

Solar activity ranged from low to high levels. Region 3182 (S17, L=228, class/area=Eki/880 on 08 Jan) produced a the strongest event of the period, an X1/2b flare 06/0057 (R3 - Strong) UTC with an associated Tenflare. The region also produced an M1/Sf flare (R1 - Minor) at 07/0052 UTC. As it was rotating on to the visible disk from the SE limb, Region 3184 (S13, L=179, class/area=Hax/240) produced four M1 flares on 08 Jan at 0839, 0915, 1451 and 1902 UTC. The remaining nine numbered active regions were either quiet or only produced C-class X-ray flares.

Other activity included an asymmetric, partial-halo CME which was observed off the E limb at ~03/0636 UTC. Associated with the event was a C3 flare, a Type II (est. 624 km/s) and Type IV radio sweep, along with a Tenflare. The produced CME was analyzed and not determined to have an Earth-directed component.

No proton events were observed at geosynchronous orbit.

The greater than 2 MeV electron flux at geosynchronous orbit was at moderate to high levels. High levels were observed on 02-03 Jan in response to a positive polarity CH HSS. The remainder of the summary period reached only moderate levels.

Geomagnetic field activity was at quiet to G1 (Minor) geomagnetic storm conditions. G1 conditions were observed on 04 Jan in response to the arrival of a CME that left the Sun on 30 Dec. Total magnetic field strength increased to a peak of 19 nT and Bz reached as far south as -12 nT. Solar wind speeds through the transient were roughly 420-380 km/s. The remainder of the summary period was at mostly quiet to unsettled levels.

Space Weather Outlook

09 January - 04 February 2023

Solar activity is expected to be at low to moderate levels over 09-11 Jan, primarily due to the flare potential from Regions 3182 and 3184. The remainder of the outlook period is expected to be at low levels with a slight chance for M-class flares (R1-R2 - Minor- Moderate).

No proton events are expected at geosynchronous orbit.

The greater than 2 MeV electron flux at geosynchronous orbit is expected to be high levels of 20-30 Jan in response to CH HSS activity. The remainder of the outlook period is expected to be at normal to moderate levels.

Geomagnetic field activity is expected to range from quiet to G1 (Minor) geomagnetic storm conditions. G1 conditions are anticipated on 19 Jan and 26 Jan; active conditions are likely on 20 Jan, 27 Jan and 01 Feb; unsettled conditions are likely on 10-11 Jan, 14 Jan, 18 Jan, 21 Jan, 25 Jan, 28 Jan and 02 Feb. Elevations in geomagnetic activity are anticipated in response to multiple, recurrent CHSSs. The remainder of the outlook period is expected to be at mostly quiet



levels.



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
02 January	146	94	1100	B6.6	9	0	0	7	1	0	0	0
03 January	149	89	930	C1.0	5	0	0	1	0	0	0	0
04 January	151	86	550	C1.1	3	0	0	4	0	1	0	0
05 January	154	103	690	C1.0	7	0	0	6	0	0	0	0
06 January	172	101	920	C1.1	9	0	1	18	0	1	0	0
07 January	179	104	1210	C1.3	13	1	0	7	1	0	0	0
08 January	184	117	1810	C2.0	13	4	0	23	1	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	
	02 January	6.9e+04	3.1e+04	1.6e+08
03 January	9.1e+04	3.1e+04	1.4e+08	
04 January	6.2e+04	2.8e+04	3.8e+06	
05 January	4.2e+04	2.5e+04	2.7e+06	
06 January	3.3e+04	2.6e+04	1.8e+06	
07 January	6.8e+04	2.6e+04	1.7e+06	
08 January	1.2e+05	2.6e+04	4.4e+06	

Daily Geomagnetic Data

Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
	02 January	5	1-1-1-1-1-2-2-2	8	2-1-1-2-4-2-1-1	8
03 January	5	1-0-1-1-1-2-2-3	4	0-0-2-2-1-2-2-1	7	2-1-1-1-1-2-2-3
04 January	17	3-4-4-4-3-3-2-1	23	3-4-5-5-4-3-1-0	21	4-5-5-4-3-2-2-1
05 January	6	0-1-1-1-3-2-2-2	14	0-0-1-1-5-5-2-1	8	0-1-1-1-3-3-2-3
06 January	4	1-0-1-0-2-2-2-2	1	0-0-1-2-0-0-0-0	4	2-0-1-1-1-1-2-2
07 January	5	0-2-1-1-1-3-2-1	2	0-1-0-0-0-2-2-0	6	1-3-1-1-1-3-2-1
08 January	7	2-2-2-1-3-2-1-1	16	0-2-2-4-6-1-0-0	9	2-2-2-1-3-2-1-1

