Space Weather Highlights **SWPC PRF 2454**
05 September - 11 September 2022 **12 September 2022**

Solar activity was at low to moderate levels over the period. Moderate levels were observed on 05 Sep due to an M1 (R1-Minor) flare at 05/1805 UTC from Region 3089 (S22, L=194, class/area Ekc/580 on 29 Aug). Region 3089 produced a total of 69 C-class flares and 5 M-class flares during its transit on the visible disk between 25 Aug and 05 Sep. This region was responsible for the majority of the C-class flaring on the first two days of the period (05-06 Sep). Low levels were observed during the rest of the period with C-flare activity mostly from Regions 3096 (N16, L=023, class/area Dso/130 on 08 Sep), 3098 (N18, L=051, class/area Eai/160 on 11 Sep), and 3100 (S25, L=352, class/area Cai/080 on 11 Sep). Beginning on 11 Sep, Region 3098 grew moderately and developed a BG magnetic structure. No Earth-directed CMEs were observed.

A slight increase in the greater than 10 MeV proton flux was observed beginning late on 09 Sep possibly due to a far sided event on 08 Sep. However, flux levels never exceed 1.5 pfu.

The greater than 2 MeV electron flux at geosynchronous orbit was at high levels throughout the period (05-11 Sep) due to CH HSS influence with a peak flux of 22,600 pfu observed at 08/1815 UTC.

Geomagnetic field activity ranged from quiet to G1 (Minor) storm levels. The period began under the influence of a positive polarity CH HSS. Solar wind speed reached a peak of 668 km/s at 05/0045 UTC and decreased to around 500-570 km/s on 06-09 Sep. A further decrease in speed to 400-500 km/s came on 10-11 Sep. Total field ranged from 5-8 nT. The geomagnetic field responded with unsettled to G1 (Minor) storm conditions on 05 Sep, reached active levels on 06-09 Sep, and finished with quiet to unsettled levels on 10-11 Sep.

Space Weather Outlook
12 September - 08 October 2022

Solar activity is expected to be at low levels, with a slight chance for M-flares (R1-R2, Minor-Moderate) on 12-17 Sep, due primarily to flare potential from Region 3098 and the return of old Region 3088 (S27, L=300). On 18 Sep - 01 Oct, solar activity is expected to increase to low levels, with a chance for M-flares, due to the return of old Region 3089. Very low to low levels are expected to return on 02-08 Oct.

A slight chance exists for an S1 (Minor) solar radiation storm on 12-25 Sep due to the return of old Region 3088 which produced an S1 proton event on 27 Aug.

The greater than 2 MeV electron flux at geosynchronous orbit is expected to reach high levels on 12-17 Sep, 20-23 Sep, and 26 Sep - 08 Oct due to CH HSS influence.

Geomagnetic field activity is expected to reach unsettled to active levels on 13-18 Sep, 23 Sep -

08 Oct, with G1 (Minor) levels likely on 17 Sep, 30 Sep - 03 Oct, and G2 (Moderate levels likely on 01 Oct, due to recurrent CH HSS activity.

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 September	130	79	780	C1.1	15	1	0	3	1	0	0	0
06 September	126	56	270	B8.1	8	0	0	0	0	0	0	0
07 September	126	73	240	B6.6	4	0	0	3	0	0	0	0
08 September	127	75	240	B5.3	5	0	0	5	0	0	0	0
09 September	126	72	180	B5.1	5	0	0	3	0	0	0	0
10 September	136	122	340	B5.4	9	0	0	4	1	0	0	0
11 September	152	113	410	C1.1	10	0	0	21	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 September	8.5e+05	3.0e+04	2.1e+08
06 September	1.2e+05	3.0e+04	2.6e+08
07 September	1.2e+05	3.1e+04	5.7e+08
08 September	1.4e+05	3.4e+04	8.8e+08
09 September	1.4e+05	4.2e+04	3.9e+08
10 September	2.6e+05	7.5e+04	3.7e+08
11 September	3.6e+05	8.2e+04	3.3e+08

