

Solar activity ranged from very low to high levels. Region 1520 (S16, L=86, class/area Fkc/1460 on 12 July) was responsible for most of the flares during the week, including the largest. High activity occurred on 19/0558 UTC when Region 1520 produced the largest flare of the week, an M7 accompanied by Type II (estimated velocity 1110 km/s) and Type IV radio sweeps, a 1000 sfu Tenflare, and a partial-halo CME. Activity was at moderate levels two days earlier when Region 1520 produced a long-duration M1/1f flare and partial-halo CME on 17/1715 UTC. The same region produced two days of low activity, with a C7/Sf at 16/2003 UTC and a C4 flare at 18/2218 UTC. With the exception of one C1 flare at 21/2324 UTC from Region 1526 (S18, L=266, class/area Bxo/10 on 21 July), very low levels of activity persisted from the 20th through the remainder of the week as Region 1520 rotated around the west limb.

A greater than 10 MeV proton event began at 17/1715 UTC, reached a maximum flux of 136 pfu at 18/0600 UTC, and ended at 21/0310 UTC. This event was associated with the long-duration M1/1f event on 17 July. The greater than 100 MeV proton flux showed a slight enhancement late on 17 July.

The greater than 2 MeV electron flux at geosynchronous orbit was at moderate levels on 16 July, increased to high levels 17-21 July, and decreased to moderate levels on 22 July.

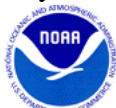
Geomagnetic field activity ranged from quiet to major storm levels. Activity on 16 July began at major storm levels and decreased to unsettled levels as the day passed. 17 July saw quiet to active levels with a periods of minor to major storm levels at high latitudes. The increased activity was attributed to lingering effects from a CME which arrived late on 14 July. Quiet levels followed on 18-19 July. Data from the ACE spacecraft suggested the CME from 17 July swept past on the 20th, and the CME from 19 July passed on the 21st. This brought quiet to unsettled conditions, with intervals of active to minor storm conditions at high latitudes, from the 20th through the end of the week.

### **Space Weather Outlook** **23 July - 18 August 2012**

Solar activity is expected to be at very low levels with a chance for C-class events until 29 July when activity is expected to increase to low levels due to the return of old Region 1522 (N11, L=099). The return of old Regions 1519 (S15, L=107) and 1520 are expected to bring moderate activity levels with a slight chance for X-class events, from 30 July through 13 August. Activity is expected to return to mostly low levels for the remainder of the period as Regions 1519 and 1520 depart.

A greater than 10 MeV proton event above 10 pfu is possible with a slight chance for major flare activity from 30 July to 13 August.

The greater than 2 MeV electron flux at geosynchronous orbit is expected to be at normal to moderate levels on 23-27 July, 3-5 August, and 11-15 August. High levels are expected from 28 July to 2 August and on 6-10 August.



Geomagnetic field activity is expected to be at quiet to unsettled levels with isolated active periods for the first three days (23-25 July) as a coronal hole high speed (CH HSS) stream becomes geoeffective. Activity is expected to decrease to mostly quiet levels on 26-27 July, then increase to unsettled to active periods through 30 July as a recurrent negative polarity CH HSS becomes geoeffective. Quiet to unsettled conditions are then expected for the remainder of the forecast period.



### *Daily Solar Data*

Date	Radio Flux 10.7cm	Sun spot No.	Sunspot Area (10 <sup>-6</sup> hemi.)	X-ray Background Flux	Flares							
					X-ray			Optical				
					C	M	X	S	1	2	3	4
16 July	138	89	840	C1.0	5	0	0	9	0	1	0	0
17 July	128	87	920	C1.0	2	1	0	15	1	0	0	0
18 July	110	59	480	B6.2	3	0	0	1	0	0	0	0
19 July	100	39	140	B5.8	4	1	0	3	0	0	0	0
20 July	92	55	110	B3.4	0	0	0	0	0	0	0	0
21 July	90	50	60	B1.7	1	0	0	0	0	0	0	0
22 July	94	29	70	B2.2	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	>0.6 MeV	>2MeV	>4 MeV
	16 July	5.9e+06	1.6e+04	2.7e+03		1.4e+07
17 July	7.0e+06	1.4e+06	4.0e+03		1.6e+08	
18 July	2.0e+07	3.5e+06	4.1e+03		3.5e+08	
19 July	2.9e+07	4.0e+06	1.9e+04		7.4e+08	
20 July	4.2e+07	3.5e+06	3.4e+03		2.9e+08	
21 July	1.0e+07	4.8e+05	2.9e+03		5.1e+07	
22 July	5.7e+06	1.3e+05	2.6e+03		4.1e+07	

