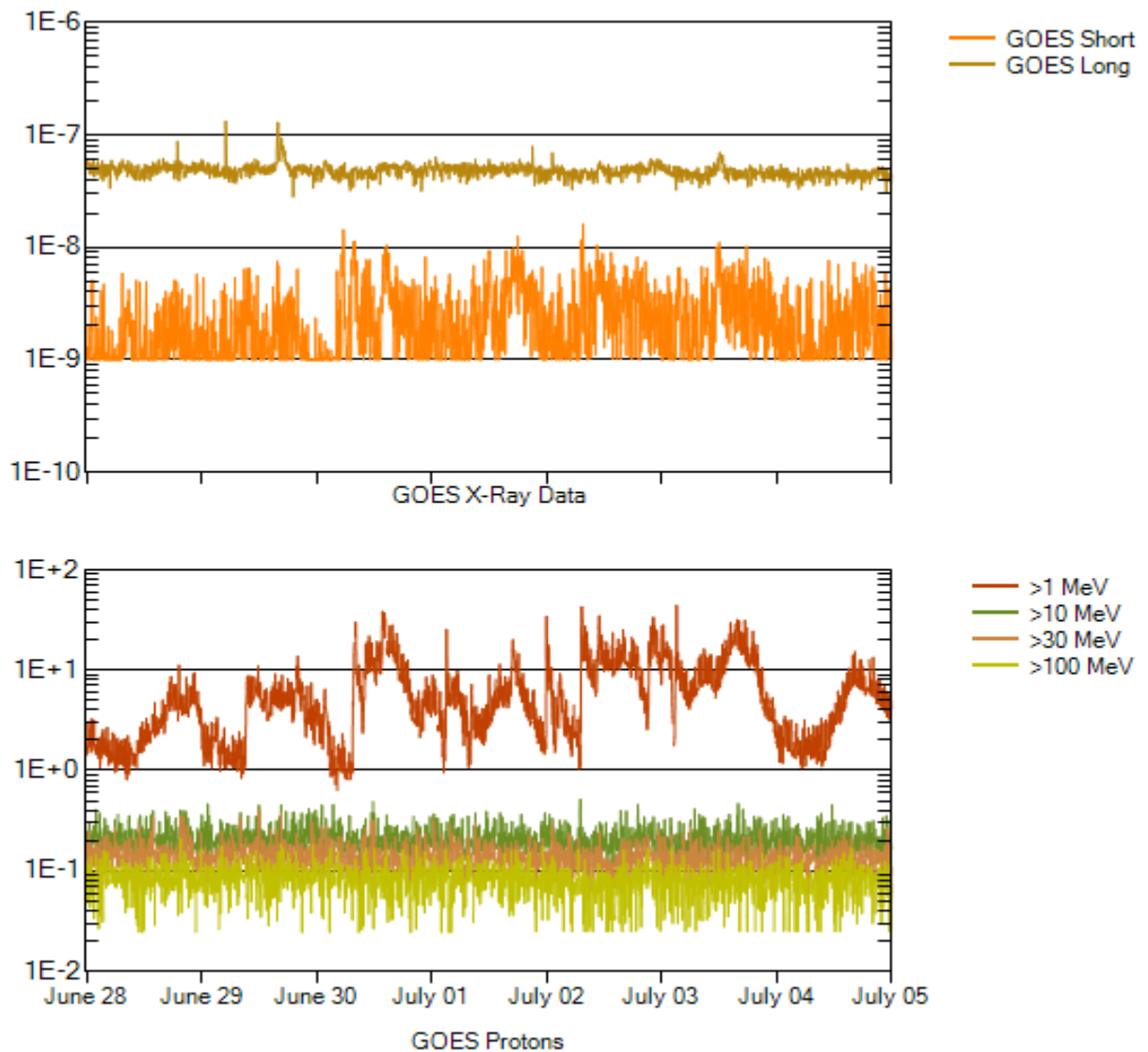
The proton flux plot contains the five-minute averaged integral proton flux (protons/cm²–sec–sr) as measured by GOES-13 (W75) for each of three energy thresholds: greater than 10, 50, and 100 MeV. The electron flux plot contains the five-minute averaged integral electron flux (electrons/cm²–sec–sr) with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

