

**Space Weather Highlights**  
**21 - 27 June 2010**

**SWO PRF 1817**  
29 June 2010

Solar activity was very low. Region 1082 (N27, L=306, class/area Dro/040 on 21 June) produced isolated low-level B-class flares. Region 1082 quietly departed the west limb early on 27 June.

No proton events were observed at geosynchronous orbit.

The greater than 2 MeV electron flux at geosynchronous orbit reached high levels during 21 – 22 June. Fluxes were at normal to moderate levels during 23 – 27 June.

Geomagnetic field activity was at quiet to unsettled levels during 21 – 22 June. Activity decreased to quiet levels at all latitudes on 23 June. Field activity returned to quiet to unsettled levels during 24 – 25 June. A further increase to quiet to active levels occurred during 26 – 27 June. ACE solar wind measurements indicated the increased activity during 25 – 27 June was due to a recurrent co-rotating interaction region/coronal hole high-speed wind stream (CIR/CH HSS). Solar wind velocities began to increase on 26 June and reached a high of 571 km/s at 27/1416 UTC. Interplanetary magnetic field changes associated with the CIR/CH HSS included increased Bt (peak 12 nT at 25/2123 UTC) and intermittent periods of southward Bz (minimum - 10 nT at 26/0408 UTC).

**Space Weather Outlook**  
**30 June - 26 July 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 30 June – 10 July, 14 – 19 July, and 26 July. Normal to moderate flux levels are expected during the remainder of the period.

Geomagnetic field activity is expected to be at unsettled to active levels during 30 June – 01 July due to a recurrent CIR/CH HSS. Field activity is expected to decrease to quiet to unsettled levels during 02 – 04 July. A further decrease to quiet levels is expected during 05 – 11 July. Field activity is expected to increase to quiet to unsettled levels during 12 – 14 July due to a recurrent CIR/CH HSS. Activity is expected to decrease to quiet levels during 15 – 22 July. Activity is expected to increase to unsettled to active levels during 23 – 24 July due to a recurrent CIR/CH HSS. Activity is expected to decrease to quiet to unsettled levels during 25 – 26 July.



### Daily Solar Data

Date	Radio Flux 10.7 cm	Sun spot No.	Sunspot Area (10 <sup>-6</sup> hemi.)	X-ray Background	Flares						
					X-ray Flux			Optical			
					C	M	X	S	1	2	3 4
21 June	72	14	40	A4.8	0	0	0	0	0	0	0 0
22 June	73	14	30	A4.9	0	0	0	0	0	0	0 0
23 June	74	14	20	A4.9	0	0	0	0	0	0	0 0
24 June	74	13	10	A4.6	0	0	0	0	0	0	0 0
25 June	75	12	0	A5.1	0	0	0	0	0	0	0 0
26 June	75	0	0	A4.9	0	0	0	0	0	0	0 0
27 June	73	11	90	A4.7	0	0	0	0	0	0	0 0

### Daily Particle Data

Date	Proton Fluence (protons/cm <sup>2</sup> -day-sr)			Electron Fluence (electrons/cm <sup>2</sup> -day-sr)		
	>1 MeV	>10 MeV	>100 MeV	>.6 MeV	>2MeV	>4 MeV
21 June	5.6e+05	1.5e+04	4.3e+03		5.9e+07	
22 June	8.9e+05	1.9e+04	7.6e+03		5.7e+07	
23 June	5.0e+05	1.9e+04	7.8e+03		3.2e+07	
24 June	7.6e+05	1.9e+04	8.0e+03		3.1e+07	
25 June	6.6e+05	1.9e+04	8.1e+03		2.0e+07	
26 June	1.3e+05	2.0e+04	8.0e+03		1.6e+06	
27 June	1.9e+05	1.9e+04	7.6e+03		3.9e+06	

