Space Weather Highlights **SWPC PRF 2467**
05 December - 11 December 2022 **12 December 2022**

Solar activity was at low levels through the period. A total of 46 C-class flares were observed from Regions 3153 (S17, L=327, class/area Fko/1080 on 04 Dec), 3155 (N23, L=026, class/area Dai/140 on 04 Dec), 3156 (N25, L=319, class/area Dao/220 on 03 Dec), 3157 (N16, L=305, class/area Esi/230 on 10 Dec), 3158 (N24, L=354, class/area Dai/110 on 05 Dec), 3161 (N26, L=312, class/area Bxo/020 on 09 Dec), 3162 (S13, L=239, class/area Hsx/070 on 10 Dec) and 3163 (S20, L=217, class/area Eso/140 on 11 Dec). During the period, numrous CMEs were observed, but none were detected to have Earth-directed components.

No proton events were observed at geosynchronous orbit.

The greater than 2 MeV electron flux at geosynchronous orbit was at high levels on 05-07 Dec with a peak flux reading of 2,610 pfu observed at 05/1450 UTC. Moderate levels were observed on 08-11 Dec.

Geomagnetic field activity generally ranged from quiet to unsettled levels throughout the period. Isolated active levels were observed on 07-09 Dec with an isolated minor storm (G1-Minor) reading at midday on 07 Dec. Positive polarity CH HSS influences were present on 05 Dec and negative polarity CH HSS influences were present on 07-10 Dec. Wind speeds reached a maximum reading of about 610 km/s late on 08 Dec.

Space Weather Outlook
12 December - 07 January 2023

Solar activity is expected to be at very low to low levels throughout the outlook period. M-class (R1-R2, Minor-Moderate) flares are possible on 11-31 Dec due to current and returning M-class producing regions.

No proton events are expected at geosynchronous orbit.

The greater than 2 MeV electron flux at geosynchronous orbit is expected to reach high levels on 24-31 Dec and 01-03 Jan due to CH HSS influence. Low to moderate levels are expected on 12-23 Dec and 04-07 Jan.

Geomagnetic field activity is expected to be at unsettled to active levels on 19-20 Dec, 22-31 Dec, 01 Jan and 03-06 Jan. Minor storm (G1-Minor) levels are possible on 22 Dec and 25-28 Dec. This activity is all due to recurrent CH HSS effects.

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
05 December	150	89	1160	B7.0	10	0	0	12	0	0	0	0
06 December	144	123	1060	B5.1	2	0	0	0	0	0	0	0
07 December	148	107	770	B5.9	8	0	0	3	0	0	0	0
08 December	143	115	1140	B4.7	2	0	0	2	0	0	0	0
09 December	149	116	1200	B7.1	16	0	0	0	0	0	0	0
10 December	142	111	1290	B9.1	8	0	0	11	1	0	0	0
11 December	148	141	1340	B6.5	8	0	0	10	0	0	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
05 December	1.7e+05	3.2e+04	9.6e+07
06 December	6.7e+04	3.3e+04	8.8e+07
07 December	2.2e+06	3.2e+04	5.6e+07
08 December	4.1e+04	3.2e+04	1.3e+06
09 December	7.3e+04	3.2e+04	1.6e+06
10 December	5.2e+04	3.3e+04	1.8e+06
11 December	4.8e+04	3.3e+04	2.1e+06

