

**Space Weather Highlights**  
**19 July - 25 July 2010**

**SWO PRF 1821**  
27 July 2010

Solar activity was at very low to low levels during the period. Activity was at very low levels on 19 July with occasional B-class flares from Region 1087 (N18, L=331, class/area Axx/010, on 21 July) and Region 1089 (S24, L=200, class/area Dsi/310, on 21 July), which was numbered on 19 July. Activity increased to low levels on 20 July due to a C1/Sf flare at 20/1345 UTC from Region 1089. Activity returned to very low levels with Region 1089 and Region 1087 producing several B-class flares throughout the remainder of the period (21-25 July). Region 1087 rotated off the disk on 22 July. Region 1090 (N23, L=149, class/area Axx/000, on 24 July) was numbered on 24 July.

No proton events were observed at geosynchronous orbit.

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

Geomagnetic field activity was at predominantly quiet levels from 19-22 July. Activity increased slightly to quiet to unsettled levels on 23-25 July. An isolated period at active levels was observed at high latitudes on 25 July. The increase in activity was due to a recurrent co-rotating interactive region (CIR) with a coronal hole high-speed stream (CH HSS) moving into a geoeffective position.

**Space Weather Outlook**  
**28 July – 23 Aug 2010**

Solar activity is expected to be at very low levels during most of the period. However, there is a chance for isolated C-class flares from Region 1089 until it departs the visible disk on 01 August.

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 28 July - 07 August. Normal to moderate flux levels are expected during the remainder of the period.

Geomagnetic field activity is expected to be at quiet to unsettled levels with a chance for brief active periods from 28-29 July as a recurrent CH HSS continues to disturb the field. Quiet conditions are expected during 30 July - 09 August. Activity is expected to increase to quiet to unsettled levels with a chance for brief active periods during 10 - 12 August due to a recurrent CH HSS. Quiet conditions are expected during 13 - 22 August. Activity is expected to increase to quiet to unsettled levels with a chance for brief active periods on 23 August due to a recurrent CH HSS.



### 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
19 July	80	25	140	B1.3	0	0	0	0	0	0	0 0
20 July	87	32	160	B1.8	1	0	0	5	0	0	0 0
21 July	89	38	320	B2.3	0	0	0	17	1	0	0 0
22 July	88	39	240	B2.3	0	0	0	3	0	0	0 0
23 July	86	45	200	B1.1	0	0	0	2	0	0	0 0
24 July	85	41	160	B1.1	0	0	0	1	0	0	0 0
25 July	85	39	150	B1.1	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
19 July	5.6e+05	1.4e+04	3.6e+03		8.4e+06	
20 July	6.7e+05	1.4e+04	3.6e+03		4.0e+06	
21 July	4.4e+05	1.4e+04	3.5e+03		2.9e+06	
22 July	3.0e+05	1.4e+04	3.4e+03		1.7e+06	
23 July	3.8e+05	1.4e+04	3.3e+03		1.4e+06	
24 July	5.5e+05	1.4e+04	3.3e+03		1.6e+06	

### Daily Geomagnetic Data

Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
19 July	2	0-0-0-1-1-1-1-1	1	0-0-0-0-0-2-1-0	4	1-0-0-1-1-2-1-2
20 July	3	1-0-2-1-1-1-1-1	2	0-1-2-0-0-0-1-1	5	2-1-2-1-2-1-2-2
21 July	3	1-2-0-1-1-1-1-1	4	1-2-1-1-1-1-1-1	5	2-2-0-1-1-2-2-1
22 July	4	0-1-1-1-1-1-2-2	7	1-1-3-3-2-1-1-1	5	1-1-1-1-2-1-2-2
23 July	6	1-1-2-1-1-2-2-3	9	1-2-2-2-3-3-3-1	8	2-2-2-1-2-2-2-3
24 July	4	2-1-1-0-1-1-2-2	2	1-1-1-0-0-1-1-1	5	2-1-1-0-1-1-2-2
25 July	5	2-1-1-1-2-1-2-2	7	3-1-1-1-4-0-1-1	6	3-1-1-1-2-1-1-2

