Space Weather Highlights
10 October - 16 October 2022

SWPC PRF 2459
17 October 2022

Solar activity was between low to moderate levels. All M-class activity (R1-Minor) was observed from Region 3112 (N22, L=49, area/class=800/Fkc on 06 Oct). It produced a total of six M-class flares over the past 7 days, the largest of which was an M3 at 11/0842 UTC. Three Type II radio sweeps were observed over 11-12 Oct but no Type IVs were observed. The region steadily decayed before rotating around the W limb on 14 Oct. Only C-class activity was observed from the other less significant spotted regions on the visible disk.

Other activity included two filament eruptions, the around 13/0700 UTC, centered near S28E10 and the second around 15/1440 UTC, centered near S23E45. Analysis and modeling of the subsequent coronagraph imagery suggested no significant contributions to the solar wind along the Sun-Earth line. No other Earth-directed CMEs were observed in available coronagraph imagery.

No proton events were observed at geosynchronous orbit.

The greater than 2 MeV electron flux at geosynchronous orbit ranged from normal to high levels. High levels were observed on 10-13 Oct and normal to moderate levels were observed from 14-16 Oct due to geomagnetic activity associated with a negative polarity CH HSS. A peak flux of 6,220 pfu was observed at 12/1420 UTC.

Geomagnetic field activity was at quiet to G1 (Minor) geomagnetic storm levels. G1 conditions were observed on 15 Oct in response to influence from a positive polarity CH HSS. Active conditions on 14-16 Oct due to a negative polarity CH HSS. Unsettled conditions were observed on 10-11 Oct due to a positive polarity CH HSS. Peak solar wind parameters included Bt reaching 18 nT on 14 Oct and solar wind speeds increasing to just under 600 km/s on 16 Oct. The remainder of the summary period was at quiet levels.

Space Weather Outlook
17 October - 12 November 2022

Solar activity is expected to be very low to low levels with a chance for moderate levels over the outlook period. Several regions that produced M-class (R1-Minor) or greater flares are scheduled to return to the visible disk on 18 Oct, 27 Oct and 28 Oct.

No proton events are expected at geosynchronous orbit.

The greater than 2 MeV electron flux at geosynchronous orbit is expected to reach moderate to high levels. High levels are likely on 21 Oct, 24-29 Oct and 10-12 Nov. Normal to moderate levels are expected for the remainder of the outlook period. All elevations in electron flux are due to anticipated influence from multiple, recurrent CH HSSs.

Geomagnetic field activity is expected to range from quiet to G1 (Minor) geomagnetic storm

levels. G1 levels are likely on 26 Oct, 28 Oct, 30-31 Oct, 02 Nov, 05 Nov and 10 Nov; active levels are likely on 17 Oct, 20-21 Oct, 27 Oct, 29 Oct, 01 Nov, 03-04 Nov and 11 Nov; unsettled levels are likely on 22 Oct, 06 Nov and 12 Nov. The remainder of the outlook period is expected to be at quiet levels. All increases in geomagnetic activity is due to multiple, recurrent CH HSSs.

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
10 October	163	134	860	B7.1	8	2	0	3	1	0	0	0
11 October	150	72	600	B7.2	9	2	0	4	0	0	0	0
12 October	141	62	580	B6.1	4	1	0	3	0	0	0	0
13 October	130	57	480	B5.8	7	0	0	2	0	0	0	0
14 October	121	51	260	B5.3	0	1	0	0	0	0	0	0
15 October	115	50	80	B4.0	2	0	0	2	0	0	0	0
16 October	119	59	110	B5.3	3	0	0	7	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
10 October	5.5e+04	3.2e+04	1.5e+08
11 October	5.3e+04	3.3e+04	2.1e+08
12 October	7.7e+04	3.3e+04	2.6e+08
13 October	5.3e+04	3.3e+04	1.7e+08
14 October	7.5e+04	3.2e+04	3.8e+06
15 October	1.1e+05	3.0e+04	1.7e+06
16 October	1.1e+05	2.9e+04	1.6e+07