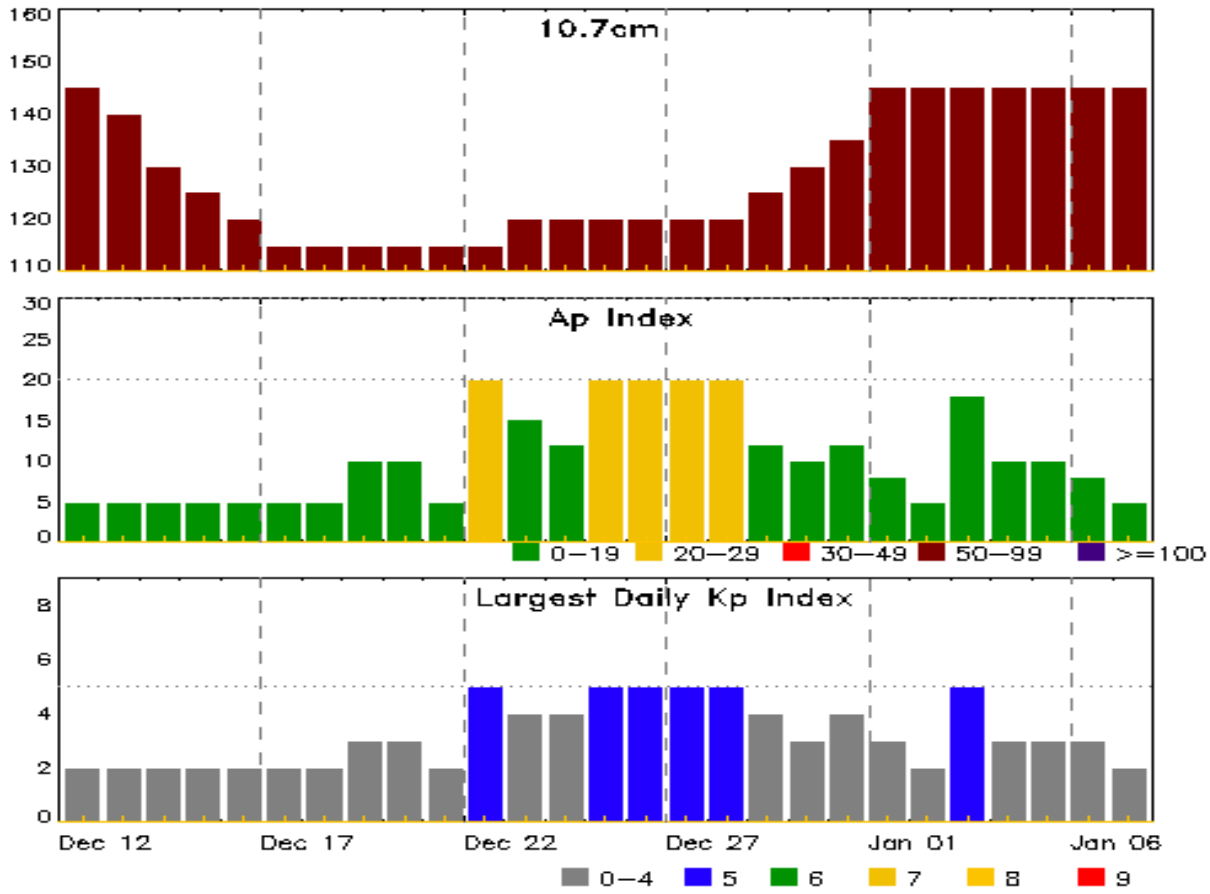
Daily Geomagnetic Data

Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
05 December	7	1-2-2-2-3-2-1-1	19	0-1-4-5-5-3-2-1	8	1-2-3-2-3-2-1-1
06 December	2	0-1-0-1-1-1-0-0	3	0-0-0-2-3-1-0-0	4	1-2-1-1-1-1-1-1
07 December	9	0-1-0-3-4-3-2-2	36	0-0-1-6-6-6-4-3	18	1-1-1-3-5-4-3-3
08 December	9	2-2-2-1-1-2-2-4	7	1-2-3-2-1-1-2-2	11	2-3-2-2-1-1-3-4
09 December	9	4-1-2-2-2-2-2-1	12	3-1-2-5-3-1-1-0	11	4-2-2-3-2-2-2-1
10 December	6	2-1-1-3-1-2-2-1	8	1-2-1-4-2-2-2-1	8	3-2-1-3-1-2-2-2
11 December	7	2-2-2-1-2-2-1-3	23	1-3-5-3-5-5-2-1	9	2-3-2-2-1-3-1-3

