Space Weather Highlights **SWPC PRF 2527**
29 January - 04 February 2024 **05 February 2024**

Solar activity was at low to high levels this period. High levels were observed on 29 Jan when Region 3559 (N27, L=288, class/area Fki/520 on 23 Jan) produced an M6.8/Sf at 29/0438 UTC with an associated Type II Sweep (512 km/s) and a 2,700 sfu tenflare. Assocated with this event was a partial-halo CME that was determined to pass ahead of Earth. Low activity levels were observed on 30-31 Jan and 01 Feb. On 01 Feb, Region 3773 (N23, L=158, class/area Cso/040 on 02 Feb) produced a long-duration C3.0 flare at 01/0743 UTC was an associated CME that was determined to produce a glacing blow at Earth late on 04 Feb to early on 05 Feb.

Moderate levels were observed on 02 Feb when Region 3771 (S17, L=104, class/area Cso/130 on 04 Feb) produced an M1.1 flare at 02/0301 UTC with an associated Type II sweep (1,444 km/s). 03 Feb experienced low levels. High levels were observed on 04 Feb when Regions 3576 (S16, L=055, class/area Ekc/700 on 04 Feb) produced 6 M-class flares and Region 3559 produced a lone M-class flare. The largest of these flares was an M2.7 at 04/2234 UTC produced by 3576.

A 10 Mev proton event was observed at geosynchronous orbit on 29-30 Jan due to the M6.8/Sf flare from Region 3559. The event began at 29/0615 UTC, peaked at 137 pfu at 29/1805 UTC and ended at 30/0425 UTC.

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

Geomagnetic field activity was mostly quiet through the period. Isolated unsettled levels were observed on 29 and 30 Jan and again late on 04 Feb.

Space Weather Outlook
05 February - 02 March 2024

Solar activity is expected to be at low to moderate levels on 05-16 Feb due primarily to the flare history and potential of Region 3776 and the return of old Region 3559. Low levels are expected on 17-23 Feb. An increased chance for moderate levels are possible on 24-29 Feb and 01-02 Mar as old Regions 3359 and 3776 rotate back onto the visible disk.

No proton events are expected at geosynchronous orbit.

The greater than 2 MeV electron flux at geosynchronous orbit is expected to be at low to moderate levels.

Geomagnetic field activity is expected to be at active to G1 (minor) levels on 05 Feb due to combined CME and positive polarity CH HSS effects. Unsettled levels are expected on 06 Feb due to positive polarity CH HSS effects. Mostly quiet levels are expected on 07-25 Feb and 28-29 Feb and 01-02 Mar. Unsettled levels are expected on 26-27 Feb due to negative polarity CH HSS effects.

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
29 January	140	48	260	C1.4	10	2	0	2	0	0	0	0
30 January	135	53	280	B8.4	11	0	0	2	0	0	0	0
31 January	136	75	390	B7.7	11	0	0	6	0	0	0	0
01 February	137	113	510	B7.6	9	0	0	5	0	0	0	0
02 February	143	131	490	B9.8	7	1	0	0	1	0	0	0
03 February	156	123	770	C1.7	15	0	0	6	0	0	0	0
04 February	170	138	1320	C2.2	11	7	0	8	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
29 January	2.5e+07	2.8e+06	1.2e+06
30 January	1.7e+07	5.0e+05	1.7e+06
31 January	2.7e+06	1.3e+05	2.9e+06
01 February	9.4e+05	6.3e+04	5.2e+06
02 February	5.3e+05	5.6e+04	5.8e+06
03 February	6.2e+05	3.7e+04	7.0e+06
04 February	6.1e+05	2.4e+04	2.6e+06