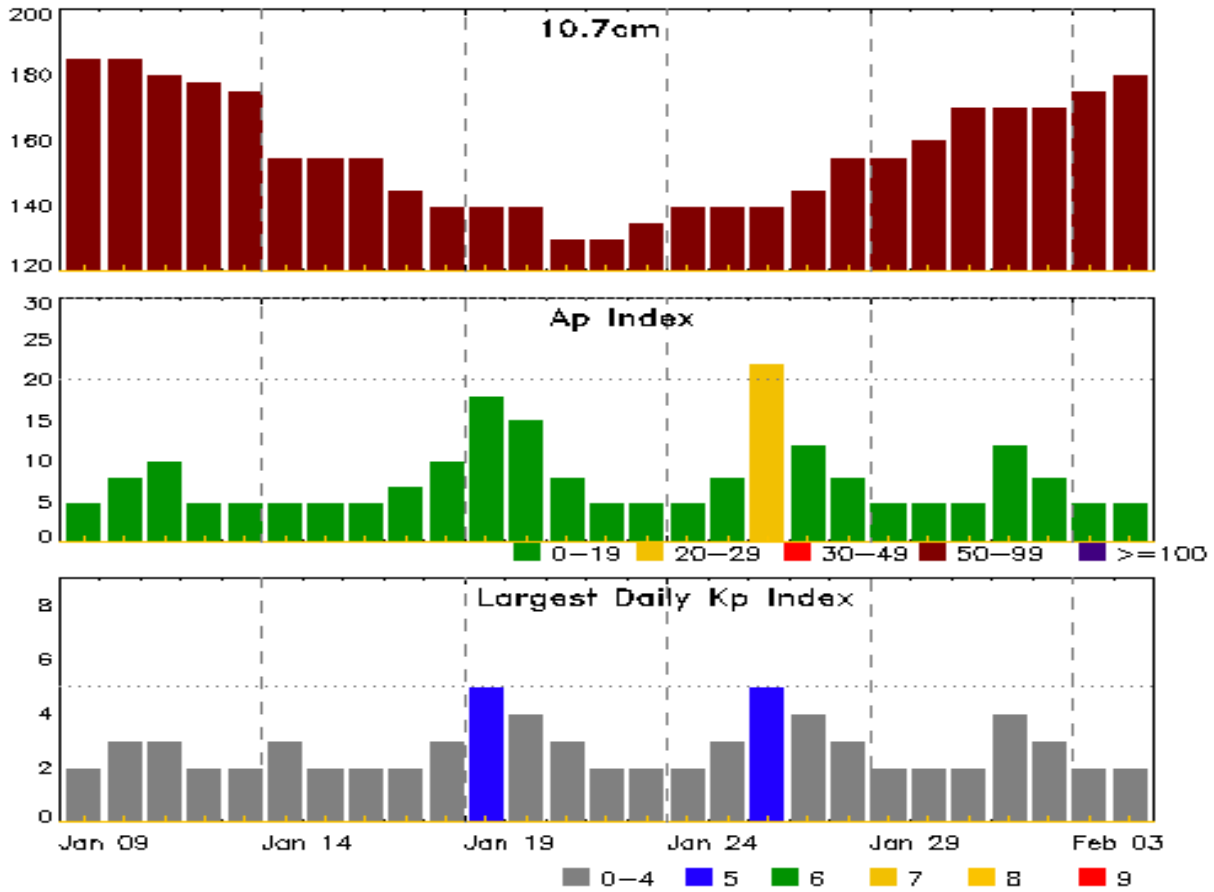


Alerts and Warnings Issued

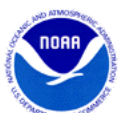
Date & Time of Issue UTC	Type of Alert or Warning	Date & Time of Event UTC
02 Jan 0459	CONTINUED ALERT: Electron 2MeV Integral Flux \geq 1000pfu	24/1415
02 Jan 2117	WATCH: Geomagnetic Storm Category G1 predicted	
03 Jan 0459	CONTINUED ALERT: Electron 2MeV Integral Flux \geq 1000pfu	24/1415
03 Jan 0653	SUMMARY: 10cm Radio Burst	03/0626 - 0630
03 Jan 0722	ALERT: Type II Radio Emission	03/0627
03 Jan 0728	ALERT: Type IV Radio Emission	03/0642
04 Jan 0129	WARNING: Geomagnetic K = 4	04/0129 - 1200
04 Jan 0233	WARNING: Geomagnetic Sudden Impulse expected	04/0230 - 0300
04 Jan 0237	ALERT: Geomagnetic K = 4	04/0236
04 Jan 0252	WARNING: Geomagnetic K = 5	04/0250 - 0900
04 Jan 0351	SUMMARY: Geomagnetic Sudden Impulse	04/0254
04 Jan 0521	ALERT: Geomagnetic K = 5	04/0520
04 Jan 0850	ALERT: Geomagnetic K = 5	04/0845
04 Jan 0902	EXTENDED WARNING: Geomagnetic K = 4	04/0129 - 2359
04 Jan 0902	EXTENDED WARNING: Geomagnetic K = 5	04/0250 - 1800
04 Jan 2354	EXTENDED WARNING: Geomagnetic K = 4	04/0129 - 05/0900
05 Jan 1102	WARNING: Geomagnetic K = 4	05/1100 - 2359
05 Jan 1102	WARNING: Geomagnetic K = 5	05/1100 - 1800
06 Jan 0106	ALERT: X-ray Flux exceeded M5	06/0057
06 Jan 0125	SUMMARY: 10cm Radio Burst	06/0055 - 0058
06 Jan 0149	SUMMARY: X-ray Event exceeded X1	06/0043 - 0107
08 Jan 1317	WARNING: Geomagnetic K = 4	08/1317 - 1800



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
09 Jan	185	5	2	23 Jan	135	5	2
10	185	8	3	24	140	5	2
11	180	10	3	25	140	8	3
12	178	5	2	26	140	22	5
13	175	5	2	27	145	12	4
14	155	5	3	28	155	8	3
15	155	5	2	29	155	5	2