Alerts and Warnings Issued

Date & Time of Issue UTC	Type of Alert or Warning	Date & Time of Event UTC
05 Dec 0558	EXTENDED WARNING: Geomagnetic K = 4	04/1705 - 05/1200
05 Dec 1136	CONTINUED ALERT: Electron 2MeV Integral Flux >= 1000pfu	29/1425
05 Dec 2037	WATCH: Geomagnetic Storm Category G1 predicted	
06 Dec 1232	CONTINUED ALERT: Electron 2MeV Integral Flux >= 1000pfu	29/1425
07 Dec 1027	CONTINUED ALERT: Electron 2MeV Integral Flux >= 1000pfu	29/1425
07 Dec 1106	WARNING: Geomagnetic K = 4	07/1105 - 1800
07 Dec 1241	ALERT: Geomagnetic K = 4	07/1234
07 Dec 1244	EXTENDED WARNING: Geomagnetic K = 4	07/1105 - 2100
07 Dec 1245	WARNING: Geomagnetic K = 5	07/1245 - 1800
07 Dec 1314	ALERT: Geomagnetic K = 5	07/1304
07 Dec 1325	WARNING: Geomagnetic K = 6	07/1325 - 1800
07 Dec 2056	EXTENDED WARNING: Geomagnetic K = 4	07/1105 - 08/0900
08 Dec 0855	EXTENDED WARNING: Geomagnetic K = 4	07/1105 - 08/1500
08 Dec 2309	WARNING: Geomagnetic K = 4	08/2305 - 09/1200
08 Dec 2310	ALERT: Geomagnetic K = 4	08/2310

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
12 Dec	145	5	2	26 Dec	120	20	5
13	140	5	2	27	120	20	5
14	130	5	2	28	120	20	5
15	125	5	2	29	125	12	4
16	120	5	2	30	130	10	3
17	115	5	2	31	135	12	4
18	115	5	2	01 Jan	145	8	3
19	115	10	3	02	145	5	2
20	115	10	3	03	145	18	5
21	115	5	2	04	145	10	3
22	115	20	5	05	145	10	3
23	120	15	4	06	145	8	3
24	120	12	4	07	145	5	2
25	120	20	5				

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

No Events Observed

Flare List

	Time				Optical		
Date	Begin	Max	End	X-ray Class	Imp/ Brtns	Location Lat CMD	Rgn #
05 Dec	0140	0151	0201	C1.9	SF	N24E39	3156
05 Dec	0518	0530	0540	C2.7	SF	N23E04	3158
05 Dec	0632	0642	0651	C1.3	SF	S17E30	3153
05 Dec	0720	0721	0723		SF	S17E30	3153
05 Dec	0806	0806	0812		SF	S19E42	3153
05 Dec	0904	0911	0917	C0.9	SF	S16E30	3153
05 Dec	1010	1018	1025	C1.1	SF	N24E01	3158
05 Dec	1038	1047	1052	C1.4	SF	N24E00	3158
05 Dec	1208	U1210	1212		SF	N24E00	3158
05 Dec	1448	1459	1541	C1.4	SF	S15E26	3153
05 Dec	1550	1559	1607	C1.4			
05 Dec	1650	1650	1712	C2.0	SF	N24W02	3158
05 Dec	2044	2057	2107	C1.6	SF	N24W05	3158
06 Dec	1418	1427	1434	B8.7			
06 Dec	1803	1810	1815	B8.3			
06 Dec	2138	2142	2201	C1.1			3157
06 Dec	2354	2359	0005	C1.0			3155
07 Dec	1100	1111	1128	C1.2	SF	N15E29	3157
07 Dec	1157	1207	1213	C1.2	SF	N15E29	3157
07 Dec	1256	1304	1316	C5.8	SN	N15E28	3157
07 Dec	1516	1523	1529	C1.1			
07 Dec	1559	1604	1613	B9.3			
07 Dec	1623	1634	1646	C1.4			
07 Dec	1746	1759	1804	C1.3			
07 Dec	1901	1904	1908	C2.5			
07 Dec	2308	2316	2327	C1.0			3153
08 Dec	0530	0537	0544	B7.4			
08 Dec	0554	0603	0612	C1.3	SF	N17E16	3157
08 Dec	0736	0741	0749	B8.7			
08 Dec	1232	1234	1237		SF	N15E19	3157
08 Dec	2052	2109	2135	C1.4			3153

