Space Weather Highlights
19 April - 25 April 2021

SWPC PRF 2382
26 April 2021

Solar activity ranged from very low to R1 (Moderate) over the reporting period. Region 2816 (S24, L=262, class/area Dai/120 on 19 Apr) produced an M1/Sn flare at 19/2342 UTC, the largest of the period. The impulsive flare produced both a Type II and Type IV radio sweep. Subsequent coronagraph imagery indicated any ejecta from the event was not Earth-directed. However, the Region would go on to produce a C3/1f flare on 22/0921 UTC that would also produce a Type II and Type IV radio sweep. Analysis and modeling of this event suggested CME effects would reach Earth over 25 Apr. Over the next few days, Region 2816 would continue to slowly decay. No other CME signatures observed in available coronagraph imagery suggested a component on the Sun-Earth line.

No proton events were observed at geosynchronous orbit.

The greater than 2 MeV electron flux at geosynchronous orbit was at normal to high levels. High levels were observed on 19-25 Apr before geomagnetic activity in response to a passing CME caused flux to drop to normal to moderate levels on 26 Apr.

Geomagnetic field activity was quiet to G1 (Minor) geomagnetic storm levels. G1 (Minor) storm conditions were first observed late on 23 Apr during a transition from a CIR into a negative polarity CH HSS following a period of peak total magnetic field strength of 11 nT while Bz reached as far south as -10 nT. A second isolated period of G1 (Minor) storm conditions was observed early on 25 Apr during the onset of influence from a CME that left the Sun on 22 Apr and was first observed at L1 at 24/2221 UTC. Solar wind parameters increased abruptly to a total magnetic field strength of 11 nT and Bz dropped to -8 nT. Solar wind speeds increased to ~490 km/s and would fluctuate between ~460-500 km/s through the end of the reporting period. A negative polarity CH HSS produced active conditions on 19 Apr and unsettled conditions on 20-21 Apr. Wind speeds from the HSS decreased from ~650 km/s on 20 Apr to under 450 km/s by 22 Apr. Only quiet conditions were observed on 22 Apr.

Space Weather Outlook
26 April - 22 May 2021

Solar activity is expected to be low with a slight chance for moderate activity from Region 2820 (S22, L=210, class/area Dai/80 on 25 Apr) over 26 Apr - 01 May, when the region will rotate around the W. limb.

No proton events are expected at geosynchronous orbit.

The greater than 2 MeV electron flux at geosynchronous orbit is expected to range from moderate to high. High levels are likely on 14-22 May due to activity associated with an anticipated negative polarity CH HSS. Normal to moderate levels are likely for the remainder of the outlook period.

Geomagnetic field activity is expected to range from quiet to G2 (Moderate) geomagnetic storm levels. Active conditions are likely on 26 Apr due to waning CME effects. Active conditions are again likely on 02-03 May and unsettled on 04 May under influence from a positive polarity CH HSS. A SSBC is expected to cause unsettled conditions on 11 May and negative polarity CH HSS influence is expected to cause active conditions on 12 May, G1 (Minor) conditions on 13 May, G2 (Moderate) conditions on 14 May before decreasing to active conditions on 12-17 May as CH HSS effects wane. Another negative polarity CH HSS is expected to cause active conditions on 20 May and unsettled conditions on 21 May. The remainder of the outlook period is expected to be at 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
19 April	86	36	180	B1.1	0	1	0	6	0	0	0	0
20 April	80	54	340	B1.9	0	0	0	12	0	0	0	0
21 April	78	47	320	B1.2	1	0	0	4	0	0	0	0
22 April	84	42	240	B2.3	11	0	0	4	1	0	0	0
23 April	77	29	100	B2.3	6	0	0	2	0	0	0	0
24 April	79	62	150	B1.3	0	0	0	1	0	0	0	0
25 April	79	57	160	A6.6	1	0	0	2	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
19 April	3.7e+05	4.1e+04	2.1e+08
20 April	2.1e+05	4.2e+04	4.7e+08
21 April	6.5e+04	4.2e+04	5.5e+08
22 April	8.3e+04	4.3e+04	6.9e+08
23 April	2.5e+05	4.3e+04	5.0e+08
24 April	6.8e+04	4.3e+04	1.8e+08
25 April	7.1e+04	4.3e+04	1.8e+07

