Space Weather Highlights **SWPC PRF 2414**
29 November - 05 December 2021 **06 December 2021**

Solar activity was at very low to moderate levels. Region 2898 (S24, L=236, class/area Dao/140 on 27 Nov) produced an M1 flare at 05/0719 UTC, the largest of the period. The region had recently rotated around the W limb before producing the event. With the exception of Region 2904 (S27, L=80, class/area Bxo/30), which developed recently in the SW quadrant, all other regions were either in decay or quietly rotated off of the visible disk.

Other Earth-directed activity included a ~40 degree filament eruption centered near S45W10, beginning around 05/1103 UTC in SDOAIA 304 imagery. A subsequent faint CME signature was noted in SOHO/LASCO C2 coronagraph imagery beginning at 05/1412 UTC. Preliminary analysis and modeling suggests a slow-moving Earth-directed component that'll arrive at Earth 09-10 Dec.

No proton events were observed at geosynchronous orbit.

The greater than 2 MeV electron flux at geosynchronous orbit ranged from moderate to high levels. High levels were reached on 01-05 Dec, with the highest recorded flux of 4,870 pfu at 03/1520 UTC. Normal to moderate levels were observed on 29-30 Nov.

Geomagnetic field activity was at quiet to G1 (Minor) geomagnetic storm levels. G1 conditions were observed late on 30 Nov in response to the onset of influence from a positive polarity CH HSS. Solar wind conditions surrounding the event consisted of a total magnetic field strength increase to a peak of 15 nT, the Bz component rotated as far south as -12 nT and solar wind speeds increased from ~350 km/s to ~475 km/s. Active conditions were observed after as the HSS proper set in over 01 Dec, and on 29 Nov in response to waning weak transient influence. Periodic unsettled conditions were observed over 02-05 Dec.

Space Weather Outlook
06 December - 01 January 2022

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

No proton events are expected at geosynchronous orbit.

The greater than 2 MeV electron flux at geosynchronous orbit is expected range from moderate to high levels. High levels are likely on 06-08 Dec, 11-12 Dec, 20-23 Dec and 29 Dec-01 Jan. Normal to moderate levels are expected for the remainder of the outlook period. All increases in electron flux are due to the influence of multiple, recurrent CH HSSs.

Geomagnetic field activity is expected to be at quiet to G1 (Minor) geomagnetic storm levels. G1 conditions are likely on 17 Dec and 27-28 Dec; active conditions are likely on 13 Dec, 18 Dec and 29 Dec; unsettled levels are likely on 06-07 Dec, 10-11 Dec, 14 Dec, 19-20 Dec and 30 Dec - 01 Jan. All elevated levels of geomagnetic activity are in anticipation of influence from

multiple, recurrent CH HSSs. 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
29 November	90	47	360	B1.6	0	0	0	0	0	0	0	0
30 November	90	61	390	B1.1	0	0	0	0	0	0	0	0
01 December	86	37	350	A7.8	0	0	0	0	0	0	0	0
02 December	87	45	200	A5.6	0	0	0	0	0	0	0	0
03 December	85	29	140	A9.4	0	0	0	2	0	0	0	0
04 December	88	35	40	B2.0	11	0	0	2	0	0	0	0
05 December	83	36	50	B1.2	5	1	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
29 November	1.3e+05	4.5e+04	2.4e+06
30 November	5.4e+05	4.4e+04	5.3e+06
01 December	7.0e+05	4.3e+04	9.7e+06
02 December	1.1e+05	4.4e+04	1.0e+08
03 December	8.1e+05	4.4e+04	1.1e+08
04 December	1.2e+05	4.3e+04	4.2e+07
05 December	1.1e+05	4.5e+04	5.0e+07