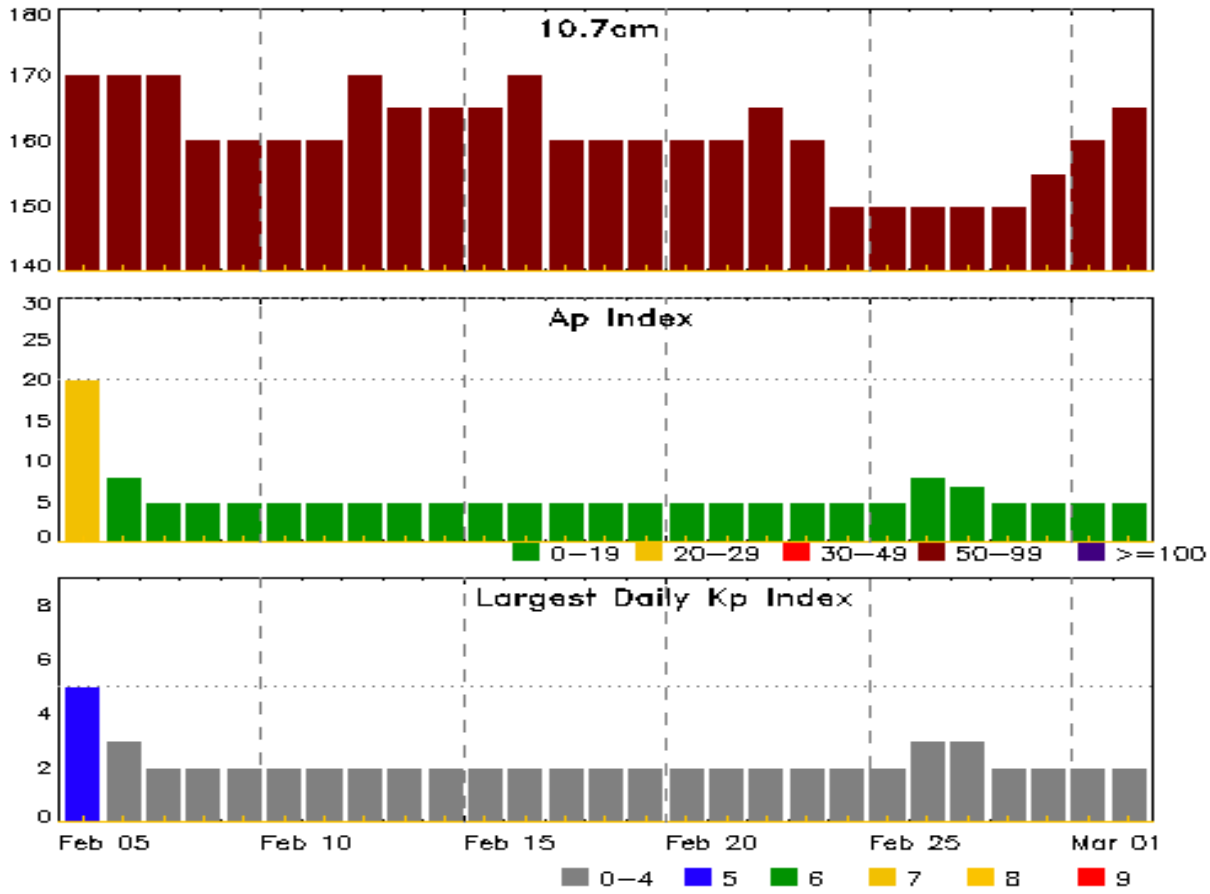
Daily Geomagnetic Data

Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
29 January	7	2-1-1-1-3-2-2-2	5	1-2-1-1-3-1-0-1	9	3-2-1-1-2-2-2-3
30 January	8	2-3-3-2-1-2-1-2	7	1-2-3-3-2-1-1-1	8	2-3-2-2-1-1-2-2
31 January	7	2-2-1-1-2-3-2-1	4	0-1-1-3-1-1-1-0	6	2-2-1-2-2-2-2-1
01 February	4	1-1-2-2-1-1-1-0	6	0-0-1-4-3-1-1-0	5	1-1-2-2-1-2-2-1
02 February	3	0-0-1-2-2-2-1-0	2	0-0-1-2-1-0-0-0	3	1-0-1-1-1-1-0-0
03 February	2	0-1-1-1-0-1-1-0	0	0-0-0-1-0-0-0-0	3	0-1-1-1-0-1-1-1
04 February	5	0-1-1-1-2-2-2-2	2	0-0-1-1-0-0-1-2	3	1-1-1-2-1-2-2-3

