Space Weather Highlights **SWPC PRF 2505**
28 August - 03 September 2023 **04 September 2023**

Solar activity ranged from low to high levels. Low levels were observed on 28-31 Aug. Moderate levels occurred on 01 Sep due to a long duration M1.2 flare (R1/Minor) at 01/0351 UTC with associated Type II (743 km/s) and Type IV radio sweeps as well as a 190 sfu Tenflare. Moderate levels also occurred on 02 Sep due to an M3.3/Sf at 02/0712 UTC. Solar activity increased to high levels on 03 Sep due to an M1.1 at 03/0023 UTC and an M6.0 (R2/Moderate) at 03/0836 UTC. All flares were from Region 3413 (N11, L=100, class/area Dki/400 on 25 Aug). Other activity included a filament eruption centered near N22W14 beginning at 30/2015 UTC. An associated partial-halo CME was observed at 30/2200 UTC in SOHO/LASCO C2 imagery. Modelling of this CME showed a potential arrival late on 02 Sep to early on 03 Sep. Another CME associated with the aforementioned M1.2 flare on 01 Sep was modelled with the potential for a glancing impact on 05 Sep.

A greater than 10 MeV proton event was observed associated with the M1.2 flare on 01 Sep. The event reached the 10 pfu (S1/Minor) threshold at 01/0430 UTC, reached a maximum flux of 25.8 pfu at 01/0610 UTC, and ended at 01/2010 UTC.

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

Geomagnetic field activity ranged from quiet to G2 (Moderate) levels. Nominal solar wind conditions prevailed through approximately 31/1630 UTC when an increase in total field to 12 nT was observed as well as an increase in speed from 323 to 400 km/s. A further increase in solar wind speed to near 540 km/s happened after 01/1755 UTC, followed by a decrease in solar wind speed beginning after 02/2125 UTC. Total field ranged from 5-10 nT during this time with prolonged periods of southward Bz. This was likely the result of a combination of positive polarity coronal hole high speed stream (CH HSS) activity and the arrival of the 30 Aug CME. The geomagnetic field responded with quiet conditions on 28-31 Aug, quiet to unsettled conditions on 01 Sep, unsettled to G1 (Minor) storming on 02 Sep, and quiet to G2 (Moderate) storming on 03 Sep.

Space Weather Outlook
04 September - 30 September 2023

Solar activity is expected to be at low levels on 04-14 Sep and again on 29-30 Sep. There is a chance for M-class flaring (R1-R2/Minor-Moderate) on 15-28 Sep with the return of Region 3413 to the visible disk.

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 04-10 Sep due to CH HSS influence.

Geomagnetic field activity is expected to be at unsettled to active levels on 04-08 Sep, 14-18

Sep, 23 Sep, and on 28-30 Sep due to CH HSS activity. There is a chance for a glancing blow from the 01 Sep CME to impact the geomagnetic field on 05 Sep.

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
28 August	142	68	650	B5.9	7	0	0	2	0	0	0	0
29 August	142	82	640	B5.8	7	0	0	4	0	0	0	0
30 August	139	94	700	B6.0	4	0	0	3	1	0	0	0
31 August	140	77	650	B6.0	3	0	0	0	0	0	0	0
01 September	136	83	580	B6.0	3	1	0	2	0	0	0	0
02 September	131	77	370	B6.3	3	1	0	3	0	0	0	0
03 September	131	79	230	B7.0	8	2	0	2	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
28 August	3.1e+04	1.8e+04	5.5e+06
29 August	3.5e+04	1.8e+04	2.6e+06
30 August	5.8e+04	1.8e+04	1.5e+06
31 August	2.3e+05	1.8e+04	1.2e+06
01 September	2.4e+07	9.9e+05	1.3e+06
02 September	2.0e+07	1.6e+05	5.0e+06
03 September	9.2e+05	2.7e+04	1.9e+07

