Space Weather Highlights
20 June - 26 June 2022

SWPC PRF 2443
27 June 2022

Solar activity was at low levels through the period with C-class flare activity observed from 6 separate regions. The majority of the flare activity was observed from Region 3038 (N16, L=053, class/area Ehi/580 on 24 Jun) with 22 C-class flares observed during the period, the largest a C5.7 event at 20/0618 UTC. Region 3840 (S13, L=325, class/area Cso/160 on 24 Jun) contributed 8 C-class flares, the largest a C2.9/Sf at 22/0506 UTC. During the period, a pair of DSFs were observed that both had possible Earth-directed components. The first was an 18 degree filament, centered near N25W28, that lifted off at about 24/0756 UTC, viewed in GOES-16 SUVI 304 imagery. The second was a 35 degree filament, centered near S53E09, that lifted off at about 26/0128 UTC, viewed in GOES-16 SUVI 304 imagery.

No proton events were observed at geosynchronous orbit.

The greater than 2 MeV electron flux at geosynchronous orbit was at moderate levels on 24 Jun and high levels on 20-23 Jun and 25-26 Jun with a peak flux of 2,040 pfu observed at 25/1520 UTC.

Geomagnetic field activity ranged from quiet to minor storm levels. Quiet to unsettled levels were observed on 20-24 Jun due to positive polarity CH HSS influence (20-21 Jun) and negative polarity CH HSS influence (22-24 Jun). Active to G1 (Minor) storm levels were observed on 25-26 Jun due to negative polarity CH HSS influence. During the period, solar wind speeds ranged from a low of near 400 km/s on 23 Jun to a high of about 700 km/s on 26 Jun. Total field remained below 15 nT while the Bz component varied between +/- 12 nT. Phi angle was in a positive orientation on 20-21 Jun and rotated to a negative orientation on 22-26 Jun.

Space Weather Outlook
27 June - 23 July 2022

Solar activity is expected to be at very low to low levels through the outlook period.

No proton events are expected at geosynchronous orbit.

The greater than 2 MeV electron flux at geosynchronous orbit is expected to be high levels on 27 Jun - 04 Jul and 15-23 Jul due to CH HSS influence. Low to moderate levels are expected on 05-14 Jul.

Geomagnetic field activity is expected to be at unsettled levels on 27-29 Jun, 08-11, 14-16 and 22-23 Jul with active intervals likely on 27 and 29 Jun and 23 Jul due to recurrent CH HSS activity coupled with CME activity on 27 and 29 Jun from the 24 Jun and 26 Jun CMEs, respectively.

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
20 June	137	112	800	C1.0	7	0	0	21	0	0	0	0
21 June	139	104	880	B7.7	5	0	0	9	0	0	0	0
22 June	129	80	770	B7.8	17	0	0	17	0	0	0	0
23 June	121	69	710	B5.8	5	0	0	0	0	0	0	0
24 June	115	60	830	B4.4	2	0	0	5	0	0	0	0
25 June	108	31	630	B3.6	2	0	0	9	0	0	0	1
26 June	102	33	340	B3.3	4	0	0	9	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
20 June	1.1e+05	3.1e+04	1.1e+08
21 June	1.2e+05	3.2e+04	8.5e+07
22 June	9.5e+04	3.3e+04	2.8e+07
23 June	6.4e+04	3.4e+04	3.3e+07
24 June	5.4e+04	3.4e+04	3.6e+07
25 June	6.3e+04	3.4e+04	3.2e+07
26 June	1.5e+05	3.3e+04	2.5e+07

