Space Weather Highlights
12 May - 18 May 2025

SWPC PRF 2594
19 May 2025

Solar activity ranged from low to high. Region 4087 (N15, L=058, class/area=Dho/250 on 15 May) produced the strongest event of the period, an impulsive X2.7/2b flare (R3 - Strong) at 14/0825 UTC near the NE limb. A Type II radio sweep and Tenflare accompanied the event. The region also produced an M5.3 flare (R2 - Moderate) at 14/0325 UTC with a Type II radio sweep and an M7.7/1n flare (R2) at 14/1119 UTC. Finally, three R1 events were produced by the region on 14 and 15 May. Region 4086 (N07, L=207, class/area=Dao/060 on 13 May) also produced R3 event, with an X1.2/1b flare observed at 13/1538 UTC. Associated with that event was a Type II radio sweep and Tenflare.

Other activity included a DSF that lifted off of the Sun's northern hemisphere late on 12 May. Analysis and modeling of the event suggested the bulk of the ejecta would pass close but above Earth early on 17 May. No other Earth-directed CMEs were identified in available coronagraph imagery.

No proton events were observed at geosynchronous orbit. However, a weak enhancement, which peaked below the S1 (Minor) threshold, was observed on 13 May following the X1.2 event from Region 4086.

The greater than 2 MeV electron flux at geosynchronous orbit reached high levels 18 May following activity associated with the onset of a positive polarity CH HSS.

Geomagnetic field activity was quiet levels on 12-13 May. Periods of southward Bz elevated geomagnetic activity to active levels on 14-15 May. Late on 16 May, enhancements in solar wind parameters, associated with the onset of a positive polarity CH HSS and possible influence from the southern periphery of the CME that left the Sun on 12 May, increased activity to active levels. Total magnetic field strength reached peak levels of 22 nT on 17 May and the Bz component reached as far south as -17 nT. Solar wind speeds increased to around 500 km/s. The geomagnetic field responded with conditions up to G2 (Moderate) levels. Wind speeds continued to increase to around 750-800 km/s by 18 May, but the decreased in magnetic field strength in the IMF only provoked a peak of G1 (Minor) conditions as the high-speed stream began to wane.

Space Weather Outlook
19 May - 14 June 2025

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

No proton events are expected at geosynchronous orbit.

The greater than 2 MeV electron flux at geosynchronous orbit is likely to reach high levels on 19-23 May, 29 May - 05 Jun, and 14 Jun in response to recurrent coronal hole activity. The

remainder of the outlook period is expected to be at normal to moderate levels.

Geomagnetic field activity is likely to elevated above quiet levels for most of the next 27 days due to multiple, recurrent, coronal hole features. G2 (moderate) conditions are likely on 29 May and 13 Jun; G1 (minor) conditions likely on 19 May, 28 May, and 14 Jun; active conditions are likely on 30 May - 01 Jun, and 10 Jun; unsettled levels are likely on 20-23 May, 27 May, 02-07 Jun, and 11-12 Jun. Quiet conditions are expected for the few remaining days of the outlook period.

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
12 May	116	64	200	B6.7	9	0	0	0	0	0	0	0
13 May	117	54	260	B6.3	2	0	1	4	2	0	0	0
14 May	122	53	260	B6.7	6	4	1	4	1	1	0	0
15 May	119	45	290	B5.0	9	1	0	2	1	0	0	0
16 May	117	57	330	B4.3	6	0	0	7	0	0	0	0
17 May	117	58	310	B4.0	1	0	0	0	0	0	0	0
18 May	118	53	330	B4.8	2	0	0	0	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
12 May	1.3e+05	1.5e+04	1.6e+07
13 May	5.2e+05	8.6e+04	2.2e+07
14 May	2.0e+06	5.1e+04	1.6e+07
15 May	4.9e+05	1.6e+04	1.5e+07
16 May	3.4e+05	1.5e+04	1.5e+07
17 May	1.2e+06	1.5e+04	1.1e+07
18 May	2.3e+06	1.6e+04	3.7e+07