### *Daily Geomagnetic Data*

Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
	16 July	27	6-4-3-4-4-3-2-3	50	4-6-6-4-6-6-3-2	31
17 July	9	2-3-3-2-2-2-2-2	25	3-5-6-3-3-3-2-2	14	3-4-4-2-2-3-2-2
18 July	5	1-1-1-2-2-2-2-1	5	2-1-2-1-1-1-1-2	5	2-1-1-1-1-2-1-1
19 July	6	1-2-2-1-2-1-2-2	6	1-2-1-3-1-2-1-1	6	1-2-2-1-1-1-2-1
20 July	10	2-3-2-3-3-2-2-2	17	2-3-3-5-3-4-2-1	11	2-3-2-3-2-3-2-3
21 July	8	2-2-2-2-2-2-3-2	7	3-2-2-1-1-2-2-1	11	3-2-2-2-1-3-3-2
22 July	9	1-2-3-2-3-2-2-2	18	1-4-4-5-4-0-1-2	8	1-3-3-2-2-1-2-2



### *Alerts and Warnings Issued*

<b>Date &amp; Time of Issue UTC</b>	<b>Type of Alert or Warning</b>	<b>Date &amp; Time of Event UTC</b>
16 Jul 0211	ALERT: Geomagnetic K = 6	16/0207
16 Jul 0211	EXTENDED WARNING: Geomagnetic K = 6	15/1705 - 16/0900
16 Jul 1249	EXTENDED WARNING: Geomagnetic K = 4	14/1740 - 16/1800
17 Jul 0337	WARNING: Geomagnetic K = 4	17/0335 - 1000
17 Jul 0425	ALERT: Geomagnetic K = 4	17/0423
17 Jul 0959	EXTENDED WARNING: Geomagnetic K = 4	17/0335 - 1500
17 Jul 1022	ALERT: Electron 2MeV Integral Flux $\geq$ 1000pfu	17/1005
17 Jul 1625	WARNING: Proton 10MeV Integral Flux $>$ 10pfu	17/1630 - 18/1200
17 Jul 1731	ALERT: Proton Event 10MeV Integral Flux $\geq$ 10pfu	17/1715
17 Jul 2311	EXTENDED WARNING: Proton 10MeV Integral Flux $>$ 10pfu	17/1630 - 18/1200
18 Jul 0456	ALERT: Proton Event 10MeV Integral Flux $\geq$ 100pfu	18/0440
18 Jul 0531	CONTINUED ALERT: Electron 2MeV Integral Flux $\geq$ 1000pfu	17/1005
18 Jul 1107	SUMMARY: Proton Event 10MeV Integral Flux $\geq$ 100pfu	18/0440 - 0645
18 Jul 1155	EXTENDED WARNING: Proton 10MeV Integral Flux $>$ 10pfu	17/1630 - 18/2100
18 Jul 2053	EXTENDED WARNING: Proton 10MeV Integral Flux $>$ 10pfu	17/1630 - 18/1200
18 Jul 2203	EXTENDED WARNING: Proton 10MeV Integral Flux $>$ 10pfu	17/1630 - 19/1200
19 Jul 0503	CONTINUED ALERT: Electron 2MeV Integral Flux $\geq$ 1000pfu	17/1005
19 Jul 0531	ALERT: X-ray Flux exceeded M5	19/0530
19 Jul 0553	ALERT: Type II Radio Emission	19/0524
19 Jul 0607	ALERT: Type IV Radio Emission	19/0525
19 Jul 0633	SUMMARY: 10cm Radio Burst	19/0517 - 0601
19 Jul 0659	SUMMARY: X-ray Event exceeded M5	19/0417 - 0656
19 Jul 1240	EXTENDED WARNING: Proton 10MeV Integral Flux $>$ 10pfu	17/1630 - 19/2359
19 Jul 2059	EXTENDED WARNING: Proton 10MeV Integral Flux $>$ 10pfu	17/1630 - 20/1300