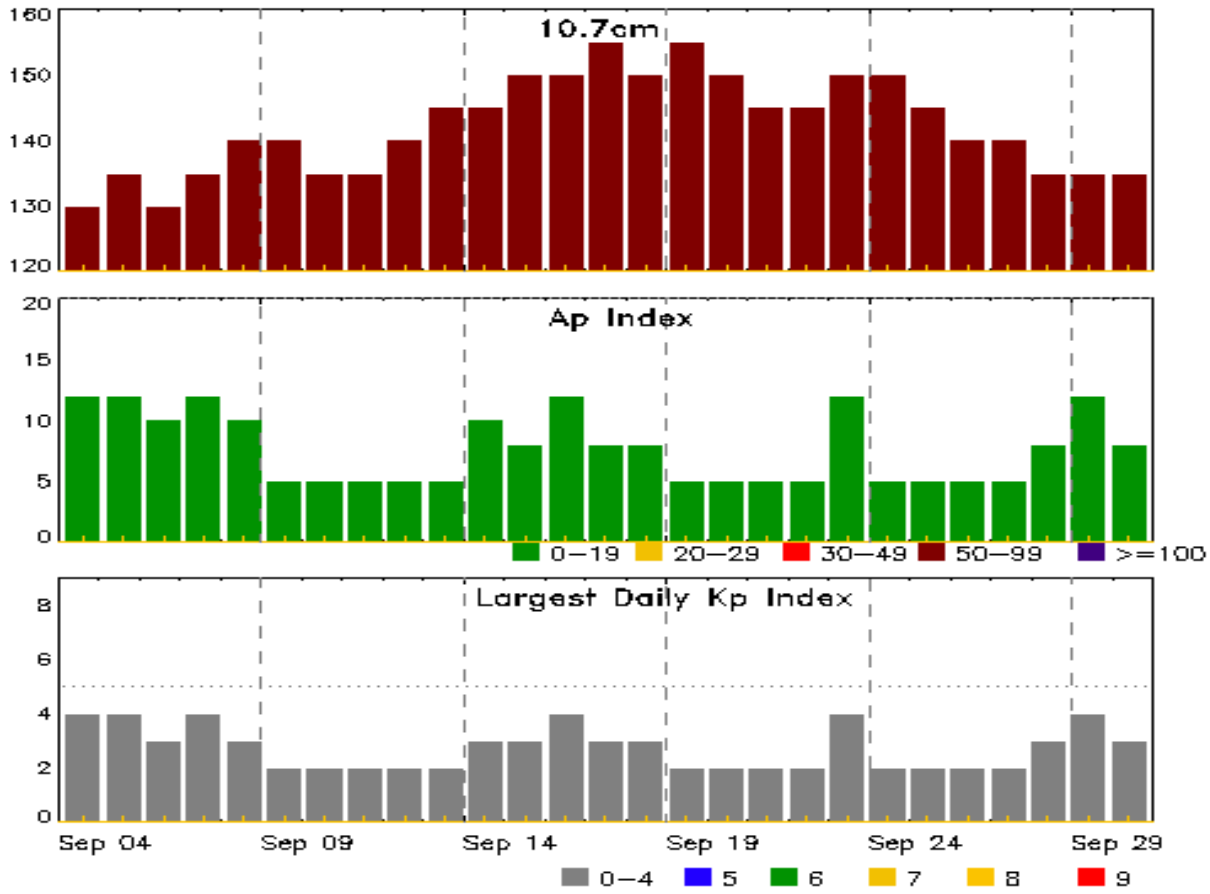
Daily Geomagnetic Data

Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
28 August	8	2-2-2-3-2-2-2-1	17	1-3-5-5-3-2-1-0	6	2-2-2-2-2-2-2-1
29 August	7	2-1-1-2-3-1-2-2	6	0-0-0-4-3-1-1-1	5	1-1-1-2-2-1-1-2
30 August	9	2-2-1-3-3-1-3-1	7	1-1-1-3-3-2-1-1	6	2-1-1-2-2-1-2-1
31 August	8	1-2-2-3-2-2-2-2	10	1-2-3-5-0-1-1-1	6	1-2-2-2-1-1-2-2
01 September	15	2-3-3-4-4-2-2-3	27	2-3-4-6-4-5-2-2	12	3-3-3-3-3-2-3-2
02 September	25	3-4-3-4-5-3-4-4	59	3-3-7-6-6-6-3-5	38	3-4-5-5-5-4-4-5
03 September	28	5-3-5-4-4-4-3-3	28	5-4-5-5-4-3-2-2	67	6-3-5-4-3-3-2-3