Daily Geomagnetic Data

Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
05 September	21	4-4-4-4-3-3-3-3	49	5-4-5-7-5-5-3-3	32	5-5-4-5-3-4-4-4
06 September	14	3-3-3-3-3-2-3-3	31	5-4-5-4-5-4-3-2	20	4-4-3-3-3-3-4-4
07 September	12	2-2-4-3-3-3-2-1	27	3-2-3-5-5-5-4-2	14	3-2-3-3-3-4-3-1
08 September	17	2-4-4-3-3-2-2-4	36	2-3-6-6-5-4-3-3	19	3-4-4-3-3-3-3-4
09 September	14	3-2-3-4-4-2-1-2	30	2-1-4-7-5-2-1-1	13	4-2-3-4-3-2-1-2
10 September	10	2-1-3-2-3-2-3-2	31	2-2-4-4-6-6-3-1	12	3-2-3-2-3-3-3-2
11 September	9	2-1-1-3-3-3-2-1	15	2-1-1-5-4-4-1-1	12	3-2-1-2-2-3-2-1

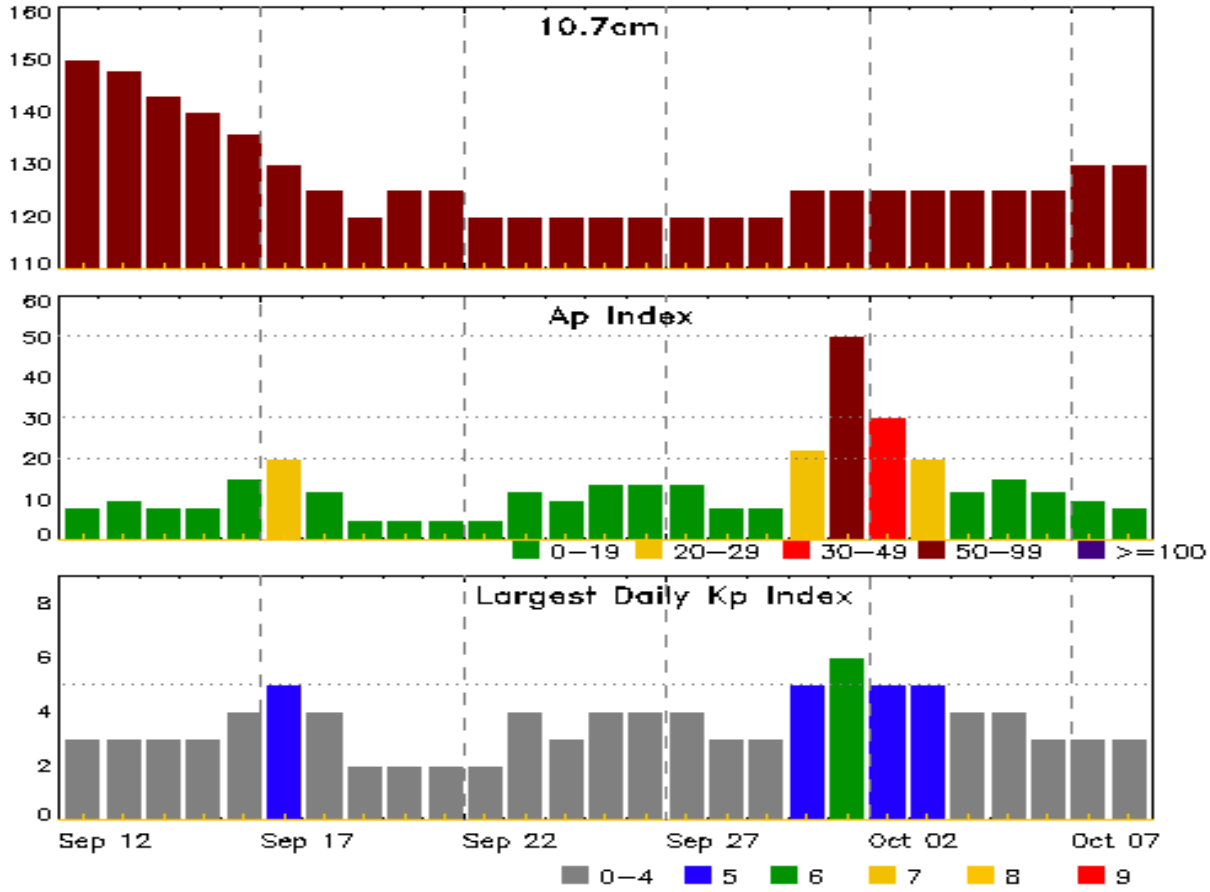
Alerts and Warnings Issued

Date & Time of Issue UTC	Type of Alert or Warning	Date & Time of Event UTC
05 Sep 0040	ALERT: Geomagnetic K = 5	05/0035
05 Sep 1128	ALERT: Geomagnetic K = 5	05/1125
05 Sep 1128	EXTENDED WARNING: Geomagnetic K = 5	04/0126 - 05/1800
05 Sep 1139	CONTINUED ALERT: Electron 2MeV Integral Flux >= 1000pfu	04/1405
05 Sep 2354	EXTENDED WARNING: Geomagnetic K = 4	02/2350 - 06/1200
06 Sep 0206	WARNING: Geomagnetic K = 5	06/0205 - 0900
06 Sep 0506	CONTINUED ALERT: Electron 2MeV Integral Flux >= 1000pfu	04/1405
06 Sep 1115	EXTENDED WARNING: Geomagnetic K = 4	02/2350 - 06/1800
06 Sep 2053	WARNING: Geomagnetic K = 4	06/2048 - 2359
06 Sep 2053	ALERT: Geomagnetic K = 4	06/2050
06 Sep 2228	EXTENDED WARNING: Geomagnetic K = 4	06/2048 - 07/0600
07 Sep 0506	CONTINUED ALERT: Electron 2MeV Integral Flux >= 1000pfu	04/1405
07 Sep 0653	WARNING: Geomagnetic K = 4	07/0653 - 1500
