Space Weather Highlights
16 October - 22 October 2023

SWPC PRF 2512
23 October 2023

Solar activity was at low levels on 16-17 and 19-21 Oct with C-class flare activity observed. Very low levels were observed on 18 and 22 Oct with only B-class flares registered. Three CMEs were identified to be likely glancing-blow arrivals this period. The first CME resulted from a C7.5 flare at 16/1051 UTC from Region 3467 (N13, L=106, class/area=Axx/10 on 16 Oct), with the CME first visible in LASCO C2 imagery off the ENE at 16/1148 UTC. Model analysis indicated a glancing blow arrival on 19 Oct. The second CME of note was associated with a C2.2 flare at 17/0505 UTC from Region 3463 (S18, L=179, class/area=Axx/10 on 16 Oct), with the CME first visible in C2 data at 17/0548 UTC off the SW. The second CME was analyzed as a glancing-blow likely to arrive on 20 Oct. The final CME was associated with an episode of EUV dimming just north of Region 3468 (S11, L=079, class/area=Hax/130 on 17 Oct) at 18/0545 UTC, with the CME first visible in C2 off the SE at 18/0612 UTC. This third CME was modeled as a likely glancing-blow arrival on 21 Oct. Clear CME influences were observed over 20-22 Oct, though individual CME arrival timing was impossible to discern in the solar wind data.

No proton events were observed at geosynchronous orbit.

The greater than 2 MeV electron flux at geosynchronous orbit was at normal to moderate levels throughout the summary period.

Geomagnetic field activity began the period at quiet levels on 16-17 Oct. Positive polarity CH HSS influences produced quiet to unsettled levels on 18 Oct, and quiet to active levels on 19 Oct. One or more of the above-mentioned CMEs were detected in the solar wind data over 20-22 Oct, resulting in quiet and unsettled levels on 20 Oct, quiet to G1 (Minor) storm levels on 21 Oct, and quiet to unsettled levels on 22 Oct.

Space Weather Outlook
23 October - 18 November 2023

Solar activity is expected to range from very low to low levels throughout the period with a chance for R1-R2 (Minor-Moderate) events over 24 Oct-11 Nov.

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 28 Oct-02 Nov, with normal to moderate levels expected throughout the remainder of the period.

Geomagnetic field activity is expected to reach active levels on 27 Oct, 01 and 09 Nov in response to recurrent CH HSS features. Quiet and quiet to unsettled levels are expected to persist throughout the remainder of the period.

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 October	144	106	430	B6.2	7	0	0	3	0	0	0	0
17 October	137	57	440	B5.8	2	0	0	3	0	0	0	0
18 October	135	54	330	B4.8	0	0	0	0	0	0	0	0
19 October	129	39	220	B4.9	8	0	0	1	0	0	0	0
20 October	126	56	180	B4.4	5	0	0	1	0	0	0	0
21 October	123	65	160	B4.1	2	0	0	0	0	0	0	0
22 October	119	48	90	B4.4	0	0	0	0	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
16 October	2.6e+05	1.9e+04	1.6e+06
17 October	4.1e+05	1.9e+04	2.1e+06
18 October	2.4e+05	1.8e+04	1.7e+06
19 October	9.7e+04	1.8e+04	1.3e+06
20 October	3.4e+05	2.0e+04	1.9e+06
21 October	2.7e+05	1.8e+04	1.2e+06
22 October	1.2e+05	1.8e+04	1.8e+06

