Space Weather Highlights **SWPC PRF 2464**
14 November - 20 November 2022 **21 November 2022**

Solar activity was at low to moderate levels. Moderate levels were observed on 15 and 19 Nov. On 15 Nov, Region 3140 (N25, L= 326, class/area Ekc/550 on 14 Nov) produced an M1/1n at 15/0251 UTC. On 19 Nov, Region 3150 (N22, L=253, class/area Dso/140 on 19 Nov) produced an M1 flare at 19/1256 UTC along with associated Type II (930 km/s) and IV radio sweeps as well as a non-Earth-directed CME observed beginning at 19/1325 UTC in SOHO/LASCO C2 imagery. Other activity included a slow, narrow CME from a filament eruption centered near S32W36 around 16/1100 UTC with a subsequent CME off the SW limb at 16/1408 UTC in C2 imagery. Another filament eruption occurred beginning at 19/0724 UTC centered near N45E35 and created a CME off the NNW limb at 19/0948 UTC in C2 imagery. Modelling of both CMEs indicated a possible glancing blow on 21 and 22 Nov, respectively.

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 period.

Geomagnetic field activity ranged from quiet to unsettled levels. Solar wind parameters were in decline from 14-15 Nov under waning CH HSS influence. Mostly nominal conditions were observed through late on 18 Nov. At approximately 18/1615-19/2200 UTC, total field increased to a maximum of 12 nT while solar wind speed remained nominal. This was likely weak transient influence. Total field increased once again beginning at 20/0800 UTC, reaching near 12 nT with a subsequent rise in solar wind speed from 330-410 km/s suggesting the onset of a connection to negative polarity CH HSS influence. Quiet conditions were observed on 14-17 Nov and again on 19 Nov. Quiet to unsettled levels occurred on 18 and 20 Nov.

Space Weather Outlook
21 November - 17 December 2022

Solar activity is expected to be very low to low on 21-28 Nov and on 13-17 Dec. A chance for M-class flares (R1-R2, Minor-Moderate) exists on 29 Nov-12 Dec with the return of old Regions 3140 (N25, L=326) and 3141 (N14, L=318).

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 Nov-05 Dec due to recurrent CH HSS influence.

Geomagnetic field activity is expected to be at unsettled to active levels on 21 Nov-03 Dec, 08-09 Dec, and again on 17 Dec with G1 (Minor) geomagnetic storm levels likely on 21 Nov due to recurrent CH HSS activity. There is a possibility of a glancing blow from the 16 and 19 Nov CMEs contributing to geomagnetic field response on 21 and 22 Nov.

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
14 November	142	77	890	C1.0	12	0	0	13	1	0	0	0
15 November	134	69	810	C1.2	16	1	0	5	1	0	0	0
16 November	133	85	850	C1.2	8	0	0	4	0	0	0	0
17 November	119	64	370	C1.1	8	0	0	8	0	0	0	0
18 November	116	55	410	B7.5	9	0	0	8	0	0	0	0
19 November	115	59	440	B6.0	7	1	0	9	0	0	0	0
20 November	119	72	520	B3.9	1	0	0	10	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
14 November	8.5e+04	3.1e+04	4.9e+06
15 November	5.9e+04	3.1e+04	6.0e+06
16 November	4.8e+04	3.0e+04	6.9e+06
17 November	5.3e+04	3.0e+04	5.3e+06
18 November	8.6e+04	3.0e+04	7.7e+06
19 November	6.3e+04	3.0e+04	1.6e+06
20 November	1.4e+05	3.0e+04	1.7e+06

