Space Weather Highlights
04 March - 10 March 2024

SWPC PRF 2532
11 March 2024

Solar activity was at low to moderate levels. Region 3599 (S13, L=067, class/area Dai/220 on 09 Mar) produced two M-class flares. The first was an impulsive M1.3/Sf at 08/2126 UTC. The second was an M7.4 flare at 10/1213 UTC with an associated 340 sfu Tenflare, a Type II radio sweep (714 km/s), a weak Castelli U radio signature, and a CME directed off the NW limb at 10/1248 UTC. Initial modelling of the CME indicated no Earth-directed component, however further analysis is on-going. A faint partial halo was observed beginning at 10/1812 UTC in coronagraph imagery, likely related to a C6.9/1f flare at 10/1538 UTC from Region 3599. Initial analysis showed a glancing blow around midday on 13 Mar.

No proton events were observed at geosynchronous orbit. A slight enhancement to near 0.4 pfu was observed following the M7.4 flare at 10/1213 UTC.

The greater than 2 MeV electron flux at geosynchronous orbit was at normal to moderate levels with a peak flux of 739 pfu observed at 10/1935 UTC.

Geomagnetic field activity ranged from quiet to active levels. The period began under the influence of CME activity that left the Sun on 28 Feb. Total field reached 13 nT early on 04 Mar and diminished to 5-7 nT by 05 Mar. Solar wind speed gradually increased from approximately 350 km/s to near 460 km/s during this time. The geomagnetic field responded with quiet to active levels on 04 Mar and quiet to unsettled levels on 05 Mar. Solar wind speed continued in the 350-460 km/s range through early on 08 Mar. Quiet to unsettled levels were observed on 06-07 Mar. By 08 Mar, solar wind speed increased to around 515 km/s due to negative polarity coronal hole high speed stream (CH HSS) activity. Solar wind speed slowly decreased thereafter to near 410 km/s by the end of the period. The geomagnetic field responded with quiet to active levels on 08-09 Mar and quiet to unsettled levels on 10 Mar.

Space Weather Outlook
11 March - 06 April 2024

Solar activity is expected to be at very low to low levels with a chance for M-class (R1-R2/Minor-Moderate) flares on 11-14 Mar due primarily to the flare potential of Region 3599. Quiet to unsettled levels are expected on 15-26 Mar. On 27 Mar-06 Apr, a chance for M-class flares is once again likely as Region 3599 returns to the visible disk.

No proton events are expected at geosynchronous orbit.

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

Geomagnetic field activity is expected to reach unsettled on 11-12 Mar due to CH HSS activity and unsettled to active levels on 13 Mar due to possible influence from the 10 Mar CME.

Unsettled levels are likely again on 28-29 Mar and 03-05 Apr due to recurrent CH HSS activity.

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
04 March	140	113	480	B7.3	7	0	0	1	0	0	0	0
05 March	142	121	560	B6.4	6	0	0	2	0	0	0	0
06 March	136	105	510	B5.9	3	0	0	2	0	0	0	0
07 March	137	99	370	B5.9	12	0	0	11	0	0	0	0
08 March	129	91	260	B4.4	3	1	0	3	0	0	0	0
09 March	135	99	310	B5.8	6	0	0	2	0	0	0	0
10 March	127	77	280	B4.5	6	1	0	3	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
04 March	3.5e+04	1.7e+04	1.0e+06
05 March	3.2e+04	1.7e+04	1.2e+06
06 March	3.4e+04	1.7e+04	1.4e+06
07 March	5.8e+04	1.7e+04	1.9e+06
08 March	3.9e+04	1.7e+04	1.6e+06
09 March	9.7e+04	1.7e+04	1.2e+07
10 March	8.4e+05	2.0e+04	2.4e+07