Daily Geomagnetic Data

Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
12 May	7	2-2-1-2-2-2-2-2	10	2-2-2-3-4-2-1-2	6	2-2-2-2-2-1-1-2
13 May	9	2-1-1-2-2-3-3-3	6	1-1-1-2-3-1-2-2	9	2-2-2-2-2-2-3-3
14 May	13	3-3-2-3-3-3-3-2	24	4-3-3-4-5-4-4-1	16	3-2-2-3-4-4-4-2
15 May	15	3-5-3-1-2-2-2-3	22	4-4-4-4-3-4-2-3	13	3-4-3-2-2-3-2-3
16 May	11	2-2-4-2-2-2-2-3	24	2-4-5-5-4-3-2-3	13	2-3-3-2-3-2-2-4
17 May	25	5-5-3-4-4-3-3-2	51	5-5-4-6-6-6-4-3	38	6-5-3-5-4-4-4-3
18 May	16	4-2-4-3-2-3-3-3	40	4-2-6-6-4-6-3-2	27	4-3-5-3-2-4-4-3

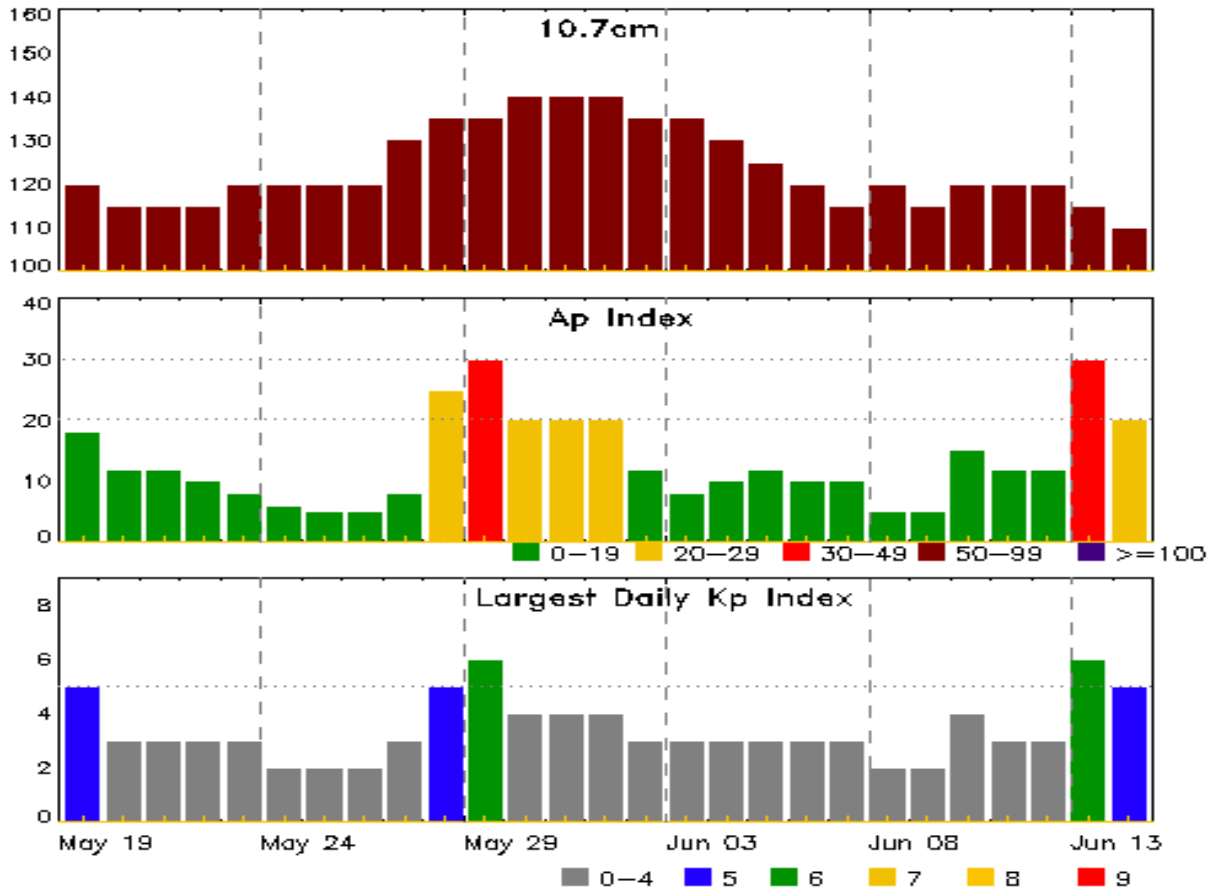
Alerts and Warnings Issued

Date & Time of Issue UTC	Type of Alert or Warning	Date & Time of Event UTC
13 May 1537	ALERT: X-ray Flux exceeded M5	13/1535
13 May 1552	SUMMARY: X-ray Event exceeded X1	13/1525 - 1544
13 May 1607	ALERT: Type II Radio Emission	13/1542
13 May 1613	SUMMARY: 10cm Radio Burst	13/1534 - 1535
13 May 1852	WARNING: Proton 10MeV Integral Flux > 10pfu	13/1930 - 14/1200
14 May 0057	WARNING: Geomagnetic K = 4	14/0058 - 1200
14 May 0325	ALERT: X-ray Flux exceeded M5	14/0323
14 May 0345	SUMMARY: X-ray Event exceeded M5	14/0305 - 0335
14 May 0420	ALERT: Type II Radio Emission	14/0323
14 May 0819	ALERT: X-ray Flux exceeded M5	14/0817
14 May 0830	SUMMARY: 10cm Radio Burst	14/0817 - 0818
14 May 0839	SUMMARY: X-ray Event exceeded X1	14/0804 - 0831
14 May 1117	ALERT: X-ray Flux exceeded M5	14/1115
14 May 1136	SUMMARY: X-ray Event exceeded M5	14/1104 - 1131