Daily Geomagnetic Data

Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
19 April	15	3-3-3-3-3-3-3-3	47	3-3-5-7-5-5-5-3	18	4-4-3-3-3-3-4-3
20 April	10	3-3-2-2-2-1-2-3	26	3-3-5-6-3-3-3-2	13	3-3-2-3-2-2-3-3
21 April	7	2-3-2-2-2-1-1-1	16	1-2-5-5-3-1-1-0	7	2-3-2-2-2-0-1-1
22 April	4	1-1-2-1-2-0-1-2	9	1-2-3-4-3-1-0-0	5	2-2-2-2-2-0-0-2
23 April	15	3-2-3-3-2-3-3-4	13	1-3-3-4-2-3-1-3	15	3-3-3-2-1-3-3-5
24 April	10	3-3-3-2-2-0-2-3	20	3-3-4-6-3-1-0-2	10	3-3-2-2-2-1-2-3
25 April	16	5-3-3-3-3-1-2-2	40	5-5-4-6-6-3-3-2	56	5-4-3-3-3-2-3-2

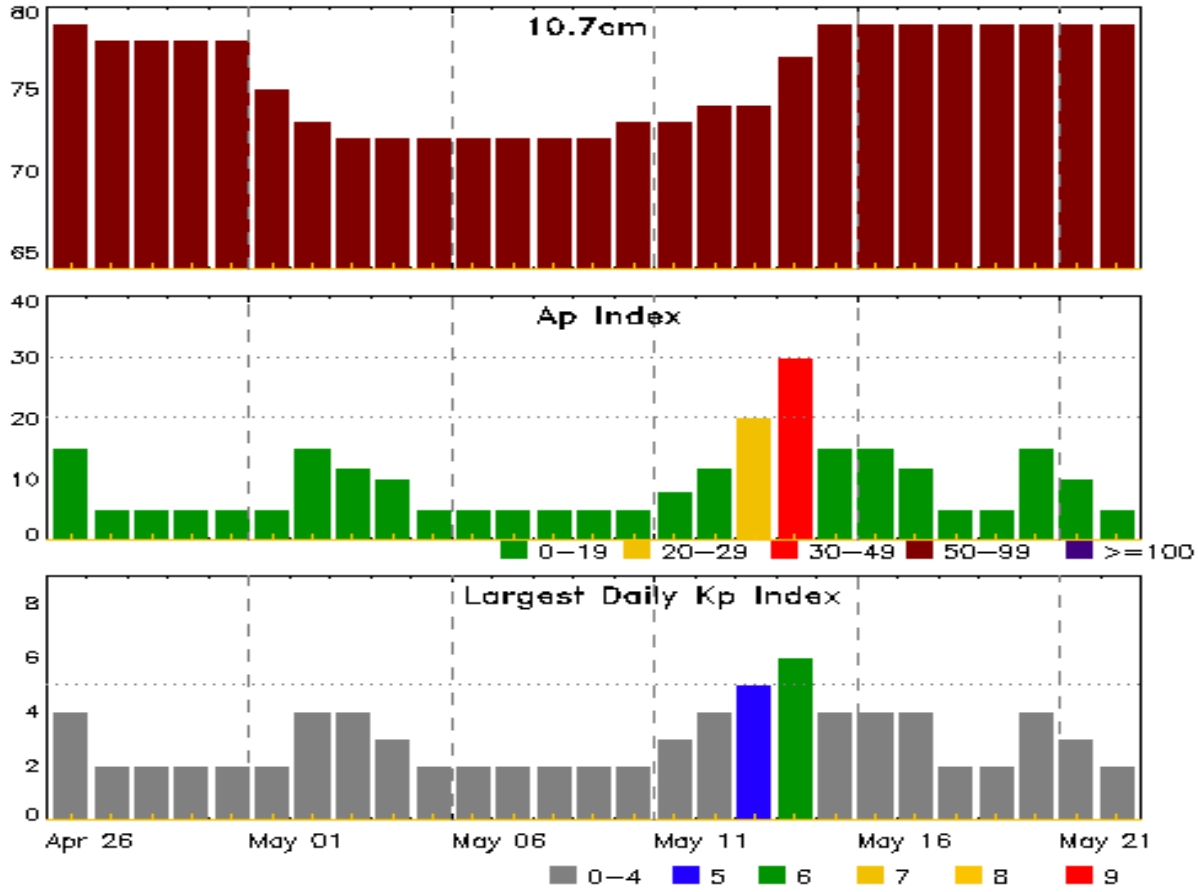
Alerts and Warnings Issued

Date & Time of Issue UTC	Type of Alert or Warning	Date & Time of Event UTC
19 Apr 0002	ALERT: Geomagnetic K = 4	18/2359
19 Apr 0503	EXTENDED WARNING: Geomagnetic K = 4	18/2240 - 19/1500
19 Apr 0516	WARNING: Geomagnetic K = 5	19/0516 - 1200
19 Apr 0941	CONTINUED ALERT: Electron 2MeV Integral Flux >= 1000pfu	17/1715
19 Apr 1922	WARNING: Geomagnetic K = 4	19/1924 - 20/0600
19 Apr 2106	ALERT: Geomagnetic K = 4	19/2059
20 Apr 0431	EXTENDED WARNING: Geomagnetic K = 4	19/1924 - 20/1200
20 Apr 0459	CONTINUED ALERT: Electron 2MeV Integral Flux >= 1000pfu	17/1715
20 Apr 0706	ALERT: Type II Radio Emission	19/2339
20 Apr 0707	ALERT: Type IV Radio Emission	20/0000