Flare List

Date	Time			X-ray	Optical		
	Begin	Max	End	Class	Imp/ Brtns	Location Lat CMD	Rgn #
09 Dec	0542	0557	0614	C1.3			
09 Dec	0614	0618	0628	C1.2			
09 Dec	0721	0728	0738	C1.3			3162
09 Dec	0913	0921	0928	C1.5			3163
09 Dec	1043	1048	1054	C1.6			3163
09 Dec	1054	1107	1118	C1.8			3163
09 Dec	1126	1134	1137	C2.0			3163
09 Dec	1137	1220	1237	C4.0			3163
09 Dec	1237	1240	1244	C4.1			3157
09 Dec	1347	1357	1359	C3.8			3163
09 Dec	1359	1413	1432	C6.0			3163
09 Dec	1547	1632	1635	C4.3			3163
09 Dec	1635	1641	1645	C4.5			3163
09 Dec	1918	1926	1943	C1.7			3162
09 Dec	2142	2150	2201	C3.6			3163
09 Dec	2238	2242	2246	C5.0			3157
10 Dec	0257	0258	0301		SF	N13W11	3157
10 Dec	0638	0649	0657	C3.9			3163
10 Dec	0755	0802	0811	C2.1			3163
10 Dec	0950	0957	1014	C1.3			3163
10 Dec	1014	1026	1039	C4.6			3161
10 Dec	1039	1044	1053	C5.3			3163
10 Dec	1535	1538	1539		SF	S20E74	3163
10 Dec	1552	1611	1637	C5.2			3163
10 Dec	1555	1602	1625		SF	S20E71	3163
10 Dec	1627	1633	1636		SF	S21E72	3163
10 Dec	1641	1641	1644		SF	S21E72	3163
10 Dec	1644	1644	1645		SF	N22E23	3160
10 Dec	1804	1811	1826	C1.7	SF	S21E70	3163
10 Dec	1837	1838	1840		SF	S16W38	3153
10 Dec	1852	1853	1857		SF	S21E70	3163
10 Dec	2035	2046	2055	C4.8	1N	N25W27	3161
10 Dec	2116	2121	2123		SF	S20E71	3163
10 Dec	2247	2247	2249		SF	S07E63	
11 Dec	0222	0230	0238	C1.1			3163
11 Dec	0612	0628	0634	C1.6			
11 Dec	0634	0638	0645	C1.6			3163
11 Dec	0910	0912	0918		SF	N25W31	3161

Flare List

	Time			Optical			
Date	Begin	Max	End	X-ray Class	Imp/ Brtns	Location Lat CMD	Rgn #
11 Dec	0911	0912	0914		SF	N21W77	3158
11 Dec	1125	1140	1144	C2.9	SF	S16W60	3153
11 Dec	1139	U1151	1202		SF	S21E63	3163
11 Dec	1247	1252	1257		SF	S22E62	3163
11 Dec	1430	1506	1531	C1.2	SF	S19E58	3163
11 Dec	1459	1508	1523	C1.2	SF	N25W37	3161
11 Dec	1542	1546	1551	C1.2	SF	S13W62	3153
11 Dec	1737	1741	1747	C1.7	SF	S14W63	3153
11 Dec	1838	1843	1900		SF	S07E50	3153