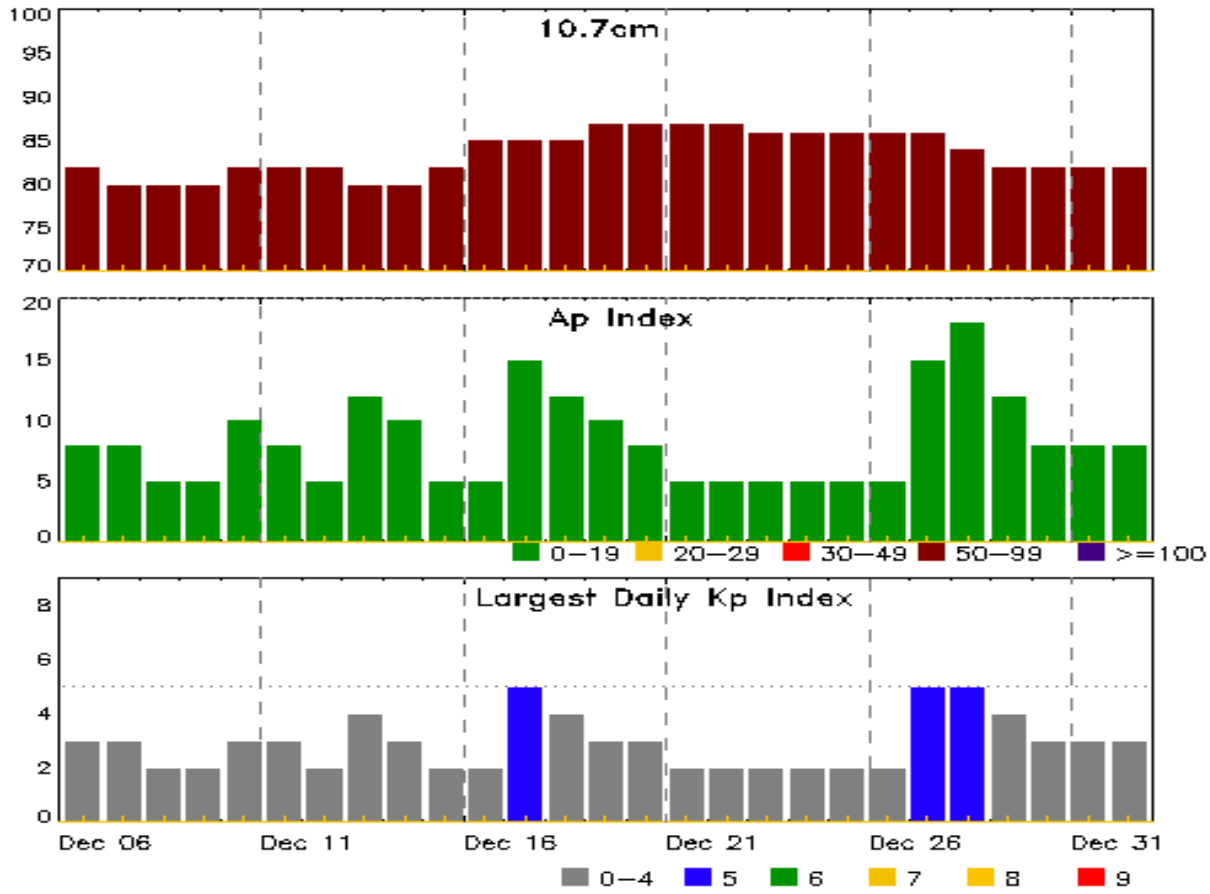
Daily Geomagnetic Data

Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
29 November	6	3-3-1-1-1-1-1-0	11	2-4-1-4-3-1-1-0	9	4-4-1-1-1-1-2-1
30 November	8	0-0-1-0-0-2-2-5	4	0-0-2-1-0-0-2-3	11	1-0-1-0-1-1-2-5
01 December	14	4-3-3-2-2-3-2-3	48	4-5-6-6-6-4-3-4	18	4-4-3-2-3-3-3-4
02 December	7	2-1-3-1-2-2-2-2	13	1-1-3-3-4-4-2-2	10	2-2-3-1-2-3-2-2
03 December	4	0-0-1-2-2-2-2-1	21	0-0-1-5-5-5-3-1	8	1-1-1-2-3-3-3-2
04 December	7	3-2-3-1-2-1-1-1	5	2-2-3-2-0-2-0-0	9	3-3-3-1-1-1-2-1
05 December	6	2-2-1-1-1-2-2-2	10	0-1-1-4-3-2-3-2	6	2-2-1-1-1-3-3-3