14 May 1803	WARNING: Geomagnetic K = 4	14/1730 - 15/0000
14 May 1803	ALERT: Geomagnetic K = 4	
15 May 0333	WARNING: Geomagnetic K = 4	15/0332 - 0900
15 May 0349	ALERT: Geomagnetic K = 4	
15 May 0509	WARNING: Geomagnetic K = 5	15/0508 - 1200
15 May 0509	EXTENDED WARNING: Geomagnetic K = 4	15/0332 - 1500
15 May 2252	WATCH: Geomagnetic Storm Category G1 predicted	
16 May 0742	WARNING: Geomagnetic K = 4	16/0742 - 1200
16 May 1900	WATCH: Geomagnetic Storm Category G1 predicted	
16 May 2256	WARNING: Geomagnetic K = 4	16/2255 - 17/2359
16 May 2336	ALERT: Geomagnetic K = 4	
17 May 0051	WARNING: Geomagnetic K = 5	17/0050 - 1500
17 May 0052	WARNING: Geomagnetic K = 6	17/0052 - 1200
17 May 0053	ALERT: Geomagnetic K = 5	
17 May 0054	ALERT: Geomagnetic K = 6	

Alerts and Warnings Issued

Date & Time of Issue UTC	Type of Alert or Warning	Date & Time of Event UTC
17 May 0507	ALERT: Geomagnetic K = 5	
17 May 1125	ALERT: Geomagnetic K = 5	
17 May 1152	EXTENDED WARNING: Geomagnetic K = 5	17/0050 - 2100
17 May 1152	EXTENDED WARNING: Geomagnetic K = 6	17/0052 - 1800
17 May 2055	EXTENDED WARNING: Geomagnetic K = 5	17/0050 - 18/1200
17 May 2106	EXTENDED WARNING: Geomagnetic K = 4	16/2255 - 18/1500
18 May 0835	ALERT: Geomagnetic K = 5	
18 May 1455	EXTENDED WARNING: Geomagnetic K = 4	16/2255 - 18/2359
18 May 1721	ALERT: Electron 2MeV Integral Flux >= 1000pfu	18/1705
18 May 2354	EXTENDED WARNING: Geomagnetic K = 4	16/2255 - 19/2359

