Space Weather Highlights
16 September - 22 September 2024

SWPC PRF 2560
23 September 2024

Solar activity was low with C-class flare activity observed over 16-21 Sep. Solar activity reached moderate levels on 22 Sep due to an M3.7/2n flare at 22/2139 UTC from Region 3835 (); the largest event of the week. Regions 3828 () and 3831 () produced most of the C-class flare activity observed throughout the week. No Earth-directed CMEs were observed.

The greater than 10 MeV proton flux reached S1 (Minor) levels at 17/0735 UTC, reached a peak flux of 33.6 pfu at 17/1050 UTC, and decreased below the S1 level at 17/1615 UTC. The greater than 10 MeV proton flux remained elevated over 18-19 Sep, but remained below the S1 level. Background levels were observed over 20-22 Sep.

The greater than 2 MeV electron flux at geosynchronous orbit reached high levels on 16-17, and 19-22 Sep, and normal to moderate levels were observed on 18 Sep.

Geomagnetic field activity reached active levels on 16 Sep due to positive polarity CH HSS influences early in the day, followed by the initial arrival of CMEs that left the Sun on 13-14 Sep late in the day. Periods of G1-G4 (Minor-Severe) storming were observed on 17 Sep due to sustained CME enhancements. Active conditions were observed again on 18 Sep, with periods of G1 (Minor) storming observed on 19 Sep, as CME influences waned and subsided. Quiet and unsettled conditions were observed on 20 Sep followed by quiet conditions over 21-22 Sep.

Space Weather Outlook
23 September - 19 October 2024

Solar activity is expected to range from low to moderate levels throughout the outlook period, with a varying chance for M-class (R1-R2/Minor-Moderate) flares.

No proton events are expected at geosynchronous orbit, barring significant flare activity.

The greater than 2 MeV electron flux at geosynchronous orbit is expected to reach high levels on 23-26 Sep and 12-15 Oct, with normal to moderate levels expected for the remainder of the period.

Geomagnetic field activity is likely to reach unsettled levels on 25-26 Sep due to positive polarity CH HSS influences. Periods of active conditions are likely on 05-06 Oct due to another positive polarity CH HSS. Periods of active conditions are likely again on 10 Oct, followed by likely periods of G1 (Minor) storming on 11-12 Oct, due to yet another positive polarity CH HSS.

Daily Solar Data

Date	Radio Flux 10.7cm	Sun spot No.	Sunspot Area (10^{-6} hemi.)	X-ray Background Flux	Flares							
					X-ray			Optical				
					C	M	X	S	1	2	3	4
16 September	169	103	660	C1.3	4	0	0	3	0	0	0	0
17 September	165	140	590	C1.1	3	0	0	0	0	0	0	0
18 September	163	93	520	C1.0	4	0	0	4	0	0	0	0
19 September	161	109	580	C1.0	4	0	0	3	0	0	0	0
20 September	154	113	600	B9.3	1	0	0	1	0	0	0	0
21 September	158	117	640	C1.0	3	0	0	2	0	0	0	0
22 September	163	114	650	C1.3	1	1	0	5	0	1	0	0

Daily Particle Data

Date	Proton Fluence (protons/cm ^{2} -day -sr)		Electron Fluence (electrons/cm^2 -day -sr)
	>1 MeV	>10 MeV	>2MeV
16 September	3.9e+06	3.2e+05	4.3e+07
17 September	9.5e+07	8.4e+05	1.0e+07
18 September	5.4e+07	1.6e+05	9.0e+06
19 September	3.4e+07	2.0e+04	2.5e+07
20 September	7.9e+06	1.5e+04	5.6e+07
21 September	7.1e+06	1.5e+04	6.1e+07
22 September	3.0e+06	1.5e+04	1.1e+08