Alerts and Warnings Issued

Date & Time of Issue UTC	Type of Alert or Warning	Date & Time of Event UTC
29 Nov 0256	ALERT: Geomagnetic K = 4	29/0247
29 Nov 0256	EXTENDED WARNING: Geomagnetic K = 4	28/2225 - 29/0900
30 Nov 2141	WARNING: Geomagnetic K = 4	30/2141 - 01/0600
30 Nov 2144	ALERT: Geomagnetic K = 4	30/2141
30 Nov 2150	WARNING: Geomagnetic K = 5	30/2150 - 01/0300
30 Nov 2239	ALERT: Geomagnetic K = 5	30/2238
01 Dec 0539	EXTENDED WARNING: Geomagnetic K = 4	30/2141 - 01/1200
01 Dec 2241	WARNING: Geomagnetic K = 4	01/2240 - 02/0300
02 Dec 0714	WARNING: Geomagnetic K = 4	02/0715 - 1200
02 Dec 1137	ALERT: Electron 2MeV Integral Flux >= 1000pfu	02/1130
03 Dec 0459	CONTINUED ALERT: Electron 2MeV Integral Flux >= 1000pfu	02/1130
03 Dec 1933	WARNING: Geomagnetic K = 4	03/1933 - 04/0600
04 Dec 1353	CONTINUED ALERT: Electron 2MeV Integral Flux >= 1000pfu	02/1130
05 Dec 1512	CONTINUED ALERT: Electron 2MeV Integral Flux >= 1000pfu	02/1130

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
06 Dec	82	8	3	20 Dec	87	8	3
07	80	8	3	21	87	5	2
08	80	5	2	22	87	5	2
09	80	5	2	23	86	5	2
10	82	10	3	24	86	5	2
11	82	8	3	25	86	5	2
12	82	5	2	26	86	5	2
13	80	12	4	27	86	15	5
14	80	10	3	28	84	18	5
15	82	5	2	29	82	12	4
16	85	5	2	30	82	8	3
17	85	15	5	31	82	8	3
18	85	12	4	01 Jan	82	8	3
19	87	10	3				

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
05 Dec	0658	0719	0736	M1.4	0.019			2898	1400			

Flare List

	Time				Optical		
Date	Begin	Max	End	X-ray Class	Imp/ Brtns	Location Lat CMD	Rgn #
29 Nov	0001	0012	0031	B5.4			2900
29 Nov	0148	0200	0205	B3.7			2900
29 Nov	1246	1254	1301	B2.8			
29 Nov	1302	1311	1318	B4.6			
29 Nov	1349	1355	1402	B2.8			
30 Nov	0012	0020	0033	B3.0			
30 Nov	0252	0258	0319	B3.1			
30 Nov	0621	0630	0633	B2.3			
01 Dec	0734	0739	0743	B2.2			
01 Dec	1338	1346	1354	B1.1			
01 Dec	1520	1527	1532	B1.2			
01 Dec	1635	1643	1647	B1.9			
01 Dec	2302	2312	2319	B2.7			
02 Dec	1228	1244	1255	B2.1			2902
02 Dec	1343	1350	1357	B1.2			2902
02 Dec	1441	1451	1500	B1.7			2902
03 Dec	0123	0133	0148	B1.3			
03 Dec	0251	0256	0303	B2.8			
03 Dec	0427	0435	0441	B1.9			2898
03 Dec	0534	0541	0554	B1.5			2898
03 Dec	0955	1002	1014	B1.3			2902
03 Dec	1118	1127	1131	B1.7			2902
03 Dec	1437	1439	1443		SF	S27W80	2898
03 Dec	1902	1904	1912		SF	S27W80	2898
03 Dec	2054	2116	2137	B3.7			2898
04 Dec	0322	0330	0336	B3.1			
04 Dec	0417	0423	0427	B3.3			
04 Dec	0443	0515	0534	C4.2			2898
04 Dec	0644	0652	0656	C2.5	SF	S30W85	2898
04 Dec	0714	0724	0731	C1.4			2898