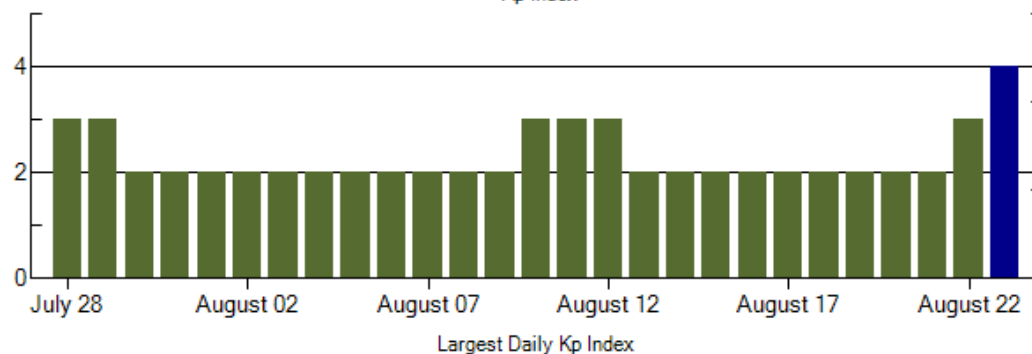
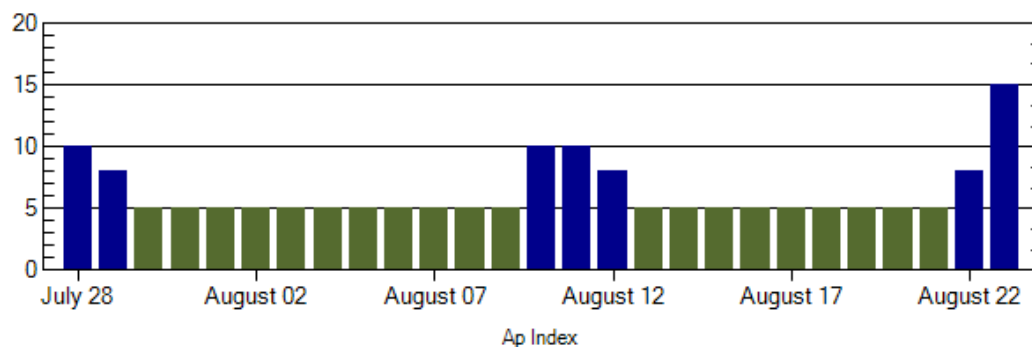
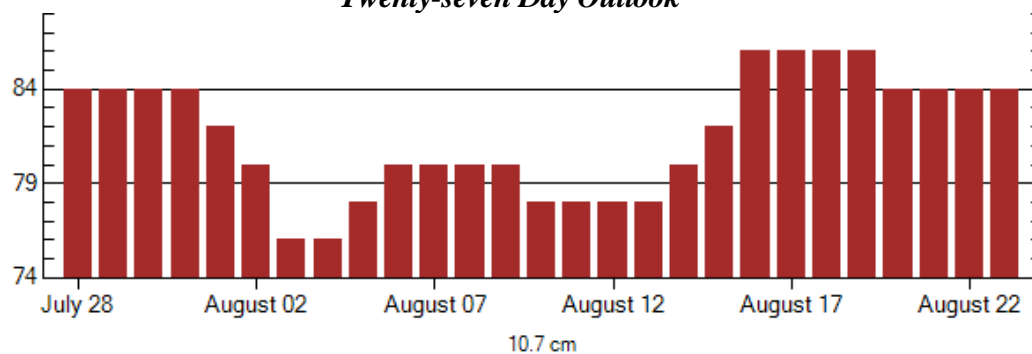


### *Alerts and Warnings Issued*

Date & Time of Issue	Type of Alert or Warning	Date & Time of Event UTC
No Alerts Issued		



### 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
28 Jul	84	10	3	11 Aug	78	10	3
29	84	8	3	12	78	8	3
30	84	5	2	13	78	5	2
31	84	5	2	14	80	5	2
01 Aug	82	5	2	15	82	5	2
02	80	5	2	16	86	5	2
03	76	5	2	17	86	5	2
04	76	5	2	18	86	5	2
05	78	5	2	19	86	5	2
06	80	5	2	20	84	5	2
07	80	5	2	21	84	5	2
08	80	5	2	22	84	8	3
09	80	5	2	23	84	15	4
10	78	10	3				