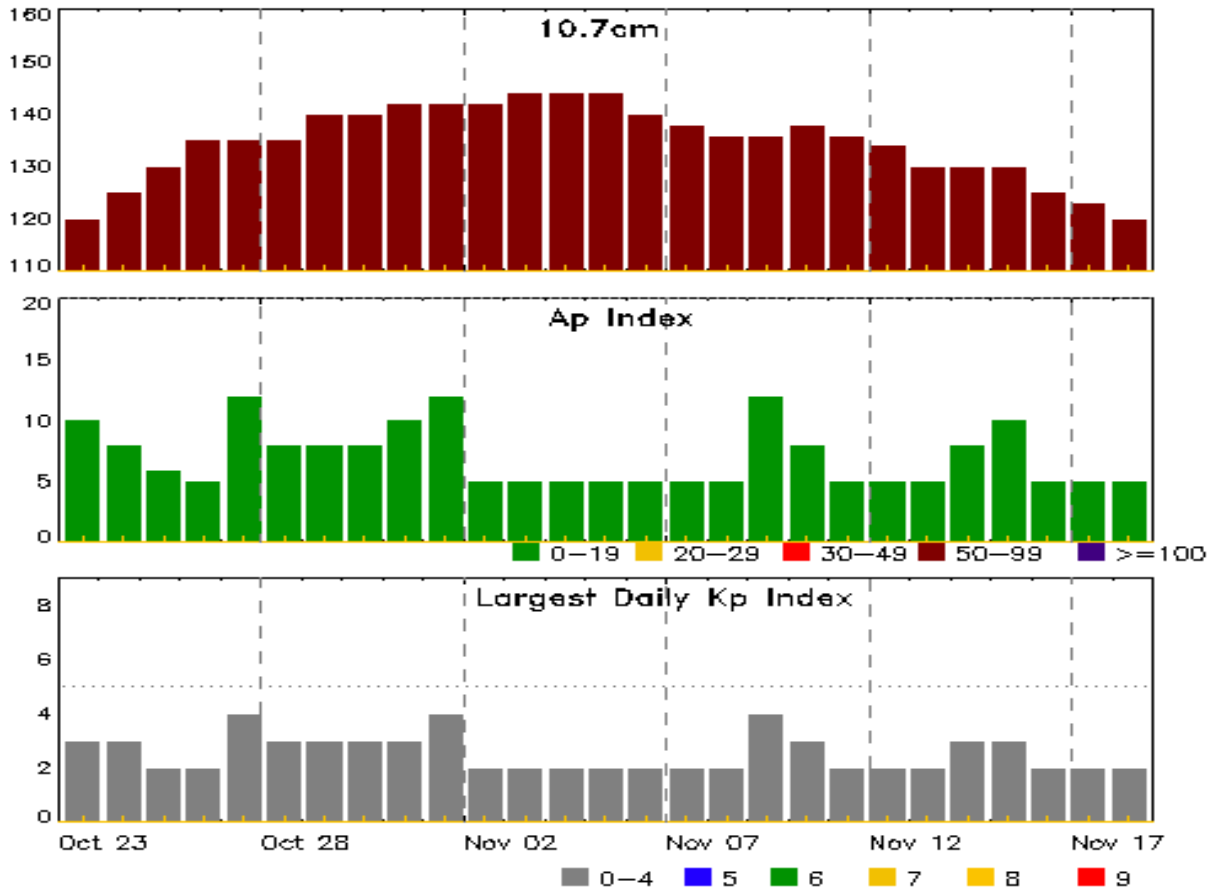
Daily Geomagnetic Data

Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
16 October	3	2-0-1-1-2-1-0-0	0	0-0-0-0-0-0-0-0	4	2-0-1-1-1-1-0-0
17 October	2	0-0-0-0-2-1-1-1	0	0-0-0-0-0-0-0-0	3	1-0-1-1-1-0-0-1
18 October	8	0-2-2-2-3-3-2-2	12	0-1-0-3-5-4-1-1	9	0-2-1-2-3-3-2-2
19 October	8	2-3-2-3-2-1-1-1	24	2-4-4-6-3-4-2-1	10	3-4-2-3-2-2-2-1
20 October	8	2-2-2-2-2-1-2-3	10	1-1-3-4-3-1-1-2	8	1-2-2-2-2-1-2-3
21 October	13	3-3-4-4-2-2-1-1	39	3-5-6-6-4-5-2-2	22	4-5-5-3-3-3-2-1
22 October	7	2-1-2-2-1-2-3-1	17	1-1-4-5-4-3-2-2	9	2-2-2-2-1-2-3-2