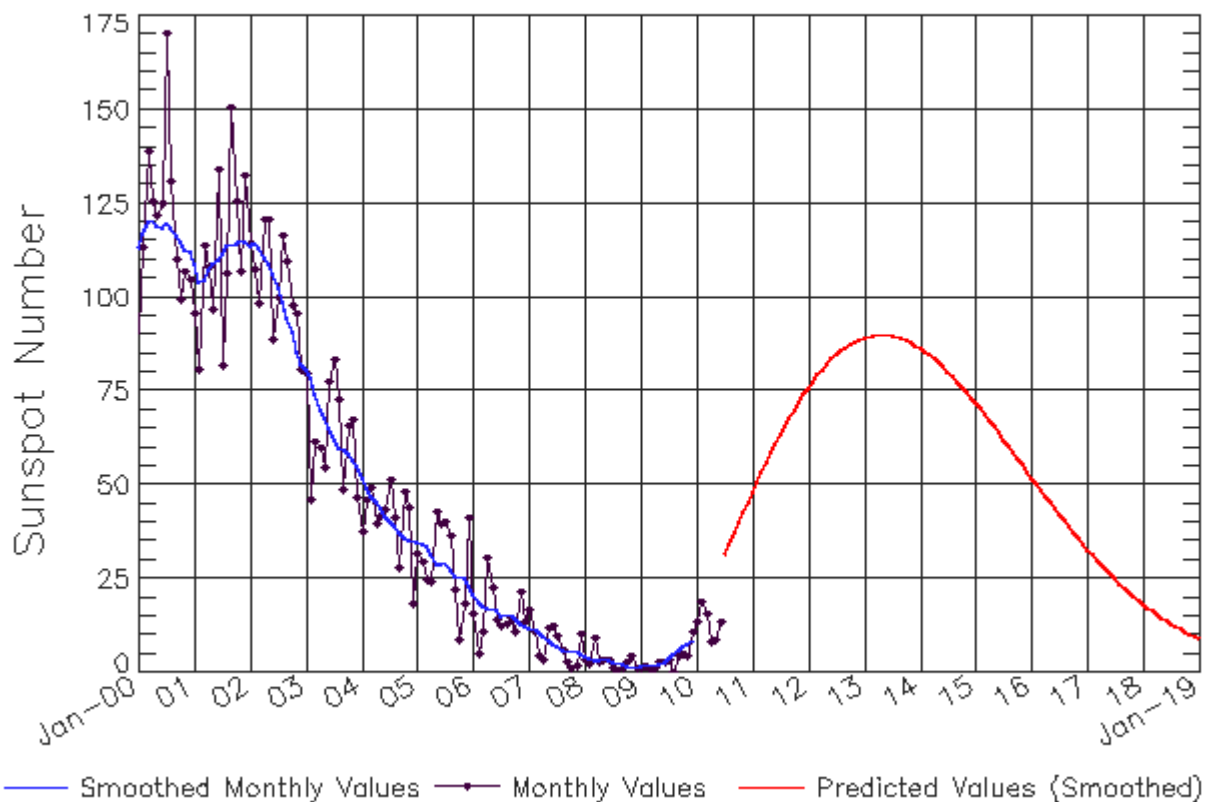
The x-ray plot contains five-minute averaged x-ray flux (Watts/m^2) as measured by GOES 14 (W105) in two wavelength bands, 0.05 - 0.4 and 0.1 - 0.8 nm. The letters A, B, C, M and X refer to x-ray event levels for the 0.1 - 0.8 nm band.

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.



