Space Weather Highlights
13 June - 19 June 2022

SWPC PRF 2442
20 June 2022

Solar activity ranged from low to moderate levels. Low levels were observed on 14-19 Jun with the majority of the C-class flares from Regions 3030 (N18, L=117, class/area Dai/230 on 19 Jun), 3031 (S26, L=130, class/area Eai/240 on 15 Jun), 3037 (S21, L=140, class/area Csi/060 on 17 Jun) and 3038 (N15, L=053, class/area Dai/140 on 19 Jun). Moderate (R1-Minor) flare activity was observed on 13 and 16 Jun. Region 3032 (N21, L=106, class/area Dai/180 on 13 Jun) produced an LDE, M3.4/1n event at 13/0407 UTC. Associated with this event were Type II (325 km/s) and Type IV Sweep signatures, a 670 sfu Tenflare and a CME signature analyzed with a potential arrival time of early on 15 Jun. Region 3031 produced an M1.6 at 16/0353 UTC. Other than the 13 Jun CME, no additional Earth-directed CMEs were observed.

No proton events were observed at geosynchronous orbit.

The greater than 2 MeV electron flux at geosynchronous orbit was at normal to moderate levels on 13-17 Jun. High levels were reached on 18-19 Jun with a maximum flux reading of 2,950 pfu observed at 19/1735 UTC.

Geomagnetic field activity ranged from quiet to minor storm levels. Unsettled to G1 (Minor) geomagnetic storms were observed on 13 Jun due to positive polarity CH HSS influence. Mostly quiet levels were observed on 14 Jun. Unsettled to G1 (Minor) geomagnetic storms were observed on 15 Jun due to effects from the 13 Jun CME. 16 Jun saw unsettled to active levels as CME effects continued. Unsettled to active levels were observed on 17-19 Jun due to positive polarity CH HSS influence. During the period, solar wind speeds ranged from a low of near 440 km/s on 14 Jun to a high of near 650 km/s late on 17 Jun. Total field was at mostly 5-10 nT through the period with the Bz component at mostly +/- 7 nT. The phi angle remained in a predominately positive orientation.

Space Weather Outlook
20 June - 16 July 2022

Solar activity is expected to be at very low to low levels, with a chance for further M-class flares on 20-24 Jun due to potential flare activity from Regions 3031 and 3032.

No proton events are expected at geosynchronous orbit.

The greater than 2 MeV electron flux at geosynchronous orbit is expected to be reach high levels on 20-22 Jun, 27 Jun - 02 Jul and 15-16 Jul due to CH HSS influence.

Geomagnetic field activity is expected to reach unsettled levels on 20 Jun, 23-26 Jun, 08-11 Jul and 14-16 Jul with active levels on 24 Jun 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
13 June	132	96	480	B8.4	1	1	0	3	2	0	0	0
14 June	146	121	560	C1.0	10	0	0	13	0	0	0	0
15 June	140	149	810	B7.4	4	0	0	6	0	0	0	0
16 June	147	159	730	B7.5	6	1	0	6	0	0	0	0
17 June	149	152	510	B9.0	7	0	0	7	0	0	0	0
18 June	140	145	640	B7.3	6	0	0	9	1	0	0	0
19 June	144	120	800	B8.6	7	0	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
13 June	9.8e+04	3.8e+04	2.7e+06
14 June	1.4e+06	5.2e+04	3.1e+06
15 June	1.4e+07	5.9e+04	3.9e+06
16 June	1.9e+07	5.1e+04	9.3e+06
17 June	2.6e+06	3.9e+04	2.7e+07
18 June	4.0e+05	3.3e+04	5.0e+07
19 June	1.8e+05	3.1e+04	1.0e+08