07 Sep 1350	EXTENDED WARNING: Geomagnetic K = 4	07/0653 - 2359
07 Sep 1625	ALERT: Geomagnetic K = 4	07/1623
08 Sep 0335	WARNING: Geomagnetic K = 4	08/0335 - 1200
08 Sep 0405	ALERT: Geomagnetic K = 4	08/0404
08 Sep 0506	CONTINUED ALERT: Electron 2MeV Integral Flux >= 1000pfu	04/1405
08 Sep 0522	WARNING: Geomagnetic K = 5	08/0522 - 0900
08 Sep 2135	WARNING: Geomagnetic K = 4	08/2133 - 09/0300
08 Sep 2154	ALERT: Geomagnetic K = 4	08/2153
08 Sep 2243	WARNING: Geomagnetic K = 5	08/2241 - 09/0300
09 Sep 0256	EXTENDED WARNING: Geomagnetic K = 4	08/2133 - 09/1200
09 Sep 0527	CONTINUED ALERT: Electron 2MeV Integral Flux >= 1000pfu	04/1405
09 Sep 1054	WARNING: Geomagnetic K = 5	09/1054 - 1500
09 Sep 1056	EXTENDED WARNING: Geomagnetic K = 4	08/2133 - 09/1800

Alerts and Warnings Issued

Date & Time of Issue UTC	Type of Alert or Warning	Date & Time of Event UTC
10 Sep 0459	CONTINUED ALERT: Electron 2MeV Integral Flux >= 1000pfu	04/1405
10 Sep 0737	WARNING: Geomagnetic K = 4	10/0735 - 1500
11 Sep 0926	CONTINUED ALERT: Electron 2MeV Integral Flux >= 1000pfu	04/1405

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 Sep	150	8	3	26 Sep	120	14	4
13	148	10	3	27	120	14	4
14	143	8	3	28	120	8	3
15	140	8	3	29	120	8	3
16	136	15	4	30	125	22	5
17	130	20	5	01 Oct	125	50	6
18	125	12	4	02	125	30	5
19	120	5	2	03	125	20	5
20	125	5	2	04	125	12	4
21	125	5	2	05	125	15	4
22	120	5	2	06	125	12	3
23	120	12	4	07	130	10	3
24	120	10	3	08	130	8	3
25	120	14	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
05 Sep		1758	1805	1814	M1.0		0.007		3089			

