Space Weather Highlights **SWPC PRF 2361**
23 November - 29 November 2020 **30 November 2020**

Solar activity reached moderate levels. The largest event was an M4 X-ray flare from a region just around the SE limb. Associated with the flare was a Type II radio sweep (765 km/s), a tenflare (240 sfu) and a CME signature first observed in SOHO/LASCO C2 imagery at 29/1325 UTC. Modeling and analysis of the event suggested only the far periphery had the potential to interact with Earth around 02 Dec.

Of the numbered regions currently on the visible disk, 2786 (S17, L=343, class/area, Cko/1000 on 25 Nov) was the largest. It produced several C-class X-ray flares as it rotated across the disk, the strongest being a C3/Sf at 26/1253 UTC. The leader spot remained stable throughout the reporting period while the intermediate and trailer spots exhibited frequent, but short-lived new spot emergence.

No proton events were observed at geosynchronous orbit.

The greater than 2 MeV electron flux at geosynchronous orbit was at normal to high levels throughout the reporting period, with the highest flux of 2,430 pfu observed at 23/1700 UTC.

Geomagnetic field activity ranged from quiet to unsettled. Numerous periods of weakly enhanced Bt, combined with frequent sustained periods of southward Bz, produced periods of unsettled conditions on 23 Nov and 25-29 Nov. 24 Nov remained quiet.

Space Weather Outlook
30 November - 26 December 2020

Solar activity is expected to be at low levels, with a chance for R1-R2 (Minor - Moderate) radio blackouts on 30 Nov - 14 Dec, due primarily to the flare potential from a region just around the SE limb. Very low levels are expected on 15-18 Dec and low levels are expected from 19-26 Dec.

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 expected on 20-26 Dec while moderate levels are anticipated for the remainder of the outlook period. All enhancements in electron flux are due to anticipated influence from multiple, recurrent CH HSSs.

Geomagnetic field activity is expected to be at quiet to G1 (Minor) geomagnetic storm levels. Potential influence from the periphery of the 29 Nov CME may cause periods of active conditions around 01-02 Dec. Coronal hole influence is expected to produce active conditions on 18 Dec, G1 (Minor) storm conditions on 19 Dec, and unsettled conditions as influence wanes on 20 Dec. Weak interaction with the current sheet is likely to produce unsettled conditions on 23-25 Dec. The remainder of the outlook period is expected to be quiet.

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
23 November	96	38	330	B3.1	1	0	0	1	1	0	0	0
24 November	100	37	620	B3.9	2	0	0	0	0	0	0	0
25 November	104	40	1180	B4.1	1	0	0	3	0	0	0	0
26 November	106	43	1020	B3.7	4	0	0	7	0	0	0	0
27 November	106	60	980	B3.4	1	0	0	5	0	0	0	0
28 November	110	67	960	B4.5	5	0	0	5	0	0	0	0
29 November	116	84	930	B4.8	2	1	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
23 November	8.0e+04	4.4e+04	9.0e+07
24 November	6.7e+04	4.6e+04	1.2e+08
25 November	1.4e+05	4.5e+04	9.2e+07
26 November	1.1e+05	4.5e+04	4.9e+07
27 November	5.4e+05	4.5e+04	6.3e+07
28 November	1.2e+05	4.6e+04	6.8e+07
29 November	9.1e+04	4.7e+04	6.0e+07

