

**Space Weather Highlights**  
**12 July - 18 July 2010**

**SWO PRF 1820**  
**20 July 2010**

Solar activity was at very low to low levels during the period. Activity was very low during 12, 15 – 16, and 18 July due to low-level B-class flares from Region 1087 (N20, L=330, class/area Dao/130 on 12 July). Activity was at low levels during 13 – 14 and 17 July due to isolated low-level C-class flares from Region 1087, the largest of which was a C2/Sf at 13/1051 UTC.

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 ranged from quiet to minor storm levels. Mostly quiet conditions occurred until late on 14 July. Activity increased to unsettled to minor storm levels during 14/2100 – 15/0300 UTC. Activity decreased to quiet to unsettled levels for the rest of 15 July with some active periods detected at high latitudes. Activity decreased to mostly quiet levels for the remainder of the period. ACE solar wind data indicated the increased activity during 14 – 15 July was due to a recurrent coronal hole high-speed stream (CH HSS). The disturbance began with the arrival late on 14 July of a co-rotating interaction region (CIR) in advance of the CH HSS. Interplanetary magnetic field activity during the CIR included increased total field intensity (peak 18 nT at 14/2154 UTC) and intermittent periods of southward Bz (maximum deflection -16 nT at 14/2234 UTC). Solar wind velocities increased during 14 – 15 July and reached a peak of 505 km/s at 15/0311 UTC. Velocities began to gradually decrease around midday on 15 July.

**Space Weather Outlook**  
**21 July – 16 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 26 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 levels from 21 July through most of 22 July. Activity is expected to increase to unsettled levels late on 22 July as a recurrent coronal hole high-speed stream (CH HSS) begins to disturb the field. Quiet to unsettled levels with a chance for brief active periods are expected during 23 – 29 July as CH HSS effects persist. Activity is expected to decrease to quiet levels during 30 July – 10 August. Activity is expected to increase to quiet to unsettled levels with a chance for brief active periods during 11 – 12 August due to a recurrent CH HSS. Quiet conditions are expected during 13 – 16 August.



### Daily Solar Data

Date	Radio	Sun	Sunspot	X-ray	Flares							
	Flux	spot	Area	Background	X-ray Flux			Optical				
	10.7 cm	No.	(10 <sup>-6</sup> hemi.)		C	M	X	S	1	2	3	4
12 July	80	22	130	B1.0	0	0	0	1	0	0	0	0
13 July	79	28	80	A9.8	1	0	0	3	0	0	0	0
14 July	78	16	100	A9.5	2	0	0	0	0	0	0	0
15 July	76	15	60	A7.6	0	0	0	0	0	0	0	0
16 July	77	17	50	A8.0	0	0	0	0	0	0	0	0
17 July	79	13	20	A9.4	1	0	0	0	0	0	0	0
18 July	77	12	10	A9.6	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
12 July	5.8e+05	1.5e+04	3.6e+03		2.1e+07	
13 July	6.3e+05	1.5e+04	4.1e+03		1.8e+07	
14 July	1.0e+06	1.6e+04	4.0e+03		1.6e+07	
15 July	3.0e+05	1.4e+04	3.7e+03		4.2e+06	
16 July	2.2e+05	1.4e+04	3.6e+03		4.3e+06	
17 July	2.5e+05	1.5e+04	3.5e+03		5.2e+06	
18 July	3.0e+05	1.5e+04	3.8e+03		6.0e+06	

### Daily Geomagnetic Data

Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
12 July	2	1-0-0-1-1-0-1-1	1	1-0-0-0-0-0-1-1	5	2-0-0-0-1-2-2-3
13 July	1	1-0-0-0-0-0-0-1	1	2-0-0-0-0-0-0-0	3	2-0-0-0-0-2-1-2
14 July	7	1-1-1-1-1-1-2-4	10	1-2-1-3-4-1-2-3	11	1-1-1-2-2-1-2-5
15 July	10	5-2-1-2-1-1-1-1	13	3-3-2-4-4-2-1-1	10	4-3-1-2-2-2-1-2
16 July	2	0-0-1-1-2-1-0-1	5	0-1-1-4-1-0-0-0	4	1-1-1-1-1-1-0-2
17 July	1	0-0-0-0-1-1-0-1	0	0-0-0-0-0-0-0-0	2	1-0-0-0-1-1-0-1
18 July	2	0-0-0-1-1-1-1-1	0	0-0-0-0-0-0-0-0	3	1-0-0-0-0-1-1-2