### Daily Geomagnetic Data

Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
21 June	6	2-1-3-0-1-1-2-2	2	1-1-2-0-0-0-1-0	5	2-0-3-0-1-1-2-2
22 June	5	1-2-1-1-1-1-2-2	2	0-1-0-1-1-1-1-1	6	2-1-1-1-1-2-3-2
23 June	2	0-0-1-1-1-1-1-0	3	1-1-1-2-2-1-0-0	4	1-1-1-1-1-1-2-1
24 June	5	0-0-1-1-2-2-3-2	4	0-0-0-0-2-3-2-1	7	1-0-0-0-2-2-3-3
25 June	8	2-0-1-1-2-2-2-4	5	1-1-0-3-2-1-1-2	8	3-1-1-1-2-2-2-3
26 June	9	2-3-3-2-2-2-2-2	20	2-4-5-5-1-2-2-3	15	3-4-3-3-2-3-4-3
27 June	12	3-4-3-2-2-2-2-2	22	2-4-5-5-4-2-2-2	13	3-4-3-2-2-2-3-3

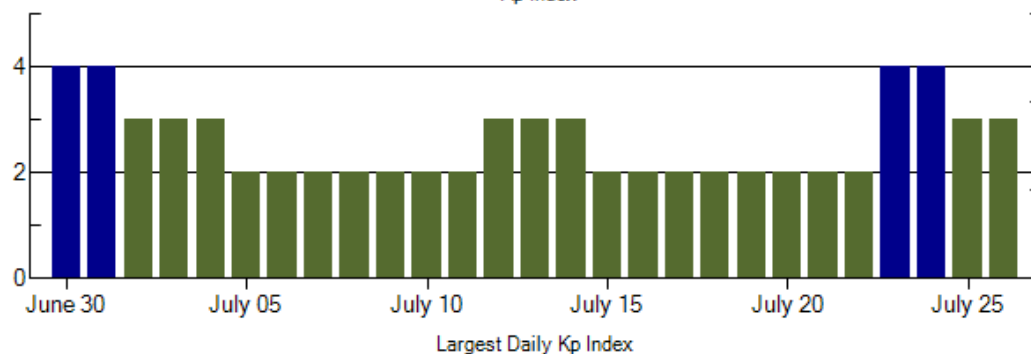
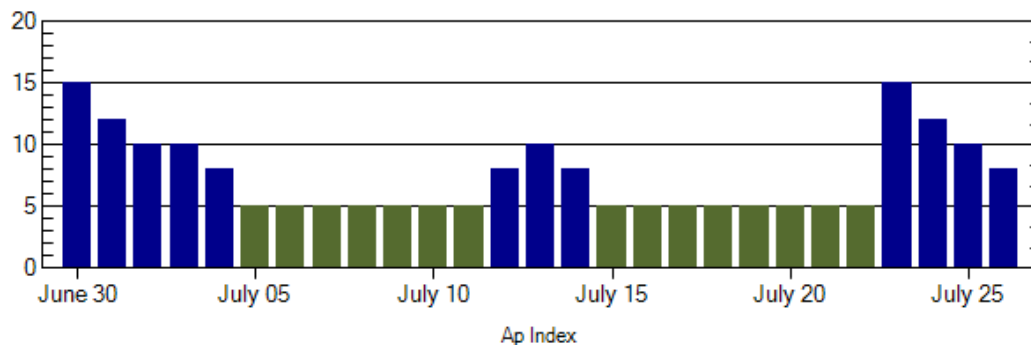
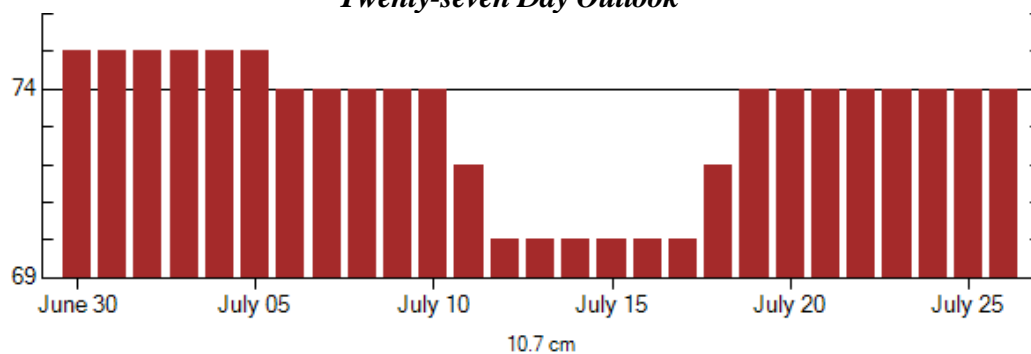