Alerts and Warnings Issued

Date & Time of Issue UTC	Type of Alert or Warning	Date & Time of Event UTC
29 Jan 0428	ALERT: X-ray Flux exceeded M5	29/0427
29 Jan 0500	SUMMARY: 10cm Radio Burst	29/0408 - 0444
29 Jan 0502	WARNING: Proton 10MeV Integral Flux > 10pfu	29/0500 - 1800
29 Jan 0502	WARNING: Proton 100MeV Integral Flux > 1pfu	29/0502 - 1200
29 Jan 0516	ALERT: Type II Radio Emission	29/0407
29 Jan 0536	SUMMARY: X-ray Event exceeded M5	29/0354 - 0515
29 Jan 0632	ALERT: Proton Event 10MeV Integral Flux >= 10pfu	29/0615
29 Jan 0731	CANCELLATION: Proton 100MeV Integral Flux > 1pfu	
29 Jan 1146	ALERT: Type II Radio Emission	29/1021
29 Jan 1757	ALERT: Proton Event 10MeV Integral Flux >= 100pfu	29/1740
29 Jan 1757	EXTENDED WARNING: Proton 10MeV Integral Flux > 10pfu	29/0500 - 30/2359
30 Jan 0234	SUMMARY: Proton Event 10MeV Integral Flux >= 100pfu	29/0615 - 30/0230
30 Jan 1153	SUMMARY: Proton Event 10MeV Integral Flux >= 10pfu	29/0615 - 30/0425
02 Feb 0348	ALERT: Type II Radio Emission	02/0306
02 Feb 1206	ALERT: Type II Radio Emission	02/1107
03 Feb 0009	WATCH: Geomagnetic Storm Category G1 predicted	
04 Feb 2248	ALERT: Type II Radio Emission	04/2101

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
05 Feb	170	20	5	19 Feb	160	5	2
06	170	8	3	20	160	5	2
07	170	5	2	21	160	5	2
08	160	5	2	22	165	5	2
09	160	5	2	23	160	5	2
10	160	5	2	24	150	5	2
11	160	5	2	25	150	5	2
12	170	5	2	26	150	8	3
13	165	5	2	27	150	7	3
14	165	5	2	28	150	5	2
15	165	5	2	29	155	5	2
16	170	5	2	01 Mar	160	5	2
17	160	5	2	02	165	5	2
18	160	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
29 Jan	0129	0140	0152	M1.2	0.011	SF	N29W61	3559	430			
29 Jan	0354	0438	0515	M6.8	0.190	SF	N25W70	3559			2700	2
02 Feb	0252	0301	0305	M1.1	0.004			3571	310			3
04 Feb	1140	1153	1208	M1.4	0.015	SF	S15E86	3576				
04 Feb	1622	1638	1646	M1.5	0.015			3576				
04 Feb	1705	1712	1719	M1.3	0.002			3576				
04 Feb	1816	1829	1843	M1.1	0.012			3575				
04 Feb	2052	2057	2101	M1.2	0.004			3576			96	
04 Feb	2220	2228	2234	M2.1	0.015			3576				
04 Feb	2234	2237	2242	M2.7	0.012			3576				

Flare List

	Time			Optical			
Date	Begin	Max	End	X-ray Class	Imp/ Brtns	Location Lat CMD	Rgn #
29 Jan	0043	0051	0059	C5.2			
29 Jan	0129	0140	0152	M1.2	SF	N29W61	3559
29 Jan	0341	0351	0354	C2.5			3559
29 Jan	0354	0438	0515	M6.8	SF	N25W70	3559
29 Jan	1010	1018	1023	C5.4			
29 Jan	1034	1037	1041	C5.1			
29 Jan	1139	1143	1148	C2.8			3565
29 Jan	1449	1456	1502	C6.0			3559
29 Jan	1524	1531	1537	C2.4			3559
29 Jan	1629	1642	1653	C5.9			3559
29 Jan	1742	1752	1759	C2.2			
29 Jan	2228	2232	2236	C1.8			3567
30 Jan	0007	0016	0022	C1.9			3559
30 Jan	0250	0256	0303	C1.4			3559
30 Jan	0618	0625	0631	C1.4			
30 Jan	0633	0641	0645	C2.0			3565
30 Jan	0708	0708	0711		SF	N20E69	
30 Jan	0947	0955	1000	C1.2	SF	N06E46	3565
30 Jan	1445	1450	1454	C1.3			
30 Jan	1558	1602	1607	C1.7			
30 Jan	1715	1722	1726	C1.4			