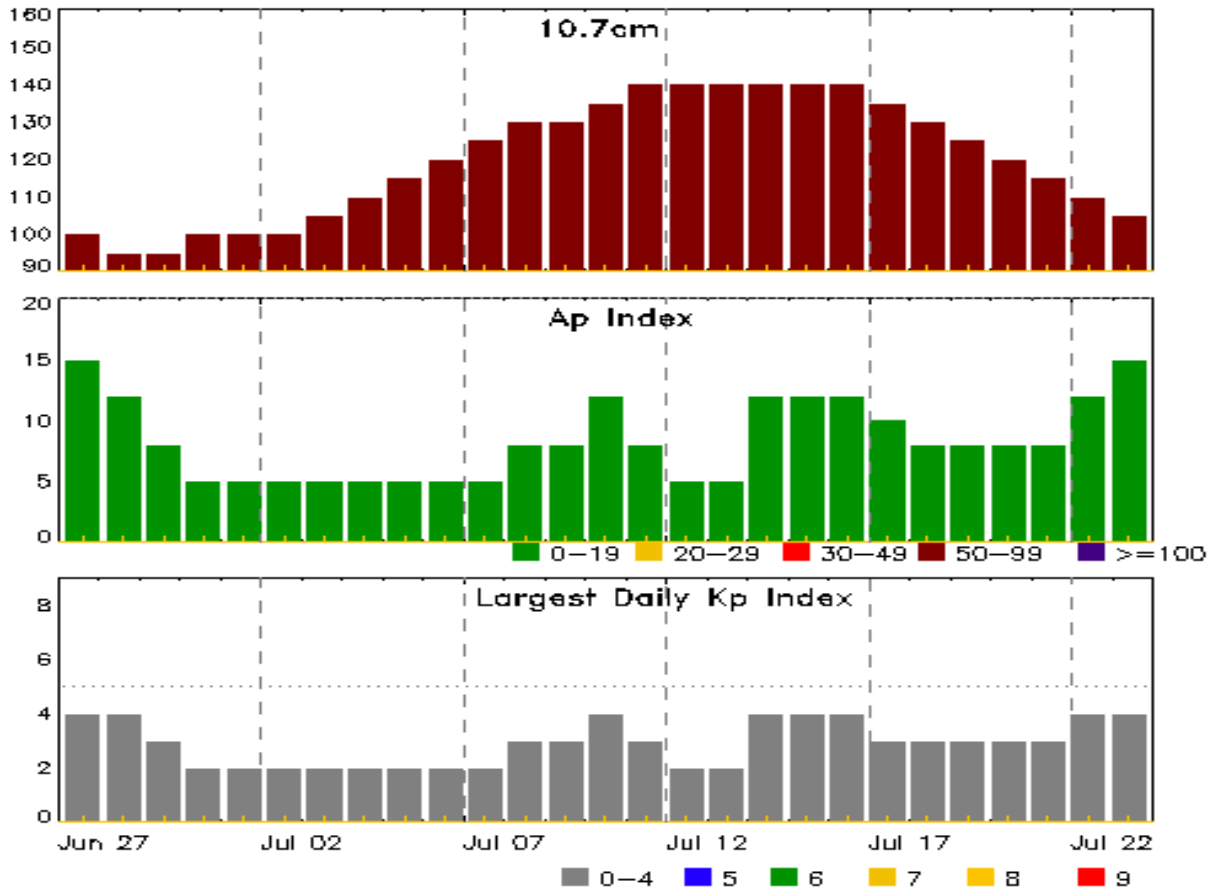
Daily Geomagnetic Data

Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
20 June	10	1-1-3-3-3-3-2-2	25	2-1-4-1-5-6-4-2	10	2-1-3-2-3-3-3-2
21 June	10	2-2-2-3-3-2-2-3	13	2-2-4-4-3-2-1-2	8	2-2-1-3-2-1-2-3
22 June	10	2-2-3-3-2-2-3-2	19	2-3-3-4-5-4-2-2	11	2-2-3-3-3-2-3-3
23 June	12	3-3-2-3-2-2-3-3	12	4-3-2-3-2-2-2-2	10	3-3-2-2-2-2-3-2
24 June	8	3-1-0-1-2-2-3-3	4	2-1-0-0-0-2-2-2	8	3-1-0-1-1-2-3-3
25 June	14	3-2-3-2-3-2-3-4	27	3-1-3-3-5-5-5-4	16	3-2-2-2-2-3-4-5
26 June	15	4-2-2-3-4-2-3-3	29	4-3-2-6-5-4-3-3	39	5-2-2-4-4-3-4-4