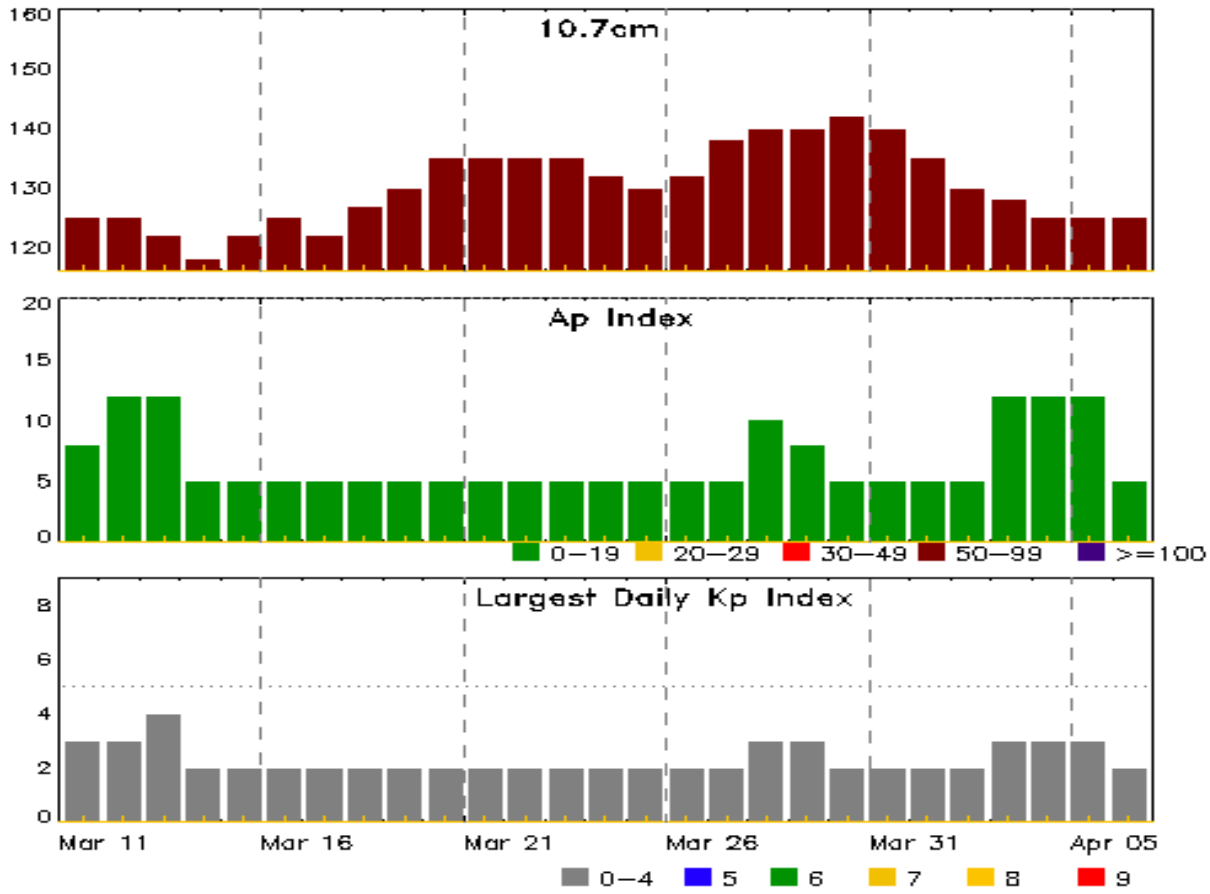
Daily Geomagnetic Data

Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
04 March	8	3-2-3-1-2-2-1-2	7	2-2-3-3-1-1-1-1	10	4-2-2-2-2-1-1-2
05 March	7	2-1-2-1-3-2-2-1	7	1-0-4-3-2-1-1-0	7	3-1-2-2-2-1-2-1
06 March	5	1-2-2-2-2-1-1-0	11	0-1-1-4-5-1-0-0	6	1-3-2-2-2-1-0-1
07 March	8	3-2-2-2-2-2-2-2	13	2-1-2-3-4-4-2-2	12	3-2-2-3-2-3-3-3
08 March	9	2-3-2-1-3-1-2-3	10	2-3-3-2-2-2-1-3	11	3-3-2-1-2-1-2-4
09 March	11	3-3-3-2-2-2-3-2	13	3-2-3-5-2-1-1-1	13	4-3-3-2-3-2-3-2
10 March	6	1-2-2-3-2-1-2-0	9	1-1-2-5-1-2-1-0	5	1-1-2-3-2-1-2-0