Alerts and Warnings Issued

Date & Time of Issue UTC	Type of Alert or Warning	Date & Time of Event UTC
31 Aug 2116	WATCH: Geomagnetic Storm Category G1 predicted	
01 Sep 0336	SUMMARY: 10cm Radio Burst	01/0307 - 0319
01 Sep 0344	ALERT: Type II Radio Emission	01/0308
01 Sep 0345	ALERT: Type IV Radio Emission	01/0303
01 Sep 0419	WARNING: Proton 10MeV Integral Flux > 10pfu	01/0425 - 2359
01 Sep 0446	ALERT: Proton Event 10MeV Integral Flux >= 10pfu	01/0430
02 Sep 0326	SUMMARY: Proton Event 10MeV Integral Flux >= 10pfu	01/0430 - 2010
02 Sep 0329	WARNING: Geomagnetic K = 4	02/0328 - 2359
02 Sep 0404	ALERT: Geomagnetic K = 4	02/0400
02 Sep 0706	WARNING: Geomagnetic K = 5	02/0705 - 1800
02 Sep 0737	SUMMARY: 10cm Radio Burst	02/0704 - 0719
02 Sep 0813	ALERT: Geomagnetic K = 5	02/0810
02 Sep 1216	ALERT: Geomagnetic K = 5	02/1159
02 Sep 1502	ALERT: Geomagnetic K = 5	02/1459
02 Sep 1755	EXTENDED WARNING: Geomagnetic K = 5	02/0705 - 03/0900
02 Sep 1755	EXTENDED WARNING: Geomagnetic K = 4	02/0328 - 03/1200
02 Sep 2156	ALERT: Geomagnetic K = 5	02/2155
03 Sep 0150	ALERT: Geomagnetic K = 5	03/0149
03 Sep 0151	WARNING: Geomagnetic K = 6	03/0150 - 0900
03 Sep 0302	ALERT: Geomagnetic K = 6	03/0259
03 Sep 0842	ALERT: X-ray Flux exceeded M5	03/0842
03 Sep 0902	ALERT: Geomagnetic K = 5	03/0859
03 Sep 0916	SUMMARY: X-ray Event exceeded M5	03/0809 - 0846
03 Sep 1112	EXTENDED WARNING: Geomagnetic K = 4	02/0328 - 03/2359
03 Sep 2336	EXTENDED WARNING: Geomagnetic K = 4	02/0328 - 04/0900

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
04 Sep	130	12	4	18 Sep	150	8	3
05	135	12	4	19	155	5	2
06	130	10	3	20	150	5	2
07	135	12	4	21	145	5	2
08	140	10	3	22	145	5	2
09	140	5	2	23	150	12	4
10	135	5	2	24	150	5	2
11	135	5	2	25	145	5	2
12	140	5	2	26	140	5	2
13	145	5	2	27	140	5	2
14	145	10	3	28	135	8	3
15	150	8	3	29	135	12	4
16	150	12	4	30	135	8	3
17	155	8	3				

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
01 Sep	0254	0351	0447	M1.2	0.067				3413	190	2	2
02 Sep	0633	0712	0738	M3.3	0.075	SF	N10	W82	3413	230		
03 Sep	0014	0023	0033	M1.1	0.009				3413			
03 Sep	0809	0836	0849	M6.0	0.064				3413			

Flare List

	Time			Optical			
Date	Begin	Max	End	X-ray Class	Imp/ Brtns	Location Lat CMD	Rgn #
28 Aug	0005	0007	0010		SF	S08E08	3415
28 Aug	0354	0402	0407	C1.0			
28 Aug	0817	0824	0831	B9.1			3417
28 Aug	1213	1213	1216		SF	N09W21	3413
28 Aug	1642	1650	1659	C1.4			
28 Aug	2119	2128	2144	C1.3			
28 Aug	2207	2215	2236	C1.2			
28 Aug	2236	2246	2253	C1.1			
28 Aug	2300	2306	2312	C1.5			3417
28 Aug	2354	2359	0005	C2.3			
29 Aug	0007	0012	0022	C1.9			
29 Aug	0239	0245	0300	C1.1			3413
29 Aug	0415	0421	0426	C1.6	SF	N09W19	3413
29 Aug	0426	0436	0444	C1.4			3417
29 Aug	0634	0642	0650	C2.1			
29 Aug	0815	0824	0835	B9.7			
29 Aug	0942	0946	0949	B8.7			
29 Aug	1600	1604	1608	C1.0			
29 Aug	2254	2258	2313		SF	S07E67	3417
29 Aug	2317	2327	2346	C3.9	SF	S10E68	3417
29 Aug	2321	2321	2335		SF	S10W15	3415
30 Aug	0407	0419	0428	C1.7	SF	S08E60	3417
30 Aug	0824	0830	0837	B8.4			
30 Aug	1628	1641	1657	C2.8	SF	S08W23	3415
30 Aug	1738	1746	1754	C1.5	SF	N06W46	3413
30 Aug	2316	2326	2340	C3.0	1F	N05W49	3413
31 Aug	0501	0613	0735	C2.4			3413