Alerts and Warnings Issued

Date & Time of Issue UTC	Type of Alert or Warning	Date & Time of Event UTC
20 Jun 0537	CONTINUED ALERT: Electron 2MeV Integral Flux >= 1000pfu	18/1235
21 Jun 1116	CONTINUED ALERT: Electron 2MeV Integral Flux >= 1000pfu	18/1235
22 Jun 1559	CONTINUED ALERT: Electron 2MeV Integral Flux >= 1000pfu	18/1235
23 Jun 1437	CONTINUED ALERT: Electron 2MeV Integral Flux >= 1000pfu	18/1235
25 Jun 1520	ALERT: Electron 2MeV Integral Flux >= 1000pfu	25/1410
25 Jun 2025	WARNING: Geomagnetic K = 4	25/2024 - 26/1200
25 Jun 2034	ALERT: Geomagnetic K = 4	25/2034
25 Jun 2039	WARNING: Geomagnetic K = 5	25/2039 - 26/0900
25 Jun 2343	ALERT: Geomagnetic K = 5	25/2342
26 Jun 0230	ALERT: Geomagnetic K = 5	26/0220
26 Jun 1029	EXTENDED WARNING: Geomagnetic K = 4	25/2024 - 26/1800
26 Jun 1029	WARNING: Geomagnetic K = 5	26/1026 - 1500
26 Jun 1707	CONTINUED ALERT: Electron 2MeV Integral Flux >= 1000pfu	25/1410
26 Jun 1910	WARNING: Geomagnetic K = 4	26/1910 - 27/1200
26 Jun 2006	ALERT: Geomagnetic K = 4	26/2006

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
27 Jun	100	15	4	11 Jul	140	8	3
28	95	12	4	12	140	5	2
29	95	8	3	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	17	135	10	3
04	110	5	2	18	130	8	3
05	115	5	2	19	125	8	3
06	120	5	2	20	120	8	3
07	125	5	2	21	115	8	3
08	130	8	3	22	110	12	4
09	130	8	3	23	105	15	4
10	135	12	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

No Events Observed

Flare List

	Time				Optical		
Date	Begin	Max	End	X-ray Class	Imp/ Brtns	Location Lat CMD	Rgn #
20 Jun	0055	0116	0248	C5.0	SF	N20W55	3030
20 Jun	0106	0109	0153		SF	N17E05	3038
20 Jun	0220	0221	0227		SF	N17E05	3038
20 Jun	B0417	0418	0420		SF	N15E07	3038
20 Jun	0421	0423	0428		SF	N17E02	3038
20 Jun	0431	0436	0439		SF	N16E01	3038
20 Jun	0434	0435	0436		SF	N19W63	3030
20 Jun	0451	0452	0453		SF	N16E01	3038
20 Jun	0458	0506	0525	C2.0	SF	N17W63	3030
20 Jun	0508	0509	0516		SF	N15E05	3038
20 Jun	0520	0632	0708		SF	N16E00	3038
20 Jun	0605	0618	0628	C5.7			3038
20 Jun	0708	0716	0724	C2.4			3031
20 Jun	0711	0747	0848		SF	N16W01	3038
20 Jun	0850	0908	0923		SF	N16W00	3038
20 Jun	1016	U1031	A1055		SF	N17W03	3038
20 Jun	1130	1134	1200		SF	N17W03	3038
20 Jun	1216	1217	1219		SF	N16W03	3038
20 Jun	1300	1303	1306		SF	N16W03	3038
20 Jun	1446	1517	1519	C4.4	SF	N20W72	3030
20 Jun	1542	1556	1559		SF	N18W05	3038
20 Jun	1605	1610	1617	C4.5	SF	N22W74	3030
20 Jun	1632	1635	1640		SF	N26W66	3030
20 Jun	2202	2205	2209	C2.1			3034
20 Jun	2341	2347	2353	C2.1	SF	S02W25	3034
21 Jun	0007	0008	0012		SF	N19W06	3038
21 Jun	0038	0039	0041		SF	N20W82	3030
21 Jun	0142	0144	0145		SF	N21W84	3030
21 Jun	0233	0252	0328	C2.5			
21 Jun	0340	0345	0350		SF	N15W11	3038
21 Jun	0354	0405	0415		SF	N15W11	3038