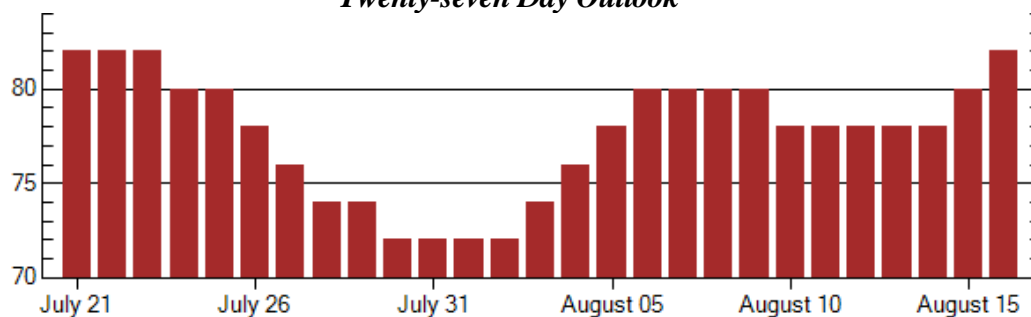


### *Alerts and Warnings Issued*

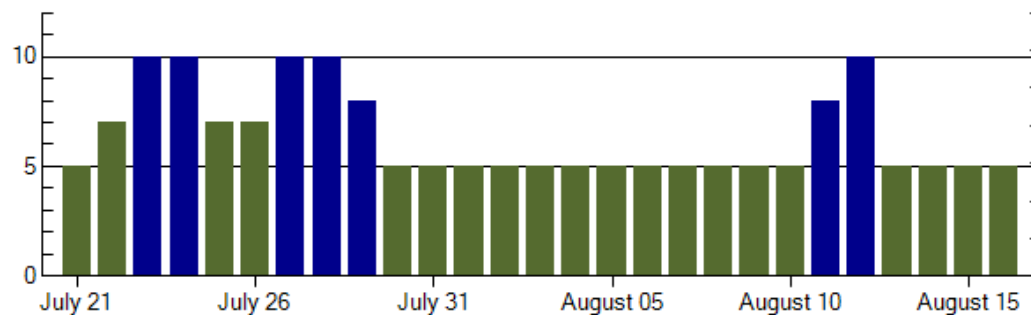
Date & Time of Issue	Type of Alert or Warning	Date & Time of Event UTC
14 Jul 2127	WARNING: Geomagnetic K = 4	14 Jul 2130 - 15/1600
14 Jul 2131	ALERT: Geomagnetic K = 4	14 Jul 2130
14 Jul 2223	WARNING: Geomagnetic K = 5	14 Jul 2225 - 15/0300
14 Jul 2302	ALERT: Geomagnetic K = 5	14 Jul 2300
15 Jul 2109	WATCH: Geomagnetic A $\geq$ 20	15 Jul
15 Jul 2143	CANCELLATION: Geomagnetic A $\geq$ 20	



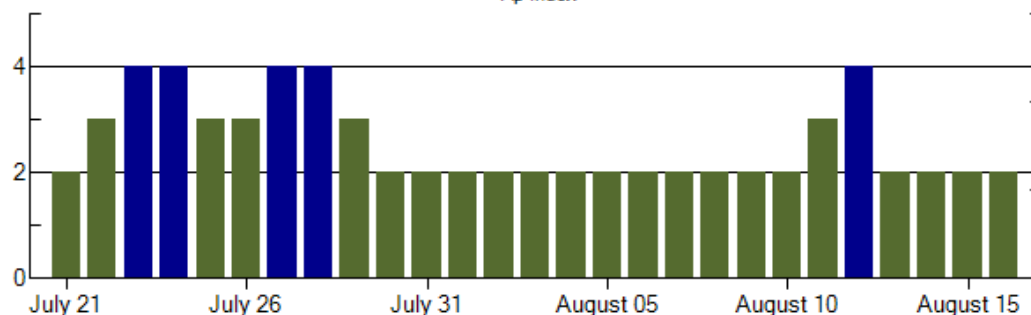
# *Twenty-seven Day Outlook*



10.7 cm



Ap Index



Largest Daily Kp Index

Date	Radio Flux 10.7 cm	Planetary A Index	Largest Kp Index	Date	Radio Flux 10.7 cm	Planetary A Index	Largest Kp Index
21 Jul	82	5	2	04 Aug	76	5	2
22	82	7	3	05	78	5	2
23	82	10	4	06	80	5	2
24	80	10	4	07	80	5	2
25	80	7	3	08	80	5	2
26	78	7	3	09	80	5	2
27	76	10	4	10	78	5	2
28	74	10	4	11	78	8	3
29	74	8	3	12	78	10	4
30	72	5	2	13	78	5	2
31	72	5	2	14	78	5	2
01 Aug	72	5	2	15	80	5	2
02	72	5	2	16	82	5	2
03	74	5	2				