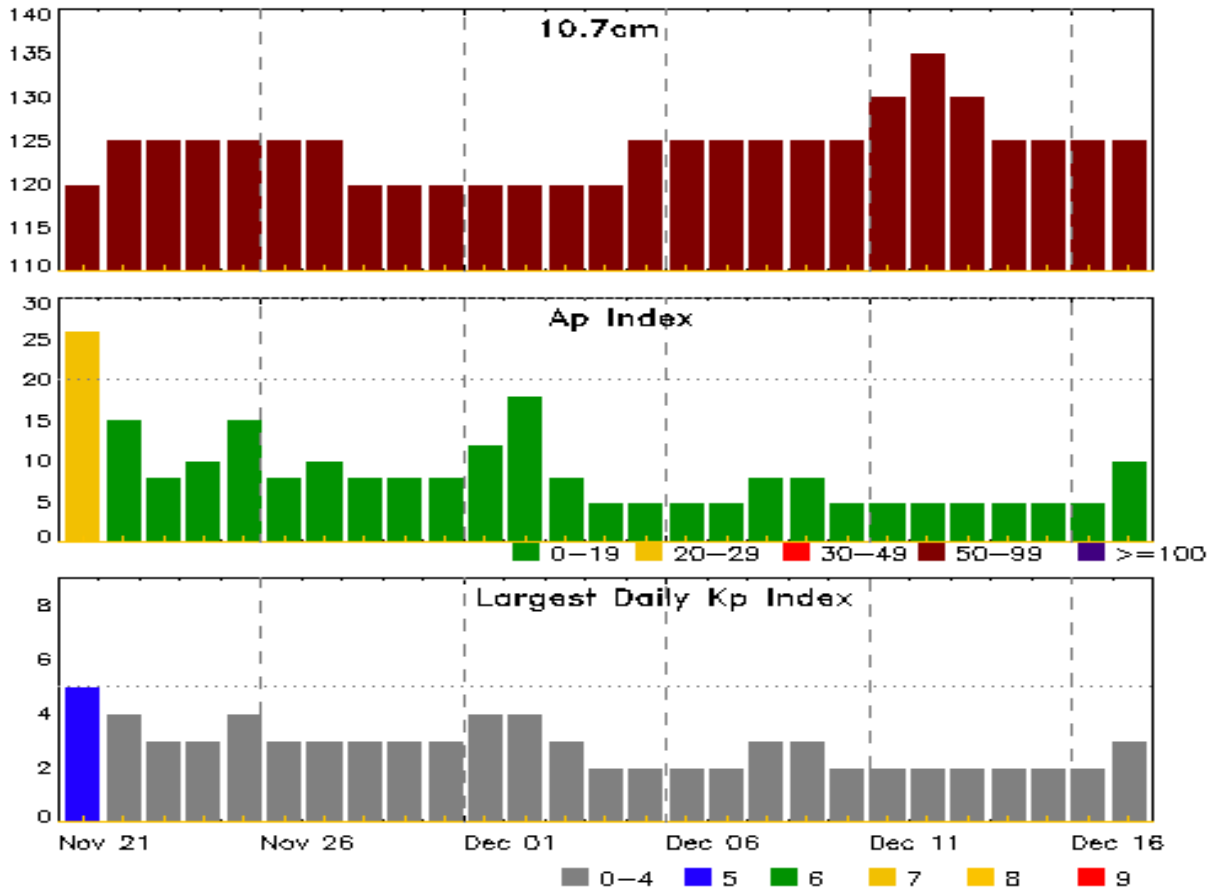
Daily Geomagnetic Data

Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
14 November	3	0-0-1-2-2-1-1-0	4	0-0-3-3-0-0-1-0	4	1-0-2-2-1-1-1-0
15 November	2	1-1-0-0-1-1-0-0	0	0-0-0-0-0-0-0-0	2	0-1-0-0-0-1-0-0
16 November	2	1-0-0-0-1-1-1-1	0	0-0-0-0-0-0-1-0	2	0-0-0-0-0-1-1-1
17 November	1	0-1-0-0-1-1-0-0	0	0-0-0-0-0-0-0-0	2	0-1-0-1-1-0-1-0
18 November	5	0-0-1-1-1-2-3-2	7	0-0-0-3-4-1-2-1	7	0-0-1-1-2-2-3-3
19 November	4	2-0-1-1-2-2-1-1	2	2-0-1-1-1-0-0-0	5	2-0-1-1-1-1-1-1
20 November	3	1-0-0-0-1-2-2-1	3	0-0-0-0-0-1-3-1	4	1-0-0-1-1-2-3-2