### *Alerts and Warnings Issued*

Date & Time of Issue	Type of Alert or Warning	Date & Time of Event UTC
21 Jun 1807	CONTINUED ALERT: Electron 2MeV Integral Flux >= 1000pfu	17 Jun 1440
22 Jun 1333	CONTINUED ALERT: Electron 2MeV Integral Flux >= 1000pfu	17 Jun 1440
26 Jun 0209	WARNING: Geomagnetic K = 4	26 Jun 0245 - 0800
26 Jun 0506	ALERT: Geomagnetic K = 4	26 Jun 0505
26 Jun 0708	EXTENDED WARNING: Geomagnetic K = 4	26 Jun 0245 - 1200
27 Jun 0154	WARNING: Geomagnetic K = 4	27 Jun 0200 - 1600
27 Jun 0832	ALERT: Geomagnetic K = 4	27 Jun 0830



# *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
30 Jun	75	15	4	14 Jul	70	8	3
01 Jul	75	12	4	15	70	5	2
02	75	10	3	16	70	5	2
03	75	10	3	17	70	5	2
04	75	8	3	18	72	5	2
05	75	5	2	19	74	5	2
06	74	5	2	20	74	5	2
07	74	5	2	21	74	5	2
08	74	5	2	22	74	5	2
09	74	5	2	23	74	15	4
10	74	5	2	24	74	12	4
11	72	5	2	25	74	10	3
12	70	8	3	26	74	8	3
13	70	10	3				



### ***Energetic Events***

Date	Time			X-ray		Optical Information			Peak		Sweep Freq	
	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			X-ray Class.	Imp / Brtns	Optical		Rgn
	Begin	Max	End			Location	Lat CMD	
21 June	1908	1912	1914	B1.3				
22 June	0901	0904	0906	B1.0				
	0933	0938	0941	B2.1				
23 June	1100	1103	1105	B1.6				
	1217	1220	1222	B1.1				
24 June	No Flares Observed							
25 June	1017	1021	1025	B3.4				
	2242	2246	2249	B1.5				
	2312	2317	2328	B1.8				
26 June	0245	0250	0252	B1.0				
27 June	0314	0317	0320	B1.5				



### Region Summary

Date	Location		Sunspot Characteristics					Flares							
	(° Lat ° CMD)	Helio	Area (10 <sup>-6</sup> hemi)	Extent (helio)	Spot Class	Spot Count	Mag Class	X-ray			Optical				
		Lon						C	M	X	S	1	2	3	4
<i>Region 1082</i>															
17 Jun	N28E33	303	10	5	BXO	4	B							1	
18 Jun	N29E22	300	10	4	AXX	6	A								
19 Jun	N29E10	299	10	5	CRO	4	B								
20 Jun	N27W10	305	30	7	DSO	3	B								
21 Jun	N27W23	307	40	8	DRO	4	B								
22 Jun	N26W37	298	30	8	BXO	4	B								
23 Jun	N26W52	308	20	7	CAO	4	B								
24 Jun	N27W65	308	10	9	BXO	3	B								
25 Jun	N26W77	307		1	AXX	2	A								
26 Jun	N27W88	306													
								0	0	0	1	0	0	0	0

Crossed West Limb.