### ***Energetic Events***

Energy 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

*No Events Observed*

### ***Flare List***

Date	Time			X-ray Class.	Imp / Brtns	Optical		Rgn
	Begin	Max	End			Location	Lat CMD	
19 July	0203	0208	0211	B2.5				
	0445	0451	0454	B4.5				
	0621	0624	0629	B2.5				
	0727	0752	0836	B5.5				
	1655	1658	1700	B2.8				
20 July	0408	0412	0415	B2.2				
	0502	0521	0530	B4.1				
	0916	0942	1003	B8.0				
	1123	1130	1139	B5.6				
	1234	1239	1251	B5.6				
	1341	1343	1354	C1.4	SF	S21E55		1089
	1514	1515	1518		SF	S21E55		1089
	1542	1553	1602		SF	S21E55		1089
	1855	1856	1916	B8.0	SF	S22E63		1089
	1518	1525	1532		SF	S23E65		1089
21 July	B0110	0112	0121		SF	S23E58		1089
	0133	0140	0154		SF	S23E58		1089
	0243	0246	0249	B3.2				
	0255	0255	0300		SF	S23E58		1089
	0302	0307	0317		1F	S26E55		1089
	0321	0322	0324		SF	S23E58		1089
	0325	0330	0335		SF	S26E55		1089
	0339	0351	0359		SF	S23E57		1089
	0434	0438	0441	B4.6	SF	N17W81		1087
	0441	0443	0453		SF	S26E54		1089
	0502	0503	0510		SF	S26E54		1089
	0550	0550	0556		SF	S22E57		1089
	0656	0700	0705		SF	S25E52		1089
	0712	0717	0721		SF	S25E52		1089
	0725	0725	0735	B5.7	SF	S26E52		1089
	0746	0747	0756		SF	S26E52		1089
	0807	0808	0810		SF	S25E52		1089
	0907	0918	0925	B5.9				
	1227	1230	1233	B3.9				
	0317	0318	0320		SF	S23E58		1089
	0409	0415	0440		SF	S23E56		1089



*Flare List (Cont.)*

Date	Time			Optical			Rgn
	Begin	Max	End	X-ray Class.	Imp / Brtns	Location Lat CMD	
22 July	1424	1437	1449	B8.5			
	1641	1645	1647	B4.6			
	1845	1851	1855	B8.5			
	0200	0204	0209	B5.7			
	0631	0631	0634	B6.9	SF	S27E42	1089
	0657	0703	0719	B3.7			
	0728	0735	0741	B5.7			
	1210	1216	1233	B8.4	SF	S23E39	1089
	1514	1514	1519	B5.9	SF	S25E39	1089
	1552	1601	1615	B5.3			
23 July	1719	1723	1730	B3.8			
	2130	2138	2145	B9.8			
	0023	0024	0031	B5.2	SF	S27E33	1089
	0130	0138	0145	B3.6			
	0852	0857	0914	B3.6	SF	S23E31	1089
24 July	1521	1522	1527	B9.3	SF	S26E24	1089
	0305	0309	0313	B3.0			
	0430	0434	0439	B3.1			
	0604	0610	0616		SF	S24E18	1089
25 July	2033	2037	2041	B1.9			
	0751	0754	0757	B1.4			
	2154	2213	2359	B2.3			



## 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
Region 1087															
08 Jul	N17E83	335						1							
09 Jul	N18E72	332	30	4	DRO	2	B	2			1				
10 Jul	N19E57	334	100	10	DRO	8	B								
11 Jul	N19E44	334	120	14	ERO	15	B								
12 Jul	N21E30	335	130	7	DAO	12	BD				1				
13 Jul	N21E20	332	70	5	DSO	7	B	1			3				
14 Jul	N20E08	331	100	5	DSO	6	BG								
15 Jul	N19W05	330	60	8	CSO	5	BG								
16 Jul	N20W19	331	50	12	ESO	7	BG								
17 Jul	N23W33	332	20	2	HSX	3	A	1							
18 Jul	N24W48	334	10	1	AXX	2	A								
19 Jul	N17W61	334	10	1	AXX	1	A								
20 Jul	N16W78	337	10	2	AXX	3	A								
21 Jul	N18W85	331	10	4	AXX	2	A				1				
								5	0	0	6	0	0	0	0

Crossed West Limb.