### *Alerts and Warnings Issued*

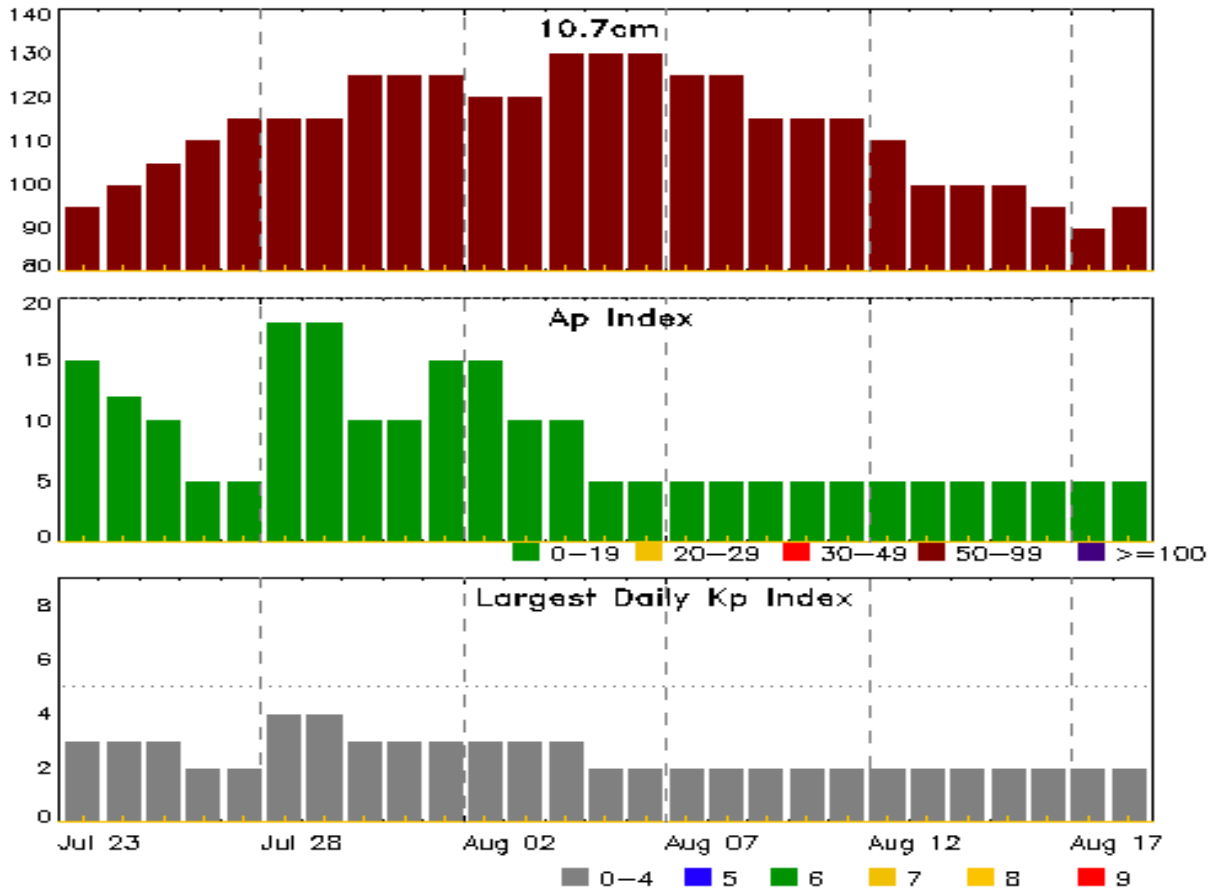
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<b>Date &amp; Time of Issue UTC</b>	<b>Type of Alert or Warning</b>	<b>Date &amp; Time of Event UTC</b>
20 Jul 0457	WARNING: Geomagnetic K = 4	20/0457 - 1300
20 Jul 0521	CONTINUED ALERT: Electron 2MeV Integral Flux >= 1000pfu	17/1005
20 Jul 1255	EXTENDED WARNING: Proton 10MeV Integral Flux > 10pfu	17/1630 - 21/0100
21 Jul 0039	EXTENDED WARNING: Proton 10MeV Integral Flux > 10pfu	17/1630 - 21/1200
21 Jul 1134	SUMMARY: Proton Event 10MeV Integral Flux >= 10pfu	17/1715 - 21/0310
21 Jul 1337	CONTINUED ALERT: Electron 2MeV Integral Flux >= 1000pfu	17/1005