21 Apr 0459	CONTINUED ALERT: Electron 2MeV Integral Flux >= 1000pfu	17/1715
22 Apr 0501	CONTINUED ALERT: Electron 2MeV Integral Flux >= 1000pfu	17/1715
22 Apr 0550	ALERT: Type II Radio Emission	22/0430
22 Apr 0552	ALERT: Type IV Radio Emission	22/0438
22 Apr 1849	WATCH: Geomagnetic Storm Category G2 predicted	
23 Apr 0139	WARNING: Geomagnetic K = 4	23/0139 - 0600
23 Apr 0459	CONTINUED ALERT: Electron 2MeV Integral Flux >= 1000pfu	17/1715
23 Apr 2204	WARNING: Geomagnetic K = 4	23/2205 - 24/0900
23 Apr 2217	ALERT: Geomagnetic K = 4	23/2217
23 Apr 2327	WARNING: Geomagnetic K = 5	23/2330 - 2359
23 Apr 2354	ALERT: Geomagnetic K = 5	23/2354
24 Apr 0502	CONTINUED ALERT: Electron 2MeV Integral Flux >= 1000pfu	17/1715
24 Apr 2244	WARNING: Geomagnetic Sudden Impulse expected	24/2300 - 2330
24 Apr 2246	WARNING: Geomagnetic K = 4	24/2300 - 25/1200
24 Apr 2321	SUMMARY: Geomagnetic Sudden Impulse	23/2307

Alerts and Warnings Issued

Date & Time of Issue UTC	Type of Alert or Warning	Date & Time of Event UTC
25 Apr 0030	ALERT: Geomagnetic K = 4	25/0027
25 Apr 0039	WARNING: Geomagnetic K = 5	25/0039 - 0900
25 Apr 0059	ALERT: Geomagnetic K = 5	25/0059
25 Apr 0116	WARNING: Geomagnetic K = 6	25/0115 - 0900
25 Apr 1156	EXTENDED WARNING: Geomagnetic K = 4	24/2300 - 25/1800