Alerts and Warnings Issued

Date & Time of Issue UTC	Type of Alert or Warning	Date & Time of Event UTC
17 Nov 1951	WATCH: Geomagnetic Storm Category G1 predicted	
18 Nov 1910	WARNING: Geomagnetic K = 4	18/1910 - 19/0600
19 Nov 0530	EXTENDED WARNING: Geomagnetic K = 4	18/1910 - 19/1800
19 Nov 1326	ALERT: Type IV Radio Emission	19/1254
19 Nov 1331	ALERT: Type II Radio Emission	19/1301
19 Nov 1934	WATCH: Geomagnetic Storm Category G1 predicted	

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
21 Nov	120	26	5	05 Dec	125	5	2
22	125	15	4	06	125	5	2
23	125	8	3	07	125	5	2
24	125	10	3	08	125	8	3
25	125	15	4	09	125	8	3
26	125	8	3	10	125	5	2
27	125	10	3	11	130	5	2
28	120	8	3	12	135	5	2
29	120	8	3	13	130	5	2
30	120	8	3	14	125	5	2
01 Dec	120	12	4	15	125	5	2
02	120	18	4	16	125	5	2
03	120	8	3	17	125	10	3
04	120	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
15 Nov	0242	0251	0255	M1.0	0.003	1N	N23	W65	3140				
19 Nov	1242	1256	1311	M1.6	0.017				3150	410		1	1

Flare List

	Time			Optical			
Date	Begin	Max	End	X-ray Class	Imp/ Brtns	Location Lat CMD	Rgn #
14 Nov	0019	0211	0221	C4.1	SF	N23W53	3140
14 Nov	0115	0119	0129	C3.4			3140
14 Nov	0244	0249	0258	C3.3	SF	N25W36	3145
14 Nov	0304	0307	0311		SF	N24W37	3145
14 Nov	0345	0354	0359	C3.6	SF	N23W53	3140
14 Nov	0636	0636	0638		SF	N23W56	3140
14 Nov	0710	0717	0725	C3.8	SF	N23W56	3140
14 Nov	B0727	0752	0832		1F	N22W52	3140
14 Nov	1020	1026	1029		SF	N22W54	3140
14 Nov	1258	1310	1320	C1.9	SF	N22W55	3140
14 Nov	1334	1340	1344	C7.4			3140
14 Nov	B1408	1544	1616		SF	N22W59	3140
14 Nov	1724	1729	1734	C5.1			3140
14 Nov	1804	1828	1855	C4.5	SF	N25W58	3140
14 Nov	1923	1929	1935	C5.1	SF	N21W59	3140
14 Nov	2112	2116	2120	C2.5			
14 Nov	2148	2154	2159	C4.3	SF	N21W60	3140
14 Nov	2249	2251	2254		SF	N24W64	3140
15 Nov	0042	0050	0054	C3.0	SF	N24W65	3140
15 Nov	0242	0251	0255	M1.0	1N	N23W65	3140
15 Nov	0258	0259	0307		SF	N23W65	3140
15 Nov	0347	0352	0358	C2.0			
15 Nov	0429	0442	0449	C2.7			
15 Nov	0546	0555	0603	C8.9	SF	N23W64	3140
15 Nov	0654	0703	0709	C6.7	SF	N22W62	3140
15 Nov	0804	0808	0812	C2.0			
15 Nov	0911	0918	0922	C2.8			
15 Nov	1036	1046	1114	C3.5	SF	N22W65	3140
15 Nov	1308	1315	1319	C2.1			3140