Flare List

Date	Time			Optical			
	Begin	Max	End	X-ray Class	Imp/ Brtns	Location Lat CMD	Rgn #
31 Aug	1745	1753	1803	C1.2			3413
31 Aug	2307	2318	2332	C1.0			3413
01 Sep	0203	0215	0220	C1.1			3413
01 Sep	0254	0351	0447	M1.2			3413
01 Sep	0552	0638	0646		SF	N09W21	3413
01 Sep	0622	0626	0657		SF	S08W55	3415
01 Sep	1507	1514	1519	B9.9			
01 Sep	2019	2027	2035	C1.0			
01 Sep	2035	2038	2042	B9.3			
01 Sep	2148	2224	2233	C7.3			
02 Sep	0633	0712	0738	M3.3	SF	N10W82	3413
02 Sep	1131	1136	1142	B9.3			3417
02 Sep	1134	1135	1137		SF	N13W84	3413
02 Sep	1410	U1411	A1413		SF	N07W83	3413
02 Sep	1631	1640	1644	C2.1			3413
02 Sep	1954	1959	2014	C1.2			3413
02 Sep	2232	2241	2249	C1.3			3413
03 Sep	0002	0011	0014	C1.3			3413
03 Sep	0014	0023	0033	M1.1			3413
03 Sep	0058	0104	0109	C1.5			3413
03 Sep	0225	0232	0238	C1.0			3413
03 Sep	0400	0410	0414	C1.8			3413
03 Sep	0518	0623	0712	C5.9			3413
03 Sep	0707	0708	0715		SF	S07E08	3417
03 Sep	0809	0836	0849	M6.0			3413
03 Sep	1131	1145	1203	C5.0			3413
03 Sep	1203	1228	1252	C5.7			3413
03 Sep	1846	1857	1916		SF	S20E21	
03 Sep	1957	2005	2013	C1.1			3417

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 3411													
17 Aug	N14E54	167	70	2	Hsx	1	A								
18 Aug	N15E35	173	30	2	Hsx	1	A								
19 Aug	N13E22	171	50	4	Hsx	2	A								
20 Aug	N13E10	171	50	2	Hsx	1	A								
21 Aug	N13W03	170	60	2	Hsx	1	A								
22 Aug	N12W16	171	40	2	Hsx	1	A								
23 Aug	N14W28	169	40	3	Hsx	1	A								
24 Aug	N13W43	171	50	1	Hsx	1	A								
25 Aug	N14W56	172	50	2	Hsx	1	A								
26 Aug	N14W71	173	40	2	Hsx	1	A								
27 Aug	N14W84	173	40	2	Hsx	1	A								
								0	0	0	0	0	0	0	0

Crossed West Limb.
Absolute heliographic longitude: 170

		Region 3412													
18 Aug	N32E72	136	60	2	Hsx	1	A								
19 Aug	N30E58	136	40	1	Hsx	1	A								
20 Aug	N30E44	137	40	2	Hsx	1	A								
21 Aug	N30E34	134	70	2	Hsx	1	A								
22 Aug	N31E20	135	60	2	Hsx	1	A								
23 Aug	N30E08	133	50	2	Hsx	1	A								
24 Aug	N10W07	136	60	2	Hsx	1	A								
25 Aug	N31W20	135	60	2	Hsx	1	A								
26 Aug	N31W35	137	60	2	Hsx	1	A								
27 Aug	N31W47	136	60	2	Hsx	1	A								
28 Aug	N31W57	133	40	1	Hsx	1	A								
29 Aug	N30W67	130	30	1	Hsx	1	A								
30 Aug	N30W78	127	30	1	Hsx	1	A								
								0	0	0	0	0	0	0	0

Crossed West Limb.
Absolute heliographic longitude: 136

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 3413												
21 Aug	N10E73	94	150	3	Hsx	1	A	1			2				
22 Aug	N09E60	95	200	6	Hsx	3	A	1			1				
23 Aug	N10E46	95	280	17	Fho	6	B	3			3				
24 Aug	N11E33	95	330	11	Eki	15	B	1			3				
25 Aug	N11E16	100	400	7	Dki	8	B				1				
26 Aug	N12E01	101	250	7	Dko	6	B	1			1				
27 Aug	N10W13	102	260	7	Dki	12	B								
28 Aug	N10W25	101	280	6	Dki	8	BG				1				
29 Aug	N09W36	98	230	5	Dao	14	B	2			1				
30 Aug	N09W48	97	230	4	Dao	14	B	2			1	1			
31 Aug	N09W62	98	280	5	Dkc	12	B	3							
01 Sep	N10W76	99	260	5	Dkc	12	B	1	1		1				
02 Sep	N10W89	99	150	5	Dso	5	B	3	1		3				
								18	2	0	18	1	0	0	0