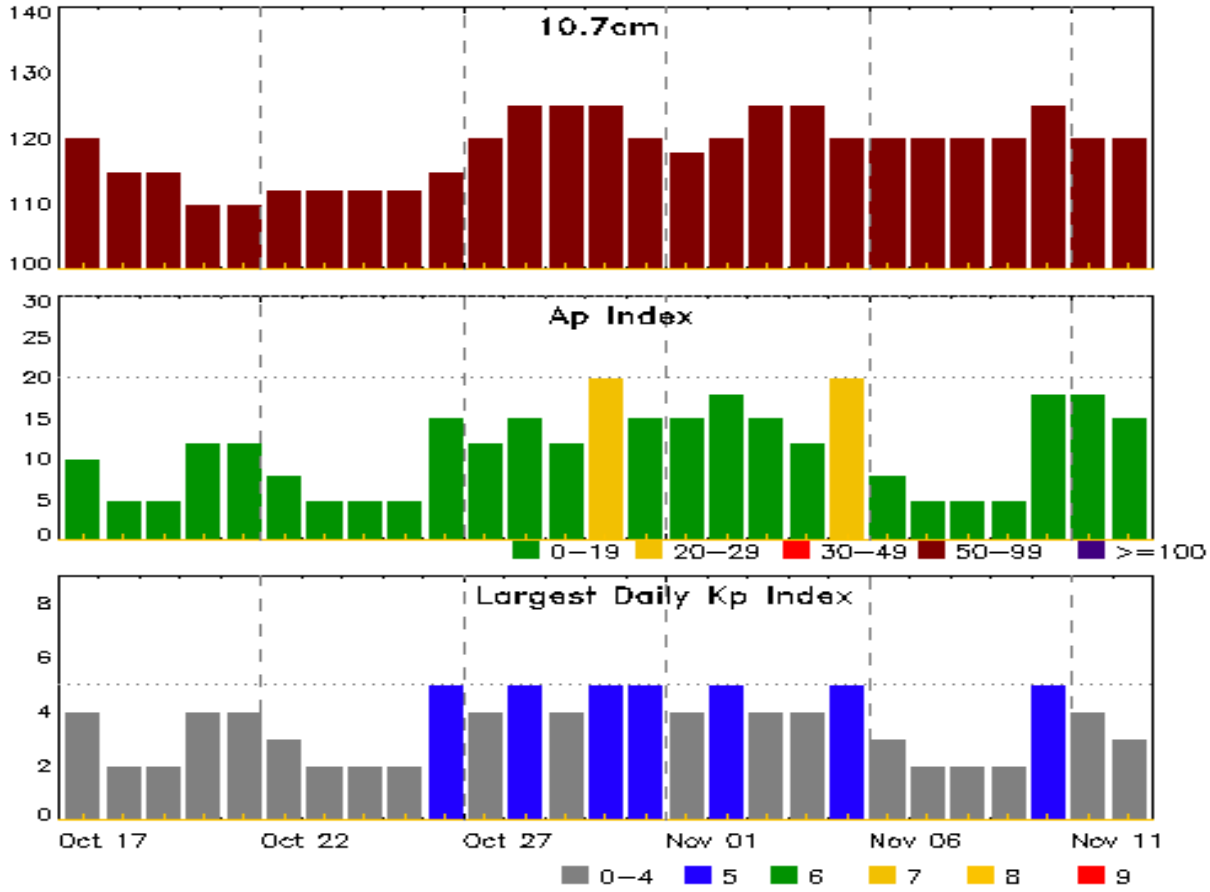
Daily Geomagnetic Data

Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
10 October	8	2-3-2-3-1-2-1-2	12	3-2-2-5-1-1-1-2	10	3-3-2-3-1-2-2-2
11 October	7	3-2-1-1-2-2-1-2	4	2-1-1-2-1-1-1-1	7	3-2-1-2-1-1-1-2
12 October	4	1-0-0-1-3-1-1-1	3	0-0-1-2-2-2-1-0	6	1-1-1-1-2-1-2-2
13 October	4	1-0-2-1-2-1-1-1	3	0-0-3-1-1-0-0-0	5	2-1-1-1-1-1-1-2
14 October	16	2-3-4-4-4-2-2-2	28	1-4-6-4-5-4-1-2	18	2-3-4-4-4-3-1-3
15 October	15	5-2-2-3-2-3-3-1	13	3-3-1-4-1-3-3-2	18	5-3-2-3-2-3-4-2
16 October	11	2-1-2-3-4-3-1-2	30	2-1-4-6-6-4-2-2	15	3-2-2-4-4-3-2-3

Alerts and Warnings Issued

Date & Time of Issue UTC	Type of Alert or Warning	Date & Time of Event UTC
10 Oct 0240	EXTENDED WARNING: Geomagnetic K = 4	09/0139 - 10/1500
10 Oct 0459	CONTINUED ALERT: Electron 2MeV Integral Flux >= 1000pfu	05/1535
11 Oct 0113	WARNING: Geomagnetic K = 4	11/0112 - 0600
11 Oct 0459	CONTINUED ALERT: Electron 2MeV Integral Flux >= 1000pfu	05/1535
11 Oct 0928	ALERT: Type II Radio Emission	11/0847
11 Oct 1149	ALERT: Type II Radio Emission	11/1101
12 Oct 0459	CONTINUED ALERT: Electron 2MeV Integral Flux >= 1000pfu	05/1535
12 Oct 1549	ALERT: Type II Radio Emission	12/1424
13 Oct 0500	CONTINUED ALERT: Electron 2MeV Integral Flux >= 1000pfu	05/1535
14 Oct 0603	WARNING: Geomagnetic K = 4	14/0602 - 1500
14 Oct 0825	ALERT: Geomagnetic K = 4	14/0820
