Space Weather Highlights **SWPC PRF 2456**
19 September - 25 September 2022 **26 September 2022**

Solar activity reached moderate levels this week with three M-class flares observed during the period. Region 3102 (S25, L=298, class/area Eki/320 on 18 Sep) produced an M1.0/1n flare at 20/1122 UTC. Region 3107 (S25, L=113, class/area Fai/240 on 24 Sep) produced an M1.0 at 21/0702 UTC. This was followed by the largest event of the period, an M1.7/Sf at 23/1810 UTC from Region 3110 (N16, L=158, class/area Dhi/320 on 25 Sep). Associated with this event were Type II (est. 2453 km/s S.V.) and Type IV signatures. During the period, a total of 62 C-class and 3 M-class flares were recorded. In addition to Regions 3102, 3107 and 3110, C-class activity was also observed from Regions 3105 (S17, L=210, class/area Dki/490 on 22 Sep) and 3109 (N10, L=257, class/area Dro/040 on 23 Sep). Numerous CME signatures, off of both limbs, were observed in coronagraph imagery throughout the week, but none were determined to have Earth-directed components.

No proton events were observed at geosynchronous orbit, although the 10 Mev proton flux was slightly elevated above background levels.

The greater than 2 MeV electron flux at geosynchronous orbit was at normal to moderate levels on 19-24 Sep and high levels on 25 Sep with a peak flux of 2,130 pfu observed at 25/1555 UTC.

Geomagnetic field activity mostly ranged from quiet to unsettled levels with an isolated active period early on 24 September. Quiet to unsettled periods were observed on 19-20 September under weak, diminishing, negative polarity coronal hole high stream influence. Quiet levels were observed on 21 and 22 September, with the exception of an isolated unsettled period late on 22 September. Unsettled to isolated active conditions persisted on 24 and 25 September under weak, positive polarity coronal hole high speed stream influence.

Space Weather Outlook
26 September - 22 October 2022

Solar activity is expected to be low with a chance for M-class (R1-R2, Minor to Moderate) flare activity on 26 September to 04 October and from 08-22 October due to current active regions on the visible disk and returning, active 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 26-28 September, 03-12 October and 22 October in response to CH HSS influences.

Geomagnetic field activity is expected to be at unsettled levels on 27-28 September, 01-06 October, 16-17 October, with active levels possible on 01-05 October and 20-21 October. G1-G2 (Minor-Moderate) levels are possible on 01-04 October as well. This enhanced activity is due to CH HSS influences.

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
19 September	128	74	440	C1.0	8	0	0	4	1	0	0	0
20 September	137	70	720	C1.3	6	1	0	6	3	0	0	0
21 September	137	70	650	C1.0	4	1	0	4	0	0	0	0
22 September	137	99	980	C1.0	10	0	0	9	1	0	0	0
23 September	146	111	1050	C1.2	15	1	0	27	0	0	0	0
24 September	147	128	980	C1.5	13	0	0	29	0	0	0	0
25 September	135	96	850	B8.2	11	0	0	5	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
19 September	1.4e+06	9.3e+04	5.5e+06
20 September	6.4e+05	6.2e+04	7.3e+06
21 September	2.6e+05	4.4e+04	1.2e+07
22 September	3.4e+05	4.4e+04	1.2e+07
23 September	2.7e+05	3.6e+04	5.9e+06
24 September	5.2e+05	4.1e+04	1.8e+07
25 September	4.1e+05	5.2e+04	5.4e+07