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
26 Apr	79	15	4	10 May	73	5	2
27	78	5	2	11	73	8	3
28	78	5	2	12	74	12	4
29	78	5	2	13	74	20	5
30	78	5	2	14	77	30	6
01 May	75	5	2	15	79	15	4
02	73	15	4	16	79	15	4
03	72	12	4	17	79	12	4
04	72	10	3	18	79	5	2
05	72	5	2	19	79	5	2
06	72	5	2	20	79	15	4
07	72	5	2	21	79	10	3
08	72	5	2	22	79	5	2
09	72	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
19 Apr	2319	2342	2359	M1.1	0.013	SN	S24E25	2816			2	1

Flare List

	Time				Optical		
Date	Begin	Max	End	X-ray Class	Imp/ Brtns	Location Lat CMD	Rgn #
19 Apr	0017	0024	0028	B1.0			2016
19 Apr	0247	0253	0259	B1.2			
19 Apr	0408	0415	0420	B1.0			
19 Apr	0444	0447	0452	B1.0			
19 Apr	0511	0519	0525	B2.7			
19 Apr	0625	0631	0635	B1.4			
19 Apr	0734	0740	0744	B1.4			
19 Apr	0853	0859	0903	B1.1			
19 Apr	0914	0928	0948	B2.8			
19 Apr	1355	1359	1404	B3.1	SF	N18W41	2817
19 Apr	1557	1602	1609	B1.0			
19 Apr	1635	1644	1648	B5.4	SF	N18W43	2817
19 Apr	1751	1759	1803	B3.3			
19 Apr	1821	1827	1843	B2.5			
19 Apr	1859	1906	1908	B2.5	SF	N18W44	2817
19 Apr	2110	2119	2125	B8.0	SF	S24E26	2816
19 Apr	2204	2215	2226	B6.7	SF	N18W44	2817
19 Apr	2319	2342	2359	M1.1	SN	S24E25	2816
20 Apr	0000	0000	0012		SF	S24E25	2816
20 Apr	0335	0340	0347	B2.8	SF	N16W51	2817
20 Apr	0418	0425	0429	B2.3	SF	N18W52	2817
20 Apr	0504	0520	0523		SF	N19W51	2817
20 Apr	0525	0532	0534		SF	N20W51	2817
20 Apr	0546	0549	0553	B4.1	SF	N20W52	2817
20 Apr	0607	0610	0616	B6.7	SF	N19W52	2817
20 Apr	0642	0648	0652	B7.5			2817
20 Apr	0704	0706	0729		SF	N17W54	2817
20 Apr	0737	0802	0806		SF	N17W54	2817
20 Apr	0831	0843	0845	B3.4	SF	N19W54	2817
20 Apr	0929	0934	0941	B3.4			2817

Flare List

Date	Time			Optical			
	Begin	Max	End	X-ray Class	Imp/ Brtns	Location Lat CMD	Rgn #
20 Apr	1000	1010	1021	B3.7			2817
20 Apr	1038	1044	1051	B5.0			2817
20 Apr	1138	1145	1151	C1.9			2814
20 Apr	1309	1333	1602	B5.9	SF	N20W58	2817
20 Apr	1416	1420	1428	B6.4			
20 Apr	1502	1515	1522	B6.6			2816
20 Apr	1614	1624	1638	B4.7			2816
20 Apr	1705	1713	1718	B5.1	SF	N20W58	2817
20 Apr	1744	1754	1759	B5.0			2816
20 Apr	2332	2338	2347	B3.1			
21 Apr	0118	0129	0141	C1.5	SF	N17W54	2817
21 Apr	0237	0247	0253	B3.5			
21 Apr	0258	0302	0306	B4.8	SF	N17W63	2817
21 Apr	0335	0346	0358	B4.0			2817
21 Apr	0414	0418	0423	B3.3			2817
21 Apr	0534	0542	0548	B1.7			2817
21 Apr	0813	0819	0831	B2.9			2817
21 Apr	0831	0835	0839	B3.2			2817
21 Apr	0907	0912	0924	B1.2			2817
21 Apr	1040	1047	1100	B1.8			2817
21 Apr	1144	1151	1208	B2.1			2817
21 Apr	1256	1303	1312	B2.5			2817
21 Apr	1428	1435	1439	B1.5			2816
21 Apr	1508	1529	1550	B4.9			2817
21 Apr	1631	1640	1649	B5.4			2817
21 Apr	1651	1658	1703	B6.4			2817
21 Apr	1810	1819	1823	B2.1			2816
21 Apr	1851	1901	1905	B4.6			2817
21 Apr	1927	1932	1937	B6.3	SF	N20W72	2816
21 Apr	1956	1959	2005		SF	N19W71	2816
21 Apr	2239	2248	2255	B2.6			2817
22 Apr	0226	0234	0253	B6.3			2817
22 Apr	0410	0435	0500	C3.8	1F	S25W06	2816
22 Apr	0500	0506	0510	C2.7			2816
22 Apr	0550	0557	0602	C1.7			2817
22 Apr	0716	0723	0727	C2.3			2817
22 Apr	0900	0908	0914	B4.5			2817
22 Apr	0914	0921	0941	C4.3			2817