14 Oct 1455	EXTENDED WARNING: Geomagnetic K = 4	14/0602 - 2100
15 Oct 0124	WARNING: Geomagnetic K = 4	15/0120 - 1200
15 Oct 0126	ALERT: Geomagnetic K = 4	15/0120
15 Oct 0127	WARNING: Geomagnetic K = 5	15/0128 - 0900
15 Oct 0130	ALERT: Geomagnetic K = 5	15/0129
15 Oct 2022	WARNING: Geomagnetic K = 4	15/2021 - 16/0600
15 Oct 2023	ALERT: Geomagnetic K = 4	15/2022
16 Oct 1151	WARNING: Geomagnetic K = 4	16/1151 - 1500
16 Oct 1155	ALERT: Geomagnetic K = 4	16/1155
16 Oct 1457	EXTENDED WARNING: Geomagnetic K = 4	16/1151 - 2100
16 Oct 2157	WARNING: Geomagnetic K = 4	16/2200 - 17/0900

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
17 Oct	120	10	4	31 Oct	120	15	5
18	115	5	2	01 Nov	118	15	4
19	115	5	2	02	120	18	5
20	110	12	4	03	125	15	4
21	110	12	4	04	125	12	4
22	112	8	3	05	120	20	5
23	112	5	2	06	120	8	3
24	112	5	2	07	120	5	2
25	112	5	2	08	120	5	2
26	115	15	5	09	120	5	2
27	120	12	4	10	125	18	5
28	125	15	5	11	120	18	4
29	125	12	4	12	120	15	3
30	125	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
10 Oct	0035	0047	0055	M1.0	0.011	1F	N24W26	3112				
10 Oct	1605	1628	1647	M2.4	0.039	SF	N24W34	3112				
11 Oct	0836	0842	0846	M3.9	0.009	SB	N22W42	3112	5500		140	
11 Oct	1047	1052	1057	M1.5	0.005			3112	29000			
12 Oct	2354	0019	0037	M1.5	0.022	SF	N24W65	3112			93	
14 Oct	0920	0944	0951	M1.3	0.012			3112				