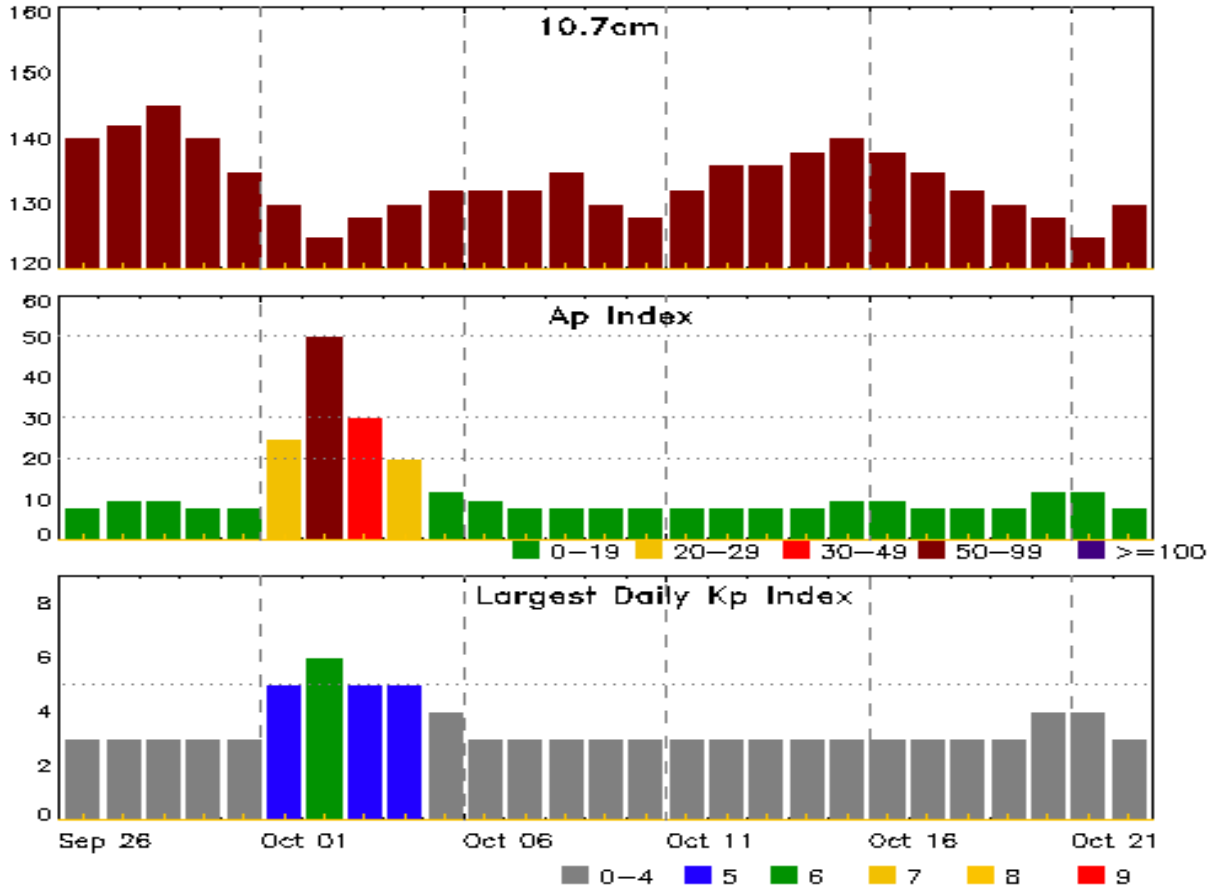
Daily Geomagnetic Data

Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
19 September	7	2-1-0-2-3-3-1-2	18	2-0-1-4-5-5-2-2	11	3-1-1-3-3-3-2-3
20 September	6	2-2-1-2-2-2-2-1	6	2-2-1-2-2-2-1-1	8	2-2-1-2-2-2-3-2
21 September	4	1-0-1-2-2-2-0-1	8	1-1-2-5-1-0-0-1	5	2-1-2-2-1-1-0-2
22 September	5	0-1-1-1-2-2-1-3	3	0-0-0-0-2-1-1-2	6	0-1-1-1-2-2-1-3
23 September	12	3-2-3-3-3-3-2-2	27	1-1-6-5-4-5-1-2	12	3-1-3-3-3-3-2-3
24 September	10	2-3-2-2-3-3-2-2	22	2-3-3-6-4-3-2-2	13	2-4-2-3-3-3-3-3
25 September	5	2-2-2-2-2-1-0-1	11	1-1-1-5-4-2-0-0	7	2-2-2-2-2-1-0-2