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
19 May	120	18	5	02 Jun	135	12	3
20	115	12	3	03	135	8	3
21	115	12	3	04	130	10	3
22	115	10	3	05	125	12	3
23	120	8	3	06	120	10	3
24	120	6	2	07	115	10	3
25	120	5	2	08	120	5	2
26	120	5	2	09	115	5	2
27	130	8	3	10	120	15	4
28	135	25	5	11	120	12	3
29	135	30	6	12	120	12	3
30	140	20	4	13	115	30	6
31	140	20	4	14	110	20	5
01 Jun	140	20	4				

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
13 May	1525	1538	1544	X1.2	0.058	1B	N07W86	4086	1700	220	2	
14 May	0305	0325	0335	M5.3	0.048			4087	110		2	
14 May	0736	0745	0751	M1.2	0.009			4087	100			
14 May	0804	0825	0831	X2.7	0.210	2B	N15E68	4087	120	390		
14 May	1104	1119	1131	M7.7	0.072	1N	N19E65	4087	100			
14 May	1759	1811	1818	M4.7	0.030			4087	660			
15 May	1708	1721	1727	M2.1	0.013	1F	N18E48	4087				

Flare List

	Time			Optical			
Date	Begin	Max	End	X-ray Class	Imp/ Brtns	Location Lat CMD	Rgn #
12 May	0041	0049	0054	C1.6			4079
12 May	0541	0548	0552	C1.6			4079
12 May	0558	0602	0606	C2.0			
12 May	1152	1159	1202	C1.0			
12 May	1249	1308	1339	C2.7			4079
12 May	1452	1502	1504	C2.7			4087
12 May	1654	1701	1706	C1.2			4086
12 May	1714	1723	1727	C1.0			4086
12 May	1939	1948	1954	C1.2			4087
13 May	B0445	0514	0519		1F	N10W71	4086
13 May	0522	U0614	A0624		SF	N09W74	4086
13 May	0643	0645	A0648		SF	N09W75	4086
13 May	1349	1357	1400	C3.7	SF	N01W10	4085
13 May	1525	1538	1544	X1.2	1B	N07W86	4086
13 May	2005	2014	2020	B9.9	SF	N18E72	4087
13 May	2234	2241	2253	C2.3			4085
14 May	0037	0045	0050	B9.5			4087
14 May	0145	0157	0208	C1.2			4087
14 May	0208	0215	0221	C2.1			4087
14 May	0232	0234	0235		SF	N17E70	4087
14 May	0305	0325	0335	M5.3			4087
14 May	0700	0720	0734	C5.5	SF	N15E68	4087
14 May	0736	0745	0751	M1.2			4087
14 May	0804	0825	0831	X2.7	2B	N15E68	4087