Flare List

Date	Time			Optical			
	Begin	Max	End	X-ray Class	Imp/ Brtns	Location Lat CMD	Rgn #
30 Jan	1734	1740	1748	C5.7			3559
30 Jan	1852	1859	1913	C1.6			3569
30 Jan	2300	2307	2313	C1.6			3567
31 Jan	0519	0526	0534	C1.9			3567
31 Jan	0627	0631	0635	C3.2	SF	N04E36	3565
31 Jan	0816	0829	0838	C4.5	SF	N19E56	3567
31 Jan	0938	0944	0951	C1.6			3567
31 Jan	1011	1017	1022	C1.0	SF	N20E56	3567
31 Jan	1054	1057	1109		SF	N07E34	3565
31 Jan	1059	1108	1121	C1.3			
31 Jan	1205	1218	1229	C1.4			3567
31 Jan	B1244	U1244	A1254		SF	S04E71	
31 Jan	1310	1322	1333	C1.7			3569
31 Jan	1340	1345	1350	C2.3	SF	N04E31	3565
31 Jan	2022	2030	2039	C1.2			3567
31 Jan	2121	2125	2131	C1.5			3567
01 Feb	0348	0357	0407	C1.4			3571
01 Feb	0606	0612	0618	C1.0	SF	S20E73	3571
01 Feb	0636	0743	0848	C3.0			3573
01 Feb	1129	1132	1133		SF	S19E70	3571
01 Feb	1438	1448	1455	C1.6	SF	N17E38	3567
01 Feb	1457	1500	1504	C2.5			3571
01 Feb	1847	1852	1900	C1.3	SF	N21E39	3567
01 Feb	2057	2106	2111	C1.1			3571
01 Feb	B2212	2215	2221	C1.1	SF	S09W05	3565
01 Feb	2311	2322	2326	C2.2			3571
02 Feb	0252	0301	0305	M1.1			3571
02 Feb	0520	0530	0538	C3.2			3571
02 Feb	0814	0819	0825	C1.7			3575
02 Feb	1048	1057	1103	C5.6	1N	S20E57	3571
02 Feb	1116	1135	1202	C6.5			
02 Feb	1525	1534	1539	C3.0			3571
02 Feb	1622	1632	1638	C3.1			3571
02 Feb	1916	1924	1931	C1.6			3571
03 Feb	0054	0105	0123	C3.1			
03 Feb	0138	0203	0222	C4.7			
03 Feb	0531	0554	0623	C7.7			
03 Feb	0705	0708	0749		SF	N08W04	3565

Flare List

Date	Time			Optical			
	Begin	Max	End	X-ray Class	Imp/ Brtns	Location Lat CMD	Rgn #
03 Feb	0724	0724	0732		SF	S18E45	3571
03 Feb	0810	0813	0815		SF	N21E17	3567
03 Feb	1033	1047	1054	C5.8			
03 Feb	1122	1133	1144	C3.7			3576
03 Feb	1244	1248	1253	C4.3			3576
03 Feb	1303	1306	1311	C3.1			3576
03 Feb	1351	1357	1402		SF	S35W30	3575
03 Feb	1406	1414	1422	C2.2			3576
03 Feb	1410	1413	1419		SF	S35W32	3575
03 Feb	1425	1430	A1531		SF	S35W32	3575
03 Feb	1519	1525	1529	C3.1			3576
03 Feb	1746	1756	1800	C4.4			3576
03 Feb	1941	1948	1953	C4.0			3576
03 Feb	2011	2017	2021	C2.3			3576
03 Feb	2106	2117	2123	C5.9			3576
03 Feb	2123	2127	2129	C5.8			3576
03 Feb	2129	2140	2144	C6.4			3576
04 Feb	0112	0117	0121	C3.6			3576
04 Feb	0220	0227	0231	C3.3			3576
04 Feb	0648	0701	0706	C3.7			3576
04 Feb	0714	0716	0720	C3.9			3576
04 Feb	0724	0734	0747	C4.8			3576
04 Feb	0816	0821	0825	C3.9			3576
04 Feb	1140	1153	1208	M1.4	SF	S15E86	3576
04 Feb	1158	1200	1205		SF	S15E86	3576
04 Feb	1225	1229	1234		SF	S14E78	3576
04 Feb	1238	1239	1241		SF	S16E80	3576
04 Feb	1324	1329	1350		SF	N16E00	3567
04 Feb	1335	1353	1402	C8.4	SF	S16E82	3576
04 Feb	1433	1434	1442		SF	S14E77	3576
04 Feb	1508	1516	1522	C4.3	SF	S22E84	3576
04 Feb	1549	1557	1608	C6.0			3576
04 Feb	1608	1613	1622	C5.6			3576
04 Feb	1622	1638	1646	M1.5			3576
04 Feb	1705	1712	1719	M1.3			3576
04 Feb	1816	1829	1843	M1.1			3575
04 Feb	2016	2019	2024	C4.4			3576
04 Feb	2052	2057	2101	M1.2			3576