Alerts and Warnings Issued

Date & Time of Issue UTC	Type of Alert or Warning	Date & Time of Event UTC
19 Sep 1742	WARNING: Geomagnetic K = 4	19/1742 - 20/0300
20 Sep 1731	WATCH: Geomagnetic Storm Category G1 predicted	
21 Sep 0614	SUMMARY: 10cm Radio Burst	21/0541 - 0545
22 Sep 2226	WARNING: Geomagnetic K = 4	22/2225 - 23/1200
23 Sep 1419	ALERT: Type II Radio Emission	23/1401
23 Sep 1431	ALERT: Type IV Radio Emission	23/1350
23 Sep 1537	WATCH: Geomagnetic Storm Category G1 predicted	
23 Sep 1846	ALERT: Type II Radio Emission	23/1756
23 Sep 1847	ALERT: Type IV Radio Emission	23/1808
23 Sep 2149	ALERT: Type IV Radio Emission	23/1807
24 Sep 0338	WARNING: Geomagnetic K = 4	24/0338 - 1200
24 Sep 0602	ALERT: Geomagnetic K = 4	24/0559
24 Sep 1444	WARNING: Geomagnetic K = 4	24/1445 - 2100
25 Sep 1311	ALERT: Electron 2MeV Integral Flux >= 1000pfu	25/1235

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
26 Sep	140	8	3	10 Oct	128	8	3
27	142	10	3	11	132	8	3
28	145	10	3	12	136	8	3
29	140	8	3	13	136	8	3
30	135	8	3	14	138	8	3
01 Oct	130	25	5	15	140	10	3
02	125	50	6	16	138	10	3
03	128	30	5	17	135	8	3
04	130	20	5	18	132	8	3
05	132	12	4	19	130	8	3
06	132	10	3	20	128	12	4
07	132	8	3	21	125	12	4
08	135	8	3	22	130	8	3
09	130	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
20 Sep	1113	1122	1134	M1.0	0.009	1N	S25W17	3102	3000			
21 Sep	0651	0702	0717	M1.0	0.010			3107				
23 Sep	1748	1810	1841	M1.7	0.038	SF	N19E77	3110	150	130	1	1

Flare List

	Time			Optical			
Date	Begin	Max	End	X-ray Class	Imp/ Brtns	Location Lat CMD	Rgn #
19 Sep	0043	0102	0120	C6.5			
19 Sep	0225	0230	0239	C7.6	1F	S25E00	3102
19 Sep	0535	0541	0548	C2.7			
19 Sep	0605	0619	0646	C4.8			
19 Sep	0855	0855	0902		SF	S16E80	
19 Sep	1029	1038	1049	C1.8	SF	S24W04	3102
19 Sep	1143	1149	1153	C1.7	SF	S18E85	3102
19 Sep	1346	1357	1403	C2.5	SF	S25W06	3102
19 Sep	1930	1936	1940	C1.5			3105
20 Sep	0254	0255	0300		SF	S28W10	3102
20 Sep	0535	0542	0555	C5.5	1F	S24W19	3102
20 Sep	0918	0924	0929	C2.4	SF	S25W17	3102
20 Sep	1113	1122	1134	M1.0	1N	S25W17	3102
20 Sep	1450	1503	1532	C7.7	1F	S29W19	3102
20 Sep	1624	1633	1639	C3.8	SF	S25W21	3102
20 Sep	1833	1842	1846	C4.5	SF	S25W21	3102
20 Sep	2059	2111	2120	C2.0	SF	S23W25	3102
20 Sep	2203	2204	2205		SF	S21E77	
21 Sep	0232	0236	0250		SF	S17E59	3105
21 Sep	0512	0526	0542	C2.7			3102
21 Sep	0516	0518	0525		SF	S17E59	3105
21 Sep	0524	0524	0524		SF	S24W28	3102
21 Sep	0651	0702	0717	M1.0			3107
21 Sep	1242	1250	1254	C1.4			3107
21 Sep	1814	1824	1841	C1.7			3105
21 Sep	2308	2320	2330	C6.7	SF	S18E54	3105
22 Sep	0123	0136	0152	C3.6	SF	S18E45	3105
22 Sep	0352	0356	0402	C1.6	SF	N11W00	3109