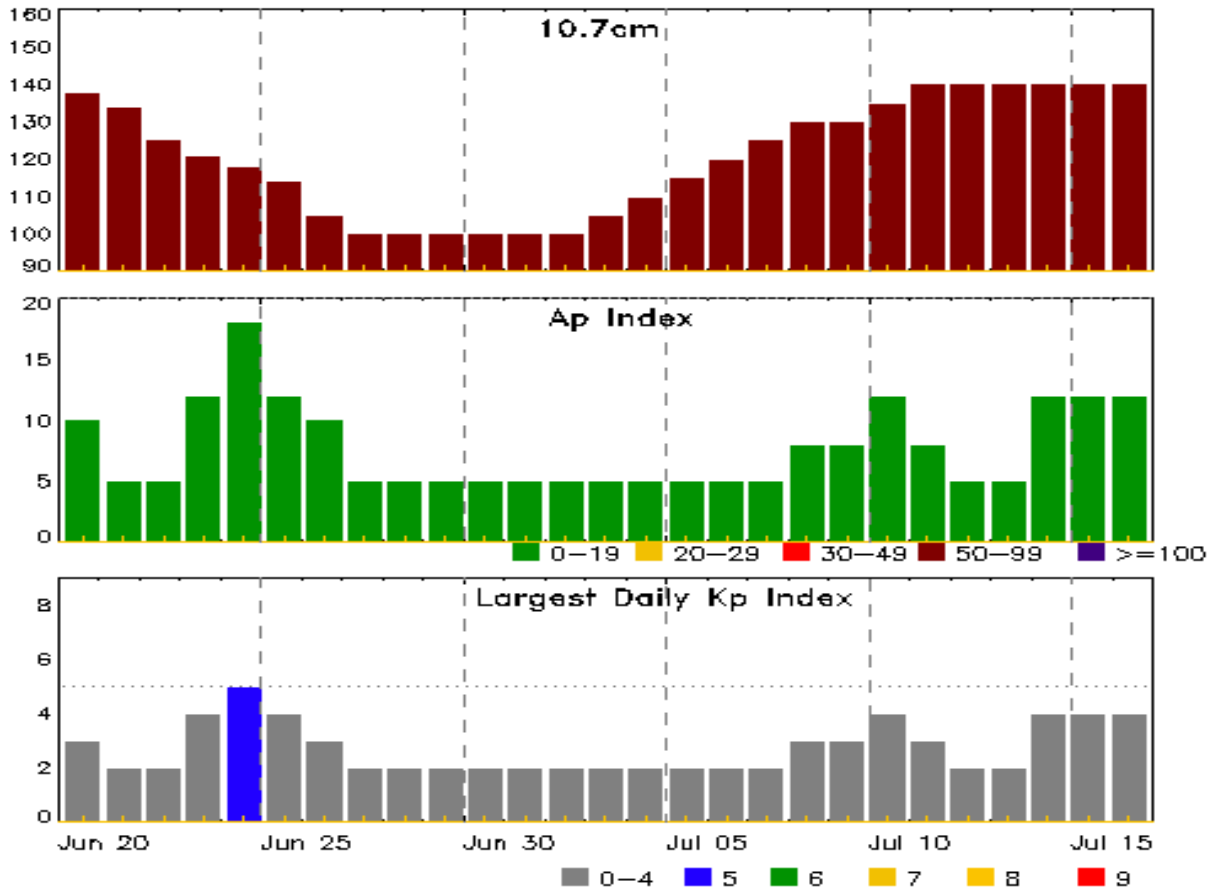
Daily Geomagnetic Data

Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
13 June	14	3-4-2-2-3-3-3-2	13	3-4-2-3-3-2-2-2	13	3-5-2-2-2-3-2-2
14 June	10	2-2-2-2-3-3-2-3	7	2-2-2-2-2-2-1-2	8	2-2-2-2-2-2-2-3
15 June	18	2-4-3-3-4-4-2-3	49	3-4-4-6-6-7-3-2	20	2-4-3-4-5-4-2-2
16 June	14	2-3-3-3-3-2-2-4	21	2-3-2-6-4-2-2-3	12	2-3-2-3-3-2-2-4
17 June	14	3-2-2-3-3-2-4-3	18	4-2-3-4-4-2-3-3	13	3-2-2-3-3-2-4-3
18 June	15	3-3-2-3-2-2-4-4	14	4-4-2-2-1-2-3-3	14	3-3-2-3-1-2-3-4
19 June	10	3-3-2-3-2-3-1-1	24	3-4-3-5-5-4-2-1	27	4-3-2-3-2-3-2-1