Daily Geomagnetic Data

Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
16 September	19	3-3-4-4-4-2-2-4	43	3-4-7-6-4-3-3-4	23	4-4-4-4-4-2-2-4
17 September	39	6-5-5-5-5-3-3-2	65	5-7-6-6-6-5-4-3	71	8-7-5-6-6-4-4-4
18 September	10	4-2-1-2-2-2-1-3	11	3-2-2-2-4-2-1-3	12	4-2-2-2-2-2-1-4
19 September	15	4-2-1-3-4-3-3-2	39	3-4-2-6-6-6-3-2	20	5-3-2-3-4-4-3-2
20 September	6	1-1-0-2-2-2-2-3	6	1-1-2-3-0-1-2-2	7	1-1-1-2-2-1-1-3
21 September	6	2-1-2-1-2-2-2-1	7	2-1-3-3-0-1-2-1	6	2-2-2-1-1-1-2-1
22 September	3	0-0-0-1-2-2-2-1	4	1-0-0-3-1-2-1-0	5	1-1-0-2-1-2-2-1

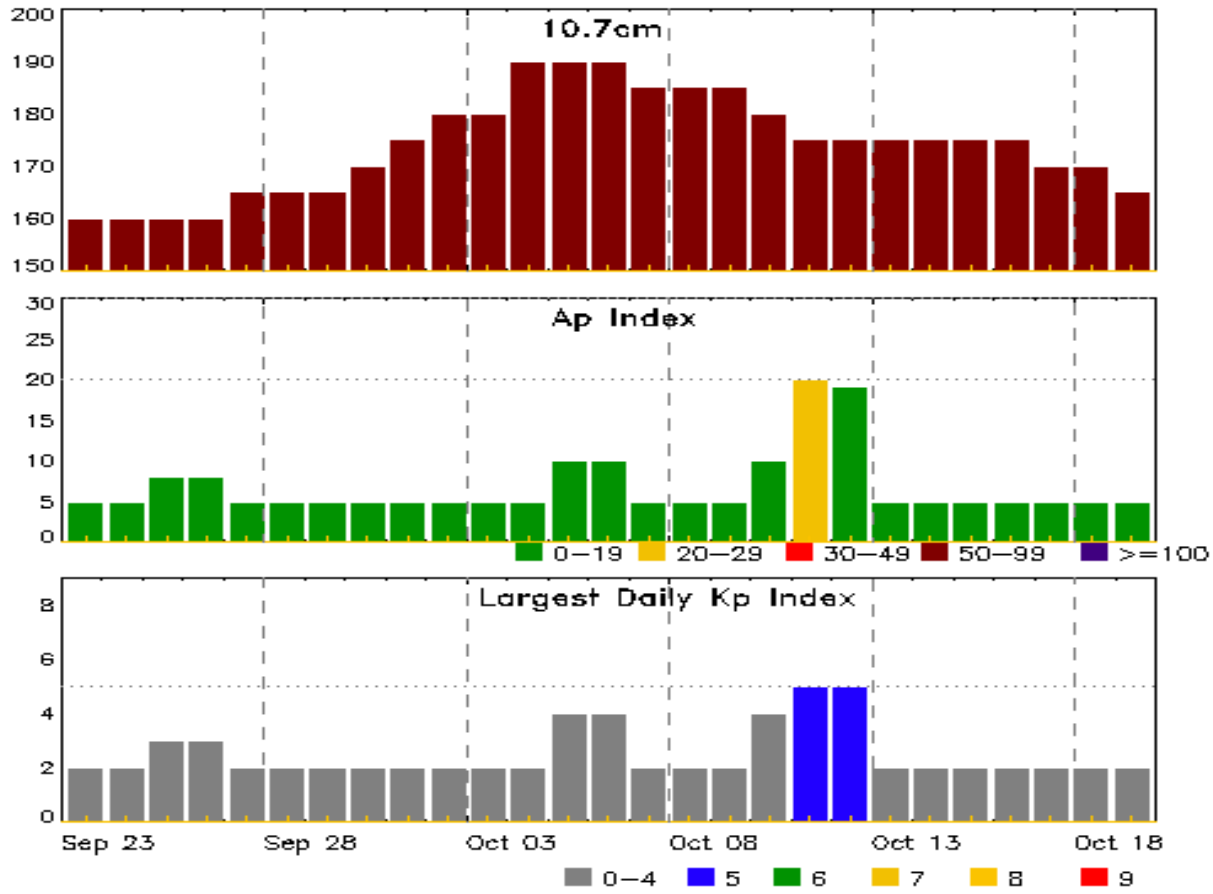
Alerts and Warnings Issued

Date & Time of Issue UTC	Type of Alert or Warning	Date & Time of Event UTC
16 Sep 0246	EXTENDED WARNING: Geomagnetic K = 4	12/0355 - 16/0900
16 Sep 0845	EXTENDED WARNING: Geomagnetic K = 4	12/0355 - 16/1500
16 Sep 1016	CONTINUED ALERT: Electron 2MeV Integral Flux >= 1000pfu	15/1215
16 Sep 1028	WARNING: Geomagnetic K = 5	16/1028 - 1500
16 Sep 1455	EXTENDED WARNING: Geomagnetic K = 4	12/0355 - 17/0300
16 Sep 2302	WARNING: Geomagnetic Sudden Impulse expected	16/2310 - 17/0010
16 Sep 2332	WARNING: Geomagnetic K = 5	16/2335 - 17/1200
16 Sep 2332	EXTENDED WARNING: Geomagnetic K = 4	12/0355 - 17/1200
16 Sep 2341	SUMMARY: Geomagnetic Sudden Impulse	16/2329
17 Sep 0105	ALERT: Geomagnetic K = 5	
17 Sep 0105	WARNING: Geomagnetic K = 6	17/0105 - 1200
17 Sep 0114	ALERT: Geomagnetic K = 6	
17 Sep 0118	WARNING: Geomagnetic K>= 7	17/0120 - 1200
17 Sep 0128	ALERT: Geomagnetic K = 7	
17 Sep 0300	ALERT: Geomagnetic K = 8	
17 Sep 0331	ALERT: Geomagnetic K = 5	