Flare List

Date	Time			Optical			
	Begin	Max	End	X-ray Class	Imp/ Brtns	Location Lat CMD	Rgn #
22 Sep	0426	0437	0449	C1.7			3107
22 Sep	0510	0517	0522		SF	N11W00	3109
22 Sep	0707	U0714	0724		SF	N11W02	3109
22 Sep	0833	0850	0906	C1.7	SF	N10W03	3109
22 Sep	0942	0951	0958	C1.6	SF	S18E42	3105
22 Sep	1033	1036	1040	C1.8			3107
22 Sep	1123	1134	1139	C7.8	1F	S16E43	3105
22 Sep	1309	1311	1316		SF	S16E39	3105
22 Sep	1421	1443	1459	C3.6			3107
22 Sep	1814	1827	1839	C1.9	SF	N11W09	3109
22 Sep	2012	2020	2032	C1.7	SF	S21E53	3107
23 Sep	0001	0002	0006		SF	S23E53	3107
23 Sep	0009	0023	0033	C3.5	SF	N10W13	3109
23 Sep	0137	0137	0142		SF	S17E31	3105
23 Sep	0230	0237	0243	C2.2			
23 Sep	0306	0306	0308		SF	N10W13	3109
23 Sep	0332	0339	0351	C6.0	SF	S23E49	3107
23 Sep	0422	0428	0438	C2.6	SF	N15E88	
23 Sep	0459	0510	0521	C5.0			3110
23 Sep	B0534	U0616	A0810		SF	N16E85	
23 Sep	0619	0619	0624		SF	S17E31	3105
23 Sep	0821	0826	0848		SF	N15E88	
23 Sep	B0824	U0825	A0834		SF	N16E85	
23 Sep	0834	0838	0842	C2.5	SF	N16E85	3107
23 Sep	0847	0855	0900	C2.8	SF	N10W16	3109
23 Sep	0852	0855	0905		SF	N10W15	3109
23 Sep	0853	0857	0920		SF	N15E84	3109
23 Sep	0929	0938	0951	C2.7			3107
23 Sep	0933	U0936	0948		SF	S24E49	3107
23 Sep	0934	0947	0950		SF	N15E84	3107
23 Sep	0934	0947	0947		SF	S23E49	3107
23 Sep	1129	1133	1137	C7.2	SF	N10W18	3109
23 Sep	1235	1241	1245	C1.8			3109
23 Sep	1414	1423	1426	C4.7	SF	S22E45	3107
23 Sep	1426	1452	1459	C5.6			3110
23 Sep	1442	1443	1501		SF	S24E46	
23 Sep	1451	1456	1502		SF	N16E81	
23 Sep	1523	1528	1545		SF	S26E49	

Flare List

Date	Time			Optical			
	Begin	Max	End	X-ray Class	Imp/ Brtns	Location Lat CMD	Rgn #
23 Sep	1529	1537	1545		SF	N10W20	
23 Sep	1712	1716	1724	C3.6			3107
23 Sep	1748	1810	1841	M1.7	SF	N19E77	3110
23 Sep	2221	2227	2235	C3.0	SF	S24E41	3107
23 Sep	2318	2328	2336		SF	N15E77	3110
23 Sep	2323	2327	2339	C3.6	SF	N10W24	3109
24 Sep	0003	0012	0033		SF	N15E77	3110
24 Sep	0005	0008	0010		SF	S25E42	3107
24 Sep	0048	0049	0052		SF	N15E77	3110
24 Sep	0253	0257	0301		SF	N15E77	3110
24 Sep	0325	0356	0407		SF	N15E77	3110
24 Sep	0333	0344	0345		SF	S25E42	3107
24 Sep	0435	0442	0455	C2.0			3110
24 Sep	0537	0551	0556		SF	N15E69	3110
24 Sep	0639	0649	0656	C2.2	SF	N15E69	3110
24 Sep	0658	0702	0708	C3.0	SF	S25E35	3107
24 Sep	0700	0702	0713		SF	N15E69	3110
24 Sep	0746	0752	0757	C2.1	SF	N15E77	3110
24 Sep	0945	0946	0949		SF	N15E77	3110
24 Sep	1138	1144	1155		SF	N16E66	3110
24 Sep	1201	1202	1208		SF	N15E68	3110
24 Sep	1209	1211	1213		SF	N15E68	3110
24 Sep	1221	1236	1256	C4.3			3107
24 Sep	1255	1322	1334	C5.1			3107
24 Sep	1309	1313	1318		SF	N15E69	3110
24 Sep	1311	1317	1328		SF	S28E38	3107
24 Sep	1417	1453	1516		SF	N15E67	3110
24 Sep	1422	1437	1447	C3.0			3107
24 Sep	1424	1425	1430		SF	N19E69	3110
24 Sep	1428	1429	1441		SF	S24E32	3107
24 Sep	1434	1437	1442		SF	N19E69	3110
24 Sep	1447	1453	1457	C3.8	SF	N19E70	3110
24 Sep	1553	1607	1616	C7.2	SF	S23E32	3107
24 Sep	1643	1650	1655	C2.9	SF	S22E29	3107
24 Sep	1659	1719	1746	C7.2			3110
24 Sep	1815	1815	1823		SF	S25E26	3107
24 Sep	1823	1824	1828		SF	N18E68	3110
24 Sep	1838	1840	1852		SF	N18E68	3110

