

Solar activity ranged from low to high levels. Of the 19 numbered active regions that were observed on the visible disk this week, Region 3514 (N05, L=141, class/area=Ekc/470 on 14 Dec) was the primarily responsible for the most significant activity. The region produced an X2.8 flare (R3-Strong) at 14/1702 UTC, the strongest since Sep 2017. Associated with the event were Type II (est. 2118 km/s) and Type IV radio sweeps, a radio burst values with a Castelli-U profile, a Tenflare, and extremely high radio burst fluxes reported by the USAF RSTN observatories. Subsequent coronagraph imagery contained a CME signature with a halo shock and ejecta that was primarily headed towards the SW. This ejecta was modeled alongside other CME-producing events, an M5.8 flare (R2 - Moderate) at 14/0744 UTC, an M2.3 flare (R1 - Minor) at 14/1348 UTC and double peak M6.9 flare at 15/0734 UTC. The resulting WSA-Enlil output suggested anticipated CME influence for late on 16 Dec and through 17 Dec.

Other activity of note included coronal dimming on late on 11 Dec and 12 Dec from the vicinity of Region 3514. The X-ray response from these events were below the R1 event threshold but signatures in coronagraph imagery were identified following the events. Modeling and analysis of these events suggested CME influence likely around 14-15 Dec.

With high levels observed on 14-15 Dec, and moderate levels observed on 17 Dec (all from Region 3514), the remainder of the summary period was at low solar activity levels. Other CME activity observed in coronagraph imagery was determined to not be along the Sun-Earth line.

The GOES-16 greater than 10 MeV proton flux briefly exceeded the S1 (Minor) threshold at the very end of the 15 Dec UT day. Flux levels reached a peak of 13.9pfu shortly after at 16/0015 UTC. The proton enhancement was thought to be produced by the combined contribution of the CMEs associated with the X2.8 flare at 14/1702 UTC and the M6.9 flare at 15/0734 UTC.

The greater than 2 MeV electron flux at geosynchronous orbit was at high levels on 11-12 Dec. Due to an increase in geomagnetic activity, electron flux levels remained at normal to moderate levels from 13-17 Dec.

Geomagnetic field activity ranged from quiet to G1 (Minor) storm levels. Quiet levels were observed over 11 Dec. An increase to active levels was observed after a brief period of southward Bz reached -12 nT. This was likely caused by a filament eruption on the Sun over 08 Dec. Quiet to unsettled conditions on 13 Dec increased to active levels again on 14 Dec (southward Bz reached ~-11 nT). On 15 Dec, only quiet to unsettled conditions followed the arrival of a CME associated with activity on the Sun over 11-12 Dec. An increase to active conditions was observed on 16 Dec when solar wind speeds increased to above 500 km/s. Activity would increase to G1 (Minor) geomagnetic storm levels over 17 Dec as CME influence from activity on the Sun over 14-15 Dec passed by Earth. Total magnetic field strength increased to a peak 17 nT and Bz reached as far south -14 nT as the CME passed. Solar wind speeds increased to roughly 550 km/s before decreasing to below 500 km/s by the end of the 17 Dec UT



day.

## **Space Weather Outlook 18 December - 13 January 2024**

Solar activity is expected to be low levels, with a chance for moderate activity (R1-R2/Minor-Moderate) throughout the outlook period.

No proton events are expected at geosynchronous orbit.

The greater than 2 MeV electron flux at geosynchronous orbit is expected to reach high levels due to multiple, recurrent CH HSSs on 20-22 Dec, 03-05 Jan, and 08-10 Jan. The remainder of the outlook period is likely to be at normal to moderate levels.

Geomagnetic field activity is expected to reach G1 (Minor) storm on 18 Dec due to waning CME influence. Active levels are likely on 19 Dec as solar wind influence is anticipated to transition to a CH HSS. Unsettled levels due to recurrent CH HSSs are also likely on 20-21 Dec, 23 Dec, 30 Dec-02 Jan, and 08-10 Jan. The remainder of the outlook period is expected to be mostly quiet.