17 Sep 0353	ALERT: Geomagnetic K = 6	
17 Sep 0435	ALERT: Geomagnetic K = 7	
17 Sep 0521	WARNING: Proton 10MeV Integral Flux > 10pfu	17/0521 - 2359
17 Sep 0752	ALERT: Proton Event 10MeV Integral Flux >= 10pfu	17/0735
17 Sep 0821	ALERT: Geomagnetic K = 5	
17 Sep 1012	ALERT: Geomagnetic K = 5	
17 Sep 1027	ALERT: Geomagnetic K = 6	
17 Sep 1028	EXTENDED WARNING: Geomagnetic K = 6	17/0105 - 1500
17 Sep 1028	EXTENDED WARNING: Geomagnetic K = 5	16/2335 - 17/1800
17 Sep 1028	EXTENDED WARNING: Geomagnetic K = 4	12/0355 - 17/2100
17 Sep 1349	ALERT: Geomagnetic K = 5	
17 Sep 1504	ALERT: Geomagnetic K = 6	

Alerts and Warnings Issued

Date & Time of Issue UTC	Type of Alert or Warning	Date & Time of Event UTC
17 Sep 1756	EXTENDED WARNING: Geomagnetic K = 5	16/2335 - 18/0300
17 Sep 1756	EXTENDED WARNING: Geomagnetic K = 4	12/0355 - 18/0600
18 Sep 0021	SUMMARY: Proton Event 10MeV Integral Flux >= 10pfu	17/0735 - 1615
18 Sep 2311	WARNING: Geomagnetic K = 4	18/2315 - 19/0900
19 Sep 0001	ALERT: Geomagnetic K = 4	
19 Sep 0146	WARNING: Geomagnetic K = 5	19/0150 - 0900
19 Sep 0246	ALERT: Geomagnetic K = 5	
19 Sep 1026	WARNING: Geomagnetic K = 4	19/1026 - 1500
19 Sep 1328	ALERT: Geomagnetic K = 4	
19 Sep 1332	EXTENDED WARNING: Geomagnetic K = 4	19/1026 - 2359
19 Sep 1812	ALERT: Electron 2MeV Integral Flux >= 1000pfu	19/1740
20 Sep 1428	CONTINUED ALERT: Electron 2MeV Integral Flux >= 1000pfu	19/1740
21 Sep 1446	CONTINUED ALERT: Electron 2MeV Integral Flux >= 1000pfu	19/1740
22 Sep 1002	CONTINUED ALERT: Electron 2MeV Integral Flux >= 1000pfu	19/1740
22 Sep 2153	SUMMARY: 10cm Radio Burst	22/2123 - 2132