Alerts and Warnings Issued

Date & Time of Issue UTC	Type of Alert or Warning	Date & Time of Event UTC
17 Oct 1700	WATCH: Geomagnetic Storm Category G1 predicted	
19 Oct 0410	WARNING: Geomagnetic K = 4	19/0409 - 0900
19 Oct 0604	ALERT: Geomagnetic K = 4	19/0559
21 Oct 0135	WARNING: Geomagnetic K = 4	21/0135 - 1200
21 Oct 0239	ALERT: Geomagnetic K = 4	21/0238
21 Oct 0422	WARNING: Geomagnetic K = 5	21/0421 - 1200
21 Oct 0543	ALERT: Geomagnetic K = 5	21/0540
21 Oct 0808	ALERT: Geomagnetic K = 5	21/0804
21 Oct 1134	EXTENDED WARNING: Geomagnetic K = 4	21/0135 - 1800
21 Oct 1709	EXTENDED WARNING: Geomagnetic K = 4	21/0135 - 22/0300

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 Oct	120	10	3	06 Nov	140	5	2
24	125	8	3	07	138	5	2
25	130	6	2	08	136	5	2
26	135	5	2	09	136	12	4
27	135	12	4	10	138	8	3
28	135	8	3	11	136	5	2
29	140	8	3	12	134	5	2
30	140	8	3	13	130	5	2
31	142	10	3	14	130	8	3
01 Nov	142	12	4	15	130	10	3
02	142	5	2	16	125	5	2
03	144	5	2	17	123	5	2
04	144	5	2	18	120	5	2
05	144	5	2				

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 #
16 Oct	0247	0255	0301	B9.1	SF	S11W68	3460
16 Oct	0345	0353	0401	C1.8			3464
16 Oct	0723	0728	0732	C1.1			
16 Oct	0732	0739	0743	C1.1			
16 Oct	1032	1051	1107	C7.5			3467
16 Oct	1107	1115	1122	C4.9			3467
16 Oct	1559	1606	1611	C9.8			
16 Oct	2006	2021	2032	C1.8	SF	S15W68	3460
16 Oct	2341	2341	2343		SF	N15E03	3465
17 Oct	0203	0210	0215	C1.6	SF	N10E06	3465
17 Oct	0441	0505	0547	C2.2			3463
17 Oct	1358	1404	1406		SF	S16W38	3463
17 Oct	2013	2013	2024		SF	N16E29	3467
18 Oct	0954	1000	1008	B7.3			
19 Oct	0127	0133	0137	B9.5			
19 Oct	0145	0152	0159	C1.5			
19 Oct	0824	0828	0832	B7.8			
19 Oct	0839	0846	0855	C1.2			
19 Oct	0944	0952	0955	C1.4			3463
19 Oct	0955	1000	1005	C1.7			
19 Oct	1202	1211	1216	C1.4			3463
19 Oct	1338	1345	1352	B7.3			
19 Oct	1352	1400	1412	C2.7			
19 Oct	1752	1803	1809	C1.1	SF	N13W30	3465
19 Oct	2047	2106	2130	C1.4			
20 Oct	0211	0239	0322	C1.4			
20 Oct	0420	0500	0524	C2.2			
20 Oct	0931	0953	1026	C1.3			
20 Oct	1100	1114	1137	C1.7			
20 Oct	1911	1915	1924		SF	S07E20	3468
20 Oct	2224	2231	2240	B8.3			

Flare List

Date	Time			Optical			
	Begin	Max	End	X-ray Class	Imp/ Brtns	Location Lat CMD	Rgn #
20 Oct	2303	2309	2315	B6.2			3467
20 Oct	2315	2330	2339	C2.3			3467
21 Oct	0000	0030	0059	C2.8			3467
21 Oct	1202	1210	1217	C1.5			3464
21 Oct	1807	1817	1825	B7.0			3464
22 Oct	0452	0507	0518	B9.2			3464

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 3457													
04 Oct	S11E62	246	30	1	Hrx	1	A								
05 Oct	S10E47	247	30	1	Hrx	1	A	1			2				
06 Oct	S12E38	243	20	1	Hrx	1	A								
07 Oct	S11E24	244	20	1	Hrx	1	A								
08 Oct	S11E11	244	20	1	Hrx	1	A								
09 Oct	S11W03	245	5	1	Axx	1	A				1				
10 Oct	S11W17	245	plage												
11 Oct	S11W31	246	plage												
12 Oct	S11W45	247	plage												
13 Oct	S11W59	248	plage												
14 Oct	S11W73	249	plage												
15 Oct	S11W87	249	plage												
								1	0	0	3	0	0	0	0