Flare List

	Time				Optical		
Date	Begin	Max	End	X-ray Class	Imp/ Brtns	Location Lat CMD	Rgn #
05 Sep	0029	0030	0041		SF	S23W72	3089
05 Sep	0153	0204	0247	C5.0	1F	S10E29	3092
05 Sep	0249	0256	0300	C4.4			3092
05 Sep	0314	0326	0336	C2.4			3089
05 Sep	0430	0446	0509	C6.5			
05 Sep	B0606	U0607	A0619		SF	S21W74	3089
05 Sep	0755	0809	0816	C3.9	SF	S28W77	3089
05 Sep	0816	0820	0824	C3.8			3089
05 Sep	0847	0858	0916	C4.0			3092
05 Sep	1016	1021	1028	C1.6			3089
05 Sep	1030	1039	1053	C3.1			3089
05 Sep	1057	1107	1110	C4.1			3092
05 Sep	1110	1114	1118	C5.3			3089
05 Sep	1712	1722	1733	C4.7			3089
05 Sep	1758	1805	1814	M1.0			3089
05 Sep	1953	2002	2015	C2.9			3089
05 Sep	2015	2027	2035	C3.8			3089
05 Sep	2302	2308	2315	C1.8			3089
06 Sep	0056	0103	0111	C1.6			
06 Sep	0134	0142	0151	C1.8			
06 Sep	0321	0328	0333	C1.4			3089
06 Sep	1119	1129	1133	C2.3			3089
06 Sep	1523	1530	1546	C1.1			3089
06 Sep	1648	1656	1705	C1.2			3089
06 Sep	1821	1833	1842	C3.2			3089
06 Sep	2122	2131	2152	C1.1			3089
07 Sep	0132	0141	0145	C1.4			
07 Sep	0938	0953	1004		SF	N16E40	3096
07 Sep	1008	1010	1012		SF	N16E40	
07 Sep	1142	1146	1150		SF	N18E67	3096

Flare List

Date	Time			Optical			
	Begin	Max	End	X-ray Class	Imp/ Brtns	Location Lat CMD	Rgn #
07 Sep	1708	1715	1719	C1.0			3096
07 Sep	1757	1804	1808	C1.1			3096
07 Sep	2342	2353	2359	C1.1			3096
08 Sep	B0633	U0709	A0722		SF	N22E16	3094
08 Sep	0938	0947	0955	C1.3	SF	N16E28	3098
08 Sep	1310	1319	1326	C1.1	SF	N16E27	3098
08 Sep	1547	1553	1600	C1.0	SF	N18E24	3098
08 Sep	1652	1655	1657	B9.0			
08 Sep	1657	1710	1722	C2.1			
08 Sep	1745	1754	1810	C1.1			
08 Sep	1956	1956	2001		SF	N18E22	3098
09 Sep	0111	0128	0132	C1.0			
09 Sep	0132	0136	0142	C1.2			3096
09 Sep	0201	0213	0227	C2.0			3096
09 Sep	0740	0751	0803	B9.5	SF	N23E02	3094
09 Sep	0922	0934	0948	B7.6			3097
09 Sep	1048	1056	1107	B8.8	SF	N21E01	3094
09 Sep	1222	1227	1231	B8.6			
09 Sep	1530	1539	1546	C1.1	SF	S12W20	3097
09 Sep	2102	2105	2110	C1.1			3098
10 Sep	0159	0209	0218	C1.0			3100
10 Sep	0400	0407	0418	B7.5			3100
10 Sep	0651	0703	0716	C1.2	SF	N16E01	3098
10 Sep	0716	0721	0726	C1.1			3098
10 Sep	0739	0746	0753	C1.2	SF	S24E63	3100
10 Sep	0853	0902	0909	C1.9			
10 Sep	1104	1119	1130	C2.6	1F	S23E60	3100
10 Sep	1303	1312	1318	B9.3			3097
10 Sep	1457	1457	1518		SF	N20W05	3098
10 Sep	1916	1925	1937	C2.2	SF	S23E55	3100
10 Sep	2150	2157	2212	C1.6			3100
10 Sep	2349	0009	0024	C2.8	SF	S25E55	3100
11 Sep	0230	0237	0249	C1.0			3099
11 Sep	0517	0527	0535	C1.2			3100
11 Sep	0552	0553	0610		SF	S24E51	3100
11 Sep	0725	0725	0730		SF	N20W14	3098
11 Sep	0736	0739	0742		SF	N29W61	3101
11 Sep	0757	0758	0809		SF	N29W62	3101