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 Sep	160	5	2	07 Oct	185	5	2
24	160	5	2	08	185	5	2
25	160	8	3	09	185	5	2
26	160	8	3	10	180	10	4
27	165	5	2	11	175	20	5
28	165	5	2	12	175	19	5
29	165	5	2	13	175	5	2
30	170	5	2	14	175	5	2
01 Oct	175	5	2	15	175	5	2
02	180	5	2	16	175	5	2
03	180	5	2	17	170	5	2
04	190	5	2	18	170	5	2
05	190	10	4	19	165	5	2
06	190	10	4				

Energetic Events

	Time			X-ray		Optical Information			Peak Radio Flux		Sweep Freq Intensity	
Date	Begin	Max	Half Max	Class	Integ Flux	Imp/ Brtns	Location Lat CMD	Rgn #	245	2695	II	IV
22 Sep	2112	2139	2205	M3.7	0.071	2N	S20E63	3835	640	540		

Flare List

	Time				Optical		
Date	Begin	Max	End	X-ray Class	Imp/ Brtns	Location Lat CMD	Rgn #
16 Sep	0121	0125	0129	C5.9			3824
16 Sep	0139	0145	0152	C4.3			
16 Sep	1330	1351	1410	C5.0	SF	S14E28	3825
16 Sep	1429	1431	1443		SF	N12W66	3822
16 Sep	1451	1459	1507		SF	N13W67	3822
16 Sep	2329	2357	0020	C9.6			3825
17 Sep	0624	0640	0650	C4.4			3828
17 Sep	1220	1233	1242	C3.9			3824
17 Sep	1852	1909	1921	C3.1			3828
18 Sep	0333	0344	0354	C4.1			3828
18 Sep	B0723	U0724	A0728		SF	N15W56	
18 Sep	B0749	U0749	A0755		SF	N16W55	
18 Sep	1252	1314	1339	C2.9			
18 Sep	1559	1605	1609	C2.1			3824
18 Sep	1635	1643	1650	C3.0			3825
18 Sep	1729	1730	1732		SF	S07W71	3824
18 Sep	1735	1739	1742		SF	N14W63	3830
19 Sep	0759	0804	0811	C2.4			3824
19 Sep	B1330	1330	1340		SF	N13E11	3831
19 Sep	1517	1527	1535	C2.6	SF	S19W16	3825
19 Sep	2146	2152	2157	C2.4	SF	N13E08	3831
19 Sep	2201	2206	2213	C2.1			3824
20 Sep	0700	0704	0711		SF	N14E00	3831
20 Sep	1445	1457	1504	C3.9			3831
21 Sep	0705	0716	0735	C2.0			
21 Sep	B0805	U0808	A0830		SF	N21W05	3833
21 Sep	1335	1341	1346	C1.6	SF	N14W16	3831
21 Sep	2037	2046	2050	C4.4			3831
22 Sep	0724	U0732	A0747		SF	S10E03	3828
22 Sep	B0848	U0853	A0908		SF	S10E02	3828

Flare List

	Time			Optical			
Date	Begin	Max	End	X-ray Class	Imp/ Brtns	Location Lat CMD	Rgn #
22 Sep	1318	1327	1342	C3.7	SF	S10W00	3828
22 Sep	1324	1326	1354		SF	N13W28	3831
22 Sep	1557	1557	1600		SF	N15W32	3831
22 Sep	2112	2139	2205	M3.7	2N	S20E63	3835

Region Summary

	Location		Sunspot Characteristics					Flares							
		Helio	Area	Extent	Spot	Spot	Mag	X-ray			Optical				
Date	Lat CMD	Lon	10^{-6} hemi.	(helio)	Class	Count	Class	C	M	X	S	1	2	3	4
			Region 3814												
04 Sep	N16E75	117	180	2	Hax	1	A								
05 Sep	N16E61	119	180	3	Hsx	1	A	1							
06 Sep	N13E52	114	190	3	Cao	1	B								
07 Sep	N15E38	115	240	3	Cso	5	B				1				
08 Sep	N15E24	116	230	5	Dso	10	BG	1			1				
09 Sep	N16E10	116	250	13	Eho	12	BG		2				1		
10 Sep	N16W02	117	270	8	Dki	15	BGD		1			2			
11 Sep	N15W16	116	300	7	Dhi	13	BGD	1	2		5	1	1		
12 Sep	N16W29	116	280	7	Dhi	13	BGD	1	1		3	1			
13 Sep	N16W43	117	110	7	Cso	6	BG		1		3				
14 Sep	N16W56	117	180	3	Hsx	3	A								
15 Sep	N16W70	118	90	3	Cso	2	B								
16 Sep	N17W84	118	130	1	Hsx	2	A								
								4	7	0	13	4	2	0	0