Flare List

	Time			Optical			
Date	Begin	Max	End	X-ray Class	Imp/ Brtns	Location Lat CMD	Rgn #
04 Feb	2220	2228	2234	M2.1			3576
04 Feb	2234	2237	2242	M2.7			3576

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 3559												
18 Jan	N27E60	290	160	10	Dso	3	B								
19 Jan	N26E46	291	170	10	Dao	6	B								
20 Jan	N27E35	289	220	14	Eai	22	B	5							
21 Jan	N27E22	289	300	18	Fkc	28	BG	12			10	1			
22 Jan	N27E11	287	360	20	Fkc	32	BG	7	2		12	1			
23 Jan	N27W03	288	520	20	Fki	20	BG	4	2						
24 Jan	N27W18	289	480	20	Fki	20	BG	2			4				
25 Jan	N27W32	290	400	23	Fki	15	BG	2			1				
26 Jan	N25W46	291	480	16	Fki	17	BG	1			1				
27 Jan	N26W56	288	310	16	Fki	14	BG								
28 Jan	N26W70	289	280	16	Fko	11	BG	1			1				
29 Jan	N26W83	289	180	15	Eao	6	BG	4	2		2				
								38	6	0	31	2	0	0	0

Crossed West Limb.
Absolute heliographic longitude: 288

			Region 3560												
18 Jan	S11E66	284	20	1	Hrx	1	A								
19 Jan	S11E52	285	10	1	Axx	1	A								
20 Jan	S10E35	289	40	6	Bxi	8	B	3							
21 Jan	S10E22	289	60	8	Cri	10	B				1				
22 Jan	S11E08	289	40	8	Cao	4	B				1				
23 Jan	S10W06	291	80	9	Cao	8	B								
24 Jan	S10W21	292	70	7	Cao	4	B								
25 Jan	S10W35	293	50	7	Cao	4	B								
26 Jan	S22W48	293	40	5	Dai	8	B	1			2				
27 Jan	S11W61	293	120	6	Dai	6	B				1				
28 Jan	S11W75	294	130	6	Dai	7	B	1							
29 Jan	S11W89	295	50	6	Cai	8	B								
								5	0	0	5	0	0	0	0

Crossed West Limb.
Absolute heliographic longitude: 291

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 3563												
26 Jan	S06E32	213	10	2	Bxo	2	B								
27 Jan	S06E17	215	10	2	Bxo	2	B								
28 Jan	S07E03	215	10	3	Bxo	5	B								
29 Jan	S05W10	216	plage												
30 Jan	S05W25	217	plage												
31 Jan	S05W39	218	plage												
01 Feb	S05W53	219	plage												
02 Feb	S05W68	220	plage												
03 Feb	S05W83	223	plage												
								0	0	0	0	0	0	0	0

Crossed West Limb.
Absolute heliographic longitude: 215

			Region 3564												
28 Jan	S09E54	165	10	1	Axx	1	A								
29 Jan	S09E40	166	plage												
30 Jan	S12E25	167	plage												
31 Jan	S14E11	168	plage												
01 Feb	S14W03	169	plage								1				
02 Feb	S14W17	169	plage												
03 Feb	S14W31	171	plage												
04 Feb	S14W45	172	plage												
								0	0	0	1	0	0	0	0

Still on Disk.
Absolute heliographic longitude: 169

			Region 3565												
28 Jan	N07E62	155	10	2	Hrx	1	A								
29 Jan	N08E50	156	30	2	Cro	4	B	1							
30 Jan	N07E36	156	50	4	Dao	5	B	2			1				
31 Jan	N07E23	156	50	4	Dso	5	B	2			3				
01 Feb	N07E12	154	20	5	Cro	8	B	1							
02 Feb	N07W01	153	20	5	Dri	8	BG								
03 Feb	N05W15	155	20	5	Cri	7	BG				1				
04 Feb	N05W29	156	20	4	Cro	8	BG								
								6	0	0	5	0	0	0	0