Flare List

Date	Time			Optical			
	Begin	Max	End	X-ray Class	Imp/ Brtns	Location Lat CMD	Rgn #
15 Nov	1354	1400	1405	C2.0			3140
15 Nov	1512	1522	1531	C2.6			3140
15 Nov	1940	1943	1948	C1.5			
15 Nov	2007	2015	2022	C1.5			3140
15 Nov	2133	2141	2144	C2.2			3140
15 Nov	2305	2311	2316	C2.8			3140
15 Nov	2348	2353	0002	C1.8			3140
16 Nov	0328	0333	0337	C1.6			
16 Nov	0527	0538	0544	C3.4			3140
16 Nov	0648	0701	0717	C2.3			3140
16 Nov	B0808	U0818	A0821	C2.8	SF	N23W63	3145
16 Nov	0835	0842	0850	C1.8	SF	N23W63	3145
16 Nov	0901	U0904	A0911		SF	N23W63	3145
16 Nov	B0959	U1003	A1039		SF	N24W64	3145
16 Nov	1121	1130	1142	C2.6			3145
16 Nov	1251	1259	1306	C2.0			3141
16 Nov	2303	2307	2315	C1.8			3140
17 Nov	0726	0734	0741	C1.6	SF	S08E56	3147
17 Nov	0838	0838	0844		SF	N24W64	3145
17 Nov	0908	0928	0953	C6.1			
17 Nov	1121	1122	1124		SF	S08E56	3147
17 Nov	1214	1224	1234	C2.8			
17 Nov	1517	1524	1535	C1.5			
17 Nov	1632	1638	1643	C2.1	SF	N22E68	3149
17 Nov	1726	1733	1739	C1.5			
17 Nov	1742	1744	1747		SF	S33E52	3148
17 Nov	2125	2135	2148	C1.8	SF	N21E66	3149
17 Nov	2242	2247	2251		SF	S10E48	3147
17 Nov	2308	2310	2312		SF	S34E50	3148
17 Nov	2336	0000	0016	C5.4			
18 Nov	0825	0830	0835	C1.1			
18 Nov	0857	0914	0931	C5.5			
18 Nov	1027	1041	1054	C4.4			
18 Nov	1123	1128	1133	C5.1			3150
18 Nov	B1309	U1311	A1345		SF	N21W36	3148
18 Nov	1345	U1355	1400	C1.1	SF	S33E37	3148
18 Nov	1457	1512	1542	C1.5			3150
18 Nov	B1635	1638	1657		SF	N18W38	

Flare List

Date	Time			Optical			
	Begin	Max	End	X-ray Class	Imp/ Brtns	Location Lat CMD	Rgn #
18 Nov	1706	1723	1801		SF	N18W38	
18 Nov	1818	1828	1905	C4.6	SF	N18W39	3150
18 Nov	1945	2014	2017		SF	N18W39	
18 Nov	2159	2204	2208	C1.8	SF	S15E47	3147
18 Nov	2251	2251	2305		SF	N18W41	
18 Nov	2352	0001	0006	C2.0	SF	S32E35	3148
19 Nov	0104	0118	0128	C1.4			
19 Nov	0128	0137	0144	C2.7	SF	S32E35	3148
19 Nov	0251	0301	0308	C1.5	SF	S32E35	3148
19 Nov	0605	0623	0638	C8.3	SF	N21W42	3150
19 Nov	0750	0756	0806	C1.2			3150
19 Nov	1235	1239	1242	C1.2			3150
19 Nov	1242	1256	1311	M1.6			3150
19 Nov	1632	1635	1657		SF	N17W52	3150
19 Nov	1703	1711	1717	C1.2	SF	N17W52	3150
19 Nov	1704	1708	1724		SF	N23E41	3149
19 Nov	1728	1735	1737		SF	N17W52	3150
19 Nov	1747	1751	1757		SF	N17W52	3150
19 Nov	1920	1933	1949	B9.7			
20 Nov	0314	0330	0337	B9.9			3150
20 Nov	0551	0609	0626	C3.3			3150
20 Nov	0755	0804	0814	B8.1			3150
20 Nov	0947	0956	1008	B7.2			3150
20 Nov	1202	1210	1218	B8.2			3148
20 Nov	1621	1622	1625		SF	N23E31	3149
20 Nov	1726	1734	1737	B7.3			3149
20 Nov	1737	1743	1747	B7.3			3149
20 Nov	1752	1801	1804		SF	N24E28	3149
20 Nov	1817	1823	1829	B8.4	SF	N24E28	3149
20 Nov	1942	1957	1959		SF	N24E26	3149
20 Nov	2030	2031	2035		SF	N25E26	3149
20 Nov	2037	2043	2053		SF	N24E27	3149
20 Nov	2053	2100	2103		SF	N24E26	3149
20 Nov	2127	2127	2133		SF	N24E26	3149
20 Nov	2151	2202	2206		SF	N24E24	3149
20 Nov	2217	2220	2223		SF	N25E25	3149
20 Nov	2355	0010	0019	B9.1			3149