16	155	5	2	30	160	5	2
17	145	7	2	31	170	5	2
18	140	10	3	01 Feb	170	12	4
19	140	18	5	02	170	8	3
20	140	15	4	03	175	5	2
21	130	8	3	04	180	5	2
22	130	5	2				



Energetic Events

Date	Time			X-ray		Optical Information			Peak		Sweep Freq	
	Begin	Max	Half	Class	Integ Flux	Imp/ Brtns	Location Lat CMD	Rgn #	Radio Flux		Intensity	
			Max						245	2695	II	IV
06 Jan	0043	0057	0107	X1.2	0.062	2B	S18E68		3182		420	
07 Jan	0040	0052	0102	M1.6	0.012	SF	S18E56		3182			
08 Jan	0839	0854	0906	M1.2	0.014				3184			
08 Jan	0915	0948	1014	M1.4	0.039				3184			
08 Jan	1451	1507	1521	M1.4	0.018				3184			
08 Jan	1902	1911	1919	M1.0	0.011	SF	S15E86		3184			

Flare List

Date	Time			X-ray Class	Imp/ Brtns	Location Lat CMD	Rgn #
	Begin	Max	End				
02 Jan	0522	0529	0537	C1.6	SF	N20E40	3180
02 Jan	0609	0621	0626	C9.4	1F	N20W28	3176
02 Jan	0944	0956	1007	C2.8	SF	N20E37	3180
02 Jan	1056	1057	1100		SF	N19E41	3180
02 Jan	1130	1139	1141	C2.3	SF	N21E42	3180
02 Jan	1141	1152	1208	C3.0			3180
02 Jan	1602	1608	1614	C1.1			3180
02 Jan	2137	2143	2147	C1.8	SF	N20E32	3180
02 Jan	2210	2216	2220	C2.0	SF	N20E31	3180
02 Jan	2257	2311	2332	C3.2	SF	N18E33	3180
03 Jan	0103	0110	0118	C1.1			3176
03 Jan	0451	0458	0502	C2.7			3177
03 Jan	0620	0646	0705	C3.2			
03 Jan	0742	1036	1233	C4.0			
03 Jan	2302	2303	2315		SF	N20E21	3180
03 Jan	2343	0000	0056	C2.3			
04 Jan	0718	0731	0752	C2.7			
04 Jan	1247	U1248	1258		SF	S16W16	3177
04 Jan	1346	1346	1348		SF	N17E11	3180
04 Jan	1350	1350	1357		SF	S17W17	3177
04 Jan	1626	1634	1639	C2.6			3182
04 Jan	1723	1726	1730		SF	S16W13	3177
04 Jan	1814	1829	1834	C5.2	2N	S19W13	3177
05 Jan	0118	0121	0123		SF	S19E27	3181
05 Jan	0242	0249	0257	C2.6			3177