Crossed West Limb.
Absolute heliographic longitude: 117

			Region 3817												
07 Sep	S14E37	116	5	1	Axx	1	A								
08 Sep	S14E23	117	plage												
09 Sep	S14E09	117	plage												
10 Sep	S14W05	119	plage												
11 Sep	S14W19	119	plage												
12 Sep	S14W33	120	plage												
13 Sep	S14W47	121	plage												
14 Sep	S14W61	122	plage												
15 Sep	S14W75	123	plage												
16 Sep	S14W89	123	plage												
								0	0	0	0	0	0	0	0

Crossed West Limb.
Absolute heliographic longitude: 119

Region Summary - continued

	Location		Sunspot Characteristics					Flares							
		Helio	Area	Extent	Spot	Spot	Mag	X-ray			Optical				
Date	Lat CMD	Lon	10^{-6} hemi.	(helio)	Class	Count	Class	C	M	X	S	1	2	3	4
			Region 3822												
09 Sep	N14E23	104	60	3	Dao	12	B								
10 Sep	N14E09	104	100	5	Dai	15	B								
11 Sep	N14W05	105	120	6	Dac	20	B								
12 Sep	N14W17	104	130	6	Dai	13	B				2				
13 Sep	N14W31	105	140	7	Dai	13	B				1				
14 Sep	N15W45	106	30	4	Dai	9	B								
15 Sep	N14W56	104	10	2	Cro	2	B								
16 Sep	N15W71	104	30	2	Cro	1	B				2				
17 Sep	N14W85	106	10	2	Bxo	2	B								
								0	0	0	5	0	0	0	0

Crossed West Limb.
Absolute heliographic longitude: 105

			Region 3824												
11 Sep	S04E30	70	140	6	Dai	15	B	1			3				
12 Sep	S04E16	71	170	8	Dai	20	BG	1	1	1	6				
13 Sep	S05E01	73	110	10	Dsi	13	BG								
14 Sep	S05W13	74	120	10	Cai	19	B								
15 Sep	S04W26	73	40	11	Csi	2	BG	2			2				
16 Sep	S04W40	73	70	12	Csi	13	BG	1							
17 Sep	S04W54	75	100	13	Eai	25	BG	1							
18 Sep	S04W69	76	80	13	Eai	8	B	1			1				
19 Sep	S04W83	78	80	13	Eao	10	B	2							
								9	1	1	12	0	0	0	0

Crossed West Limb.
Absolute heliographic longitude: 73

Region Summary - continued

	Location		Sunspot Characteristics					Flares							
		Helio	Area	Extent	Spot	Spot	Mag	X-ray			Optical				
Date	Lat CMD	Lon	10^{-6} hemi.	(helio)	Class	Count	Class	C	M	X	S	1	2	3	4
			Region 3825												
12 Sep	S18E77	11	plage						1						
13 Sep	S18E63	11	240	6	Dac	6	BG	2	3		3				
14 Sep	S18E48	13	240	6	Dac	23	BGD	2	2	1	3		1		
15 Sep	S15E35	13	140	12	Eai	10	BG	4				1			
16 Sep	S16E20	13	180	12	Eai	13	BG	2			1				
17 Sep	S15E06	15	180	12	Ekc	35	BG								
18 Sep	S15W07	14	200	12	Esi	13	BG	1							
19 Sep	S16W21	15	130	13	Esi	13	BGD	1			1				
20 Sep	S16W33	13	110	12	Eso	8	BG								
21 Sep	S16W47	15	110	12	Eso	8	BG								
22 Sep	S16W61	16	110	12	Eso	3	BG								
								12	6	1	8	1	1	0	0