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 3137												
01 Nov	N37E64	12	20	1	Hsx	1	A	2							
02 Nov	N37E50	12	20	1	Hsx	1	A								
03 Nov	N38E39	10	30	2	Hsx	1	A								
04 Nov	N38E21	15	30	9	Cro	3	B								
05 Nov	N37E09	14	30	3	Cro	2	B								
06 Nov	N37E01	9	10	1	Axx	1	A								
07 Nov	N37W10	6	10	1	Axx	1	A								
08 Nov	N27W22	5	10	1	Axx	1	A								
09 Nov	N37W34	4	10		Axx	1	A								
10 Nov	N37W48	6	10	1	Axx	1	A								
11 Nov	N37W62	6	plage												
12 Nov	N37W76	7	plage												
13 Nov	N37W90	8	plage												
								2	0	0	0	0	0	0	0

Crossed West Limb.
Absolute heliographic longitude: 9

			Region 3139												
03 Nov	N29E48	1	20	3	Cro	4	B								
04 Nov	N28E35	1	10	3	Bxo	2	B								
05 Nov	N28E23	1	10	1	Axx	1	A								
06 Nov	N28E10	1	plage												
07 Nov	N28W04	1	plage												
08 Nov	N28W18	1	plage												
09 Nov	N28W32	2	plage												
10 Nov	N28W46	4	plage												
11 Nov	N28W60	4	plage												
12 Nov	N28W74	5	plage												
13 Nov	N28W88	6	plage												
								0	0	0	0	0	0	0	0

Crossed West Limb.
Absolute heliographic longitude: 1

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 3140												
04 Nov	N26E66	330	120	3	Hsx	1	A								
05 Nov	N26E51	332	110	1	Hsx	1	A								
06 Nov	N27E38	332	100	1	Hsx	1	A								
07 Nov	N26E26	329	130	2	Hsx	1	A								
08 Nov	N26E14	328	80	3	Hsx	1	A								
09 Nov	N26E03	326	100	7	Cso	3	B	2			4				
10 Nov	N26W12	329	120	6	Cso	3	B								
11 Nov	N25W23	327	130	7	Dao	5	B								
12 Nov	N25W36	327	190	8	Dsi	12	BG	2			2				
13 Nov	N25W48	326	230	9	Dai	11	B	8			6	1			
14 Nov	N25W62	326	550	11	Ekc	14	BGD	10			11	1			
15 Nov	N25W76	326	550	12	Ekc	13	BG	11	1		5	1			
16 Nov	N23W89	327	550	15	Ehc	13	BG	3							
								36	1	0	28	3	0	0	0

Crossed West Limb.
Absolute heliographic longitude: 326

			Region 3141												
04 Nov	N15E75	321	150	4	Hsx	1	A	4							
05 Nov	N14E63	320	190	8	Dao	3	B								
06 Nov	N15E51	319	460	12	Eko	9	B	6	1		1				
07 Nov	N14E39	317	600	11	Eko	7	BG	2							
08 Nov	N14E25	318	540	12	Eko	15	BG	1			2				
09 Nov	N14E13	316	530	12	Eko	12	BG	1			1				
10 Nov	N15W01	318	600	12	Eko	21	BGD	4			5				
11 Nov	N14W14	318	610	12	Eki	21	BGD	15	2		15	1			
12 Nov	N15W27	318	550	12	Ekc	20	BG	4	1		5	2			
13 Nov	N14W40	318	270	12	Ekc	14	BG	4			2				
14 Nov	N15W55	318	300	12	Ehc	13	B								
15 Nov	N14W69	319	220	13	Cso	7	B								
16 Nov	N14W82	320	130	10	Cso	3	B	1							
								42	4	0	31	3	0	0	0

Crossed West Limb.
Absolute heliographic longitude: 318

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 3142												
06 Nov	N26E21	349	10	6	Bxo	5	B								
07 Nov	N26E08	347	20	4	Cro	8	B								
08 Nov	N26W04	347	50	4	Cso	6	B								
09 Nov	N25W18	349	10	7	Bxo	3	B								
10 Nov	N25W32	349	plage												
11 Nov	N25W46	350	plage												
12 Nov	N25W60	351	plage												
13 Nov	N25W74	352	plage												
14 Nov	N25W88	352	plage												
								0	0	0	0	0	0	0	0