Flare List

Date	Time			X-ray Class	Optical		Rgn #
	Begin	Max	End		Imp/ Brtns	Location Lat CMD	
05 Jan	0343	0352	0400	C2.2			3182
05 Jan	0506	0513	0521	C2.6			3182
05 Jan	0742	0914	0948	C6.8			3182
05 Jan	0812	0812	0817		SF	N17E11	3180
05 Jan	1147	1149	1153		SF	N18W03	3180
05 Jan	1300	1300	1313		SF	S19E27	3181
05 Jan	1906	1915	1925	C1.7			3182
05 Jan	2211	2222	2232	C2.1	SF	S24E22	3181
05 Jan	2247	2257	2306	C2.4	SF	S18W07	3183
06 Jan	0043	0057	0107	X1.2	2B	S18E68	3182
06 Jan	0110	0117	0122		SF	S18W07	3183
06 Jan	0123	0132	0152		SF	S18W07	3183
06 Jan	0324	0334	0344	C3.5	SF	S18W07	3183
06 Jan	0356	0402	0412	C1.8			3183
06 Jan	1111	U1112	A1116		SF	S19W12	3183
06 Jan	1112	U1115	A1118		SF	S29W77	3183
06 Jan	1158	1205	1220	C1.5			3182
06 Jan	1202	U1204	A1206		SF	S19E66	3182
06 Jan	B1210	U1217	A1221		SF	S30W79	3182
06 Jan	1223	1226	1233	C1.8	SF	S18W13	3183
06 Jan	B1237	U1237	A1244		SF	S29W75	
06 Jan	B1307	U1348	A1415		SF	S29W80	3183
06 Jan	B1310	U1314	A1342		SF	S18W15	3183
06 Jan	B1408	U1414	A1425		SF	S18W16	3183
06 Jan	1450	1455	1501	C1.7	SF	S17E63	3182
06 Jan	1551	1559	1612	C1.8			
06 Jan	1820	1821	1824		SF	S22E13	3181
06 Jan	1843	1853	1858	C6.2	SF	S16W16	3183
06 Jan	2021	2027	2031	C5.0	SF	S16W18	3183
06 Jan	2229	2230	2235		SF	S17E65	3182
06 Jan	2314	2314	2321	C2.5	SF	S19E65	3182
07 Jan	0040	0052	0102	M1.6	SF	S18E56	3182
07 Jan	0456	0501	0506	C2.3			3182
07 Jan	0854	0905	0928	C2.2			3181
07 Jan	0928	0932	0940	C2.0			3182
07 Jan	1044	U1056	1134		SF	S18E59	3182
07 Jan	1106	1109	1113	C6.9			3182
07 Jan	1629	1654	1708	C8.7			3182



Flare List

Date	Time			X-ray Class	Optical		Rgn #
	Begin	Max	End		Imp/ Brtns	Location Lat CMD	
07 Jan	1813	1825	1831	C4.5			3182
07 Jan	1831	1834	1838	C5.1			3182
07 Jan	2044	2051	2052	C3.1	SF	S15E55	3182
07 Jan	2052	2105	2112	C4.7	SF	S17E55	3182
07 Jan	2104	2105	2115		SF	S20E00	3181
07 Jan	B2115	2115	2119		SF	N21E34	
07 Jan	2201	2205	2219	C4.9			3182
07 Jan	2230	2238	2247	C3.6	SF	S17E52	3182
07 Jan	2321	2330	A2359	C4.3	1F	S17E52	3182
07 Jan	2343	2352	0004	C3.8	SF	S17E52	3182
08 Jan	0220	0229	0241	C4.3	SF	S16E38	3182
08 Jan	0252	0308	0317	C6.3			3182
08 Jan	0259	0345	0403		1F	S17E49	3182
08 Jan	0317	0331	0337	C7.0			3182
08 Jan	0337	0344	0349	C9.3			3182
08 Jan	0426	0427	0447		SF	S17E43	3182
08 Jan	0437	0455	0521	C8.0			3184
08 Jan	0606	0608	0631		SF	S17E47	3182
08 Jan	0658	0705	0711	C5.0	SF	S17E47	3182
08 Jan	0711	0724	0735	C6.3			3182
08 Jan	B0730	0738	0745		SF	S19E48	3182
08 Jan	0839	0854	0906	M1.2			3184
08 Jan	0915	0948	1014	M1.4			3184
08 Jan	0920	0922	0927		SF	S17E35	3182
08 Jan	1045	U1046	A1105		SF	S17W42	3183
08 Jan	1121	U1123	1134		SF	S17E45	3182
08 Jan	1129	U1129	1138		SF	N19W42	3180
08 Jan	1154	U1203	1220	C5.3	SF	S17E40	3182
08 Jan	1222	1238	1303	C6.1			3184
08 Jan	1350	1353	1355		SF	S17E43	3182
08 Jan	1426	1436	1447	C5.4			3184
08 Jan	1451	1507	1521	M1.4			3184
08 Jan	1628	1628	1631		SF	S14E90	3184
08 Jan	1630	1631	1647		SF	S13E32	3182
08 Jan	1718	1720	1724		SF	S14E85	3184
08 Jan	1733	1734	1742		SF	S14E88	3184
08 Jan	1738	1741	1747		SF	S13W17	3181
08 Jan	1810	1811	1814		SF	S14E86	3184