Alerts and Warnings Issued

Date & Time of Issue UTC	Type of Alert or Warning	Date & Time of Event UTC
13 Jun 0232	WARNING: Geomagnetic K = 4	13/0232 - 1200
13 Jun 0338	ALERT: Geomagnetic K = 4	13/0338
13 Jun 0406	ALERT: Type II Radio Emission	13/0324
13 Jun 0420	ALERT: Type IV Radio Emission	13/0336
13 Jun 0515	SUMMARY: 10cm Radio Burst	13/0339 - 0432
13 Jun 0520	WARNING: Geomagnetic K = 5	13/0518 - 2100
13 Jun 0523	EXTENDED WARNING: Geomagnetic K = 4	13/0232 - 2100
13 Jun 0602	ALERT: Geomagnetic K = 5	13/0559
13 Jun 1625	CANCELLATION: Geomagnetic K = 5	
13 Jun 1938	WATCH: Geomagnetic Storm Category G1 predicted	
15 Jun 0420	WARNING: Geomagnetic Sudden Impulse expected	15/0425 - 0525
15 Jun 0442	WARNING: Geomagnetic K = 4	15/0445 - 1500
15 Jun 0445	SUMMARY: Geomagnetic Sudden Impulse	15/0437
15 Jun 0455	ALERT: Geomagnetic K = 4	15/0448
15 Jun 1422	EXTENDED WARNING: Geomagnetic K = 4	15/0445 - 2359
15 Jun 1453	WARNING: Geomagnetic K = 5	15/1453 - 2100
15 Jun 1503	ALERT: Geomagnetic K = 5	15/1459
16 Jun 2202	WARNING: Geomagnetic K = 4	16/2202 - 17/0900
16 Jun 2302	ALERT: Geomagnetic K = 4	16/2300
17 Jun 1940	WARNING: Geomagnetic K = 4	17/1940 - 2359
17 Jun 2026	ALERT: Geomagnetic K = 4	17/2025
18 Jun 0116	WARNING: Geomagnetic K = 4	18/0115 - 1200
18 Jun 1649	ALERT: Electron 2MeV Integral Flux >= 1000pfu	18/1235
18 Jun 2219	WARNING: Geomagnetic K = 4	18/2215 - 19/1200
18 Jun 2223	ALERT: Geomagnetic K = 4	18/2222
18 Jun 2225	WARNING: Geomagnetic K = 5	18/2222 - 19/0600
19 Jun 1211	CONTINUED ALERT: Electron 2MeV Integral Flux >= 1000pfu	18/1235

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
20 Jun	138	10	3	04 Jul	110	5	2
21	134	5	2	05	115	5	2
22	125	5	2	06	120	5	2
23	121	12	4	07	125	5	2
24	118	18	5	08	130	8	3
25	114	12	4	09	130	8	3
26	105	10	3	10	135	12	4
27	100	5	2	11	140	8	3
28	100	5	2	12	140	5	2
29	100	5	2	13	140	5	2
30	100	5	2	14	140	12	4
01 Jul	100	5	2	15	140	12	4
02	100	5	2	16	140	12	4
03	105	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
13 Jun	0258	0407	0512	M3.4	0.180	1N	N15	E45	3032		670	2	1
16 Jun	0347	0353	0357	M1.6	0.003				3031				