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## Twenty-seven Day Outlook



Date	Radio Flux 10.7cm	Planetary A Index	Largest Kp Index	Date	Radio Flux 10.7cm	Planetary A Index	Largest Kp Index
23 Jul	95	15	3	06 Aug	130	5	2
24	100	12	3	07	125	5	2
25	105	10	3	08	125	5	2
26	110	5	2	09	115	5	2
27	115	5	2	10	115	5	2
28	115	18	4	11	115	5	2
29	115	18	4	12	110	5	2
30	125	10	3	13	100	5	2
31	125	10	3	14	100	5	2
01 Aug	125	15	3	15	100	5	2
02	120	15	3	16	95	5	2
03	120	10	3	17	90	5	2
04	130	10	3	18	95	5	2
05	130	5	2				



### *Energetic Events*

Date	Time			X-ray	Optical Information			Peak		Sweep Freq		
	Begin	Max	Half Max	Class	Integ Flux	Imp/ Brtns	Location Lat CMD	Rgn #	Radio Flux 245	Radio Flux 2695	Intensity II	Intensity IV
17 Jul	1203	1715	1904	M1.7	0.210	1F	S28W65	1520				
19 Jul	0417	0558	0656	M7.7	0.360			1520	260	1000	1	1

### *Flare List*

Date	Time			X-ray Class	Imp/ Brtns	Optical Location Lat CMD	Rgn #
	Begin	Max	End				
16 Jul	0116	0119	0128		SF	S17W68	1519
16 Jul	0441	0448	0451		SF	S14W45	1520
16 Jul	0452	0458	0509	C3.0	SF	N10W62	1522
16 Jul	0457	0505	0523		SF	S15W45	1520
16 Jul	1150	1154	1156		SF	N10W67	1522
16 Jul	1301	1310	1319	C2.2			1520
16 Jul	1412	1412	1414		SF	S20W58	1521
16 Jul	1413	1413	1414		SF	S15W45	1520
16 Jul	1547	1548	1557		SF	S20W60	1521
16 Jul	1829	1836	1840	C1.8			1520
16 Jul	1919	2003	2043	C7.5	SF	S14W55	1520
16 Jul	2127	2141	2150	C3.8	2N	S20W68	1521
17 Jul	0126	0126	0128		SF	S20E65	1524
17 Jul	0154	0203	0205		SF	S20E65	1524
17 Jul	0314	0335	0342		SF	S19E63	1524
17 Jul	0351	0353	0356		SF	S19E63	1524
17 Jul	0357	0357	0400		SF	S19E63	1524
17 Jul	0400	0436	0459		SF	S19E62	1524
17 Jul	0403	0415	0421	C2.4	SF	S18W67	1521
17 Jul	0552	0605	0610	C1.5	SF	S19W84	1521
17 Jul	0709	0712	0719		SF	S19E61	1524
17 Jul	0730	0730	0747		SF	S19E61	1524
17 Jul	0752	0754	0758		SF	S19E61	1524
17 Jul	0801	0804	0805		SF	S17E61	1524
17 Jul	0807	0814	0817		SF	S19E60	1524
17 Jul	0857	0857	0900		SF	S19E60	1524
17 Jul	1146	1146	1153		SF	S17E60	1524
17 Jul	1203	1715	1904	M1.7	1F	S28W65	1520
18 Jul	0257	0309	0317	C3.9			1520



## *Flare List*

Date	Time			X-ray Class	Optical		Rgn #
	Begin	Max	End		Imp/ Brtns	Location Lat CMD	
18 Jul	0555	0602	0609	C3.0			1520
18 Jul	0819	0822	0824		SF	S16E51	1524
18 Jul	2203	2218	2233	C4.5			1520
19 Jul	0000	0009	0014	C2.4			1524
19 Jul	0134	0137	0139	C1.3			1524
19 Jul	0417	0558	0656	M7.7			1520
19 Jul	1555	1556	1601		SF	S16E29	1524
19 Jul	1832	1836	1838	C1.5	SF	S23E25	1525
19 Jul	1921	1921	1926		SF	S17E27	1524
19 Jul	2144	2148	2151	C1.1			1525
20 Jul	2131	2137	2145	B5.0			1525
20 Jul	2218	2222	2226	B4.2			1525
21 Jul	2319	2324	2329	C1.4			1526