### *Daily Solar Data*

Date	Radio Flux 10.7cm	Sun spot No.	Sunspot Area (10 <sup>-6</sup> hemi.)	X-ray Background Flux	Flares							
					X-ray			Optical				
					C	M	X	S	1	2	3	4
11 December	126	87	360	B6.0	17	0	0	3	0	0	0	0
12 December	126	80	240	B6.9	8	0	0	4	0	0	0	0
13 December	135	114	580	B9.5	4	0	0	4	0	0	0	0
14 December	155	126	940	C1.4	7	2	1	4	1	0	0	0
15 December	144	130	820	C1.3	12	2	0	14	2	0	0	0
16 December	149	163	700	C1.2	15	0	0	1	0	0	0	0
17 December	155	129	400	C1.3	8	1	0	3	0	0	0	0

### *Daily Particle Data*

Date	Proton Fluence (protons/cm <sup>2</sup> -day -sr)		Electron Fluence (electrons/cm <sup>2</sup> -day -sr)
	>1 MeV	>10 MeV	>2MeV
	11 December	2.6e+05	1.8e+04
12 December	4.9e+05	1.7e+04	1.5e+07
13 December	4.2e+04	1.7e+04	1.4e+06
14 December	1.4e+05	2.2e+04	1.2e+06
15 December	1.7e+07	2.3e+05	4.0e+06
16 December	4.5e+07	2.0e+05	2.6e+06
17 December	8.3e+06	3.7e+04	1.3e+06

### *Daily Geomagnetic Data*

Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
	11 December	3	0-2-1-0-2-1-1-0	0	0-0-0-0-0-0-0-0	3
12 December	8	0-1-1-1-4-3-2-1	18	0-0-1-1-6-5-2-0	10	0-2-1-1-4-4-2-1
13 December	7	0-2-2-1-2-2-2-3	17	0-1-3-5-4-4-3-1	8	1-2-2-2-2-3-2-3
14 December	13	3-3-3-3-3-3-1-2	30	4-4-5-6-4-3-2-2	16	4-4-3-4-3-2-1-2
15 December	8	1-1-1-2-3-3-2-2	25	1-1-2-5-6-4-3-3	12	2-1-1-3-3-3-3-3
16 December	10	3-3-3-2-2-2-2-2	13	3-3-3-3-4-1-1-2	14	3-4-3-2-2-1-3-3
17 December	32	3-4-4-5-5-5-3-4	88	3-5-6-7-7-8-4-3	22	4-4-4-5-5-5-3-4



### *Alerts and Warnings Issued*

Date & Time of Issue UTC	Type of Alert or Warning	Date & Time of Event UTC
11 Dec 1420	ALERT: Electron 2MeV Integral Flux $\geq$ 1000pfu	11/1410
12 Dec 1252	WARNING: Geomagnetic K = 4	12/1251 - 1800
12 Dec 1449	ALERT: Geomagnetic K = 4	
12 Dec 1538	CONTINUED ALERT: Electron 2MeV Integral Flux $\geq$ 1000pfu	11/1410
12 Dec 1719	EXTENDED WARNING: Geomagnetic K = 4	12/1251 - 2100
13 Dec 1816	WATCH: Geomagnetic Storm Category G1 predicted	
14 Dec 0104	WARNING: Geomagnetic K = 4	14/0103 - 1200
14 Dec 0217	ALERT: Geomagnetic K = 4	
14 Dec 0743	ALERT: X-ray Flux exceeded M5	14/0741
14 Dec 0822	SUMMARY: X-ray Event exceeded M5	14/0711 - 0800
14 Dec 1143	EXTENDED WARNING: Geomagnetic K = 4	14/0103 - 1800
14 Dec 1704	ALERT: X-ray Flux exceeded M5	14/1658
14 Dec 1725	ALERT: Type II Radio Emission	14/1708
14 Dec 1726	ALERT: Type IV Radio Emission	14/1708
14 Dec 1821	SUMMARY: X-ray Event exceeded X1	14/1647 - 1712
14 Dec 2007	SUMMARY: 10cm Radio Burst	14/1719 - 1803
15 Dec 0714	ALERT: X-ray Flux exceeded M5	15/0712
15 Dec 0733	SUMMARY: X-ray Event exceeded M5	15/0703 - 0723
15 Dec 0734	ALERT: X-ray Flux exceeded M5	15/0723
15 Dec 0747	SUMMARY: X-ray Event exceeded M5	15/0723 - 0743
15 Dec 0820	ALERT: Type IV Radio Emission	15/0729
15 Dec 0845	SUMMARY: 10cm Radio Burst	15/0729 - 0828
15 Dec 1126	WARNING: Geomagnetic Sudden Impulse expected	15/1130 - 1230
15 Dec 1134	WARNING: Geomagnetic K = 4	15/1133 - 1800
15 Dec 1216	SUMMARY: Geomagnetic Sudden Impulse	15/1147
15 Dec 1716	EXTENDED WARNING: Geomagnetic K = 4	15/1133 - 16/0600
15 Dec 1956	WATCH: Geomagnetic Storm Category G2 predicted	
15 Dec 2349	WARNING: Proton 10MeV Integral Flux $>$ 10pfu	15/2350 - 16/1200