Alerts and Warnings Issued

Date & Time of Issue UTC	Type of Alert or Warning	Date & Time of Event UTC
06 Mar 0404	ALERT: Type II Radio Emission	06/0333
06 Mar 1830	WATCH: Geomagnetic Storm Category G1 predicted	
07 Mar 1756	WARNING: Geomagnetic K = 4	07/1800 - 2359
07 Mar 2321	ALERT: Type II Radio Emission	07/2225
07 Mar 2344	ALERT: Geomagnetic K = 4	
07 Mar 2345	EXTENDED WARNING: Geomagnetic K = 4	07/1800 - 08/0600
07 Mar 2352	CANCELLATION: Geomagnetic K = 4	
08 Mar 0357	ALERT: Type II Radio Emission	08/0340
08 Mar 0405	ALERT: Type IV Radio Emission	08/0347
08 Mar 0552	EXTENDED WARNING: Geomagnetic K = 4	07/1800 - 08/1200
08 Mar 2232	WARNING: Geomagnetic K = 4	08/2231 - 09/1200
09 Mar 0001	ALERT: Geomagnetic K = 4	
10 Mar 1213	ALERT: X-ray Flux exceeded M5	10/1211
10 Mar 1232	SUMMARY: 10cm Radio Burst	10/1208 - 1212
10 Mar 1233	ALERT: Type II Radio Emission	10/1208
10 Mar 1238	SUMMARY: X-ray Event exceeded M5	10/1200 - 1220
10 Mar 1807	SUMMARY: 10cm Radio Burst	10/1530 - 1533

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
11 Mar	125	8	3	25 Mar	130	5	2
12	125	12	3	26	132	5	2
13	122	12	4	27	138	5	2
14	118	5	2	28	140	10	3
15	122	5	2	29	140	8	3
16	125	5	2	30	142	5	2
17	122	5	2	31	140	5	2
18	127	5	2	01 Apr	135	5	2
19	130	5	2	02	130	5	2
20	135	5	2	03	128	12	3
21	135	5	2	04	125	12	3
22	135	5	2	05	125	12	3
23	135	5	2	06	125	5	2
24	132	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
08 Mar	2118	2126	2131	M1.3	0.004	SF	S14W15	3599	19	49		
10 Mar	1200	1213	1220	M7.4	0.035			3599	7500	340	3	

Flare List

	Time				Optical		
Date	Begin	Max	End	X-ray Class	Imp/ Brtns	Location Lat CMD	Rgn #
04 Mar	0222	0228	0232	C1.3			3602
04 Mar	0233	0238	0242	C1.1			3599
04 Mar	0249	0253	0257	C2.3			3599
04 Mar	0308	0316	0320	C2.4			3602
04 Mar	0821	0830	0839	C1.5	SF	N18E39	3602
04 Mar	1123	1133	1149	C1.2			3602
04 Mar	1200	1211	1223	C1.6			3595
05 Mar	0943	0952	0957	C1.1			
05 Mar	1108	1125	1138	C2.6			3598
05 Mar	1416	1423	1427	C1.9	SF	S13E30	3599
05 Mar	1448	1456	1501	C1.0	SF	S17E37	3600
05 Mar	1501	1504	1509	C1.0			3600
05 Mar	2346	2351	2357	C1.4			3595
06 Mar	1009	1024	1050	C1.0	SF	S16W68	3598
06 Mar	1156	1204	1210	C1.3	SF	S12E19	3599
06 Mar	1624	1630	1635	C1.0			3599
07 Mar	0231	0240	0255	C1.1			3599
07 Mar	0408	0413	0425	C1.0			3599
07 Mar	0422	0422	A0425		SF	S12E10	3599
07 Mar	0609	0618	0623	C8.3	SF	S12E10	3599
07 Mar	0655	0705	0813		SF	S12E10	3599
07 Mar	0832	0836	0841	C1.9	SF	S12E09	3599
07 Mar	0946	0952	0958	C2.0			
07 Mar	1010	1010	1014		SF	S12E08	3599
07 Mar	1015	1028	1040	C4.0	SF	S12E08	3599
07 Mar	1116	1118	1120		SF	S15E06	3599
07 Mar	1121	U1124	A1129		SF	S15E09	3599
07 Mar	B1130	U1130	A1258		SF	S13E08	3599
07 Mar	1200	1207	1215	C6.3			3599