Flare List

Date	Time			Optical			
	Begin	Max	End	X-ray Class	Imp/ Brtns	Location Lat CMD	Rgn #
22 Apr	1003	1008	1014	C1.4			2817
22 Apr	1040	1049	1103	C3.7			2817
22 Apr	1218	1227	1242	C2.8			2816
22 Apr	1305	1312	1318	B8.6			2816
22 Apr	1413	1430	1443	C2.5			2816
22 Apr	1544	1559	1605	C1.0			2816
22 Apr	1853	1900	1904	B7.2			2816
22 Apr	1931	1931	1933		SF	N20W83	2817
22 Apr	2002	2011	2020	C8.5	SF	N20W86	2817
22 Apr	2025	2025	2026		SF	S25W11	2816
22 Apr	2039	2040	2046		SF	N20W86	2817
22 Apr	2126	2129	2133	B6.3			2817
22 Apr	2320	2326	2335	B5.5			2817
22 Apr	2340	2348	2359	B5.4			2817
23 Apr	0049	0102	0126	B8.3			2816
23 Apr	0132	0152	0202	C1.3			2817
23 Apr	0237	0252	0302	C1.4			2817
23 Apr	0423	0427	0432	B3.2			2816
23 Apr	0442	0450	0502	B4.9			2816
23 Apr	0509	0525	0559	C1.0	SF	S25W06	2816
23 Apr	0614	0628	0641	C1.4			2816
23 Apr	0803	0816	0829	B6.3			2816
23 Apr	1107	1116	1130	B4.2			2816
23 Apr	1633	1644	1700	B4.1			2817
23 Apr	1815	1828	1838	B6.8	SF	S21W30	2816
23 Apr	2239	2254	2308	C2.2			2817
23 Apr	2308	2312	2316	C2.4			2817
24 Apr	0335	0342	0346	B2.1			2816
24 Apr	0444	0502	0516	B4.3			2820
24 Apr	1113	1116	1120	B2.3			2820
24 Apr	1436	1440	1444	B1.0			2820
24 Apr	1449	1455	1459	B4.9			2820
24 Apr	1535	1559	1610	B2.0			2820
24 Apr	1645	1653	1658	B6.9			2820
24 Apr	1714	1717	1721	B3.2			2820
24 Apr	1733	1737	1742	B1.7			2820
24 Apr	1826	1835	1839	B2.6			2820
24 Apr	1842	1849	1855	B4.1	SF	S20E11	2820