Flare List

Date	Time			Optical			
	Begin	Max	End	X-ray Class	Imp/ Brtns	Location Lat CMD	Rgn #
11 Sep	0807	0818	0821		SF	N20W14	3098
11 Sep	0834	0840	0847		SF	N29W62	3101
11 Sep	0939	0942	0950		SF	N29W62	3101
11 Sep	1003	1029	1047		SF	N29W64	3101
11 Sep	1027	1033	1040	C4.7	SF	N21W14	3098
11 Sep	1137	1144	1149		SF	N29W64	3101
11 Sep	1152	1157	1202		SF	N30W64	3101
11 Sep	1226	1233	1237	C4.5	SF	N21W18	3098
11 Sep	1238	1238	1315		SF	N20W24	3094
11 Sep	1257	1300	1304		SF	N21W18	3098
11 Sep	1344	1354	1402	C3.5	SF	N21W18	3098
11 Sep	1431	1438	1450	C5.2	SF	N20W18	3098
11 Sep	1443	1449	1547		SF	N29W68	3101
11 Sep	1510	1512	1517		SF	N20W20	3098
11 Sep	1639	1650	1700	C4.8			3098
11 Sep	1804	1813	1820	C3.5			3101
11 Sep	1822	1827	1833	C4.7			3098
11 Sep	2203	2205	2214		SF	N29W62	3101
11 Sep	2208	2228	2239	C6.1	SF	N19W25	3098

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 3089												
25 Aug	S24E56	196	150	6	Dsi	9	B	9	1		4	2			
26 Aug	S21E44	196	190	8	Dai	12	BG	6	3		14	4			
27 Aug	S22E31	196	280	7	Dki	14	B				4				
28 Aug	S23E18	196	320	11	Eki	17	BD	1							
29 Aug	S22E06	194	580	14	Ekc	29	BGD				10				
30 Aug	S22W06	192	250	15	Eac	28	BG	2			4				
31 Aug	S22W20	194	490	14	Ekc	21	BGD	5			5				
01 Sep	S22W33	194	350	12	Eki	20	BD	2							
02 Sep	S23W46	194	340	12	Ekc	20	BG	8			7				
03 Sep	S22W61	195	510	11	Ekc	18	BGD	14			11				
04 Sep	S23W74	195	520	11	Ekc	13	BGD	12			3	2			
05 Sep	S23W88	195	520	12	Ekc	10	BG	10	1		3				
								69	5	0	65	8	0	0	0

Crossed West Limb.
Absolute heliographic longitude: 194

			Region 3090												
25 Aug	N14E60	191	10		Axx	1	A								
26 Aug	N16E48	192	plage												
27 Aug	N16E34	193	plage												
28 Aug	N16E20	194	plage												
29 Aug	N16E06	194	plage												
30 Aug	N16W08	195	plage												
31 Aug	N16W19	193	10	1	Axx	1	A								
01 Sep	N16W33	194	plage												
02 Sep	N16W47	195	plage												
03 Sep	N16W62	196	plage												
04 Sep	N16W76	197	plage												
								0	0	0	0	0	0	0	0

Died on Disk.
Absolute heliographic longitude: 194

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 3091												
01 Sep	N14W17	178	10	1	Axx	1	A								
02 Sep	N14W31	179	plage												
03 Sep	N14W46	180	plage												
04 Sep	N14W60	181	plage												
05 Sep	N14W74	182	plage												
06 Sep	N14W88	183	plage												
								0	0	0	0	0	0	0	0

Crossed West Limb.
Absolute heliographic longitude: 178

			Region 3092												
01 Sep	S09E67	94	110	3	Cao	3	B	2							
02 Sep	S09E53	95	170	3	Cao	3	B								
03 Sep	S10E38	96	130	3	Cso	3	B	1							
04 Sep	S10E27	94	90	3	Cso	3	B	2			2				
05 Sep	S10E13	95	120	3	Hsx	3	A	4				1			
06 Sep	S16W00	93	120	3	Hsx	3	A								
07 Sep	S16W14	95	150	3	Hsx	3	A								
08 Sep	S11W27	94	70	3	Hsx	1	A								
09 Sep	S10W40	95	50	2	Hsx	1	A								
10 Sep	S09W54	96	60	2	Hsx	1	A								
11 Sep	S09W68	97	60	2	Hsx	2	A								
								9	0	0	2	1	0	0	0

Still on Disk.
Absolute heliographic longitude: 93

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 3093												
02 Sep	S26E42	106	20	6	Cro	7	B	1							
03 Sep	S27E26	108	30	5	Bxo	4	B								
04 Sep	S27E16	105	30	3	Cro	3	B	1							
05 Sep	S27E04	103	10	5	Bxo	4	B								
06 Sep	S27W10	105	10	5	Bxo	4	B								
07 Sep	S26W25	106	0		Axx	1	A								
08 Sep	S26W39	107	plage												
09 Sep	S26W53	108	plage												
10 Sep	S26W67	109	plage												
11 Sep	S26W81	110	plage												
								2	0	0	0	0	0	0	0