Flare List

Date	Time			Optical			
	Begin	Max	End	X-ray Class	Imp/ Brtns	Location Lat CMD	Rgn #
07 Mar	1353	1400	1404	C1.1			3599
07 Mar	1542	1547	1552	C1.0			3599
07 Mar	1645	1651	1659	C2.3			3599
07 Mar	2202	2233	2324	C3.5			3595
07 Mar	2210	2210	2218		SF	S11W00	3599
07 Mar	2324	2335	2340	C4.6	SF	N06E42	3604
08 Mar	0610	0620	0627	B8.1			3604
08 Mar	1037	1042	1046	C1.7			3599
08 Mar	1523	1536	1555	B9.1	SF	N08E37	3604
08 Mar	1837	1842	1847	B9.7	SF	S11W15	3599
08 Mar	2105	2110	2114	C1.3			3599
08 Mar	2118	2126	2131	M1.3	SF	S14W15	3599
08 Mar	2300	2308	2318	C1.0			3599
09 Mar	0030	0034	0039	B8.3			3605
09 Mar	0109	0119	0128	C6.3	SF	S15W19	3599
09 Mar	0136	0140	0146	C1.9			3599
09 Mar	0922	0928	0932	C1.0			3599
09 Mar	0932	0947	1008	C1.6			3599
09 Mar	1101	1108	1114	C1.3			3599
09 Mar	2014	2029	2039	C1.4	SF	S10W26	3599
10 Mar	1107	1117	1123	C1.6			3599
10 Mar	1200	1213	1220	M7.4			3599
10 Mar	1412	1418	1420	C1.0	SF	S14W40	3599
10 Mar	1420	1424	1428	C1.1	SF	S14W40	3599
10 Mar	1522	1538	1557	C6.9	1F	S13W36	3599
10 Mar	2239	2259	2317	C1.2	SF	N13W25	3603
10 Mar	2322	2335	2349	C1.2			3599

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 3591												
23 Feb	S35E71	165	60	3	Hsx	1	A								
24 Feb	S36E60	163	40	3	Hsx	1	A								
25 Feb	S36E46	164	70	3	Hsx	1	A				1				
26 Feb	S35E33	163	40	2	Hsx	1	A								
27 Feb	S35E20	163	50	2	Hsx	1	A				2				
28 Feb	S36E09	161	90	2	Hsx	1	A								
29 Feb	S36W04	161	90	2	Hsx	1	A								
01 Mar	S36W17	161	60	2	Hsx	1	A								
02 Mar	S36W28	159	70	4	Cso	3	B	1							
03 Mar	S36W40	158	60	2	Hsx	1	A								
04 Mar	S36W53	158	30	2	Hsx	1	A								
05 Mar	S35W66	157	40	1	Hsx	1	A								
06 Mar	S35W79	156	50	2	Hsx	1	A								
07 Mar	S37W89	153	30	2	Hsx	1	A								
								1	0	0	3	0	0	0	0

Crossed West Limb.
Absolute heliographic longitude: 161

			Region 3592												
23 Feb	S10E69	167	80	7	Dso	2	B								
24 Feb	S12E58	165	140	4	Dso	5	B								
25 Feb	S13E45	165	130	7	Dao	7	B								
26 Feb	S13E30	165	40	7	Cro	7	B								
27 Feb	S11E15	167	20	7	Cro	5	B								
28 Feb	S14E04	165	10	9	Axx	8	A								
29 Feb	S13W18	165	plage												
01 Mar	S14W20	164	10	1	Axx	1	A								
02 Mar	S14W34	165	plage												
03 Mar	S15W47	164	plage					1							
04 Mar	S14W60	165	10	1	Axx	1	A								
05 Mar	S14W74	166	plage												
06 Mar	S14W88	166	plage												
								1	0	0	0	0	0	0	0