Flare List

Date	Time			Optical			
	Begin	Max	End	X-ray Class	Imp/ Brtns	Location Lat CMD	Rgn #
24 Apr	2002	2009	2016	B2.1			2820
24 Apr	2027	2034	2040	B2.4			2820
24 Apr	2058	2108	2116	B1.5			
24 Apr	2210	2217	2222	B1.4			
25 Apr	0000	0005	0012	B3.4	SF	S21E08	2820
25 Apr	0117	0135	0151	C2.6	SF	S25W46	2816
25 Apr	1058	1101	1112	B1.1			2820
25 Apr	1236	1248	1301	B1.2			2816
25 Apr	1551	1554	1603	B1.1			2819
25 Apr	1643	1655	1704	B4.8			2820
25 Apr	1741	1749	1753	B2.0			2820
25 Apr	1817	1834	1851	B2.0			2820
25 Apr	2100	2107	2114	B1.6			2820
25 Apr	2121	2125	2131	B1.3			2820
25 Apr	2350	2359	0012	B5.5			

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 2814												
12 Apr	S22E09	7	10	5	Bxo	6	B				2				
13 Apr	S22W05	8	30	6	Bxo	6	B								
14 Apr	S22W18	8	90	6	Cro	7	B								
15 Apr	S22W31	7	50	6	Dro	12	B								
16 Apr	S22W44	7	20	5	Bxo	8	B								
17 Apr	S22W59	9	10	4	Bxo	4	B								
18 Apr	S22W73	10	plage												
19 Apr	S22W87	11	plage												
								0	0	0	2	0	0	0	0

Crossed West Limb.
Absolute heliographic longitude: 8

			Region 2815												
16 Apr	S21W21	344	10	4	Bxo	3	B								
17 Apr	S21W35	345	plage												
18 Apr	S21W49	346	plage												
19 Apr	S21W63	347	plage												
20 Apr	S21W77	348	plage												
								0	0	0	0	0	0	0	0

Died on Disk.
Absolute heliographic longitude: 344

			Region 2816												
16 Apr	S24E59	264	80	5	Cao	3	B								
17 Apr	S24E46	264	20	7	Cao	4	B								
18 Apr	S25E34	263	50	7	Cao	5	B				2				
19 Apr	S24E21	262	120	8	Dai	8	B		1		2				
20 Apr	S24E08	262	110	9	Cao	10	B				1				
21 Apr	S24W06	263	100	9	Cao	9	B				2				
22 Apr	S24W18	261	50	10	Cro	6	B	5			1	1			
23 Apr	S24W31	262	50	12	Cro	8	B	2			2				
24 Apr	S24W44	262	30	13	Cro	7	B								
25 Apr	S22W65	270	10	1	Axx	1	A	1			1				
								8	1	0	11	1	0	0	0

Still on Disk.
Absolute heliographic longitude: 263

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 2817												
19 Apr	N18W46	329	60	5	Bxo	8	B				4				
20 Apr	N18W62	333	140	7	Dai	13	B				11				
21 Apr	N18W79	336	180	10	Dao	7	B	1			2				
22 Apr	N18W88	331	140	9	Cso	5	B	6			3				
								7	0	0	20	0	0	0	0
Crossed West Limb. Absolute heliographic longitude: 329															
			Region 2818												
20 Apr	S17E66	203	90	1	Hsx	1	A								
21 Apr	S17E52	205	40	1	Hsx	1	A								
22 Apr	S17E39	204	50	1	Hsx	1	A								
23 Apr	S17E25	206	50	1	Hsx	1	A								
24 Apr	S16E12	206	40	1	Hsx	1	A								
25 Apr	S16W01	205	40	1	Hsx	1	A								
								0	0	0	0	0	0	0	0
Still on Disk. Absolute heliographic longitude: 205															
			Region 2819												
24 Apr	N24W27	245	10	4	Bxo	3	B								
25 Apr	N24W40	245	plage												
								0	0	0	0	0	0	0	0
Still on Disk. Absolute heliographic longitude: 245															
			Region 2820												
24 Apr	S22E08	210	70	5	Dai	11	B				1				
25 Apr	S22W06	211	80	7	Dso	12	B				1				
								0	0	0	2	0	0	0	0
Still on Disk. Absolute heliographic longitude: 211															
			Region 2821												
25 Apr	S22W16	221	30	4	Cro	3	B								
								0	0	0	0	0	0	0	0
Still on Disk. Absolute heliographic longitude: 221															

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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