### ***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	Imp /	Optical		Rgn
	Begin	Max	End			Location	Lat CMD	
12 July	0519	0519	0535	B3.9	SF	N20E45		1087
	0554	0606	0621	B3.4				
	1134	1139	1144	B2.1				
	1322	1336	1350	B4.0				
13 July	0310	0311	0320	B3.4	SF	N18E31		1087
	0834	0835	0840	B2.9	SF	N19E27		1087
	1012	1013	1018	B3.3	SF	N19E26		1087
	1046	1049	1105	C2.6	SF	N19E26		1087
14 July	0418	0423	0430	B2.4				
	1056	1100	1102	B1.7				
	1211	1230	1257	C1.4				
	2031	2047	2122	C3.6				
15 July	1319	1322	1326	B1.2				
16 July	0140	0149	0158	B3.1				
	2329	2333	2336	B1.4				
17 July	0017	0020	0026	B1.3				
	1727	1801	1820	C2.4				
18 July	1924	1927	1930	B2.1				



### 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 1087</i>																	
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								
											5	0	0	5	0	0	00

Still on Disk.

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													
											0	0	0	0	0 0 0 0

Still on Disk.

Absolute heliographic longitude: 340



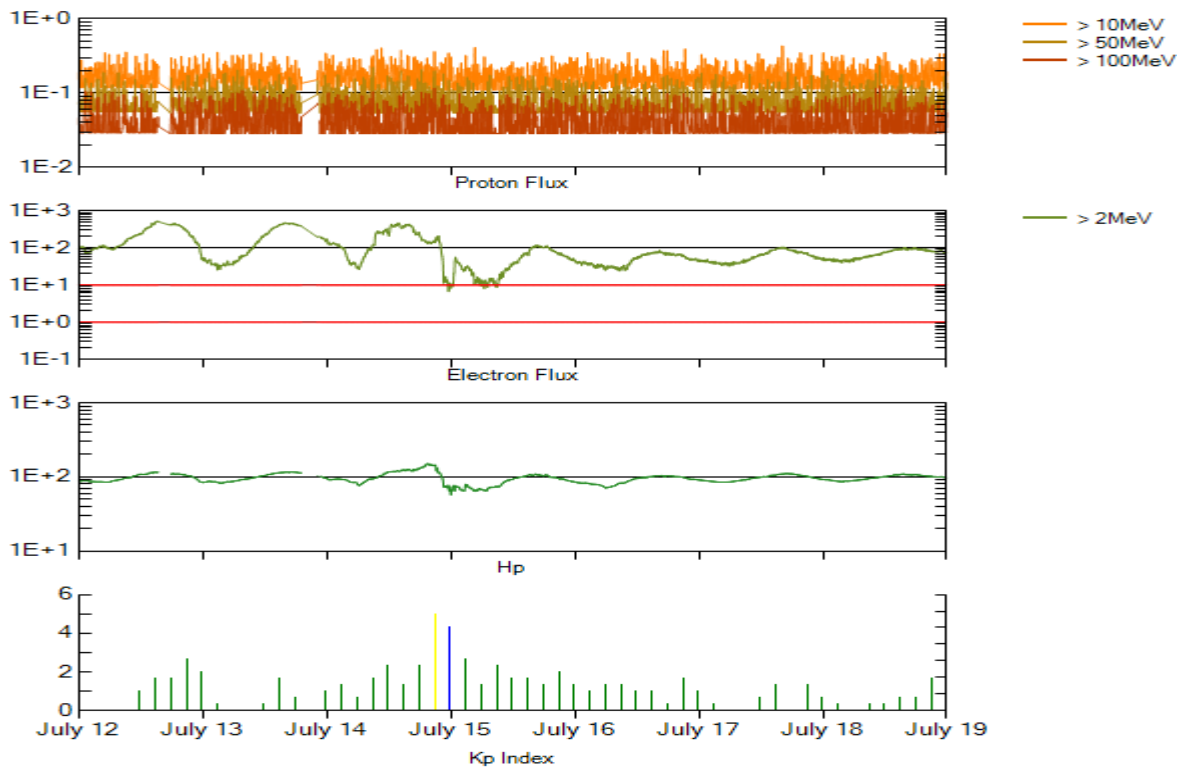
**Recent Solar Indices (preliminary)**  
**Of the observed monthly mean values**

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 12 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.