Flare List

Date	Time			Optical			
	Begin	Max	End	X-ray Class	Imp/ Brtns	Location Lat CMD	Rgn #
24 Sep	1841	1847	1854	C6.1	SF	S23E30	3107
24 Sep	2256	2306	2313	C2.5	SF	S24E23	3107
25 Sep	0057	0107	0117	C2.2			3107
25 Sep	0251	0257	0259	C1.7			3102
25 Sep	0259	0304	0308	C3.2			3107
25 Sep	0329	0339	0347	C2.1			3107
25 Sep	0452	0501	0505	C3.1	SF	N15E65	3110
25 Sep	0612	0634	0650	C4.2	SF	S25E29	3107
25 Sep	0701	0706	0710	C5.9	SF	N15E67	3110
25 Sep	0703	0706	0722		SF	S24E26	3107
25 Sep	0925	0929	0934	C1.1	SF	N15E65	3110
25 Sep	1857	1902	1906	C1.4			3110
25 Sep	1924	1934	1940	C1.9			3110
25 Sep	2043	2049	2054	C1.1			3110

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 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								
12 Sep	N16W09	24	0	5	Axx	1	A								
13 Sep	N18W19	21	0	1	Axx	2	A								
14 Sep	N18W33	22	plage												
15 Sep	N18W47	23	plage												
16 Sep	N18W61	24	plage												
17 Sep	N18W75	24	plage												
18 Sep	N18W89	25	plage												
								5	0	0	2	0	0	0	0

Crossed West Limb.
Absolute heliographic longitude: 24

			Region 3099												
10 Sep	N12E32	10	20	3	Cro	2	B								
11 Sep	N12E18	11	10	3	Bxo	2	B	1							
12 Sep	N12E04	11	0	3	Axx	1	A								
13 Sep	N12W10	12	plage												
14 Sep	N12W24	13	plage												
15 Sep	N12W38	14	plage												
16 Sep	N12W52	15	plage												
17 Sep	N12W66	15	plage												
18 Sep	N12W80	16	plage												
								1	0	0	0	0	0	0	0

Crossed West Limb.
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				
12 Sep	S24E25	350	60	10	Dso	10	B								
13 Sep	S24E22	350	140	11	Cso	7	B								
14 Sep	S25W02	351	140	13	Cso	7	B	1							
15 Sep	S24W14	350	160	14	Cso	9	B	1							
16 Sep	S24W28	351	150	14	Cso	5	B								
17 Sep	S23W42	351	190	15	Eso	13	B	3			2				
18 Sep	S22W60	354	150	9	Dso	6	B	1							
19 Sep	S22W73	356	70	8	Cso	3	B								
20 Sep	S24W86	356	80	6	Hax	1	A								
								13	0	0	6	1	0	0	0