Absolute heliographic longitude: 299

<i>Region 1083</i>															
19 Jun	N19W22	331	10	3	BXO	4	B								
20 Jun	N19W35	331													
21 Jun	N19W48	331													
22 Jun	N19W61	331													
23 Jun	N19W74	331													
24 Jun	N19W87	331													
								0	0	0	0	0	0	0	0

Crossed West Limb.

Absolute heliographic longitude: 331

<i>Region 1084</i>															
27 Jun	S19E59	145	90	2	HSX	1	A								
								0	0	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 145



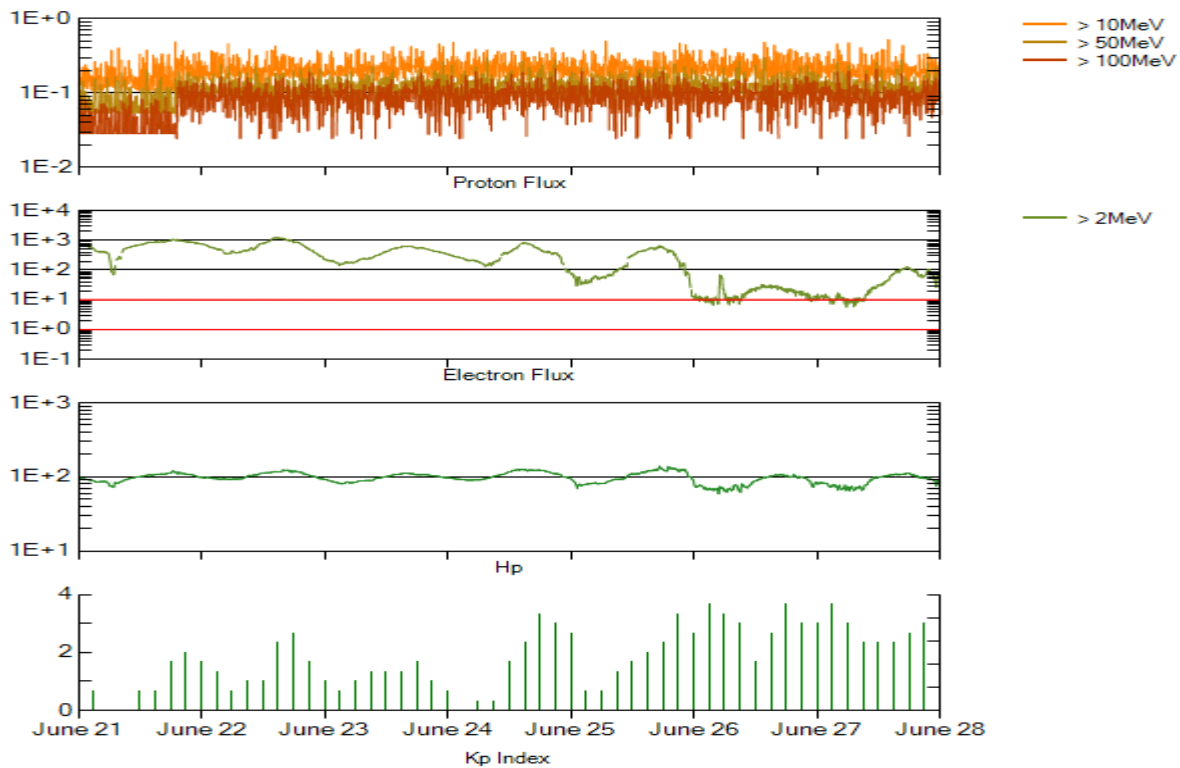
**Recent Solar Indices (preliminary)**  
**Of the observed monthly mean values**

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 21 June 2010*

The proton flux plot contains the five-minute averaged integral proton flux (protons/cm<sup>2</sup>–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/cm<sup>2</sup>–sec–sr) with energies greater than 2 MeV at GOES-13.