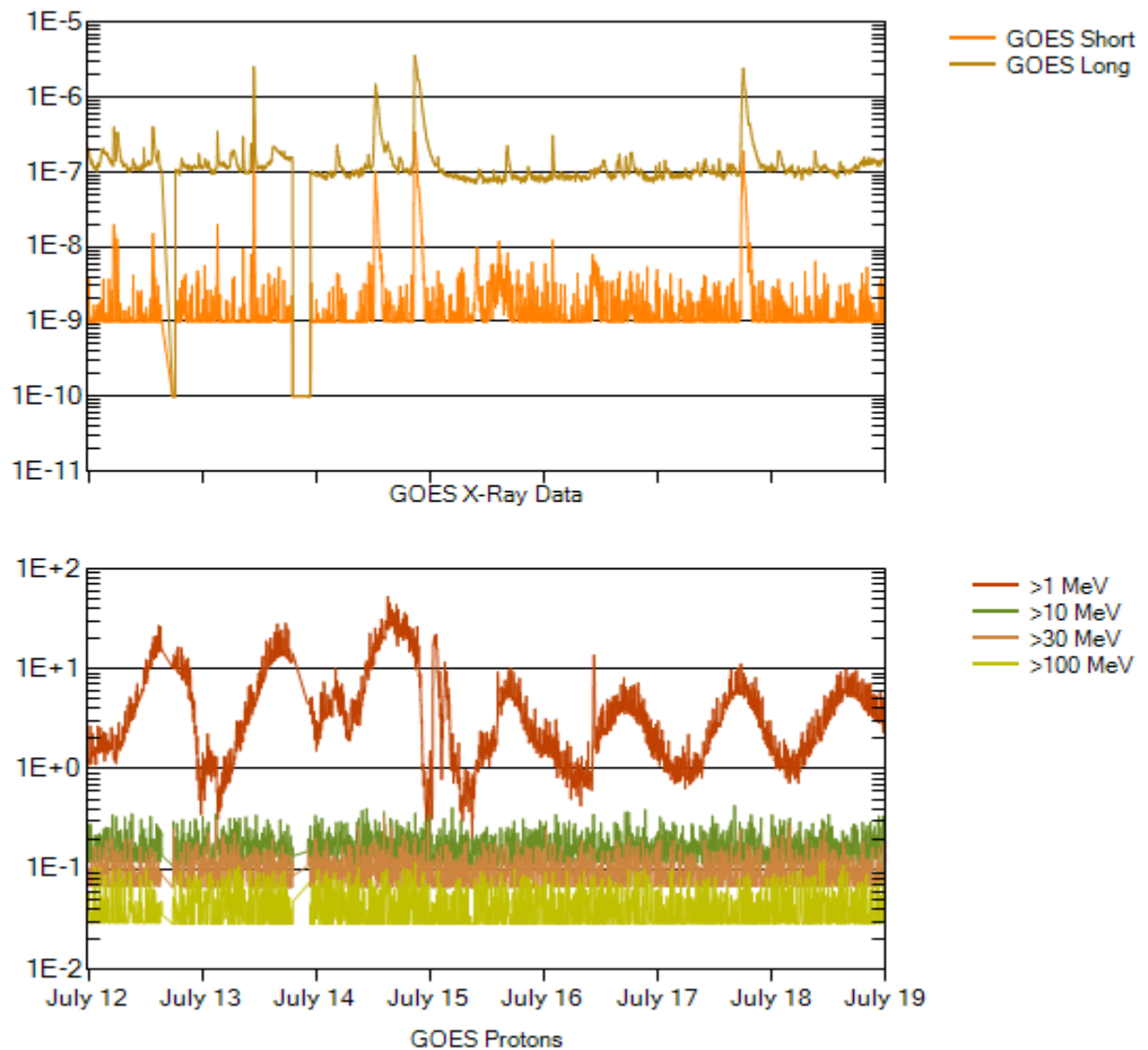
The Hp plot contains the five minute averaged Hp magnetic field component in nanoteslas (nT) as measured by GOES-13. The Hp component is parallel to the spin axis of the satellite, which is nearly parallel to the Earth's rotation axis.

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.