## *Region Summary*

Date	Location		Sunspot Characteristics				Flares											
	Lat CMD	Helio Lon	Area 10 <sup>6</sup> hemi.	Extent (helio)	Spot Class	Spot Count	Mag Class	X-ray			Optical							
								C	M	X	S	1	2	3	4			
<b><i>Region 1518</i></b>																		
04 Jul	N09E65	117	10	2	Axx	2	A											
05 Jul	N09E52	118	10	3	Bxo	5	B											
06 Jul	N09E39	117	50	7	Cso	3	B											
07 Jul	N10E24	119	30	6	Cro	4	B											
08 Jul	N09E10	120	30	9	Dso	4	B											
09 Jul	N10W00	116	10	2	Bxo	4	B											
10 Jul	N09W13	116	20	3	Bxo	4	B											
11 Jul	N09W27	117	plage															
12 Jul	N09W40	117	plage															
13 Jul	N09W53	117	plage															
14 Jul	N09W67	118	plage															
15 Jul	N09W81	118	plage															
									0	0	0	0	0	0	0	0	0	0

Crossed West Limb.  
 Absolute heliographic longitude: 116

<b><i>Region 1519</i></b>																		
04 Jul	S14E76	107	30	2	Hsx	1	A											
05 Jul	S15E63	107	120	1	Hsx	1	A	1	1									
06 Jul	S15E47	109	80	2	Hsx	1	A											
07 Jul	S15E34	109	70	2	Hsx	1	A											
08 Jul	S16E21	109	80	2	Hsx	1	A	1				1						
09 Jul	S16E13	104	100	9	Cso	8	B					4						
10 Jul	S16W04	107	60	2	Hsx	1	A	1						1				
11 Jul	S15W18	108	40	2	Hsx	1	A	1				1						
12 Jul	S14W31	108	50	2	Hsx	1	A					1						
13 Jul	S16W45	107	50	1	Hsx	1	A	1										
14 Jul	S16W56	106	50	2	Cso	3	B											
15 Jul	S17W68	105	90	7	Dao	12	B	4				4	1					
16 Jul	S17W81	105	90	7	Dao	12	B					1						
									9	1	0	12	2	0	0	0	0	

Crossed West Limb.  
 Absolute heliographic longitude: 107





**Region Summary - continued**

Date	Location		Sunspot Characteristics				Flares										
	Lat CMD	Lon	Helio 10 <sup>6</sup> hemi.	Extent (helio)	Spot Class	Spot Count	Mag Class	X-ray			Optical						
								C	M	X	S	1	2	3	4		
<b>Region 1522</b>																	
12 Jul	N13W21	98	20	3	Cro	4	B					1					
13 Jul	N13W36	98	20	4	Dao	5	B					3					
14 Jul	N13W49	98	20	4	Cao	7	B	1				2					
15 Jul	N13W62	98	40	5	Dao	9	B										
16 Jul	N11W76	99	60	6	Dso	4	B	1				2					
17 Jul	N12W90	100	60	10	Cao	3	B										
								2	0	0		8	0	0	0	0	0

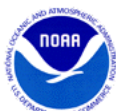
Crossed West Limb.  
Absolute heliographic longitude: 98

<b>Region 1523</b>																	
12 Jul	S27E31	46	10	3	Bxo	6	B										
13 Jul	S27E17	46	20	6	Dao	7	B										
14 Jul	S28E04	45	50	7	Dao	10	B										
15 Jul	S28W08	45	50	8	Dao	11	B										
16 Jul	S28W21	45	40	8	Dao	3	B										
17 Jul	S28W36	46	60	8	Cso	4	B										
18 Jul	S28W51	48	90	8	Dso	6	B										
19 Jul	S28W61	45	70	9	Cao	4	B										
20 Jul	S28W74	45	50	6	Cao	5	B										
21 Jul	S27W87	45	0		Axx	1	A										
								0	0	0		0	0	0	0	0	0