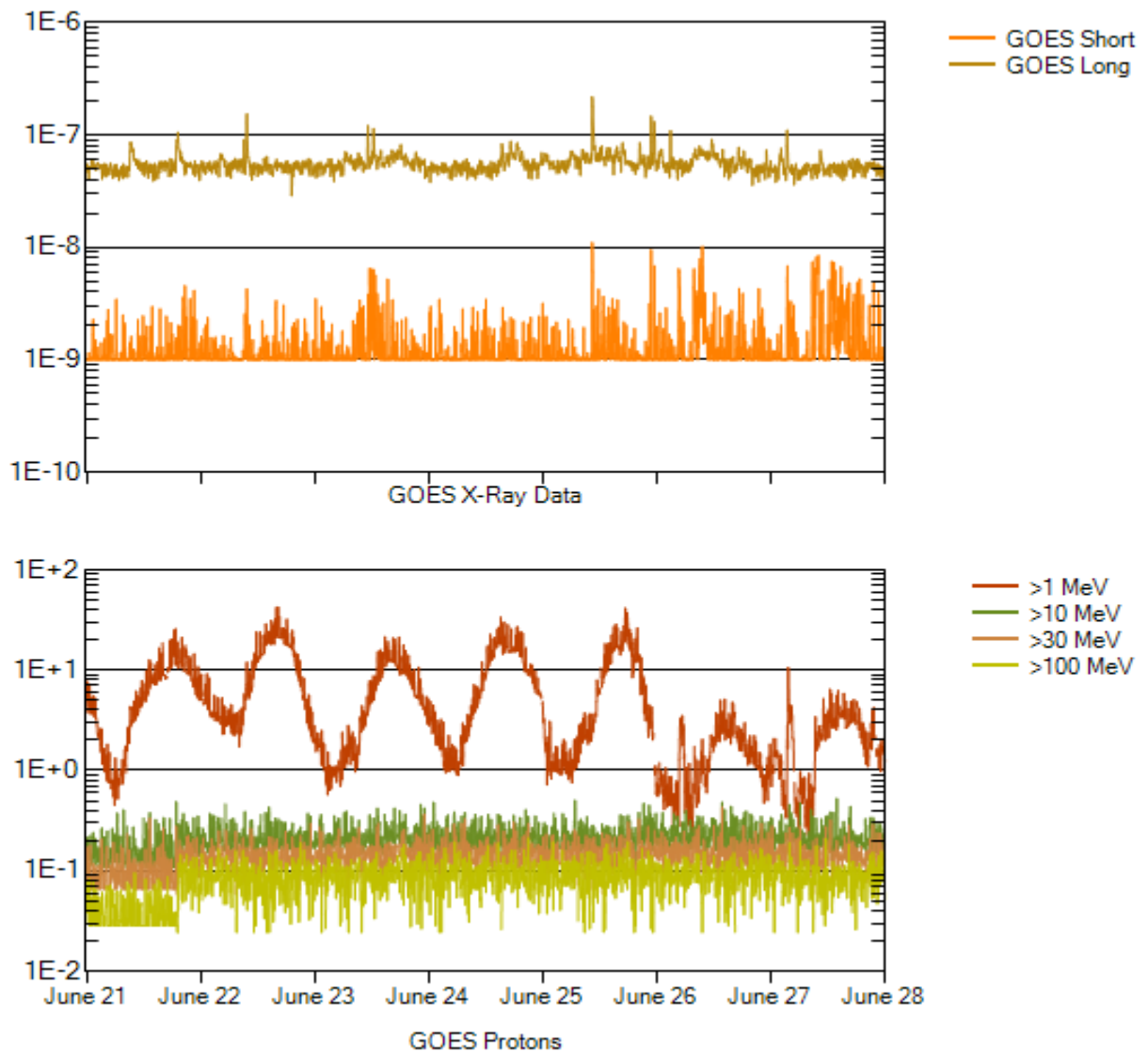
The Hp plot contains the five minute averaged Hp magnetic field component in nanoteslas (nT) as measured by GOES-13. The Hp component is parallel to the spin axis of the satellite, which is nearly parallel to the Earth's rotation axis.

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 ( $\text{Watts/m}^2$ ) 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.