Still on Disk.
Absolute heliographic longitude: 103

			Region 3094												
02 Sep	N22E79	69	120	3	Hsx	1	A	3							
03 Sep	N20E67	69	100	4	Cao	3	B								
04 Sep	N21E53	68	100	2	Cao	3	B	1							
05 Sep	N21E40	68	110	4	Dso	8	B								
06 Sep	N21E26	69	110	4	Dso	8	B								
07 Sep	N21E12	69	30	4	Cso	8	B								
08 Sep	N17E01	66	10	4	Cro	4	B				1				
09 Sep	N18W12	67	10	1	Axx	1	A				2				
10 Sep	N20W27	69	10	1	Axx	1	A								
11 Sep	N20W41	70	10	1	Axx	1	A				1				
								4	0	0	4	0	0	0	0

Still on Disk.
Absolute heliographic longitude: 66

			Region 3095												
05 Sep	S14W45	152	20	4	Cro	4	B								
06 Sep	S14W59	154	plage												
07 Sep	S14W73	154	plage												
08 Sep	S14W87	155	plage												
								0	0	0	0	0	0	0	0

Crossed West Limb.
Absolute heliographic longitude: 152

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 3096												
06 Sep	N18E71	22	30	2	Hsx	1	A								
07 Sep	N18E57	24	40	5	Dso	6	B	3			2				
08 Sep	N16E44	23	130	7	Dso	8	B								
09 Sep	N16E33	22	90	8	Dai	9	B	2							
10 Sep	N16E19	23	100	7	Dao	7	B								
11 Sep	N16E05	24	30	5	Cro	5	B								
								5	0	0	2	0	0	0	0

Still on Disk.
Absolute heliographic longitude: 24

			Region 3097												
07 Sep	S12E01	79	20	4	Dso	5	B								
08 Sep	S12W12	79	20	4	Dro	7	B								
09 Sep	S11W25	80	10	5	Bxo	3	B	1			1				
10 Sep	S11W39	81	10	2	Bxo	3	B								
11 Sep	S11W53	82	plage												
								1	0	0	1	0	0	0	0

Still on Disk.
Absolute heliographic longitude: 79

			Region 3098												
08 Sep	N15E17	49	10	4	Bxi	5	B	3			3				
09 Sep	N17E05	50	20	4	Cro	8	B	1							
10 Sep	N18W08	50	60	8	Cao	12	B	2			2				
11 Sep	N18W22	51	160	12	Eai	12	BG	7			9				
								13	0	0	14	0	0	0	0

Still on Disk.
Absolute heliographic longitude: 50

			Region 3099												
10 Sep	N12E32	10	20	3	Cro	2	B								
11 Sep	N12E18	11	10	3	Bxo	2	B	1							
								1	0	0	0	0	0	0	0

Still on Disk.
Absolute heliographic longitude: 11

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 3100												
10 Sep	S25E48	354	70	4	Csi	11	B	6			2	1			
11 Sep	S25E37	352	80	7	Cai	11	B	1			2				
								7	0	0	4	1	0	0	0

Still on Disk.
Absolute heliographic longitude: 352

			Region 3101												
10 Sep	N29W57	99	10	3	Bxo	5	B								
11 Sep	N29W71	100	60	10	Dai	10	B	1			9				
								1	0	0	9	0	0	0	0

Still on Disk.
Absolute heliographic longitude: 99

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

The Weekly has been published continuously since 1951 and is available online since 1997.

https://www.swpc.noaa.gov/products/weekly-highlights-and-27-day-forecast -- Current
ftp://ftp.swpc.noaa.gov/pub/warehouse -- Online archive from 1997
https://www.ngdc.noaa.gov/stp/satellite/goes-r.html -- NCEI GOES data textarchive
https://www.swpc.noaa.gov/products/solar-cycle-progression -- Solar Cycle Progression web site
https://www.swpc.noaa.gov/content/contact-us -- Contact and Copyright information
https://www.swpc.noaa.gov/sites/default/files/images/u2/Usr_guide.pdf -- User Guide