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 3152												
23 Nov	S26E57	89	10	2	Axx	3	A								
24 Nov	N26E45	88	10	4	Bxo	3	B				3				
25 Nov	N27E36	83	20	6	Cro	7	B								
26 Nov	N27E23	83	120	7	Cao	10	B								
27 Nov	N26E10	83	50	7	Cso	8	B								
28 Nov	N27W05	84	10	7	Bxo	6	B								
29 Nov	N27W14	80	30	4	Cro	3	B	1							
30 Nov	N27W26	78	10	7	Bxo	2	B				1				
01 Dec	N28W38	78	10	1	Axx	1	A	1	1			1			
02 Dec	N28W51	78	10	1	Axx	1	A								
03 Dec	N28W65	79	plage												
04 Dec	N28W79	80	plage												
								2	1	0	4	1	0	0	0

Crossed West Limb.
Absolute heliographic longitude: 84

			Region 3153												
01 Dec	S19E70	329	270	4	Dko	2	B	4							
02 Dec	S17E59	328	750	12	Eko	6	BD	2							
03 Dec	S17E48	326	750	12	Eko	8	BG	2							
04 Dec	S17E33	327	1080	16	Fko	13	B	1			3				
05 Dec	S16E19	327	690	17	Fkc	13	B	3			5				
06 Dec	S16E08	325	660	15	Eko	27	B								
07 Dec	S18W05	326	370	17	Fko	14	B	1							
08 Dec	S17W20	327	740	17	Fko	13	BG	1							
09 Dec	S17W33	328	730	17	Fho	9	BG								
10 Dec	S17W45	327	700	17	Fho	5	B				1				
11 Dec	S17W59	327	690	17	Fho	5	B	3			4				
								17	0	0	13	0	0	0	0

Still on Disk.
Absolute heliographic longitude: 326

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 3154												
01 Dec	S38W07	47	40	3	Dao	3	B								
02 Dec	S38W19	46	30	4	Cro	3	B								
03 Dec	S38W32	46	20	3	Bxo	2	B								
04 Dec	S38W46	47	plage												
05 Dec	S38W59	47	plage												
06 Dec	S38W72	46	plage												
07 Dec	S38W85	46	plage												
								0	0	0	0	0	0	0	0

Crossed West Limb.
Absolute heliographic longitude: 47

			Region 3155												
01 Dec	N22E17	23	10	4	Bxo	3	B								
02 Dec	N21E02	25	40	5	Dro	5	B								
03 Dec	N22W11	25	60	6	Dro	5	B	2							
04 Dec	N23W25	26	140	7	Dai	14	B	4							
05 Dec	N22W38	25	110	8	Dao	9	B								
06 Dec	N22W49	23	80	5	Cao	7	B	1							
07 Dec	N21W62	23	120	3	Hax	1	A								
08 Dec	N22W79	26	40	1	Hax	1	A								
								7	0	0	0	0	0	0	0

Crossed West Limb.
Absolute heliographic longitude: 25

			Region 3156												
02 Dec	N25E63	324	180	3	Hax	1	A	2							
03 Dec	N25E55	319	220	6	Dao	2	B	2							
04 Dec	N25E39	320	170	6	Cso	4	B	1							
05 Dec	N24E29	317	80	10	Hsx	2	A	1			1				
06 Dec	N25E13	321	50	1	Hsx	1	A								
07 Dec	N23E02	318	50	12	Cso	2	B								
08 Dec	N25W07	315	80	3	Hsx	1	A								
09 Dec	N25W25	320	80	3	Cso	2	B								
10 Dec	N25W39	321	70	2	Cso	6	B								
11 Dec	N28W54	322	80	5	Dso	5	B								
								6	0	0	1	0	0	0	0