Flare List

Date	Time			Optical			
	Begin	Max	End	X-ray Class	Imp/ Brtns	Location Lat CMD	Rgn #
14 May	0858	0858	0901		SF	N17E66	4087
14 May	1048	1121	1200	M7.7	1N	N19E65	4087
14 May	1413	1427	1433	C2.4	SF	N16E62	4087
14 May	1643	1651	1655	C1.6			
14 May	1743	1753	1759	C1.8			4087
14 May	1759	1811	1818	M4.7			4087
15 May	0300	0306	0308	C1.0			
15 May	0338	0346	0348	C1.3			4088
15 May	1332	1339	1347	C1.0			4087
15 May	1438	1444	1454	C1.2			4087
15 May	1454	1458	1500	C1.2			4087
15 May	1517	1527	1537	C3.6			4087
15 May	B1551	1551	1551		SF	N18E48	4087
15 May	1708	1721	1727	M2.1	1F	N18E48	4087
15 May	1947	1953	1959	C1.1			
15 May	2127	2136	2140	C1.2			4087
15 May	2211	2219	2221	C9.6	SF	N16E42	4087
16 May	0044	0052	0055	C3.4	SN	N16E40	4087
16 May	0214	0220	0229	B8.1			
16 May	0310	0315	0329	C1.7	SN	N15E42	4087
16 May	0348	0403	0415	C2.3			4089
16 May	0527	0539	0547	C1.0	SF	N15E40	4087
16 May	0617	0622	0630		SF	N15E38	4087
16 May	0717	0729	0738	B9.2			4089
16 May	0754	0758	0801	B9.3	SF	N16E37	4087
16 May	0821	0830	0842	B8.6			4089
16 May	0842	0845	0848	B7.5			4089
16 May	1027	1032	1038	C1.3			4087
16 May	1354	1408	1419	B6.6			4087
16 May	1419	1435	1447	B6.9			
16 May	1643	1653	1700	B8.5			
16 May	1720	1728	1737	B7.3	SF	N21E31	4087
16 May	2230	2233	2237	B7.7			4087
16 May	2237	2241	2250	C1.1	SF	N18E31	4087
17 May	0956	1009	1019	B8.5			4089
17 May	1351	1406	1419	B9.1			4089
17 May	1944	2000	2011	C2.2			4088
17 May	2311	2336	0006	B9.6			4087

Flare List

	Time			Optical			
Date	Begin	Max	End	X-ray Class	Imp/ Brtns	Location Lat CMD	Rgn #
18 May	0506	0520	0538	B8.2			
18 May	1617	1627	1636	B9.6			
18 May	1636	1642	1645	B8.4			
18 May	1813	1828	1837	C1.0			4089
18 May	2209	2218	2225	B8.2			
18 May	2303	2318	2333	C1.5			

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 4079												
28 Apr	N08E76	245	250	4	Hkx	2	A	3							
29 Apr	N08E67	241	560	14	Ehi	5	BG	7	1		2	1			
30 Apr	N08E54	241	1040	14	Ekc	13	BG	4	1		2		1		
01 May	N08E41	241	1200	14	Ekc	14	BGD	5			5				
02 May	N07E27	242	1210	12	Ekc	17	BG	8			2				
03 May	N08E15	240	1200	12	Ekc	32	BG	10			11				
04 May	N08E01	241	1200	13	Ekc	30	BG	1							
05 May	N08W12	241	1230	14	Ekc	34	BGD				2				
06 May	N08W26	240	1250	13	Ekc	32	BG	14			6				
07 May	N08W38	241	1220	13	Ekc	35	BG	10			10				
08 May	N09W52	241	1160	12	Ekc	18	BG	5			3				
09 May	N08W67	243	1100	9	Dkc	16	BG	6			3				
10 May	N08W81	244	640	7	Cki	8	BG	7							
11 May	N08W94	244	140	6	Cso	3	B	12	1						
								92	3	0	46	1	1	0	0

Crossed West Limb.
Absolute heliographic longitude: 241

			Region 4081												
03 May	N07E44	211	20	1	Hrx	1	A				1				
04 May	N08E30	212	30	4	Dao	4	B	1			1				
05 May	N08E16	213	50	5	Dai	10	B	2			1				
06 May	N08E04	210	90	6	Dai	9	B								
07 May	N07W09	211	130	6	Dai	11	B	1			1				
08 May	N08W23	212	150	7	Dai	13	B								
09 May	N07W37	213	130	7	Dai	13	B								
10 May	N07W50	213	50	6	Cao	5	B								
11 May	N07W64	214	20	4	Cso	2	B								
12 May	N07W79	215	plage												
								4	0	0	4	0	0	0	0

Crossed West Limb.
Absolute heliographic longitude: 210

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 4082												
04 May	S11E65	177	60	5	Dao	5	B	5			1				
05 May	S11E49	180	70	8	Dai	12	BG	3							
06 May	S11E34	180	140	8	Dac	8	BG								
07 May	S11E21	181	130	8	Dai	8	BG	1			2				
08 May	S10E07	182	90	8	Dso	10	BG	4			3	1			
09 May	S10W07	183	50	8	Cso	5	B	1							
10 May	S10W21	184	70	2	Hsx	1	A								
11 May	S10W34	186	30	2	Hsx	1	A								
12 May	S09W51	187	40	1	Hsx	1	A								
13 May	S09W65	188	40	2	Hsx	1	A								
14 May	S09W78	188	40	2	Hsx	1	A								
15 May	S09W92	189	20	2	Hsx	1	A								
								14	0	0	6	1	0	0	0