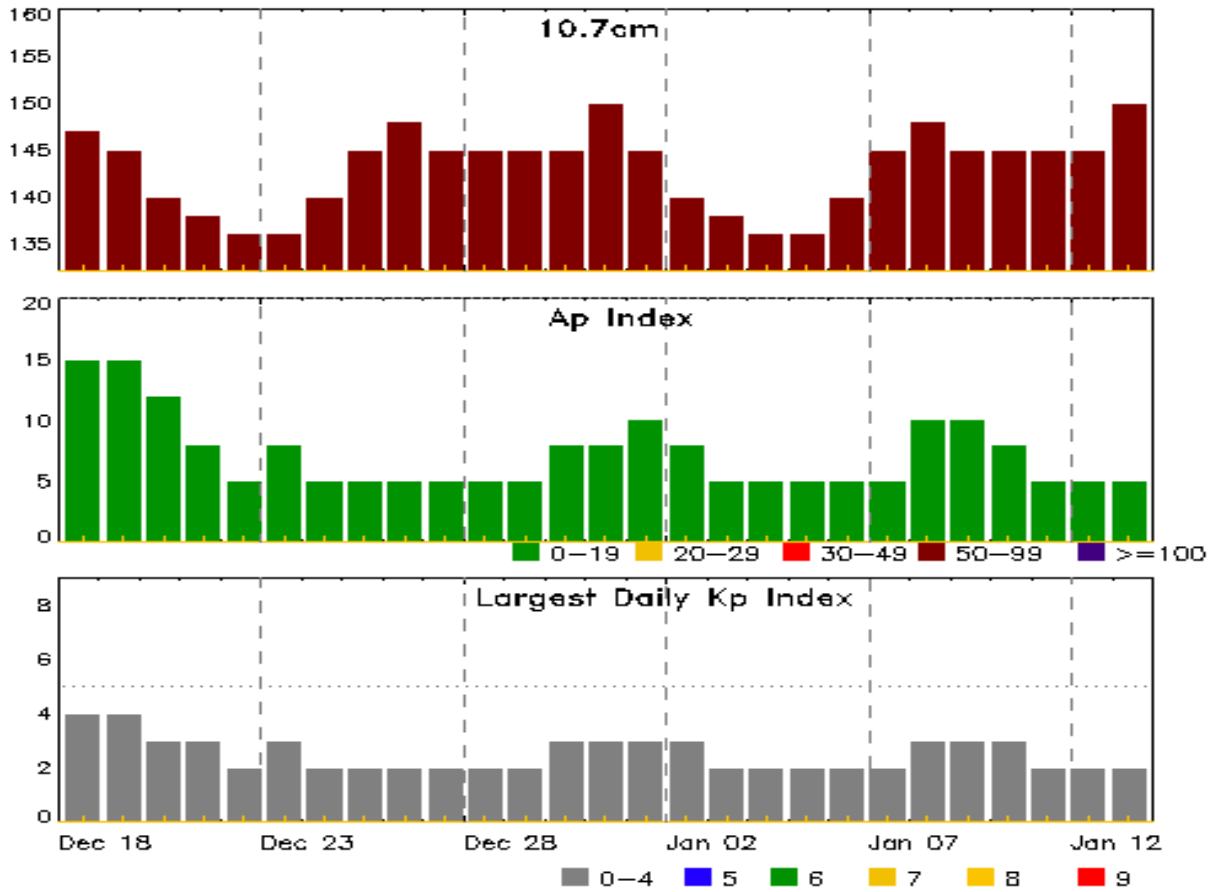


### *Alerts and Warnings Issued*

Date & Time of Issue UTC	Type of Alert or Warning	Date & Time of Event UTC
16 Dec 0002	ALERT: Proton Event 10MeV Integral Flux $\geq$ 10pfu	15/2355
16 Dec 0518	ALERT: Geomagnetic K = 4	
16 Dec 0523	EXTENDED WARNING: Geomagnetic K = 4	15/1133 - 16/1500
16 Dec 1000	CANCELLATION: Proton 10MeV Integral Flux $>$ 10pfu	
16 Dec 1002	SUMMARY: Proton Event 10MeV Integral Flux $\geq$ 10pfu	15/2345 - 16/0055
17 Dec 0154	WARNING: Geomagnetic K = 4	17/0155 - 1200
17 Dec 0303	ALERT: Geomagnetic K = 4	
17 Dec 0505	WARNING: Geomagnetic K = 5	17/0505 - 1200
17 Dec 1143	ALERT: Geomagnetic K = 5	
17 Dec 1143	EXTENDED WARNING: Geomagnetic K = 5	17/0505 - 1800
17 Dec 1143	EXTENDED WARNING: Geomagnetic K = 4	17/0155 - 2100
17 Dec 1414	ALERT: Geomagnetic K = 5	
17 Dec 1422	WARNING: Geomagnetic K = 6	17/1422 - 1800
17 Dec 1507	ALERT: Geomagnetic K = 5	
17 Dec 1659	ALERT: Geomagnetic K = 5	
17 Dec 1740	EXTENDED WARNING: Geomagnetic K = 4	17/0155 - 18/1200