Absolute heliographic longitude: 330

<i>Region 1088</i>															
13 Jul	S21E12	340	10	1	AXX	1	A								
14 Jul	S21W01	340													
15 Jul	S21W14	340													
16 Jul	S21W27	340													
17 Jul	S21W40	340													
18 Jul	S21W53	340													
19 Jul	S21W66	340													
20 Jul	S21W79	340													
								0	0	0	0	0	0	0	0

Crossed West Limb.

Absolute heliographic longitude: 340



## 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
Region 1089															
19 Jul	S23E70	203	130	7	CSO	4	B								
20 Jul	S24E58	201	150	10	DAO	9	B	1			5				
21 Jul	S24E46	200	310	9	DSI	16	B				16	1			
22 Jul	S23E33	200	240	9	DSI	29	B				3				
23 Jul	S24E20	200	200	11	ESI	35	B				2				
24 Jul	S23E06	201	160	11	ESI	20	B				1				
25 Jul	S24W08	202	140	9	DSI	16	B								
								1	0	0	27	1	0	0	0

Still on Disk.

Absolute heliographic longitude: 201

<i>Region 1090</i>															
24 Jul	N23E58	149		1	AXX	1	A								
25 Jul	N23E43	151	10	5	BXO	3	B								
								0	0	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 151





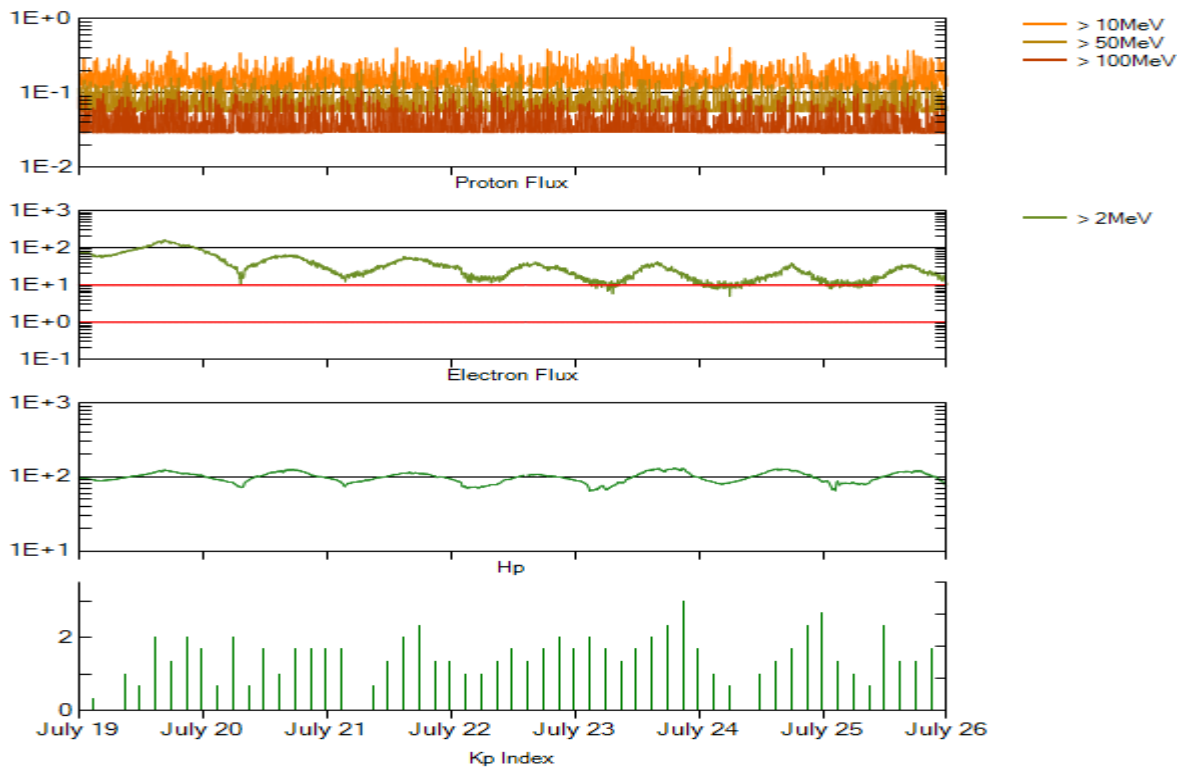
**Recent Solar Indices (preliminary)**  
**Of the observed monthly mean values**