Still on Disk.
Absolute heliographic longitude: 153

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 3566												
30 Jan	S13W61	253	10	4	Bxo	2	B								
31 Jan	S13W75	254	80	2	Dao	3	B								
01 Feb	S13W89	254	10	1	Axx	1	A								
								0	0	0	0	0	0	0	0

Crossed West Limb.
Absolute heliographic longitude: 253

			Region 3567												
29 Jan	N20E84	124	plage					1							
30 Jan	N20E70	124	210	9	Dso	4	B	1							
31 Jan	N19E54	125	220	9	Dai	12	B	7			2				
01 Feb	N19E40	126	240	6	Dai	13	BG	2			2				
02 Feb	N19E24	133	180	10	Dai	21	B								
03 Feb	N18E09	131	30	11	Eri	8	B				1				
04 Feb	N18W06	133	30	11	Cri	8	B				1				
								11	0	0	6	0	0	0	0

Still on Disk.
Absolute heliographic longitude: 133

			Region 3568												
30 Jan	S09W38	230	10	1	Bxo	2	B								
31 Jan	S10W51	230	30	4	Bxo	4	B								
01 Feb	S10W64	230	plage												
02 Feb	S10W78	230	plage												
								0	0	0	0	0	0	0	0

Crossed West Limb.
Absolute heliographic longitude: 230

			Region 3569												
30 Jan	S12E04	189	plage					1							
31 Jan	S12W10	189	10	1	Axx	1	A	1							
01 Feb	S12W24	190	plage												
02 Feb	S12W38	190	plage												
03 Feb	S12W52	192	plage												
04 Feb	S12W66	193	plage												
								2	0	0	0	0	0	0	0

Still on Disk.
Absolute heliographic longitude: 189

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 3570												
01 Feb	S04E50	116	20	5	Dro	1	B								
02 Feb	S04E35	117	20	5	Dro	5	B								
03 Feb	S04E21	119	20	6	Dro	7	B								
04 Feb	S05E08	119	20	6	Dro	4	B								
								0	0	0	0	0	0	0	0

Still on Disk.
Absolute heliographic longitude: 119

			Region 3571												
01 Feb	S16E61	105	90	3	Hsx	2	A	5			1				
02 Feb	S17E49	103	110	3	Hsx	2	A	5	1			1			
03 Feb	S18E37	103	120	2	Hsx	2	A				1				
04 Feb	S17E23	104	130	2	Cso	3	B								
								10	1	0	2	1	0	0	0

Still on Disk.
Absolute heliographic longitude: 104

			Region 3572												
01 Feb	S12E22	144	10	1	Axx	2	A								
02 Feb	S12E08	144	10	1	Axx	2	A								
03 Feb	S12W06	146	plage												
04 Feb	S12W20	147	plage												
								0	0	0	0	0	0	0	0

Still on Disk.
Absolute heliographic longitude: 146

			Region 3573												
01 Feb	N23E08	158	30	2	Cao	4	B	1							
02 Feb	N23W06	158	40	6	Cso	3	B								
03 Feb	N22W18	158	10	4	Cro	2	B								
04 Feb	N22W32	158	10	6	Cro	2	B								
								1	0	0	0	0	0	0	0

Still on Disk.
Absolute heliographic longitude: 158

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 3574												
01 Feb	N15E70	96	90	2	Dao	2	B								
02 Feb	N15E58	94	90	5	Dso	2	B								
03 Feb	N15E44	96	90	6	Dso	2	B								
04 Feb	N16E32	95	60	5	Cso	3	B								
								0	0	0	0	0	0	0	0

Still on Disk.
Absolute heliographic longitude: 95

			Region 3575												
02 Feb	S37W25	177	20	3	Bxi	8	B	1							
03 Feb	S37W37	177	280	7	Dkc	12	BGD				3				
04 Feb	S37W51	178	350	9	Dkc	12	BGD		1						
								1	1	0	3	0	0	0	0

Still on Disk.
Absolute heliographic longitude: 177

			Region 3576												
03 Feb	S17E82	58	200	6	Dac	3	B	11							
04 Feb	S16E72	55	700	14	Ekc	18	BD	11	6		7				
								22	6	0	7	0	0	0	0

Still on Disk.
Absolute heliographic longitude: 55

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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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