17 Dec 1741	EXTENDED WARNING: Geomagnetic K = 5	17/0505 - 18/0600



## 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
18 Dec	147	15	4	01 Jan	145	10	3
19	145	15	4	02	140	8	3
20	140	12	3	03	138	5	2
21	138	8	3	04	136	5	2
22	136	5	2	05	136	5	2
23	136	8	3	06	140	5	2
24	140	5	2	07	145	5	2
25	145	5	2	08	148	10	3
26	148	5	2	09	145	10	3
27	145	5	2	10	145	8	3
28	145	5	2	11	145	5	2
29	145	5	2	12	145	5	2
30	145	8	3	13	150	5	2
31	150	8	3				

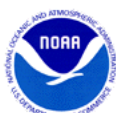


### *Energetic Events*

Date	Time			X-ray		Optical Information			Peak		Sweep Freq	
	Begin	Max	Half	Class	Integ Flux	Imp/ Brtns	Location	Rgn #	Radio Flux		Intensity	
			Max						245	2695	II	IV
14 Dec	0711	0744	0800	M5.8	0.066	SF	N04W41	3514	100			
14 Dec	1329	1348	1408	M2.3	0.032			3514				
14 Dec	1647	1702	1712	X2.8	0.190			3514			2	2
15 Dec	0703	0715	0723	M6.3	0.016			3514	250	1200		2
15 Dec	0723	0734	0743	M6.9	0.078			3514	320			
17 Dec	2008	2017	2021	M1.1	0.004			3514				