Crossed West Limb.
Absolute heliographic longitude: 347

			Region 3143												
07 Nov	S14E56	299	20	3	Cro	2	B								
08 Nov	S13E41	302	0		Axx	1	A								
09 Nov	S13E27	303	plage												
10 Nov	S13E13	304	plage												
11 Nov	S13W01	305	plage												
12 Nov	S13W15	306	plage												
13 Nov	S13W29	307	plage												
14 Nov	S13W43	307	plage												
15 Nov	S13W57	308	plage												
16 Nov	S13W71	309	plage												
17 Nov	S13W85	310	plage												
								0	0	0	0	0	0	0	0

Crossed West Limb.
Absolute heliographic longitude: 305

			Region 3144												
09 Nov	S25W20	350	5	1	Axx	1	A								
10 Nov	S25W34	351	10	1	Axx	1	A								
11 Nov	S25W48	352	plage												
12 Nov	S25W62	353	plage												
13 Nov	S25W76	354	plage												
14 Nov	S25W90	354	plage												
								0	0	0	0	0	0	0	0

Crossed West Limb.
Absolute heliographic longitude: 350

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 3145												
10 Nov	N27E04	313	10	4	Bxo	3	B	1							
11 Nov	N27W08	312	10	1	Axx	1	A								
12 Nov	N27W22	313	10	2	Bxo	3	B								
13 Nov	N25W33	311	10	4	Cro	4	B	1				1			
14 Nov	N25W47	311	10	5	Bxo	4	B	1			2				
15 Nov	N25W60	310	20	6	Dso	6	B								
16 Nov	N25W73	311	30	7	Dao	4	B	3			4				
17 Nov	N23W87	312	40	7	Dao	3	B				1				
								6	0	0	7	1	0	0	0

Crossed West Limb.
Absolute heliographic longitude: 313

			Region 3146												
13 Nov	N31E30	248	30	3	Dro	5	B								
14 Nov	N32E17	247	30	6	Cro	6	B								
15 Nov	N33E03	248	20	6	Cro	3	B								
16 Nov	N32W08	246	10	6	Bxo	2	B								
17 Nov	N32W21	246	10	1	Axx	1	A								
18 Nov	N32W35	247	plage												
19 Nov	N32W49	247	plage												
20 Nov	N32W63	248	plage												
								0	0	0	0	0	0	0	0

Still on Disk.
Absolute heliographic longitude: 248

			Region 3147												
16 Nov	S11E71	167	120	5	Hsx	1	A								
17 Nov	S11E57	168	300	3	Hkx	3	A	1			3				
18 Nov	S11E45	167	280	3	Hkx	3	A	1			1				
19 Nov	S12E32	166	230	4	Dao	4	B								
20 Nov	S12E18	167	240	5	Dao	5	B								
								2	0	0	4	0	0	0	0

Still on Disk.
Absolute heliographic longitude: 167

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 3148												
16 Nov	S32E60	178	10	5	Bxo	2	B								
17 Nov	S32E46	179	10	1	Bxo	1	B				2				
18 Nov	S33E32	180	20	1	Hrx	1	A	2			2				
19 Nov	S32E21	177	40	4	Dro	4	B	2			3				
20 Nov	S33E09	176	30	4	Cro	4	B								
								4	0	0	7	0	0	0	0

Still on Disk.
Absolute heliographic longitude: 176

			Region 3149												
17 Nov	N22E64	161	10	1	Bxo	6	B	2			2				
18 Nov	N22E51	161	30	2	Cro	3	B								
19 Nov	N23E38	160	30	3	Cro	5	B				1				
20 Nov	N23E24	161	130	6	Dai	16	B				10				
								2	0	0	13	0	0	0	0

Still on Disk.
Absolute heliographic longitude: 161

			Region 3150												
18 Nov	N21W42	254	80	6	Dri	8	B	3							
19 Nov	N22W55	253	140	8	Dso	6	B	4	1		5				
20 Nov	N21W70	255	120	10	Dao	7	B	1							
								8	1	0	5	0	0	0	0

Still on Disk.
Absolute heliographic longitude: 254

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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