Flare List

Date	Time			Optical			
	Begin	Max	End	X-ray Class	Imp/ Brtns	Location Lat CMD	Rgn #
21 Jun	B0440	U0542	0654	C1.9	SF	N16W09	3038
21 Jun	0713	0721	0735	C1.9	SF	N16W09	3038
21 Jun	0755	0755	0758		SF	N16W12	3038
21 Jun	0944	0952	0957	C1.8	SF	N18W14	3038
21 Jun	1601	1621	1648	C5.6			
22 Jun	0403	0404	0407		SF	S11E65	3040
22 Jun	0408	0416	0426	C1.9	SF	N18W24	3038
22 Jun	0502	0506	0510	C2.9	SF	S11E65	3040
22 Jun	0600	0602	0610		SF	N17W23	3038
22 Jun	0622	0640	0657	C1.9	SF	N17W25	3038
22 Jun	0629	0632	0636		SF	N18W26	3038
22 Jun	0728	0733	0741		SF	S11E62	3040
22 Jun	0748	0757	0804	C1.6	SF	N16W26	3038
22 Jun	0815	0816	0829	C2.7	SF	S12E63	3040
22 Jun	0856	0910	0924	C1.8	SF	S11E61	3040
22 Jun	1024	1030	1034	C1.5			
22 Jun	1035	1035	1039		SF	N01W47	3034
22 Jun	1126	1134	1143	C1.2	SF	N17W29	3038
22 Jun	1302	1307	1316	C1.1	SF	N17W29	3038
22 Jun	1335	1335	1339		SF	N01W48	3034
22 Jun	1434	1439	1446	C1.3	SF	N17W30	3038
22 Jun	1506	1516	1526	C1.3	SF	N17W30	3038
22 Jun	1526	1543	1547	C1.7	SF	N17W30	3038
22 Jun	1616	1623	1627	C3.3			3038
22 Jun	1906	1909	1917	C1.1			3038
22 Jun	2004	2007	2011	C1.5			3038
22 Jun	2126	2133	2140	C1.1			
22 Jun	2328	2336	2343	C3.5			3038
23 Jun	0849	1120	1228	C4.0			3034
23 Jun	1422	1427	1432	C1.1			3038
23 Jun	1957	2009	2019	C2.2			3038
23 Jun	2019	2023	2031	C3.6			3038
23 Jun	2202	2210	2214	C1.9			3038
24 Jun	0009	0015	0019	B9.1	SF	N18W50	3038
24 Jun	0457	0506	0519	B6.3	SF	N16W53	3038
24 Jun	0849	0858	0913	C1.5	SF	N16W57	3038
24 Jun	1249	1256	1300	B7.8	SF	N16W59	3038
24 Jun	1837	1844	1851	C1.1			3035

Flare List

Date	Time			Optical			
	Begin	Max	End	X-ray Class	Imp/ Brtns	Location Lat CMD	Rgn #
24 Jun	2202	2202	2206		SF	S17W84	3035
25 Jun	0035	0037	0041		SF	S13W75	3035
25 Jun	0053	0057	0101	B6.5			3035
25 Jun	0112	0121	0132	B6.7			3038
25 Jun	0409	0421	0426	B6.8			3040
25 Jun	0413	0414	0419		4F	N01W79	3034
25 Jun	0426	0433	0438	B8.1			3035
25 Jun	0720	0726	0733	B6.4			3038
25 Jun	1114	1122	1133	B6.7			
25 Jun	1352	1402	1406	C1.2	SF	S15E20	3040
25 Jun	1514	1515	1517		SF	S14E20	3040
25 Jun	1638	1646	1650		SF	S12E19	3040
25 Jun	2210	2212	2217		SF	N17W72	3038
25 Jun	2220	2222	2224		SF	N17W72	3038
25 Jun	2227	2234	2240	B6.6	SF	S15E16	3040
25 Jun	2301	2301	2306		SF	N17W72	3038
25 Jun	2310	2311	2317		SF	N17W72	3038
25 Jun	2347	2357	0009	C1.0	SF	S14E18	3040
26 Jun	0017	0030	0037	C1.6	SF	S14E18	3040
26 Jun	0206	0216	0227	B6.9	SF	S14E18	3040
26 Jun	0310	0321	0329	C1.5	SF	N22W74	3038
26 Jun	0426	0437	0451		SF	S14E18	3040
26 Jun	0631	0650	0704		SF	S14E18	3040
26 Jun	0744	0750	0755	C1.9	SF	S14E09	3040
26 Jun	0800	0812	0820	C2.4			3040
26 Jun	1239	1243	1249	B5.2			3040
26 Jun	1554	1556	1600	B5.0	SF	S13E07	3040
26 Jun	1641	1651	1657	B5.3	SF	S13E03	3040
26 Jun	1913	1920	1924	B4.5			3040
26 Jun	2218	2226	2235	B6.1			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 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				5				
20 Jun	N18W72	118	230	9	Dai	17	B	3			5				
21 Jun	N18W84	116	220	8	Dai	4	B				2				
								18	1	0	26	0	0	0	0