Crossed West Limb.
Absolute heliographic longitude: 165

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 3594													
23 Feb	N06E68	168	30	5	Cao	5	B								
24 Feb	N05E55	168	50	2	Cao	4	B								
25 Feb	N05E43	167	60	5	Cao	6	B								
26 Feb	N05E26	169	40	1	Hax	2	A								
27 Feb	N05E13	169	20	1	Hax	1	A								
28 Feb	N05W00	169	30	1	Hax	1	A	1			2				
29 Feb	N05W13	170	20	1	Hrx	1	A								
01 Mar	N05W27	171	10	1	Axx	1	A								
02 Mar	N05W42	173	plage												
03 Mar	N05W57	175	plage												
04 Mar	N05W72	177	plage												
05 Mar	N05W87	179	plage												
								1	0	0	2	0	0	0	0

Crossed West Limb.
Absolute heliographic longitude: 169

		Region 3595													
25 Feb	N20E46	164	80	5	Cai	10	B								
26 Feb	N20E29	167	40	5	Bxo	6	B								
27 Feb	N20E18	164	60	9	Cai	13	B	2			3				
28 Feb	N20E04	165	170	10	Dao	15	BG								
29 Feb	N20W10	167	320	10	Dko	12	BG								
01 Mar	N20W23	167	370	11	Eko	9	BG	1			1				
02 Mar	N20W35	166	380	11	Eko	8	BG	2			2				
03 Mar	N20W48	165	220	11	Eso	4	BG								
04 Mar	N20W62	167	180	12	Eso	2	BG	1							
05 Mar	N21W74	165	190	10	Dso	2	B	1							
06 Mar	N21W85	162	120	7	Dso	2	B								
								7	0	0	6	0	0	0	0

Crossed West Limb.
Absolute heliographic longitude: 165

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 3596												
26 Feb	N17E62	135	50	3	Cao	4	B								
27 Feb	N17E48	134	80	4	Dao	4	B	1							
28 Feb	N18E36	133	100	7	Dao	5	B	1							
29 Feb	N18E24	133	110	5	Cao	6	B								
01 Mar	N19E09	135	40	4	Cao	4	B								
02 Mar	N19W03	134	30	4	Cao	3	B								
03 Mar	N19W18	135	20	1	Hrx	1	A								
04 Mar	N20W31	136	10	1	Axx	1	A								
05 Mar	N20W45	136	10		Axx	1	A								
06 Mar	N20W59	137	10	1	Axx	1	A								
07 Mar	N20W73	138	plage												
08 Mar	N20W87	139	plage												
								2	0	0	0	0	0	0	0

Crossed West Limb.
Absolute heliographic longitude: 134

			Region 3597												
28 Feb	N07E16	154	10	2	Bxo	3	B								
29 Feb	N07E02	155	10	2	Bxo	4	B								
01 Mar	N08W13	157	10	1	Axx	1	A								
02 Mar	N08W27	158	plage												
03 Mar	N08W41	159	plage												
04 Mar	N08W55	160	plage												
05 Mar	N08W69	161	plage												
06 Mar	N08W83	161	plage												
								0	0	0	0	0	0	0	0

Crossed West Limb.
Absolute heliographic longitude: 155

			Region 3598												
29 Feb	S13W18	175	10	3	Hrx	1	A								
01 Mar	S13W33	177	80	6	Dai	5	B	2			6				
02 Mar	S13W45	176	110	8	Dai	12	B	1							
03 Mar	S13W58	176	110	9	Dai	8	B	3			4				
04 Mar	S13W72	177	100	9	Dsi	5	B								
05 Mar	S11W88	179	10	4	Bxo	1	B	1							
								7	0	0	10	0	0	0	0