Flare List

Date	Time			Optical			
	Begin	Max	End	X-ray Class	Imp/ Brtns	Location Lat CMD	Rgn #
08 Jan	1815	1818	1821		SF	S15E88	3184
08 Jan	1844	1857	1902	C9.7			3184
08 Jan	1902	1911	1919	M1.0	SF	S15E86	3184
08 Jan	1932	1933	1936		SF	S17W46	3183
08 Jan	2016	2016	2021		SF	S15E86	3184
08 Jan	2136	2141	2146	C3.1			3182
08 Jan	2237	2244	2253	C2.0			
08 Jan	2316	2318	2341		SF	S17W49	3183



Region Summary

Date	Location		Sunspot Characteristics				Flares													
	Lat CMD	Lon	Helio 10 ⁶ hemi.	Area	Extent (helio)	Spot Class	Spot Count	Mag Class	X-ray			Optical								
									C	M	X	S	1	2	3	4				
Region 3172																				
21 Dec	S35E61	75	20	1	Hsx	1	A													
22 Dec	S34E49	74	30	5	Cso	2	B													
23 Dec	S34E36	74	20	4	Cro	3	B					1								
24 Dec	S34E24	74	30	3	Hsx	2	A													
25 Dec	S36E16	67	40	10	Cro	4	B													
26 Dec	S36E04	65	10	6	Bxo	4	B													
27 Dec	S36W04	61	plage																	
28 Dec	S36W18	63	plage									1								
29 Dec	S36W34	66	10	5	Bxo	4	B	2				3								
30 Dec	S35W50	68	10	1	Axx	1	A													
31 Dec	S35W64	69	plage																	
01 Jan	S35W78	70	plage																	
								2	0	0		5	0	0	0	0	0			

Crossed West Limb.
Absolute heliographic longitude: 65

Region 3173																				
22 Dec	N26E74	50	30	2	Hrx	1	A													
23 Dec	N25E63	47	50	2	Cao	4	B													
24 Dec	N25E50	48	80	2	Hsx	1	A													
25 Dec	N25E37	46	50	2	Hsx	2	A													
26 Dec	N25E22	47	50	2	Hsx	1	A													
27 Dec	N25E10	46	90	4	Hsx	1	A													
28 Dec	N24W03	47	40	2	Hsx	2	A					1								
29 Dec	N25W16	46	30	2	Hsx	3	A													
30 Dec	N25W29	47	20	3	Hsx	3	A													
31 Dec	N24W42	47	20	1	Hrx	1	A													
01 Jan	N24W56	48	10	1	Hrx	1	A													
02 Jan	N24W70	49	10	1	Axx	1	A													
03 Jan	N24W84	50	plage																	
								0	0	0		1	0	0	0	0	0			