Flare List

	Time			Optical			
Date	Begin	Max	End	X-ray Class	Imp/ Brtns	Location Lat CMD	Rgn #
13 Jun	0258	0407	0512	M3.4	1N	N15E45	3032
13 Jun	B0359	U0359	0515		SF	N20E36	3030
13 Jun	B0359	U0359	0638		1F	N20E46	3032
13 Jun	1646	1649	1652		SF	S28E14	3031
13 Jun	2032	2033	2042		SF	S20E04	3031
13 Jun	2119	2124	2128	C8.5			3031
14 Jun	0344	0400	0413	C3.5			
14 Jun	B0440	U0444	0459		SF	S13W41	3031
14 Jun	0504	0520	0523	C4.8	SF	S14W44	
14 Jun	0648	0649	0653		SF	N21E31	3032
14 Jun	0840	0841	0843	C1.3	SF	N21E31	3032
14 Jun	0920	0921	0936	C1.7	SF	S28E07	3031
14 Jun	1058	1112	1129	C2.8	SF	N20E17	3030
14 Jun	1148	1149	1152		SF	S13W48	
14 Jun	1312	1313	1321		SN	S13W48	3036
14 Jun	1319	1326	1332	C8.5	SF	S28E05	3031
14 Jun	1411	1420	1426	C8.6	SF	S14W48	3036
14 Jun	1556	1602	1619	C1.3	SF	S20W52	3036
14 Jun	1707	1710	1718		SF	S28E05	3031
14 Jun	1734	1744	1759	C3.9	SF	N13E43	3033
14 Jun	1827	1842	1853	C2.2			3031
14 Jun	2307	2311	2317		SF	N17E11	3030
14 Jun	2321	2324	2328	C2.5	SF	S19W58	3036
15 Jun	0331	0340	0349	C1.3			3036
15 Jun	0424	0428	0433	C3.3	SF	S14W57	3036
15 Jun	0454	0455	0457		SF	S28W03	3031
15 Jun	0603	0609	0613	C1.2	SF	S29W03	3031
15 Jun	0721	0725	0729	C3.2	SN	N21E06	3030
15 Jun	0913	0914	0919		SF	S28W06	3031

Flare List

Date	Time			Optical			
	Begin	Max	End	X-ray Class	Imp/ Brtns	Location Lat CMD	Rgn #
15 Jun	1015	1022	1030	B9.5			3031
15 Jun	1110	1111	1112		SF	N19E03	3030
16 Jun	0116	0121	0127	C1.1			3030
16 Jun	0202	0208	0212	C1.4			3031
16 Jun	0347	0353	0357	M1.6			3031
16 Jun	0414	0416	0418		SF	S30W16	3031
16 Jun	1232	1233	1235	C1.1	SF	S22W25	3031
16 Jun	1237	1239	1241		SF	S09W76	3036
16 Jun	1335	1344	1348	C4.5	SF	S28W18	3031
16 Jun	1533	1538	1541	C1.7	SF	S25W20	3031
16 Jun	1707	1709	1712		SF	S18E35	3035
16 Jun	1939	1943	1947	C1.6			3031
17 Jun	0044	0053	0057	C4.6			3031
17 Jun	0221	0224	0228	C1.6			3031
17 Jun	0610	0630	0647	C2.7	SF	N18W20	3030
17 Jun	0655	0658	0710		SF	S28W32	3031
17 Jun	1052	1123	1138	C5.6	SF	N18W25	3030
17 Jun	1251	1252	1254		SF	N18W26	3030
17 Jun	1302	1319	1344	C2.5	SF	N17W26	3030
17 Jun	1425	1512	1708	C4.3	SF	N17W27	3030
17 Jun	1818	1825	1832	C3.3	SF	S21W52	3037
18 Jun	0000	0009	0011	C1.4			3037
18 Jun	0011	0020	0026	C2.1			3035
18 Jun	0801	0803	0807		SF	N18W02	3033
18 Jun	1134	1139	1146	C1.8	SF	S27W48	3031
18 Jun	1149	1149	1154		SF	N18W40	3030
18 Jun	1317	1320	1323	C1.8	SF	N18W40	3030
18 Jun	1409	1412	1425		SF	N18W41	3030
18 Jun	1519	1520	1521		SF	S30W44	3031
18 Jun	1711	1713	1715		SF	S30W44	3031
18 Jun	1734	1744	1750	C1.4			3031
18 Jun	1911	1912	1912		SF	N18W44	3030
18 Jun	2053	2105	2112	C4.8	1F	S28W52	3031
18 Jun	2223	2225	2227		SF	S30W47	3031
19 Jun	0020	0044	0102		SF	N19W46	3030
19 Jun	0125	0126	0129		SF	N28E44	
19 Jun	0238	0252	0311	C2.0	SF	S19W67	3037
19 Jun	0436	0449	0456		SF	N19W47	3030