Crossed West Limb.  
Absolute heliographic longitude: 45

<b>Region 1524</b>																	
17 Jul	S17E54	317	40	6	Cso	5	B					13					
18 Jul	S16E37	320	50	5	Cso	7	B					1					
19 Jul	S17E24	320	30	4	Cso	3	B	2				2					
20 Jul	S17E10	321	10	4	Bxo	3	B										
21 Jul	S17W01	319	10	2	Axx	3	A										
22 Jul	S17W15	320	plage														
								2	0	0		16	0	0	0	0	0

Still on Disk.  
Absolute heliographic longitude: 319



**Region Summary - continued**

Date	Location		Sunspot Characteristics				Flares																
	Lat CMD	Lon	Helio 10 <sup>6</sup> hemi.	Area	Extent (helio)	Spot Class	Spot Count	Mag Class	X-ray			Optical											
									C	M	X	S	1	2	3	4							
<b>Region 1525</b>																							
17 Jul	S22E51	320	30	3	Cso	3	B																
18 Jul	S22E36	320	40	1	Hsx	1	A																
19 Jul	S21E23	321	40	2	Dso	2	B	2				1											
20 Jul	S20E09	322	40	3	Dso	4	B																
21 Jul	S20W05	323	40	3	Cso	3	B																
22 Jul	S21W17	321	60	4	Cso	6	B																
								2	0	0		1	0	0	0	0	0	0					

Still on Disk.  
Absolute heliographic longitude: 323

<b>Region 1526</b>																							
20 Jul	S17E63	268	10	5	Bxo	3	B																
21 Jul	S18E52	266	10	4	Bxo	3	B	1															
22 Jul	S18E39	265	10	3	Bxo	3	B																
								1	0	0		0	0	0	0	0	0	0					