Flare List

	Time			Optical			
Date	Begin	Max	End	X-ray Class	Imp/ Brtns	Location Lat CMD	Rgn #
10 Oct	B0000	0046	0114	M1.0	1F	N24W26	3112
10 Oct	0223	0241	0255		SF	N27E08	3119
10 Oct	0702	0708	0712	C1.1			3112
10 Oct	0954	1002	1007	C1.2			
10 Oct	1534	1545	1558	C4.9			3115
10 Oct	1605	1628	1647	M2.4	SF	N24W34	3112
10 Oct	1915	1921	1925	C3.2			
10 Oct	2047	2054	2059	C1.5	SF	N28W02	3119
10 Oct	2131	2138	2144	C1.5			3119
10 Oct	2200	2209	2214	C2.1			3111
10 Oct	2312	2321	2325	C3.2			3112
11 Oct	0134	0143	0154	C1.9			
11 Oct	0158	0204	0208	C2.3	SF	N29W03	3119
11 Oct	0328	0343	0353	C2.9			
11 Oct	0836	0842	0846	M3.9	SB	N22W42	3112
11 Oct	1047	1052	1057	M1.5			3112
11 Oct	1245	1254	1305	C1.5			3112
11 Oct	1627	1645	1704	C3.6			3112
11 Oct	1804	1819	1824	C6.1	SF	N24W40	3112
11 Oct	1916	1931	1936	C2.9			3119
11 Oct	2036	2040	2045	C1.1			
11 Oct	2113	2121	2128	C3.9	SF	N30W15	3119
12 Oct	0225	0237	0258	C1.0			
12 Oct	0846	0930	1012	C3.7			3112
12 Oct	1414	1418	1422	C8.8	SN	N25W52	3112

Flare List

Date	Time			Optical			
	Begin	Max	End	X-ray Class	Imp/ Brtns	Location Lat CMD	Rgn #
12 Oct	1428	1432	1438		SF	N25W52	3112
12 Oct	1626	1629	1633	C4.7	SF	N25W53	3112
12 Oct	1924	1928	1935	B8.9			3119
12 Oct	2354	0019	0037	M1.5	SF	N24W65	3112
13 Oct	0148	0206	0222	C3.3			3112
13 Oct	0222	0225	0229	C3.8			3112
13 Oct	0438	0445	0453	C3.5			3119
13 Oct	0750	0755	0759	C1.0			3112
13 Oct	0903	0917	0926	C4.7	SF	N30W34	3119
13 Oct	1132	1138	1143	B8.6			3112
13 Oct	1718	1728	1736	C1.7			3119
13 Oct	2154	2207	2218	C2.2			3112
14 Oct	0125	0132	0142	B9.0			3119
14 Oct	0920	0944	0951	M1.3			3112
15 Oct	0510	0522	0535	C1.0			3112
15 Oct	0725	0736	0750	B7.9			3112
15 Oct	0942	0944	0954		SF	N26W61	3119
15 Oct	1407	1432	1501	C6.1			3112
15 Oct	1424	1426	1431		SF	N25W22	3122
15 Oct	1756	1811	1830	B9.5			3112
16 Oct	0706	0709	0711		SF	S36W30	3124
16 Oct	0718	U0744	0746		SF	S36W30	3124
16 Oct	0755	U0755	A0801		SF	S36W30	3124
16 Oct	0758	0803	0808	B7.9			3119
16 Oct	B0822	U0823	A0827		SF	N26W57	3123
16 Oct	B0918	U0918	A0935		SF	N26W60	3123
16 Oct	B0957	U1007	A1032		SF	N25W60	3123
16 Oct	1430	1436	1442	C1.5	SF	N25W61	3123
16 Oct	1603	1606	1619	C1.8			3123
16 Oct	1909	1924	1943	C1.6			