Crossed West Limb.
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	3			1				
20 Jun	S26W86	132	30	4	Cao	4	B	1							
								20	1	0	19	1	0	0	0

Crossed West Limb.
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								
20 Jun	N20W62	108	140	2	Hsx	1	A								
21 Jun	N20W74	106	100	2	Hsx	1	A								
22 Jun	N20W87	106	50	1	Hsx	1	A								
								2	1	0	2	2	0	0	0

Crossed West Limb.
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												
20 Jun	N16W42	88	plage												
21 Jun	N16W56	89	plage												
22 Jun	N16W70	90	plage												
23 Jun	N16W84	91	plage												
								2	0	0	2	0	0	0	0

Crossed West Limb.
Absolute heliographic longitude: 85

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 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								
20 Jun	N01W26	72	100	1	Hsx	1	A	2			1				
21 Jun	S00W40	72	60	1	Hsx	1	A								
22 Jun	N01W53	72	50	1	Hsx	1	A				2				
23 Jun	N01W67	73	50	1	Hsx	1	A	1							
24 Jun	N01W80	72	80	2	Hsx	1	A								
25 Jun	N01W93	73	plage												1
								3	0	0	3	0	0	0	1

Crossed West Limb.
Absolute heliographic longitude: 72

			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								
20 Jun	S18W26	72	20	8	Bxo	5	B								
21 Jun	S18W40	72	10	3	Bxo	4	B								
22 Jun	S18W49	69	50	5	Dso	4	B								
23 Jun	S17W66	72	30	2	Cro	3	B								
24 Jun	S17W80	73	10	1	Axx	1	A	1			1				
								2	0	0	2	0	0	0	0

Crossed West Limb.
Absolute heliographic longitude: 71

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 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

Crossed West Limb.
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	3			16	1			
20 Jun	N15W07	53	280	10	Dki	24	BG	1			15				
21 Jun	N14W21	53	430	11	Ehc	33	BG	3			7				
22 Jun	N15W34	53	480	12	Eki	21	BG	12			10				
23 Jun	N16W47	54	500	12	Eki	21	B	4							
24 Jun	N16W61	53	580	11	Ehi	12	B	1			4				
25 Jun	N16W75	53	500	14	Eho	6	B				4				
26 Jun	N16W87	53	190	16	Fso	5	B	1							
								25	0	0	56	1	0	0	0

Still on Disk.
Absolute heliographic longitude: 53

			Region 3039												
18 Jun	N13W68	139	20	4	Cro	3	B								
19 Jun	N13W82	141	plage												
20 Jun	N13W96	142	plage												
								0	0	0	0	0	0	0	0

Crossed West Limb.
Absolute heliographic longitude: 139

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 3040													
21 Jun	S13E68	324	60	2	Hsx	1	A								
22 Jun	S13E55	325	140	5	Cso	3	B	3			5				
23 Jun	S12E41	324	130	6	Cso	4	B								
24 Jun	S13E27	325	160	6	Cso	6	B								
25 Jun	S12E16	323	130	8	Cso	5	B	2			4				
26 Jun	S14E02	323	150	5	Cso	8	B	3			8				
								8	0	0	17	0	0	0	0

Still on Disk.
Absolute heliographic longitude: 323

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

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
https://www.swpc.noaa.gov/content/contact-us -- Contact and Copyright information
https://www.swpc.noaa.gov/sites/default/files/images/u2/Usr_guide.pdf -- User Guide