ISES Solar Cycle Sunspot Number Progression

Observed data through Jun 2010



Updated 2010 Jul 6

NOAA/SWPC Boulder, CO USA

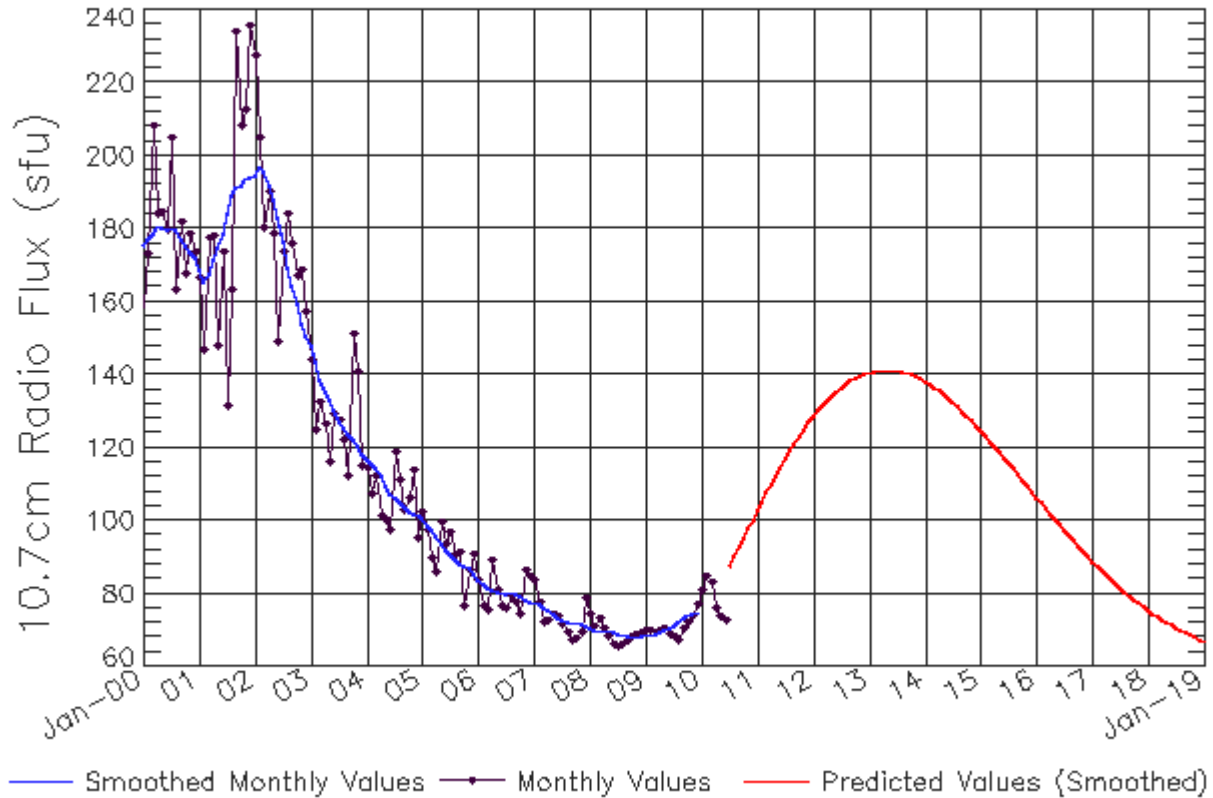
Smoothed Sunspot Number Prediction

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2009	2 (***)	2 (***)	2 (***)	2 (***)	2 (***)	3 (***)	4 (***)	5 (***)	6 (***)	7 (***)	8 (***)	8 (***)
2010	10 (1)	13 (2)	15 (3)	18 (5)	21 (5)	24 (6)	27 (7)	30 (7)	33 (8)	36 (9)	41 (9)	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 Jun 2010



Updated 2010 Jul 6

NOAA/SWPC Boulder, CO USA

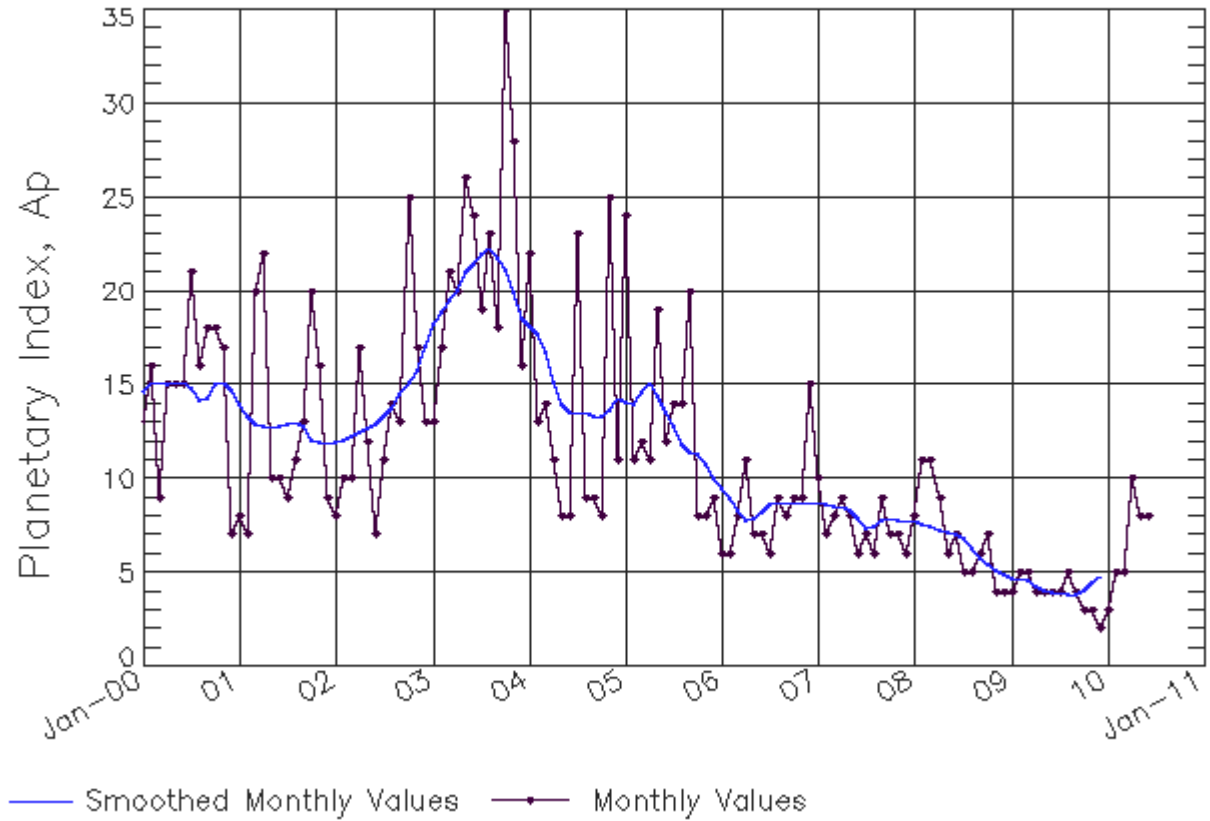
Smoothed F10.7cm Radio Flux Prediction

	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 (***)
2010	76 (1)	78 (1)	80 (2)	81 (3)	83 (4)	85 (4)	87 (5)	89 (6)	91 (7)	93 (8)	96 (8)	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 Jun 2010



Updated 2010 Jul 6

NOAA/SWPC Boulder, CO USA

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