Crossed West Limb.
Absolute heliographic longitude: 182

			Region 4084												
08 May	S20E60	129	40	3	Cso	3	B								
09 May	S21E48	128	60	4	Cso	3	B								
10 May	S21E34	129	50	2	Hsx	1	A								
11 May	S21E21	129	20	2	Cso	2	B								
12 May	S20E07	129	10	2	Axx	4	A								
13 May	S20W07	130	plage												
14 May	S20W21	131	plage												
15 May	S20W35	132	plage												
16 May	S20W49	133	plage												
17 May	S20W63	133	plage												
18 May	S20W77	134	plage												
								0	0	0	0	0	0	0	0

Still on Disk.
Absolute heliographic longitude: 129

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 4085												
10 May	N02E24	139	10	3	Bxo	5	B								
11 May	N02E11	139	30	5	Dso	6	B	1			1				
12 May	N03W02	137	30	3	Cro	2	B								
13 May	N03W16	139	20	2	Bxo	4	B	2			1				
14 May	N03W30	140	10	3	Bxo	2	B								
15 May	N03W45	142	plage												
16 May	N03W60	144	plage												
17 May	N03W75	145	plage												
18 May	N03W90	147	plage												
								3	0	0	2	0	0	0	0

Still on Disk.
Absolute heliographic longitude: 137

			Region 4086												
11 May	N08W57	207	10	1	Cso	3	B								
12 May	N07W71	207	30	4	Cro	6	B	2							
13 May	N07W84	207	60	4	Dao	6	B			1	2	2			
								2	0	1	2	2	0	0	0

Crossed West Limb.
Absolute heliographic longitude: 207

			Region 4087												
12 May	N15E77	59	90	3	Hsx	1	A	2							
13 May	N15E65	58	140	8	Dso	3	B				1				
14 May	N15E52	58	200	8	Dso	5	BGD	5	4	1	4	1	1		
15 May	N15E39	58	250	8	Dho	10	BGD	6	1		2	1			
16 May	N17E24	60	230	9	Dso	10	BGD	5			7				
17 May	N16E12	58	220	8	Dso	7	BGD								
18 May	N15W00	57	240	9	Dso	4	BGD								
								18	5	1	14	2	1	0	0

Still on Disk.
Absolute heliographic longitude: 57

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 4088												
14 May	N09W41	151	10	3	Bxo	5	B								
15 May	N09W56	153	20	5	Cro	4	B	1							
16 May	N09W74	156	10	1	Hrx	1	A								
17 May	N09W85	154	plage					1							
								2	0	0	0	0	0	0	0

Crossed West Limb.
Absolute heliographic longitude: 151

			Region 4089												
16 May	N18E55	28	30	7	Dro	3	B	1							
17 May	N18E44	26	30	5	Dro	6	B								
18 May	N17E29	28	20	5	Cro	4	B	1							
								2	0	0	0	0	0	0	0

Still on Disk.
Absolute heliographic longitude: 28

			Region 4090												
16 May	S12E63	21	60	4	Cao	3	B								
17 May	S12E51	19	40	4	Cso	2	B								
18 May	S13E37	20	40	2	Hax	2	A								
								0	0	0	0	0	0	0	0

Still on Disk.
Absolute heliographic longitude: 20

			Region 4091												
17 May	S13E37	32	20	3	Cro	3	B								
18 May	S13E24	33	30	3	Cao	3	B								
								0	0	0	0	0	0	0	0

Still on Disk.
Absolute heliographic longitude: 33

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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https://www.swpc.noaa.gov/sites/default/files/images/u2/Usr_guide.pdf -- User Guide