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									
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 19 July 2010*

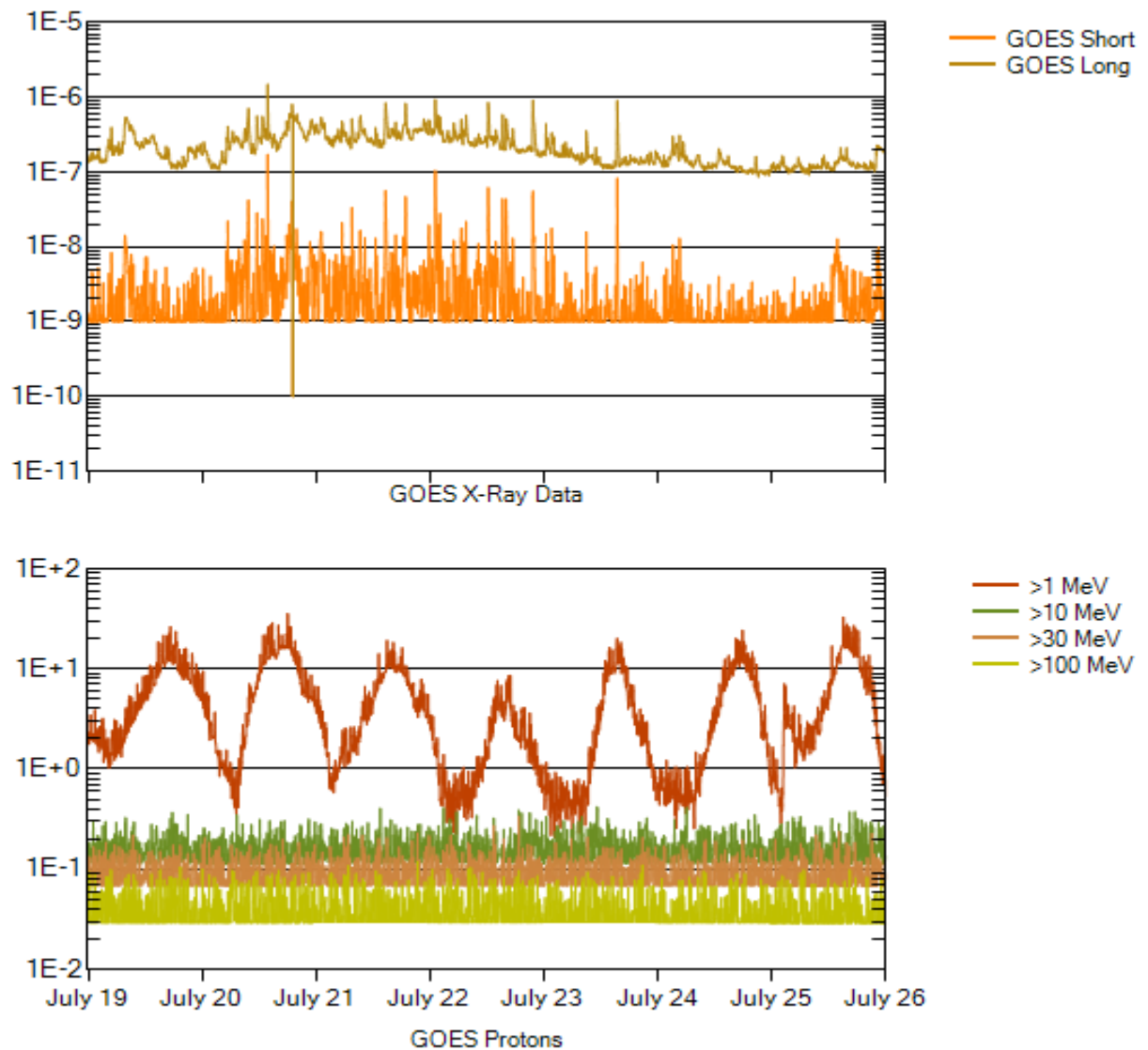
The proton flux plot contains the five-minute averaged integral proton flux (protons/cm<sup>2</sup>–sec–sr) as measured by GOES-13 (W75) for each of three energy thresholds: greater than 10, 50, and 100 MeV. The electron flux plot contains the five-minute averaged integral electron flux (electrons/cm<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.