Still on Disk.
Absolute heliographic longitude: 15

			Region 3826												
14 Sep	S28W17	78	50	4	Dsi	10	B				3				
15 Sep	S28W31	79	10	4	Dri	2	B								
16 Sep	S26W44	77	10	4	Bxo	2	B								
17 Sep	S26W58	79	10	1	Axx	1	A								
18 Sep	S26W72	80	plage												
19 Sep	S26W86	81	plage												
								0	0	0	3	0	0	0	0

Crossed West Limb.
Absolute heliographic longitude: 78

			Region 3827												
16 Sep	S28E65	31	120	3	Hsx	1	A								
17 Sep	S27E51	30	120	3	Hhx	1	A								
18 Sep	S26E33	334	100	4	Cao	3	B								
19 Sep	S27E19	336	110	5	Cao	3	B								
20 Sep	S26E07	333	120	4	Cao	4	B								
21 Sep	S26W07	335	120	4	Cao	4	B								
22 Sep	S26W21	336	120	3	Hsx	1	A								
								0	0	0	0	0	0	0	0

Still on Disk.
Absolute heliographic longitude: 333

Region Summary - continued

	Location		Sunspot Characteristics					Flares							
		Helio	Area	Extent	Spot	Spot	Mag	X-ray			Optical				
Date	Lat CMD	Lon	10^{-6} hemi.	(helio)	Class	Count	Class	C	M	X	S	1	2	3	4
			Region 3828												
16 Sep	S13E75	41	120	3	Hhx	1	A								
17 Sep	S13E61	40	120	3	Hhx	1	A	2							
18 Sep	S13E47	320	120	4	Cso	6	B	1							
19 Sep	S13E33	322	150	6	Cai	11	BGD								
20 Sep	S12E19	320	150	5	Cai	16	BG								
21 Sep	S12E05	323	150	5	Cai	16	BG								
22 Sep	S12W09	324	150	5	Dai	16	BG	1			3				
								4	0	0	3	0	0	0	0

Still on Disk.
Absolute heliographic longitude: 323

			Region 3829												
17 Sep	N11W59	80	50	5	Cro	5	B								
18 Sep	N11W73	81	10	4	Bxo	2	B								
19 Sep	N12W87	82	10	1	Bxo	2	B								
								0	0	0	0	0	0	0	0

Crossed West Limb.
Absolute heliographic longitude: 80

			Region 3830												
18 Sep	N12W68	78	10	1	Axx	1	A				1				
19 Sep	N15W82	77	plage												
								0	0	0	1	0	0	0	0

Crossed West Limb.
Absolute heliographic longitude: 78

			Region 3831												
19 Sep	N12E03	351	100	3	Cro	10	B	1			2				
20 Sep	N12W09	349	80	4	Dao	7	B	1			1				
21 Sep	N12W23	351	80	4	Dao	7	B	2			1				
22 Sep	N12W37	352	80	4	Dao	7	B				2				
								4	0	0	6	0	0	0	0

Still on Disk.
Absolute heliographic longitude: 351

Region Summary - continued

	Location		Sunspot Characteristics					Flares							
		Helio	Area	Extent	Spot	Spot	Mag	X-ray			Optical				
Date	Lat CMD	Lon	10^{-6} hemi.	(helio)	Class	Count	Class	C	M	X	S	1	2	3	4
			Region 3832												
20 Sep	N13W45	25	20	3	Cro	3	B								
21 Sep	N13W59	27	20	3	Cro	3	B								
22 Sep	N13W73	28	plage												
								0	0	0	0	0	0	0	0

Still on Disk.
Absolute heliographic longitude: 25

			Region 3833												
20 Sep	N21W02	343	10	2	Bxo	3	B								
21 Sep	N21W16	344	50	2	Dai	7	B				1				
22 Sep	N21W30	345	50	2	Dai	7	BD								
								0	0	0	1	0	0	0	0

Still on Disk.
Absolute heliographic longitude: 343

			Region 3834												
20 Sep	S14E65	275	110	2	Dso	2	B								
21 Sep	S14E51	277	110	2	Dso	2	B								
22 Sep	S14E37	278	110	2	Dso	2	B								
								0	0	0	0	0	0	0	0

Still on Disk.
Absolute heliographic longitude: 278

			Region 3835												
22 Sep	S22E63	252	30	3	Dao	8	B		1				1		
								0	1	0	0	0	1	0	0

Still on Disk.
Absolute heliographic longitude: 252

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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