### *Flare List*

Date	Time			X-ray Class	Imp/ Brtns	Location	Rgn #
	Begin	Max	End				
11 Dec	0016	0024	0045	C3.2			3511
11 Dec	0201	0212	0228	C1.1			3513
11 Dec	0322	0332	0339	C1.8			3511
11 Dec	0427	0432	0436	C1.7			3511
11 Dec	0439	0454	0501	C1.8			3507
11 Dec	0815	0827	0832	C1.3			3511
11 Dec	0842	0846	0851	C3.3			3511
11 Dec	0943	0950	0955	C1.4			3511
11 Dec	1054	1105	1111	C3.6			3511
11 Dec	1224	1229	1233	C1.0			3511
11 Dec	1241	1250	1305	C2.2	SF	N06W06	3511
11 Dec	1305	1308	1312	C2.5			3511
11 Dec	1338	1346	1350	C3.7	SF	S22W89	3511
11 Dec	1503	1513	1521	C1.8			3511
11 Dec	1521	1532	1556	C4.4			3511
11 Dec	1956	2002	2007	C1.6			3511
11 Dec	2152	2210	2225	C1.7	SF	N07W12	3514
12 Dec	0002	0015	0028	C1.3			3511
12 Dec	0327	0338	0346	C9.1	SF	N07W12	3514
12 Dec	0945	0957	1005	C3.0	SF	N07W12	3514
12 Dec	1233	1241	1248	C1.3	SF	N19W21	3513
12 Dec	1316	U1345	1358	C8.2	SF	N05W23	3514
12 Dec	1421	1431	1446	C2.6			3514
12 Dec	1908	1915	1926	C1.6			3513
12 Dec	2230	2255	2326	C2.9			3514



## Flare List

Date	Time			X-ray Class	Optical			Rgn #
	Begin	Max	End		Imp/ Brtns	Location Lat CMD		
13 Dec	0645	0653	0659	C1.2				3514
13 Dec	1123	1131	1139	C1.2				3514
13 Dec	1446	1515	1548	C9.3	SF	N06W34		3514
13 Dec	1813	1815	1819	C1.8				3513
13 Dec	1917	1920	1930		SF	S10E40		3519
13 Dec	2006	2007	2010		SF	N06W36		3514
13 Dec	2014	2021	2040		SF	N06W38		3514
14 Dec	0220	0229	0238	C1.9				3519
14 Dec	0402	0409	0413	C2.0				3514
14 Dec	0448	0456	0500	C3.3				
14 Dec	0547	0549	0553	C2.0				
14 Dec	0608	0609	0612	C1.8	SF	N06W43		3514
14 Dec	0711	0744	0800	M5.8	SF	N04W41		3514
14 Dec	1225	1228	1232	C1.8				
14 Dec	1329	1348	1408	M2.3				3514
14 Dec	1439	1446	1511		SF	N04W51		3514
14 Dec	1647	1702	1712	X2.8				3514
14 Dec	B1716	1718	1836		1B	N04W51		3514
14 Dec	2216	2220	2225		SF	N04W55		3514
14 Dec	2331	2345	0002	C5.4				3514
15 Dec	0047	0103	0113	C5.2				3514
15 Dec	0320	0326	0338	C4.5				3514
15 Dec	0339	0343	0350	C3.8				3514
15 Dec	0520	0523	0528	C2.1				3514
15 Dec	0543	0552	0600	C7.4	SF	N09W60		3514
15 Dec	0703	0715	0723	M6.3				3514
15 Dec	0707	0712	0824		1N	N05W60		3514
15 Dec	0723	0734	0743	M6.9				3514
15 Dec	0852	0852	0854		SF	N06W60		3514
15 Dec	1027	U1028	1031		SF	N12E45		3514
15 Dec	1102	1103	1105		SF	N04W64		3514
15 Dec	1110	U1136	1151	C3.6	1F	N04W64		3514
15 Dec	1219	U1220	1227		SF	N03W65		3514
15 Dec	1229	1234	1238	C2.5	SF	N04W66		3514
15 Dec	1335	1336	1337		SF	N04W65		3514
15 Dec	1417	1417	1420		SF	N04W65		3514
15 Dec	1459	1502	1504		SF	N03W65		3514
15 Dec	1851	1851	1854		SF	S10E15		3519