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 3111												
27 Sep	N27E68	109	100	1	Hax	1	A								
28 Sep	N24E54	109	130	1	Hsx	1	A								
29 Sep	N27E43	108	120	2	Hsx	1	A								
30 Sep	N27E30	108	100	2	Hsx	1	A	2			2				
01 Oct	N28E18	107	90	2	Hsx	3	A	1			1				
02 Oct	N28E04	107	70	2	Hsx	1	A								
03 Oct	N28W08	106	70	2	Hsx	1	A								
04 Oct	N28W21	106	60	2	Hsx	1	A								
05 Oct	N28W33	104	60	2	Hsx	1	A								
06 Oct	N28W47	105	50	1	Hsx	1	A								
07 Oct	N27W61	106	40	1	Hsx	1	A								
08 Oct	N27W73	105	20	1	Hsx	1	A								
09 Oct	N28W86	105	10	1	Axx	1	A								
								3	0	0	3	0	0	0	0

Crossed West Limb.
Absolute heliographic longitude: 107

			Region 3112												
30 Sep	N20E76	62	100	5	Hsx	1	A	8	3						
01 Oct	N22E71	53	560	15	Eki	15	BGD	6							
02 Oct	N23E59	52	750	18	Fki	18	BGD	3	2		8				
03 Oct	N23E46	52	710	24	Fkc	36	BGD	2	2		7	1			
04 Oct	N23E32	53	720	24	Fkc	48	BGD	4			6				
05 Oct	N22E21	50	750	25	Fkc	55	BGD	5			7				
06 Oct	N22E09	49	800	26	Fkc	54	BGD	3			2				
07 Oct	N23W04	49	550	18	Fkc	36	BD	5			2				
08 Oct	N22W16	48	470	16	Fki	32	BGD	3			6				
09 Oct	N22W28	47	400	16	Fki	14	BD	8			6				
10 Oct	N22W41	47	420	12	Eki	31	B	2	2		1	1			
11 Oct	N22W54	45	330	16	Fkc	12	BG	3	2		2				
12 Oct	N25W65	44	280	13	Eki	9	B	3	1		3				
13 Oct	N23W80	46	230	12	Esi	3	B	4			1				
14 Oct	N23W92	45	50	6	Cao	2	B		1						
								65	13	0	51	2	0	0	0

Crossed West Limb.
Absolute heliographic longitude: 49

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 3114												
01 Oct	S33E26	99	30	6	Cao	3	B								
02 Oct	S34E11	100	20	7	Bxo	3	B								
03 Oct	S34W02	100	plage												
04 Oct	S34W16	101	plage												
05 Oct	S34W30	102	plage												
06 Oct	S34W44	103	plage												
07 Oct	S34W58	103	plage												
08 Oct	S34W72	104	plage												
09 Oct	S34W86	105	plage												
								0	0	0	0	0	0	0	0

Crossed West Limb.
Absolute heliographic longitude: 100

			Region 3115												
03 Oct	S18E03	95	60	6	Dao	9	B								
04 Oct	S18W11	96	130	6	Dao	12	B								
05 Oct	S18W24	96	180	8	Dao	8	B								
06 Oct	S18W37	96	120	8	Dso	8	B								
07 Oct	S18W52	97	30	6	Cao	6	B								
08 Oct	S17W66	98	10	2	Axx	2	A				1				
09 Oct	S18W79	98	10	1	Axx	1	A								
								0	0	0	1	0	0	0	0

Crossed West Limb.
Absolute heliographic longitude: 95

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 3116												
03 Oct	N30E54	44	10	13	Bxo	6	B								
04 Oct	N30E40	45	30	8	Cro	9	B								
05 Oct	N29E28	44	60	9	Dai	9	B								
06 Oct	N30E14	45	150	9	Dai	13	B	1			1				
07 Oct	N29W00	45	140	10	Dai	11	B	2	1		1	1			
08 Oct	N30W13	45	150	12	Eai	15	B	3							
09 Oct	N30W25	44	140	11	Eao	10	B								
10 Oct	N30W39	44	210	9	Dao	17	B								
11 Oct	N29W53	45	110	5	Cso	3	B								
12 Oct	N30W54	48	120	3	Cao	2	B								
13 Oct	N29W81	47	110	2	Hax	1	A								
14 Oct	N29W95	47	90	2	Hax	1	A								
								6	1	0	2	1	0	0	0