Still on Disk.
Absolute heliographic longitude: 318

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 3157												
02 Dec	N16E89	299	plage					1							
03 Dec	N16E75	299	120	2	Hax	1	A	5	1						
04 Dec	N16E61	300	210	8	Dso	6	B								
05 Dec	N17E09	217	170	10	Dao	5	B								
06 Dec	N17E33	300	150	9	Cso	7	B	1							
07 Dec	N16E19	301	130	10	Csi	10	B	3			3				
08 Dec	N16E07	300	150	10	Csi	9	BG	1			2				
09 Dec	N16W09	304	220	14	Esi	20	B	2							
10 Dec	N16W23	305	230	12	Esi	19	B				1				
11 Dec	N16W37	305	220	12	Esi	17	B								
								13	1	0	6	0	0	0	0

Still on Disk.
Absolute heliographic longitude: 300

			Region 3158												
04 Dec	N24E06	355	20	6	Cro	6	B								
05 Dec	N24W07	354	110	7	Dai	10	B	5			6				
06 Dec	N24W19	353	70	9	Cro	9	B								
07 Dec	N24W34	355	10	9	Bxo	8	B								
08 Dec	N24W48	355	30	9	Cro	4	B								
09 Dec	N24W60	355	10	10	Bxo	7	B								
10 Dec	N23W78	356	plage												
								5	0	0	6	0	0	0	0

Crossed West Limb.
Absolute heliographic longitude: 355

			Region 3159												
06 Dec	N30E65	269	20	1	Axx	1	A								
07 Dec	N28E51	269	10	1	Axx	1	A								
08 Dec	N28E37	271	10	1	Axx	1	A								
09 Dec	N29E25	270	plage												
10 Dec	N29E11	271	plage												
11 Dec	N29W03	271	plage												
								0	0	0	0	0	0	0	0

Still on Disk.
Absolute heliographic longitude: 271

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 3160												
06 Dec	N26E72	261	30	2	Hsx	1	A								
07 Dec	N20E60	260	80	1	Hsx	1	A								
08 Dec	N21E48	259	80	1	Hax	1	A								
09 Dec	N22E34	261	80	2	Hax	1	A								
10 Dec	N22E22	260	80	2	Hsx	1	A				1				
11 Dec	N22E08	260	80	2	Hsx	1	A								
								0	0	0	1	0	0	0	0

Still on Disk.
Absolute heliographic longitude: 260

			Region 3161												
08 Dec	N26W01	309	10	4	Dro	5	B								
09 Dec	N26W17	312	20	3	Dro	6	B								
10 Dec	N26W30	312	10	4	Bxo	4	B	2				1			
11 Dec	N26W44	312	plage					1			2				
								3	0	0	2	1	0	0	0

Still on Disk.
Absolute heliographic longitude: 309

			Region 3162												
09 Dec	S13E56	239	60	2	Hsx	1	A	2							
10 Dec	S13E43	239	70	2	Hsx	1	A								
11 Dec	S13E29	239	70	2	Hsx	1	A								
								2	0	0	0	0	0	0	0

Still on Disk.
Absolute heliographic longitude: 239

			Region 3163												
09 Dec	S20E78	218	plage					10							
10 Dec	S20E64	218	130	9	Dso	5	B	6			7				
11 Dec	S20E51	217	140	11	Eso	9	B	3			3				
								19	0	0	10	0	0	0	0

Still on Disk.
Absolute heliographic longitude: 217

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 3164													
11 Dec	S18W32	300	20	4	Dro	5	B	0	0	0	0	0	0	0	0

Still on Disk.
Absolute heliographic longitude: 300

		Region 3165													
11 Dec	S18W10	278	20	3	Cro	4	B	0	0	0	0	0	0	0	0

Still on Disk.
Absolute heliographic longitude: 278

		Region 3166													
11 Dec	S07E45	222	20	6	Cro	4	B	0	0	0	0	0	0	0	0

Still on Disk.
Absolute heliographic longitude: 222

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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