Crossed West Limb.
Absolute heliographic longitude: 47



Region Summary - continued

Date	Location		Sunspot Characteristics				Flares											
	Lat CMD	Lon	Helio 10 ⁶ hemi.	Area	Extent (helio)	Spot Class	Spot Count	Mag Class	X-ray			Optical						
									C	M	X	S	1	2	3	4		
Region 3177																		
28 Dec	S18E71	333	90	8	Hax	3	A	1										
29 Dec	S18E58	336	120	6	Dso	3	B											
30 Dec	S17E44	334	170	7	Dao	5	B											
31 Dec	S18E31	334	310	8	Dac	6	B	1				3						
01 Jan	S18E17	335	220	8	Dac	9	B	1				1						
02 Jan	S18E04	335	200	7	Cai	7	B											
03 Jan	S18W09	333	190	9	Cai	11	B	1										
04 Jan	S19W23	335	100	8	Csi	13	B	1				3			1			
05 Jan	S18W36	334	90	7	Cao	10	B	1										
06 Jan	S17W48	333	50	6	Cao	5	B											
07 Jan	S18W61	334	20	5	Axx	3	A											
08 Jan	S18W72	332	10	1	Axx	1	A											
								6	0	0	7	0	1	0	0			

Still on Disk.

Absolute heliographic longitude: 335

Region 3179

29 Dec	N13W11	42	30	3	Cao	4	B											
30 Dec	N13W24	42	70	6	Dao	11	B					4						
31 Dec	N14W37	42	350	8	Dki	7	B	1										
01 Jan	N14W51	43	360	9	Dki	8	B					1						
02 Jan	N14W64	43	380	9	Dko	4	B											
03 Jan	N13W80	46	290	10	Dko	2	B											
04 Jan	N14W92	44	80	2	Hsx	1	A											
								1	0	0	5	0	0	0	0	0		

Crossed West Limb.

Absolute heliographic longitude: 42



Region Summary - continued

Date	Location		Sunspot Characteristics					Flares												
	Lat CMD	Lon	Helio 10 ⁻⁶ hemi.	Area	Extent (helio)	Spot Class	Spot Count	Mag Class	X-ray			Optical								
									C	M	X	S	1	2	3	4				
Region 3180																				
29 Dec	N19E82	310	plage							2										
30 Dec	N19E68	310	120	7	Dao	3	B	7				1								
31 Dec	N19E56	309	210	6	Dao	6	B	4				5								
01 Jan	N19E43	309	220	6	Dso	5	B	4				4								
02 Jan	N19E30	309	230	7	Dsi	6	B	8				7								
03 Jan	N18E17	307	240	9	Dsi	12	BG					1								
04 Jan	N19E03	308	240	9	Dsi	11	BG					1								
05 Jan	N19W10	308	180	8	Cso	11	B					2								
06 Jan	N18W23	308	120	8	Cso	5	B													
07 Jan	N18W37	310	100	7	Cso	3	B													
08 Jan	N18W50	310	90	7	Cso	3	B					1								
								23	2	0	22	0	0	0	0					

Still on Disk.

Absolute heliographic longitude: 308

Region 3181

01 Jan	S19E71	281	30	2	Hax	1	A												
02 Jan	S19E58	281	50	2	Hax	1	A												
03 Jan	S19E44	280	100	2	Hsx	2	A												
04 Jan	S19E30	283	70	2	Cso	6	B												
05 Jan	S18E18	280	80	4	Dao	12	B	1				3							
06 Jan	S20E06	279	110	9	Dai	13	B					1							
07 Jan	S21W07	280	380	9	Dki	16	BD	1				1							
08 Jan	S20W20	280	410	11	Eki	19	BD					1							
								2	0	0	6	0	0	0	0				

Still on Disk.

Absolute heliographic longitude: 279

Region 3182

04 Jan	S18E86	226	plage							1									
05 Jan	S17E72	226	280	1	Dki	4	B	4											
06 Jan	S16E59	226	450	10	Dki	9	BG	3		1	5		1						
07 Jan	S17E46	227	510	12	Eki	23	BGD	12	1		5	1							
08 Jan	S17E32	228	880	15	Eki	23	BGD	8			11	1							
								28	1	1	21	2	1	0	0				

Still on Disk.

Absolute heliographic longitude: 228



Region Summary - continued

Date	Location		Sunspot Characteristics				Flares									
	Lat CMD	Lon	Heli 10 ⁻⁶ hemi.	Area	Extent (helio)	Spot Class	Spot Count	Mag Class	X-ray			Optical				
									C	M	X	S	1	2	3	4
Region 3183																
05 Jan	S17W08	307	30	3	Cro	5	B	1				1				
06 Jan	S17W22	308	160	7	Dsi	8	B	5				11				
07 Jan	S17W36	309	200	9	Dso	9	BD									
08 Jan	S17W49	309	180	10	Dao	8	B					3				
								6	0	0	0	15	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 307

Region 3184

08 Jan	S13E81	179	240	3	Hax	3	A	4	4			7				
								4	4	0	7	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 179



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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