Flare List

Date	Time			Optical			
	Begin	Max	End	X-ray Class	Imp/ Brtns	Location Lat CMD	Rgn #
04 Dec	0734	0754	0800	C2.3			2898
04 Dec	0819	0826	0834	C1.2	SF	S28W85	2898
04 Dec	0854	0901	0908	B6.8			2898
04 Dec	1005	1009	1015	C1.0			2898
04 Dec	1142	1150	1202	B4.4			2898
04 Dec	1303	1314	1330	B4.4			2898
04 Dec	1504	1534	1548	C1.8			2898
04 Dec	1548	1559	1612	C1.8			2898
04 Dec	1930	1941	1951	C1.3			2898
04 Dec	2150	2158	2205	B5.8			2898
04 Dec	2207	2215	2225	C1.6			2898
04 Dec	2321	2359	0014	C7.1			2898
05 Dec	0054	0057	0102	C1.1			2898
05 Dec	0104	0109	0114	C3.9			2898
05 Dec	0313	0323	0335	C4.9			2898
05 Dec	0608	0619	0629	C2.2			2898
05 Dec	0658	0719	0736	M1.4			2898
05 Dec	1043	1049	1100	B2.9			2898
05 Dec	1610	1622	1629	B2.5			2902
05 Dec	1823	1856	1914	B6.9			2898
05 Dec	1914	1937	1956	C1.6			2898
05 Dec	2232	2240	2251	B2.0			2898

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 2898												
23 Nov	S32E03	251	30	1	Cro	5	B								
24 Nov	S24E31	239	30	4	Cro	7	B								
25 Nov	S24E17	240	90	7	Dro	10	B								
26 Nov	S24E04	240	120	8	Dao	10	B								
27 Nov	S24W06	236	140	10	Dao	10	B								
28 Nov	S24W22	239	90	8	Cso	7	B								
29 Nov	S24W36	240	90	5	Cso	5	B								
30 Nov	S25W52	242	100	2	Hsx	1	A								
01 Dec	S25W65	242	110	2	Hsx	1	A								
02 Dec	S25W78	243	100	1	Hsx	1	A								
03 Dec	S26W88	239	80	10	Cso	4	B				2				
								0	0	0	2	0	0	0	0

Crossed West Limb.
Absolute heliographic longitude: 251

			Region 2899												
26 Nov	S21W62	306	20	4	Bxo	5	B								
27 Nov	S21W78	308	50	4	Bxo	4	B								
28 Nov	S21W91	308	plage												
								0	0	0	0	0	0	0	0

Crossed West Limb.
Absolute heliographic longitude: 306

			Region 2900												
26 Nov	S28W12	256	50	4	Cro	7	B								
27 Nov	S27W24	254	130	7	Dso	9	B								
28 Nov	S26W36	253	160	8	Dso	15	B								
29 Nov	S26W51	255	240	7	Dao	11	B								
30 Nov	S27W64	254	240	7	Dao	3	B								
01 Dec	S27W76	253	210	5	Dao	2	B								
02 Dec	S27W90	254	0	1	Axx	1	A								
								0	0	0	0	0	0	0	0

Crossed West Limb.
Absolute heliographic longitude: 256

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 2901												
28 Nov	N16E64	153	20	1	Hsx	1	A								
29 Nov	N15E50	153	30	1	Hsx	1	A								
30 Nov	N15E37	153	10	1	Axx	1	A								
01 Dec	N16E24	152	plage												
02 Dec	N16E10	155	plage												
03 Dec	N16W04	155	plage												
04 Dec	N21W19	157	10	3	Bxo	2	B								
05 Dec	N21W33	158	plage												
								0	0	0	0	0	0	0	0

Still on Disk.
Absolute heliographic longitude: 155

			Region 2902												
30 Nov	N18W06	196	30	4	Cro	5	B								
01 Dec	N18W19	197	30	4	Dro	4	B								
02 Dec	N18W33	198	100	6	Dsi	13	B								
03 Dec	N18W46	197	60	6	Cro	5	B								
04 Dec	N15W62	200	20	3	Hrx	2	A								
05 Dec	N13W75	200	10	1	Axx	1	A								
								0	0	0	0	0	0	0	0

Still on Disk.
Absolute heliographic longitude: 196

			Region 2903												
30 Nov	S17E41	148	10	2	Axx	1	A								
01 Dec	S18E29	148	plage												
02 Dec	S18E15	150	plage												
03 Dec	S18W00	151	plage												
04 Dec	S18W14	152	plage												
05 Dec	S18W24	149	10	3	Bxo	2	B								
								0	0	0	0	0	0	0	0

Still on Disk.
Absolute heliographic longitude: 151

			Region 2904												
04 Dec	S26E54	84	10	1	Axx	1	A								
05 Dec	S27E45	80	30	4	Bxo	3	B								
								0	0	0	0	0	0	0	0

Still on Disk.
Absolute heliographic longitude: 80

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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