Still on Disk.  
Absolute heliographic longitude: 265

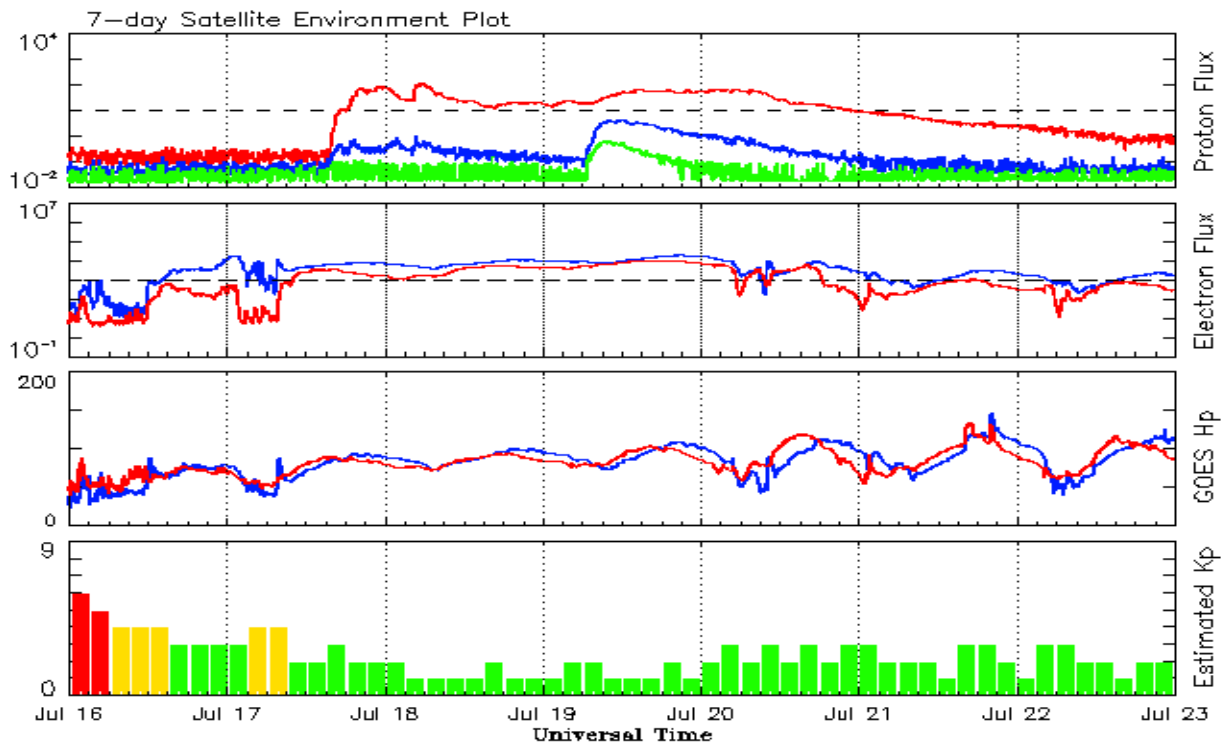


**Recent Solar Indices (preliminary)**  
**Observed monthly mean values**

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
<b>2010</b>									
July	23.1	16.1	0.70	25.9	16.7	79.9	80.1	5	6.0
August	28.2	19.6	0.70	27.3	17.4	79.7	80.7	8	6.2
September	35.6	25.2	0.71	30.6	19.6	81.1	82.4	5	6.3
October	35.0	23.5	0.67	35.9	23.2	81.6	85.3	6	6.4
November	36.1	21.5	0.60	40.5	26.5	82.5	87.7	5	6.4
December	22.0	14.4	0.66	43.8	28.8	84.3	89.6	4	6.5
<b>2011</b>									
January	32.1	18.8	0.59	47.2	30.9	83.7	91.2	6	6.7
February	53.2	29.6	0.55	50.6	33.4	94.5	92.7	6	6.8
March	81.0	55.8	0.69	55.2	36.9	115.3	95.8	7	7.2
April	81.7	54.4	0.67	61.5	41.8	112.6	100.4	9	7.5
May	61.4	41.5	0.68	69.0	47.6	95.9	105.6	9	7.5
June	55.5	37.0	0.67	76.5	53.2	95.8	110.9	8	7.4
July	67.0	43.8	0.66	82.5	57.2	94.2	115.4	9	7.3
August	66.1	50.6	0.77	84.9	59.0	101.7	117.9	8	7.4
September	106.4	78.0	0.73	84.6	59.5	134.5	118.4	13	7.7
October	116.8	88.0	0.75	84.6	59.9	137.2	118.4	7	8.0
November	133.1	96.7	0.73	86.3	61.1	153.1	119.5	3	8.0
December	106.3	73.0	0.69	89.2	63.4	141.2	121.6	3	8.0
<b>2012</b>									
January	91.3	58.3	0.64			133.1		6	
February	50.1	33.1	0.66			106.7		7	
March	77.9	64.2	0.82			115.1		14	
April	84.4	55.2	0.65			113.1		9	
May	99.5	69.0	0.69			121.5		8	
June	88.6	64.5	0.73			120.5		10	

**Note:** Values are final except for the most recent 6 months which are considered preliminary.  
Cycle 24 started in Dec 2008 with an RI=1.7.





*Weekly Geosynchronous Satellite Environment Summary  
Week Beginning 16 July 2012*

The proton flux plot contains the five-minute averaged integral proton flux (protons/cm<sup>2</sup>-sec -sr) as measured by the SWPC Primary GOES satellite, near West 75, for each of three energy thresholds: greater than 10, 50, and 100 MeV.