Flare List

	Time				Optical		
Date	Begin	Max	End	X-ray Class	Imp/ Brtns	Location Lat CMD	Rgn #
19 Jun	0640	0648	0653	C2.2			3031
19 Jun	0641	0646	0654		SF	N15E16	3038
19 Jun	0644	0646	0652		SF	S28W58	3031
19 Jun	0710	0715	0721	C2.0	SF	N15E17	3038
19 Jun	0730	0745	0809		SF	N15E18	3038
19 Jun	0737	0742	0747		SF	N18W50	3030
19 Jun	0817	0859	0912		SF	N18W50	3030
19 Jun	0825	0826	0833		SF	N15E17	3038
19 Jun	0843	0910	0921		SF	N15E17	3038
19 Jun	1005	1010	1020		SF	N16E13	3038
19 Jun	1034	1035	1038		SF	N15E17	3038
19 Jun	1110	1112	A1122		SF	N15E13	3038
19 Jun	1130	U1130	A1305		SF	N14E18	3038
19 Jun	1345	1352	1356	C1.3	SF	N16E11	3038
19 Jun	1430	1431	1432		SF	N15E15	3038
19 Jun	1452	1453	1454		SF	N15E11	3038
19 Jun	1637	1646	1717		1F	N14E13	3038
19 Jun	1721	1723	1726		SF	N14E09	3038
19 Jun	1734	1749	1800	C2.2			3031
19 Jun	1936	1939	1942		SF	N15E09	3038
19 Jun	1953	2010	2028	C4.0	SF	N15E09	3038
19 Jun	2154	2204	2210	C2.5	SF	N15E07	3038

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 3028												
04 Jun	N14E52	206	10	1	Axx	1	A								
05 Jun	N14E38	207	plage												
06 Jun	N14E24	208	plage												
07 Jun	N14E10	208	plage												
08 Jun	N14W04	209	plage												
09 Jun	N14W18	210	plage												
10 Jun	N14W32	211	plage												
11 Jun	N14W46	211	plage												
12 Jun	N14W60	212	plage												
13 Jun	N14W74	213	plage												
14 Jun	N14W88	214	plage												
								0	0	0	0	0	0	0	0

Crossed West Limb.
Absolute heliographic longitude: 209

			Region 3029												
04 Jun	S18E59	199	10	1	Axx	1	A								
05 Jun	S17E48	197	10	1	Axx	1	A	2							
06 Jun	S17E34	197	10	1	Axx	1	A								
07 Jun	S18E20	198	10	1	Axx	1	A								
08 Jun	S18E06	199	plage												
09 Jun	S17W12	204	70	4	Dao	7	B	2							
10 Jun	S17W26	205	30	4	Bxo	8	B								
11 Jun	S17W39	204	20	2	Bxo	2	B								
12 Jun	S17W53	205	plage												
13 Jun	S17W67	206	plage												
14 Jun	S17W81	207	plage												
								4	0	0	0	0	0	0	0

Crossed West Limb.
Absolute heliographic longitude: 199

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 3030												
09 Jun	N20E74	118	plage					2							
10 Jun	N20E65	114	140	15	Eao	5	B	4	1		1				
11 Jun	N20E52	113	180	15	Eao	7	B	2							
12 Jun	N20E35	117	40	9	Dao	9	B								
13 Jun	N20E21	118	40	10	Dao	5	B				1				
14 Jun	N20E09	117	40	10	Dao	7	B				1				
15 Jun	N19W03	115	60	10	Dai	13	B	1			2				
16 Jun	N19W17	116	120	10	Dai	13	B	1							
17 Jun	N17W33	118	80	7	Dai	17	B	4			5				
18 Jun	N18W47	119	200	7	Dai	18	B	1			4				
19 Jun	N18W58	117	230	9	Dai	17	B				4				
								15	1	0	18	0	0	0	0

Still on Disk.
Absolute heliographic longitude: 115

			Region 3031												
11 Jun	S27E36	129	30	3	Cro	2	B								
12 Jun	S27E23	129	30	8	Cro	5	B								
13 Jun	S27E09	129	20	9	Cro	10	B	1			2				
14 Jun	S27W04	131	160	10	Dai	15	BG	4			4				
15 Jun	S26W18	130	240	13	Eai	26	BG	1			3				
16 Jun	S25W30	129	180	13	Esi	20	BG	5	1		4				
17 Jun	S27W44	130	140	12	Esi	15	BG	2			1				
18 Jun	S27W57	130	120	15	Esi	8	B	3			4	1			
19 Jun	S25W72	131	110	4	Dao	4	B	2			1				
								18	1	0	19	1	0	0	0