Crossed West Limb.
Absolute heliographic longitude: 245

		Region 3459													
05 Oct	N10E65	229	10	1	Axx	2	A								
06 Oct	N08E60	221	20	5	Cro	5	B								
07 Oct	N07E44	224	20	3	Cro	3	B								
08 Oct	N07E31	224	10	1	Axx	1	A								
09 Oct	N07E17	225	plage								1				
10 Oct	N07E02	226	plage												
11 Oct	N07W12	227	plage												
12 Oct	N07W26	228	plage												
13 Oct	N07W41	230	plage												
14 Oct	N07W56	232	plage												
15 Oct	N07W71	233	plage												
16 Oct	N07W86	235	plage												
								0	0	0	1	0	0	0	0

Crossed West Limb.
Absolute heliographic longitude: 226

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 3460													
07 Oct	S11E35	233	10	2	Axx	2	A	1	1						
08 Oct	S10E23	232	80	7	Dai	15	BG	3			6				
09 Oct	S09E09	233	120	9	Dai	18	BG	3			10				
10 Oct	S10W06	234	140	9	Dai	18	BGD	1			2				
11 Oct	S10W20	235	110	10	Dai	11	BG	1							
12 Oct	S11W31	233	120	10	Dao	11	BG	1							
13 Oct	S10W44	233	90	9	Dao	9	BG	1			5				
14 Oct	S10W57	233	90	9	Dao	5	BG	1			1				
15 Oct	S10W70	232	90	6	Cao	5	B				1				
16 Oct	S10W87	235	30	2	Hsx	1	A	1			2				
								13	1	0	27	0	0	0	0

Crossed West Limb.
Absolute heliographic longitude: 234

		Region 3461													
08 Oct	N12E40	215	20	1	Bxo	2	B								
09 Oct	N11E26	216	5	1	Axx	1	A								
10 Oct	N12E11	217	5	1	Axx	1	A								
11 Oct	N11W02	217	20	3	Cro	3	B								
12 Oct	N13W16	218	10	2	Bxo	2	B								
13 Oct	N13W30	219	plage												
14 Oct	N13W44	220	plage												
15 Oct	N13W58	220	plage												
16 Oct	N13W72	221	plage												
17 Oct	N13W86	222	plage												
								0	0	0	0	0	0	0	0

Crossed West Limb.
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 3462												
08 Oct	N22E62	193	10	1	Axx	1	A								
09 Oct	N19E48	194	5	1	Axx	1	A								
10 Oct	N18E35	193	40	3	Cao	6	B				1				
11 Oct	N23E22	193	70	4	Dao	8	B								
12 Oct	N19E10	192	50	5	Cao	8	B								
13 Oct	N19W02	191	20	2	Hrx	2	A								
14 Oct	N20W13	189	10	1	Axx	1	A								
15 Oct	N20W27	189	plage												
16 Oct	N20W41	190	plage												
17 Oct	N20W55	191	plage												
18 Oct	N20W69	192	plage												
19 Oct	N20W83	193	plage												
								0	0	0	1	0	0	0	0

Crossed West Limb.
Absolute heliographic longitude: 191

			Region 3463												
09 Oct	S17E62	180	10	2	Hrx	1	A								
10 Oct	S17E47	181	40	3	Cao	3	B								
11 Oct	S17E33	182	50	4	Dai	7	B								
12 Oct	S17E20	182	70	4	Dai	12	B								
13 Oct	S17E07	182	40	5	Cao	6	B								
14 Oct	S17W05	181	20	5	Cro	5	B								
15 Oct	S18W17	179	10	7	Bxo	4	B				1				
16 Oct	S17W30	179	10	9	Axx	12	A								
17 Oct	S17W44	180	plage					1			1				
18 Oct	S17W58	181	plage												
19 Oct	S17W72	182	plage					2							
20 Oct	S17W86	182	plage												
								3	0	0	2	0	0	0	0