## *Flare List*

Date	Time			X-ray Class	Optical		Rgn #
	Begin	Max	End		Imp/ Brtns	Location Lat CMD	
15 Dec	1936	1941	1947	C1.5			3513
15 Dec	2045	2046	2049		SF	N05W72	3514
15 Dec	2112	2129	2138	C5.4			3516
15 Dec	2124	2133	2155		SF	N04W73	3514
15 Dec	2138	2142	2147	C5.3			3516
15 Dec	2158	2210	2222		SF	N04W73	3514
15 Dec	2225	2230	2238		SF	N05W74	3514
15 Dec	2243	2250	2300	C2.7			3514
15 Dec	2334	2343	2349	C3.9			3514
16 Dec	0005	0013	0028	C4.6			3514
16 Dec	0203	0212	0219	C2.1			3514
16 Dec	0233	0240	0256	C2.1			3514
16 Dec	0256	0309	0317	C3.9			3514
16 Dec	0534	0546	0600	C3.6			3514
16 Dec	0641	0651	0700	C2.2			3514
16 Dec	0901	0909	0920	C2.1			3514
16 Dec	1100	1107	1121	C2.6			3514
16 Dec	1124	1133	1140	C2.6			3513
16 Dec	1226	1232	1238	C1.9			3514
16 Dec	1303	1310	1319	C2.1			3514
16 Dec	1319	1354	1412	C8.3			3514
16 Dec	1412	1418	1422	C8.1			3514
16 Dec	1739	1744	1749	C2.7			3514
16 Dec	1942	1955	2015	C3.2			3514
16 Dec	2123	2123	2128		SF	N10E45	
17 Dec	0437	0445	0453	C1.7			3520
17 Dec	0631	0635	0637	C2.5			3514
17 Dec	0637	0646	0655	C4.1			3514
17 Dec	1019	1025	1031	C2.1			3514
17 Dec	1348	1413	1418		SF	N09W87	3514
17 Dec	1706	1729	1750	C3.3			3524
17 Dec	1801	1814	1835	C3.5			3514
17 Dec	1804	1821	1831	C3.8			3514
17 Dec	2008	2017	2021	M1.1			3514
17 Dec	2112	2119	2133		SF	N09E30	
17 Dec	2123	2132	2143	C4.8	SF	N15E74	3526



## Region Summary

Date	Location		Sunspot Characteristics				Flares											
	Lat CMD	Helio Lon	Area 10 <sup>6</sup> hemi.	Extent (helio)	Spot Class	Spot Count	Mag Class	X-ray			Optical							
								C	M	X	S	1	2	3	4			
<b>Region 3507</b>																		
29 Nov	N08E70	219	60	3	Hsx	1	A	1										
30 Nov	N08E55	219	70	2	Hsx	1	A											
01 Dec	N08E40	223	80	3	Hsx	1	A											
02 Dec	N08E28	222	130	3	Hsx	1	A											
03 Dec	N08E14	222	130	3	Hsx	2	A											
04 Dec	N08W00	223	160	4	Cso	5	B	2				1						
05 Dec	N09W12	221	180	4	Cso	6	B											
06 Dec	N08W25	221	210	5	Cso	9	B	1										
07 Dec	N07W40	224	180	5	Cso	6	B											
08 Dec	N07W53	223	150	5	Cso	6	B											
09 Dec	N06W66	223	80	4	Cso	2	B											
10 Dec	N07W80	224	70	2	Hsx	1	A											
								4	0	0	1	0	0	0	0	0		

Crossed West Limb.  
Absolute heliographic longitude: 223

<b>Region 3508</b>																		
29 Nov	S14E65	224	40	3	Hsx	1	A											
30 Nov	S15E53	221	40	2	Hsx	1	A											
01 Dec	S15E38	225	60	2	Hsx	1	A											
02 Dec	S15E25	225	60	2	Hsx	1	A											
03 Dec	S15E12	224	60	2	Hsx	1	A											
04 Dec	S15W02	225	60	2	Hsx	1	A					1						
05 Dec	S15W15	224	90	2	Hsx	1	A											
06 Dec	S14W28	224	80	2	Hsx	1	A											
07 Dec	S15W40	224	80	2	Hsx	1	A											
08 Dec	S15W54	224	60	2	Hsx	1	A					1						
09 Dec	S15W68	225	40	2	Hsx	1	A											
10 Dec	S16W82	226	30	2	Hax	1	A											
								0	0	0	2	0	0	0	0	0		