Still on Disk.
Absolute heliographic longitude: 131

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 3032												
12 Jun	N21E46	106	90	4	Dai	5	B	1							
13 Jun	N21E33	106	180	6	Dai	9	BG		1			2			
14 Jun	N21E19	107	120	6	Dso	7	BG	1			2				
15 Jun	N20E08	104	100	4	Cso	4	B								
16 Jun	N21W07	106	80	4	Hsx	3	A								
17 Jun	N20W20	105	70	5	Cso	2	B								
18 Jun	N19W33	105	100	5	Cso	2	B								
19 Jun	N20W48	107	160	2	Hsx	2	A								
								2	1	0	2	2	0	0	0

Still on Disk.
Absolute heliographic longitude: 106

			Region 3033												
12 Jun	N17E64	88	30	3	Bxo	4	B	1							
13 Jun	N17E52	87	50	5	Dso	7	B								
14 Jun	N17E39	87	70	6	Dao	12	B	1			1				
15 Jun	N17E28	84	120	10	Dai	13	B								
16 Jun	N18E15	83	50	8	Dao	8	B								
17 Jun	N16W00	85	20	6	Cro	6	B								
18 Jun	N16W14	87	10	2	Axx	3	A				1				
19 Jun	N16W28	87	plage												
								2	0	0	2	0	0	0	0

Still on Disk.
Absolute heliographic longitude: 85

			Region 3034												
13 Jun	N01E69	68	110	5	Dso	3	B								
14 Jun	N01E55	69	70	6	Cso	2	B								
15 Jun	N01E41	71	100	2	Hsx	1	A								
16 Jun	N01E27	72	90	2	Hsx	1	A								
17 Jun	N01E12	72	60	3	Cso	1	B								
18 Jun	N01W00	72	60	1	Hsx	1	A								
19 Jun	N01W13	72	100	1	Hsx	1	A								
								0	0	0	0	0	0	0	0

Still on Disk.
Absolute heliographic longitude: 72

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 3035												
13 Jun	S18E68	69	80	2	Dso	2	B								
14 Jun	S18E54	72	50	8	Cso	4	B								
15 Jun	S18E42	70	70	8	Cso	5	B								
16 Jun	S18E29	70	100	8	Cao	9	B				1				
17 Jun	S18E15	69	20	8	Bxo	11	B								
18 Jun	S18E01	71	20	8	Bxo	5	B	1							
19 Jun	S18W12	71	30	8	Cro	7	B								
								1	0	0	1	0	0	0	0

Still on Disk.
Absolute heliographic longitude: 71

			Region 3036												
14 Jun	S12W56	180	50	5	Dso	4	B	2			3				
15 Jun	S12W69	181	100	9	Dso	5	B	2							
16 Jun	S12W80	178	60	10	Dso	4	B				1				
								4	0	0	4	0	0	0	0

Crossed West Limb.
Absolute heliographic longitude: 180

			Region 3037												
15 Jun	S20W28	140	20	3	Cro	2	B								
16 Jun	S21W41	140	40	7	Dso	8	B								
17 Jun	S21W55	140	60	6	Csi	13	B	1			1				
18 Jun	S21W68	140	30	5	Cro	4	B	1							
19 Jun	S19W83	142	30	3	Cro	2	B	1			1				
								3	0	0	2	0	0	0	0

Still on Disk.
Absolute heliographic longitude: 140

			Region 3038												
16 Jun	N12E54	45	10	8	Cro	3	B								
17 Jun	N15E35	50	60	7	Dro	7	B								
18 Jun	N15E19	52	80	6	Cai	11	B								
19 Jun	N15E06	53	140	9	Dai	17	BG	4			16	1			
								4	0	0	16	1	0	0	0

Still on Disk.
Absolute heliographic longitude: 53

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 3039													
18 Jun	N13W68	139	20	4	Cro	3	B								
19 Jun	N13W82	141	plage												
								0	0	0	0	0	0	0	0

Still on Disk.
Absolute heliographic longitude: 139

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

The Weekly has been published continuously since 1951 and is available online since 1997.

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

ftp://ftp.swpc.noaa.gov/pub/warehouse -- Online archive from 1997

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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