Crossed West Limb.
Absolute heliographic longitude: 175

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 3599												
01 Mar	S13E75	69	40	2	Hax	1	A	1							
02 Mar	S13E60	71	30	7	Cro	4	B								
03 Mar	S13E48	70	30	9	Cro	3	B	1							
04 Mar	S14E38	67	30	3	Cso	3	B	2							
05 Mar	S13E25	66	70	4	Dsi	6	BG	1			1				
06 Mar	S12E13	64	130	6	Dsi	12	BG	2			1				
07 Mar	S12W02	66	140	6	Dai	16	BGD	9			10				
08 Mar	S12W15	67	150	7	Dai	18	BG	3	1		2				
09 Mar	S13W28	67	220	7	Dai	25	BGD	6			2				
10 Mar	S13W41	67	210	8	Dai	15	BGD	5	1		2	1			
								30	2	0	18	1	0	0	0

Still on Disk.
Absolute heliographic longitude: 66

			Region 3600												
02 Mar	S18E73	58	80	2	Hsx	1	A								
03 Mar	S18E59	59	80	2	Hsx	1	A								
04 Mar	S18E46	59	80	3	Hsx	1	A								
05 Mar	S18E33	57	70	2	Hsx	1	A	2			1				
06 Mar	S18E21	55	70	2	Hsx	2	A								
07 Mar	S18E08	55	70	2	Hsx	3	A								
08 Mar	S18W04	56	40	2	Hsx	3	A								
09 Mar	S18W18	57	30	2	Hsx	2	A								
10 Mar	S19W31	57	20	2	Hrx	3	A								
								2	0	0	1	0	0	0	0

Still on Disk.
Absolute heliographic longitude: 56

			Region 3601												
03 Mar	N13W07	125	10	3	Bxo	2	B								
04 Mar	N13W21	126	plage												
05 Mar	N14W37	128	10	2	Bxo	3	B								
06 Mar	N14W51	129	plage												
07 Mar	N14W65	130	plage												
08 Mar	N14W79	131	plage												
								0	0	0	0	0	0	0	0

Crossed West Limb.
Absolute heliographic longitude: 125

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 3602												
03 Mar	N18E42	75	plage					3							
04 Mar	N19E29	76	30	4	Dao	8	B	4			1				
05 Mar	N20E16	74	50	7	Cso	4	B								
06 Mar	N17E01	75	40	2	Cso	3	B								
07 Mar	N17W13	77	30	3	Cso	2	B								
08 Mar	N16W26	78	20	1	Hax	2	A								
09 Mar	N16W41	80	10	1	Hax	1	A								
10 Mar	N15W53	79	10	1	Hrx	1	A								
								7	0	0	1	0	0	0	0

Still on Disk.
Absolute heliographic longitude: 75

			Region 3603												
04 Mar	N14E53	52	10	1	Axx	1	A								
05 Mar	N14E40	50	40	3	Hsx	1	A								
06 Mar	N13E28	49	60	6	Cso	3	B								
07 Mar	N14E13	51	60	2	Hax	2	A								
08 Mar	N14W01	53	20	1	Hsx	1	A								
09 Mar	N13W16	55	10	1	Hrx	2	A								
10 Mar	N13W30	56	plage					1			1				
								1	0	0	1	0	0	0	0

Still on Disk.
Absolute heliographic longitude: 53

			Region 3604												
05 Mar	N08E71	20	70	2	Hax	1	A								
06 Mar	N08E65	13	30	2	Hsx	1	A								
07 Mar	N08E43	21	20	1	Hsx	1	A	1			1				
08 Mar	N07E29	23	10	2	Bxo	3	B				1				
09 Mar	N08E15	24	20	2	Cro	4	B								
10 Mar	N08E01	25	10	3	Bxo	3	B								
								1	0	0	2	0	0	0	0

Still on Disk.
Absolute heliographic longitude: 25

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 3605													
07 Mar	S15E26	38	20	3	Dao	4	B								
08 Mar	S15E13	39	20	6	Cro	4	B								
09 Mar	S15W01	40	20	7	Cro	5	B								
10 Mar	S15W14	40	30	5	Cro	5	B								
								0	0	0	0	0	0	0	0

Still on Disk.
Absolute heliographic longitude: 40

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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https://www.swpc.noaa.gov/products/weekly-highlights-and-27-day-forecast -- Current

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https://www.ngdc.noaa.gov/stp/satellite/goes-r.html -- NCEI GOES data textarchive

https://www.swpc.noaa.gov/products/solar-cycle-progression -- Solar Cycle Progression web site

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