Crossed West Limb.
Absolute heliographic longitude: 101

			Region 3414												
21 Aug	S09E32	135	20	2	Cro	5	B								
22 Aug	S08E19	136	10	1	Axx	4	A								
23 Aug	S11E05	136	10	2	Axx	2	A								
24 Aug	S07W07	135	plage												
25 Aug	S10W23	138	plage												
26 Aug	S10W37	139	plage												
27 Aug	S10W51	140	plage												
28 Aug	S10W65	141	plage												
29 Aug	S10W79	142	plage												
								0	0	0	0	0	0	0	0

Crossed West Limb.
Absolute heliographic longitude: 136

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 3415													
22 Aug	S09E74	81	240	5	Hax	1	A								
23 Aug	S11E62	79	350	10	Dho	3	B								
24 Aug	S09E49	79	350	5	Dko	4	B								
25 Aug	S09E35	79	270	5	Dko	4	BD		1			1			
26 Aug	S10E20	82	200	5	Dao	5	BD				1				
27 Aug	S10E06	83	200	4	Dao	4	BD								
28 Aug	S09W07	83	250	5	Dko	5	BD				1				
29 Aug	S10W19	80	190	4	Dao	8	BG				1				
30 Aug	S09W31	80	210	5	Dao	10	B	1			1				
31 Aug	S09W44	80	200	5	Dao	5	B								
01 Sep	S09W57	80	190	5	Dao	4	B				1				
02 Sep	S09W70	80	120	4	Dso	2	B								
03 Sep	S09W83	80	120	4	Cso	2	B								
								1	1	0	5	1	0	0	0

Still on Disk.
Absolute heliographic longitude: 83

		Region 3416													
25 Aug	S19E71	44	30	2	Hsx	1	A	1							
26 Aug	S19E52	50	30	2	Hsx	1	A								
27 Aug	S19E38	51	50	2	Hsx	1	A								
28 Aug	S19E28	48	30	1	Hsx	1	A								
29 Aug	S20E18	45	50	1	Hsx	1	A								
30 Aug	S18E06	42	50	1	Hsx	1	A								
31 Aug	S19W11	47	20	1	Hsx	1	A								
01 Sep	S19W24	47	10	1	Axx	1	A								
02 Sep	S19W38	48	plage												
03 Sep	S19W52	49	plage												
								1	0	0	0	0	0	0	0

Still on Disk.
Absolute heliographic longitude: 42

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 3417												
28 Aug	S08E75	1	50	10	Dso	3	B	1							
29 Aug	S07E61	4	140	6	Cao	8	B	2			2				
30 Aug	S05E46	2	150	7	Dao	7	B	1			1				
31 Aug	S08E35	1	120	8	Cao	8	B								
01 Sep	S08E22	1	100	11	Cso	15	B								
02 Sep	S08E07	3	80	9	Dsi	16	B								
03 Sep	S08W08	5	40	10	Cso	4	B	1			1				
								5	0	0	4	0	0	0	0

Still on Disk.
Absolute heliographic longitude: 3

			Region 3418												
30 Aug	N22E63	345	30	10	Hsx	1	A								
31 Aug	N22E50	346	30	1	Hsx	1	A								
01 Sep	N22E37	346	20	2	Hsx	1	A								
02 Sep	N21E24	346	10	1	Hsx	1	A								
03 Sep	N21E10	347	10	1	Hsx	1	A								
								0	0	0	0	0	0	0	0

Still on Disk.
Absolute heliographic longitude: 347

			Region 3419												
02 Sep	N24W37	47	10	2	Bxo	3	B								
03 Sep	N24W51	48	10	3	Bxo	3	B								
								0	0	0	0	0	0	0	0

Still on Disk.
Absolute heliographic longitude: 47

			Region 3420												
03 Sep	S20E16	341	30	3	Cso	4	B								
								0	0	0	0	0	0	0	0

Still on Disk.
Absolute heliographic longitude: 341

			Region 3421												
03 Sep	N15E14	343	20	3	Bxo	5	B								
								0	0	0	0	0	0	0	0

Still on Disk.
Absolute heliographic longitude: 343

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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