Crossed West Limb.  
Absolute heliographic longitude: 225



### *Region Summary - continued*

Date	Location		Sunspot Characteristics				Flares											
	Lat CMD	Lon	Helio 10 <sup>6</sup> hemi.	Area	Extent (helio)	Spot Class	Spot Count	Mag Class	X-ray			Optical						
									C	M	X	S	1	2	3	4		
<b>Region 3510</b>																		
03 Dec	S15E22	214	30	3	Cri	6	B	1										
04 Dec	S15E08	215	130	6	Dai	12	B											
05 Dec	S15W06	215	150	8	Dai	22	B	3				1	1					
06 Dec	S15W20	216	100	10	Dai	12	B											
07 Dec	S15W33	217	90	11	Dso	9	B											
08 Dec	S15W48	218	50	6	Hax	6	A											
09 Dec	S15W63	220	20	3	Hax	3	A	1										
10 Dec	S15W75	219	10	3	Axx	3	A											
11 Dec	S15W89	220	plage															
								5	0	0	1	1	0	0	0			

Crossed West Limb.

Absolute heliographic longitude: 215

<b>Region 3511</b>																		
03 Dec	S23E23	213	10	3	Bxo	3	B											
04 Dec	S23E09	214	60	6	Dao	8	B	2										
05 Dec	S23W05	215	170	7	Dao	15	BG	1				1						
06 Dec	S22W19	215	170	9	Dao	11	BG											
07 Dec	S22W31	215	160	11	Dso	7	B	4										
08 Dec	S22W45	215	150	13	Esi	7	B	7	1			1	1					
09 Dec	S22W59	216	180	16	Fsi	11	BG	12	2			6						
10 Dec	S23W71	215	140	16	Fsi	9	BG	14	2			2						
11 Dec	S22W85	216	60	2	Cso	3	B	14				1						
								54	5	0	11	1	0	0	0			

Crossed West Limb.

Absolute heliographic longitude: 215



### *Region Summary - continued*

Date	Location		Sunspot Characteristics				Flares										
	Lat CMD	Helio Lon	Area 10 <sup>6</sup> hemi.	Extent (helio)	Spot Class	Spot Count	Mag Class	X-ray			Optical						
								C	M	X	S	1	2	3	4		
<b>Region 3512</b>																	
04 Dec	S09E58	165	20	1	Hrx	1	A										
05 Dec	S09E42	167	30	1	Hsx	2	A										
06 Dec	S09E29	167	10	1	Axx	1	A										
07 Dec	S09E18	165	10	1	Axx	1	A										
08 Dec	S09E04	166	plage														
09 Dec	S09W10	167	plage														
10 Dec	S09W24	168	plage														
11 Dec	S09W38	169	plage														
12 Dec	S09W52	170	plage														
13 Dec	S09W66	171	plage														
								0	0	0	0	0	0	0	0	0	

Died on Disk.

Absolute heliographic longitude: 166

<b>Region 3513</b>																	
05 Dec	N19E67	142	80	2	Cao	3	B	13	3		1	3					
06 Dec	N19E53	142	100	3	Dao	8	B	11	2		11	1	1				
07 Dec	N18E40	144	120	11	Eai	12	BG	5			4						
08 Dec	N19E27	143	120	12	Eai	17	BG	7			4						
09 Dec	N19E13	144	150	11	Eai	17	BG	4			4						
10 Dec	N19W01	145	220	13	Eai	16	BG	1									
11 Dec	N19W14	145	210	11	Eai	15	BG	1									
12 Dec	N18W28	146	90	9	Dao	7	B	2			1						
13 Dec	N28W41	146	180	9	Cao	5	B	1									
14 Dec	N18W54	147	100	2	Cao	2	B										
15 Dec	N18W69	147	90	2	Hsx	1	A	1									
16 Dec	N18W82	147	70	2	Hsx	1	A	1									
								47	5	0	25	4	1	0	0		

Crossed West Limb.