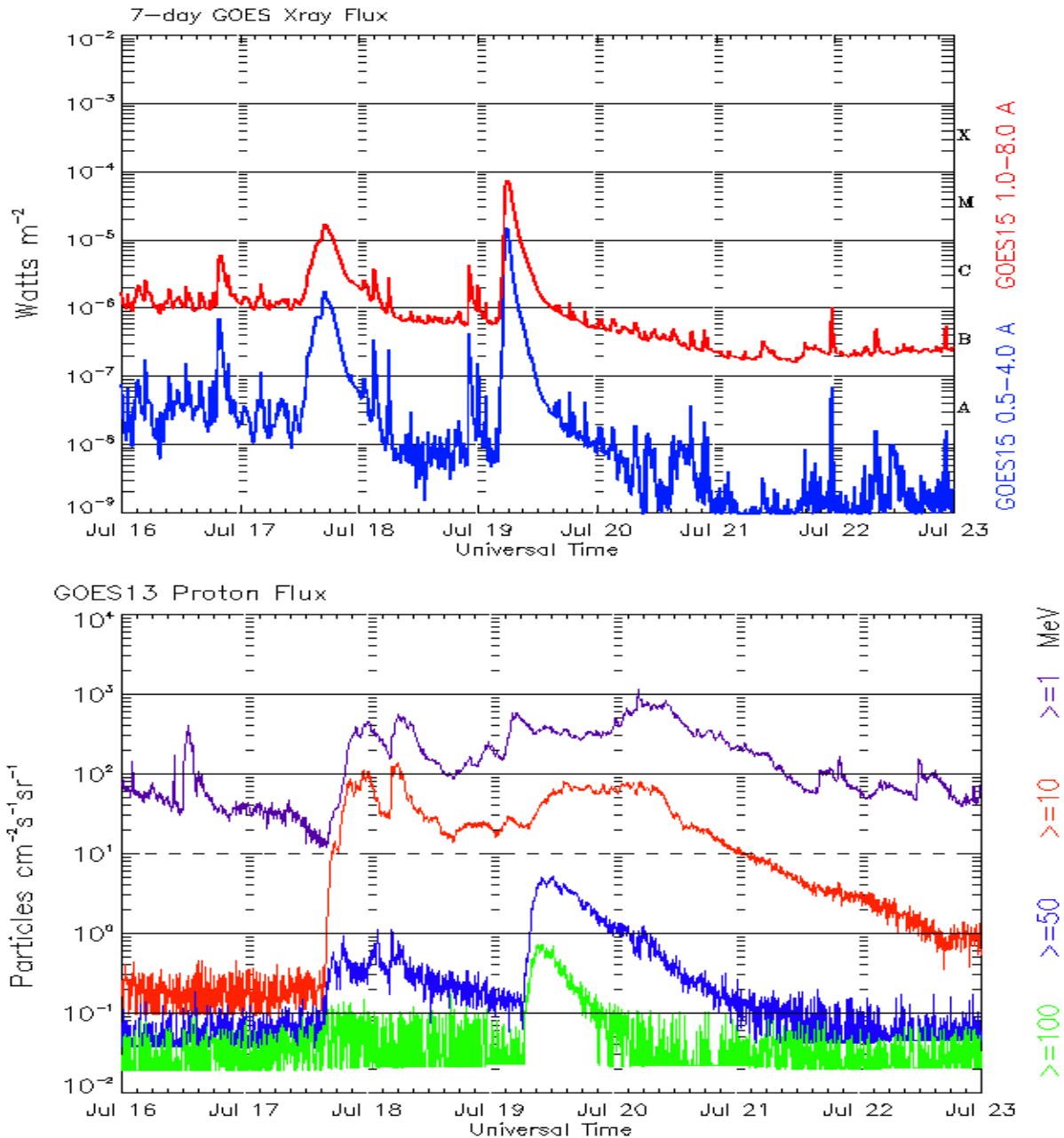
The electron flux plot contains the five-minute averaged integral electron flux (electrons/cm<sup>2</sup>-sec -sr) with energies greater than 2 MeV by the SWPC Primary GOES satellite.

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

The Estimated 3-hour Planetary Kp-index is derived at the NOAA Space Weather Prediction Center using data from the following ground-based magnetometers: Boulder, Colorado; Chambon la Foret, France; Fredericksburg, Virginia; Fresno, California; Hartland, UK; Newport, Washington; Sitka, Alaska. These data are made available thanks to the cooperative efforts between SWPC and data providers around the world, which currently includes the U.S. Geological Survey, the British Geological Survey, and the Institut de Physique du Globe de Paris.

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.

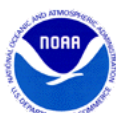




*Weekly GOES Satellite X-ray and Proton Plots  
Week Beginning 16 July 2012*

The x-ray plots contains five-minute averages x-ray flux (Watt/m<sup>2</sup>) as measure by the SWPC primary GOES X-ray satellite, usually at West 105 longitude, 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 intergral flux units (pfu = protons/cm<sup>2</sup> -sec -sr) as measured by the primary SWPC GOES Proton satellite for each of the energy thresholds: >1, >10, >30, and >100 MeV. The P10 event threshold is 10 pfu at greater than 10 MeV.



## ***Preliminary Report and Forecast of Solar Geophysical Data (The Weekly)***

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**Notice:** The 27-day Outlook, Satellite Environment, X-ray and Proton plots have been redesigned. Comments and suggestions are welcome SWPC.Webmaster@noaa.gov

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