Crossed West Limb.
Absolute heliographic longitude: 181

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 3464												
10 Oct	N04E63	165	30	3	Cro	4	B	3			3	1			
11 Oct	N04E50	165	80	4	Cao	6	BG	2			2				
12 Oct	N04E36	166	90	7	Cao	6	BG	1			5				
13 Oct	N04E22	167	70	7	Cao	8	B				1				
14 Oct	N04E09	167	80	7	Cao	5	B								
15 Oct	N04W06	168	100	4	Cao	5	B	1			2				
16 Oct	N04W19	167	100	7	Cso	9	B	1							
17 Oct	N04W33	169	90	6	Cso	7	B								
18 Oct	N04W46	169	80	2	Cso	3	B								
19 Oct	N04W62	172	70	2	Hsx	1	A								
20 Oct	N04W75	171	50	2	Hsx	1	A								
21 Oct	N03W90	173	30	1	Hsx	1	A	1							
								9	0	0	13	1	0	0	0

Crossed West Limb.
Absolute heliographic longitude: 168

			Region 3465												
11 Oct	N10E69	146	120	4	Dso	3	B								
12 Oct	N10E56	146	180	3	Hsx	3	A								
13 Oct	N10E43	146	200	3	Hsx	3	A	2			2				
14 Oct	N10E30	146	220	3	Hax	3	A				1				
15 Oct	N10E15	147	240	3	Hax	6	A								
16 Oct	N11E03	145	190	6	Hax	6	A				1				
17 Oct	N10W10	146	220	5	Cao	19	B	1			1				
18 Oct	N11W22	145	140	7	Cao	18	B								
19 Oct	N12W37	147	80	4	Hax	7	A	1			1				
20 Oct	N12W50	145	30	4	Hrx	7	A								
21 Oct	N12W64	147	plage												
22 Oct	N12W78	148	plage												
								4	0	0	6	0	0	0	0

Still on Disk.
Absolute heliographic longitude: 145

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 3466												
11 Oct	N09E05	210	30	4	Cro	6	B								
12 Oct	N09W09	211	20	4	Cao	3	B								
13 Oct	N09W22	211	20	4	Cao	3	B				3				
14 Oct	N09W36	212	30	4	Cao	6	B								
15 Oct	N08W49	211	30	6	Cao	7	B								
16 Oct	N08W62	210	10	7	Bxo	5	B								
17 Oct	N08W76	212	plage												
18 Oct	N08W90	213	plage												
								0	0	0	3	0	0	0	0

Crossed West Limb.
Absolute heliographic longitude: 210

			Region 3467												
13 Oct	N12E82	108	plage					2							
14 Oct	N12E66	110	40	6	Cao	5	B	1							
15 Oct	N13E53	109	40	7	Cao	5	B	1							
16 Oct	N13E42	106	10	3	Axx	2	A	2							
17 Oct	N13E28	108	plage								1				
18 Oct	N14E14	109	plage												
19 Oct	N14W00	110	plage												
20 Oct	N14W14	110	plage					1							
21 Oct	N14W26	109	10	1	Axx	2	A	1							
22 Oct	N14W40	110	plage												
								8	0	0	1	0	0	0	0

Still on Disk.
Absolute heliographic longitude: 110

			Region 3468												
16 Oct	S09E69	79	80	2	Hax	1	A								
17 Oct	S11E56	79	130	1	Hax	1	A								
18 Oct	S10E42	80	110	1	Hsx	3	A								
19 Oct	S10E29	81	70	2	Hsx	1	A								
20 Oct	S10E15	80	70	2	Hsx	2	A				1				
21 Oct	S10E01	82	70	2	Hsx	1	A								
22 Oct	S09W10	80	60	3	Hsx	2	A								
								0	0	0	1	0	0	0	0

Still on Disk.
Absolute heliographic longitude: 82

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 3469												
20 Oct	N27W37	133	30	4	Dro	6	B								
21 Oct	N27W51	134	30	6	Dro	6	B								
22 Oct	N27W63	133	10	5	Bxo	3	B								
								0	0	0	0	0	0	0	0

Still on Disk.
Absolute heliographic longitude: 133

			Region 3470												
21 Oct	N24E16	67	20	3	Cro	5	B								
22 Oct	N26E03	65	10	2	Axx	2	A								
								0	0	0	0	0	0	0	0

Still on Disk.
Absolute heliographic longitude: 65

			Region 3471												
22 Oct	S22E19	50	10		Axx	1	A								
								0	0	0	0	0	0	0	0

Still on Disk.
Absolute heliographic longitude: 50

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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