Crossed West Limb.
Absolute heliographic longitude: 351

			Region 3102												
13 Sep	S28E60	302	240	4	Cso	4	B	4			4				
14 Sep	S26E46	302	240	7	Dao	4	B	2			7				
15 Sep	S26E38	298	250	11	Dko	5	B				1	2			
16 Sep	S26E24	299	290	12	Eko	8	B	3			3				
17 Sep	S27E11	298	310	12	Eki	24	B	1			1				
18 Sep	S25W02	298	320	12	Eki	25	B	6			6				
19 Sep	S26W13	296	310	14	Eki	24	B	4			2	1			
20 Sep	S26W26	296	280	13	Eko	16	B	6	1		5	3			
21 Sep	S25W40	296	310	13	Eho	7	B	1			1				
22 Sep	S25W53	296	240	11	Eao	8	B								
23 Sep	S25W66	296	160	9	Dao	4	B								
24 Sep	S26W79	296	100	3	Dao	3	B								
								27	1	0	30	6	0	0	0

Crossed West Limb.
Absolute heliographic longitude: 298

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 3103												
15 Sep	S16E06	330	30	4	Cro	7	B				1				
16 Sep	S16W09	332	100	5	Dai	7	B	3			3				
17 Sep	S16W22	331	20	5	Bxo	9	B								
18 Sep	S16W36	332	plage												
19 Sep	S16W50	333	plage												
20 Sep	S16W64	334	plage												
21 Sep	S16W78	335	plage												
								3	0	0	4	0	0	0	0

Crossed West Limb.
Absolute heliographic longitude: 330

			Region 3104												
19 Sep	S11W66	349	10	1	Axx	1	A								
20 Sep	S11W80	350	plage												
								0	0	0	0	0	0	0	0

Crossed West Limb.
Absolute heliographic longitude: 349

			Region 3105												
19 Sep	S18E67	217	50	4	Dao	6	B	1							
20 Sep	S14E62	208	350	8	Dhi	11	B								
21 Sep	S16E45	211	200	8	Dai	8	B	2			3				
22 Sep	S17E33	210	490	10	Dki	22	B	3			3	1			
23 Sep	S16E21	209	370	10	Dki	20	B				2				
24 Sep	S17E08	209	300	10	Dki	24	B								
25 Sep	S17W06	210	220	10	Dai	12	B								
								6	0	0	8	1	0	0	0

Still on Disk.
Absolute heliographic longitude: 210

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 3106												
20 Sep	S10E56	214	10	3	Bxo	2	B								
21 Sep	S12E38	217	10	1	Axx	1	A								
22 Sep	S12E24	219	plage												
23 Sep	S12E10	220	plage												
24 Sep	S12W04	221	plage												
25 Sep	S12W18	222	plage												
								0	0	0	0	0	0	0	0

Still on Disk.
Absolute heliographic longitude: 221

			Region 3107												
21 Sep	S24E60	196	120	3	Dso	2	B	1	1						
22 Sep	S25E46	197	190	4	Cao	6	B	4			1				
23 Sep	S24E37	193	230	10	Cao	10	B	6			6				
24 Sep	S25E26	191	240	16	Fai	17	BG	8			10				
25 Sep	S25E13	191	240	15	Eai	17	B	4			2				
								23	1	0	19	0	0	0	0

Still on Disk.
Absolute heliographic longitude: 191

			Region 3108												
21 Sep	S13E16	240	10	8	Axx	2	A								
22 Sep	S13E03	240	30	5	Dao	7	B								
23 Sep	S12W10	240	90	6	Cso	6	B								
24 Sep	S12W24	241	70	7	Dso	7	B								
25 Sep	S12W38	242	50	7	Cso	5	B								
								0	0	0	0	0	0	0	0

Still on Disk.
Absolute heliographic longitude: 240

			Region 3109												
22 Sep	N10W13	256	30	3	Cro	6	B	3			4				
23 Sep	N10W27	257	40	7	Dro	7	B	5			7				
24 Sep	N10W40	257	30	7	Dro	6	B								
25 Sep	N10W53	257	20	5	Cro	3	B								
								8	0	0	11	0	0	0	0

Still on Disk.
Absolute heliographic longitude: 256

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 3110													
23 Sep	N16E72	158	160	5	Cao	4	B	2	1		1				
24 Sep	N16E59	158	240	9	Dsc	11	B	5			19				
25 Sep	N16E46	158	320	10	Dhi	9	B	6			3				
								13	1	0	23	0	0	0	0

Still on Disk.
Absolute heliographic longitude: 158

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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