Absolute heliographic longitude: 145





**Region Summary - continued**

Date	Location		Sunspot Characteristics				Flares																
	Lat CMD	Lon	Helio 10 <sup>6</sup> hemi.	Area	Extent (helio)	Spot Class	Spot Count	Mag Class	X-ray			Optical											
									C	M	X	S	1	2	3	4							
<b>Region 3516</b>																							
08 Dec	S19E74	96	60	2	Hsx	1	A																
09 Dec	S19E64	93	70	7	Cso	3	B																
10 Dec	S18E52	92	40	7	Cso	3	B																
11 Dec	S19E39	92	60	5	Hax	3	A																
12 Dec	S18E25	93	40	3	Cao	2	B																
13 Dec	S18E11	94	10	2	Axx	3	A																
14 Dec	S17W01	94	10	1	Axx	1	A																
15 Dec	S18W17	95	10	1	Axx	1	A	2															
16 Dec	S18W29	94	10	1	Axx	1	A																
17 Dec	S18W40	93	10	3	Axx	2	A																
								2	0	0	0	0	0	0	0	0	0	0	0	0	0		

Still on Disk.

Absolute heliographic longitude: 94

**Region 3517**

11 Dec	N14W03	134	10	4	Bxo	4	B														
12 Dec	N15W17	135	10	2	Cro	2	B														
13 Dec	N15W28	133	10	2	Cro	3	B														
14 Dec	N11W41	121	10	1	Hax	2	A														
15 Dec	N11W55	133	plage																		
16 Dec	N11W69	134	plage																		
17 Dec	N11W83	135	plage																		
								0	0	0	0	0	0	0	0	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 134

**Region 3518**

12 Dec	N13E75	43	30	10	Hsx	1	A														
13 Dec	N12E61	44	40	2	Hax	1	A														
14 Dec	N13E51	43	20	2	Cro	3	B														
15 Dec	N13E34	44	20	1	Hax	2	A														
16 Dec	N13E21	44	10	4	Axx	3	A														
17 Dec	N13E07	45	plage																		
								0	0	0	0	0	0	0	0	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 45



**Region Summary - continued**

Date	Location		Sunspot Characteristics				Flares											
	Lat CMD	Lon	Helio 10 <sup>6</sup> hemi.	Area	Extent (helio)	Spot Class	Spot Count	Mag Class	X-ray			Optical						
									C	M	X	S	1	2	3	4		
<b>Region 3519</b>																		
13 Dec	S11E38		67	50	5	Dao	4	B					1					
14 Dec	S12E28		65	200	7	Dso	15	B	1									
15 Dec	S12E13		65	150	6	Csi	18	B					1					
16 Dec	S12W02		67	130	7	Dai	18	B										
17 Dec	S11W16		68	130	7	Dsi	18	B										
									1	0	0	2	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 67

**Region 3520**

13 Dec	N10W34		139	210	8	Cao	11	B										
14 Dec	N07W46		138	120	8	Hsx	1	A										
15 Dec	N10W61		139	60	5	Cso	4	B										
16 Dec	N08W75		140	80	5	Cso	5	B										
17 Dec	N10W86		138	40	5	Cso	3	B	1									
									1	0	0	0	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 139

**Region 3521**

15 Dec	N11E71		7	20	1	Hsx	1	A										
16 Dec	N12E57		8	30	1	Hsx	1	A										
17 Dec	N12E44		8	30	2	Hax	3	A										
									0	0	0	0	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 8

**Region 3522**

16 Dec	S04E25		40	10	2	Bxo	4	B										
17 Dec	S03E12		40	plage														
									0	0	0	0	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 40



**Region Summary - continued**

Date	Location		Sunspot Characteristics				Flares								
	Lat CMD	Lon	Helio 10 <sup>6</sup> hemi.	Area	Extent (helio)	Spot Class	Spot Count	Mag Class	X-ray			Optical			
									C	M	X	S	1	2	3

**Region 3523**

16 Dec	N21E62		3	20	1	Hrx	2	A									
17 Dec	N21E50		2	10	1	Hrx	1	A									
									0	0	0	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 2

**Region 3524**

16 Dec	N26E63		2	20	2	Hrx	2	A									
17 Dec	N26E49		3	20	2	Hrx	2	A	1								
									1	0	0	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 3

**Region 3525**

16 Dec	S09E45		20	20	3	Bxo	4	B									
17 Dec	S09E31		21	20	4	Cro	3	B									
									0	0	0	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 21

**Region 3526**

17 Dec	N15E69		343	20	3	Cao	3	B	1			1					
									1	0	0	1	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 343





## ***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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