Crossed West Limb.
Absolute heliographic longitude: 45

			Region 3117												
03 Oct	S11E20	78	20	4	Cro	2	B								
04 Oct	S11E04	81	10	2	Axx	3	A								
05 Oct	S12W10	80	10	2	Bxo	3	B								
06 Oct	S12W23	82	10	1	Hrx	1	A								
07 Oct	S11W39	84	10	1	Axx	1	A								
08 Oct	S11W53	85	plage												
09 Oct	S11W67	86	plage												
10 Oct	S11W81	87	plage												
								0	0	0	0	0	0	0	0

Crossed West Limb.
Absolute heliographic longitude: 81

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 3118												
06 Oct	N09E59	359	10	2	Bxo	2	B								
07 Oct	N09E46	359	20	2	Bxo	3	B								
08 Oct	N08E34	358	20	3	Dro	4	B	1			2				
09 Oct	N08E20	359	30	3	Dro	4	B								
10 Oct	N08E07	358	40	3	Cao	7	B								
11 Oct	N09W06	358	10	2	Bxo	3	B								
12 Oct	N09W19	357	10	1	Axx	1	A								
13 Oct	N09W33	359	plage												
14 Oct	N09W47	360	plage												
15 Oct	N09W61	1	plage												
16 Oct	N09W75	2	plage												
								1	0	0	2	0	0	0	0

Still on Disk.
Absolute heliographic longitude: 358

			Region 3119												
07 Oct	N28E31	14	30	3	Bxo	6	B				2				
08 Oct	N28E19	13	110	7	Dao	9	B	1			1				
09 Oct	N28E07	12	140	8	Dai	12	B	2			4				
10 Oct	N27W08	14	180	9	Dai	27	B	2			2				
11 Oct	N28W18	11	150	10	Dsi	14	B	3			2				
12 Oct	N29W30	9	170	8	Dai	10	B								
13 Oct	N28W43	9	120	8	Dai	9	B	3			1				
14 Oct	N29W56	9	100	7	Dao	5	B								
15 Oct	N29W68	9	30	8	Cso	3	B				1				
16 Oct	N29W82	9	30	5	Cso	3	B								
								11	0	0	13	0	0	0	0

Still on Disk.
Absolute heliographic longitude: 12

			Region 3120												
07 Oct	N20W20	65	30	4	Hax	2	A								
08 Oct	N20W32	64	10	3	Axx	4	A								
09 Oct	N18W40	59	10	2	Axx	2	A								
10 Oct	N18W53	59	10	2	Axx	2	A								
11 Oct	N18W67	60	plage												
12 Oct	N18W81	61	plage												
								0	0	0	0	0	0	0	0

Crossed West Limb.
Absolute heliographic longitude: 65

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 3121												
13 Oct	N23E54	272	20	5	Bxo	4	B								
14 Oct	N24E41	272	20	6	Bxo	3	B								
15 Oct	N24E31	269	10	1	Axx	1	A								
16 Oct	N24E17	270	plage												
								0	0	0	0	0	0	0	0

Still on Disk.
Absolute heliographic longitude: 270

			Region 3122												
15 Oct	N25W29	329	30	3	Cro	4	B				1				
16 Oct	N25W43	330	20	7	Cro	5	B								
								0	0	0	1	0	0	0	0

Still on Disk.
Absolute heliographic longitude: 329

			Region 3123												
15 Oct	N27W54	354	10	3	Bxo	2	B								
16 Oct	N27W68	355	30	4	Cao	6	B	2			4				
								2	0	0	4	0	0	0	0

Still on Disk.
Absolute heliographic longitude: 354

			Region 3124												
16 Oct	S36W42	329	30	8	Dro	5	B				3				
								0	0	0	3	0	0	0	0

Still on Disk.
Absolute heliographic longitude: 329

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

Published every Monday by the Space Weather Prediction Center.

U.S. Department of Commerce
NOAA / National Weather Service
Space Weather Prediction Center
325 Broadway, Boulder CO 80305

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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