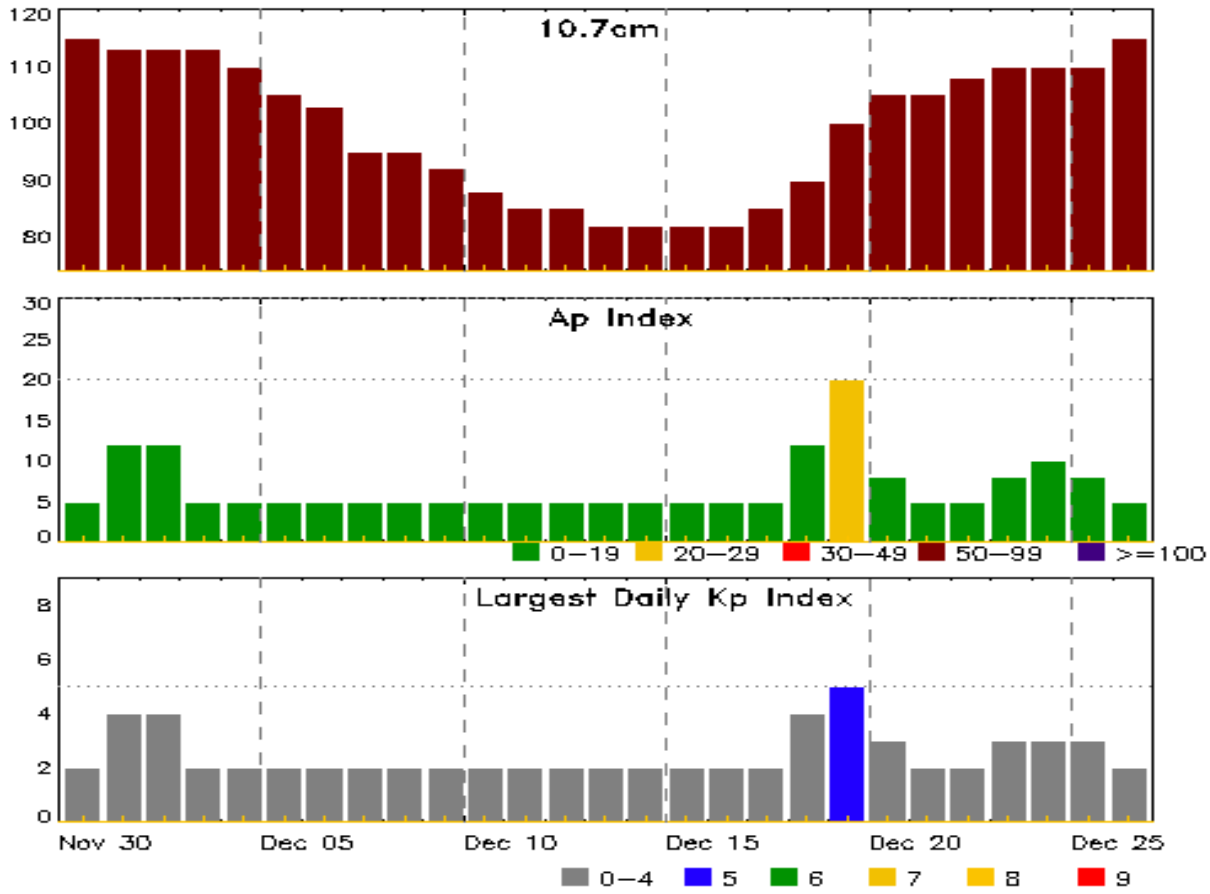
Daily Geomagnetic Data

Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
23 November	7	2-2-3-2-2-2-1-1	9	2-2-3-4-2-1-1-1	8	2-3-2-2-1-2-2-2
24 November	4	1-2-0-1-2-2-0-1	1	0-0-0-1-0-0-1-0	4	2-1-0-1-1-1-1-1
25 November	4	1-2-1-1-1-1-1-2	12	0-1-1-5-4-2-1-1	7	1-3-1-2-1-2-2-3
26 November	5	2-1-1-1-2-2-2-1	5	0-0-1-3-3-2-1-0	7	2-1-1-1-2-2-3-2
27 November	7	2-3-2-2-2-2-1-1	15	0-1-3-5-5-2-0-0	8	1-3-3-3-3-2-1-1
28 November	9	3-3-3-2-2-2-1-1	10	1-2-3-4-3-2-1-1	10	3-3-3-2-2-2-2-2
29 November	6	0-2-2-3-2-2-1-0	7	0-0-2-4-3-1-0-0	3	1-2-3-2-2-2-1-1

Alerts and Warnings Issued

Date & Time of Issue UTC	Type of Alert or Warning	Date & Time of Event UTC
23 Nov 1241	ALERT: Electron 2MeV Integral Flux >= 1000pfu	23/1225
24 Nov 0500	CONTINUED ALERT: Electron 2MeV Integral Flux >= 1000pfu	23/1225
25 Nov 0902	CONTINUED ALERT: Electron 2MeV Integral Flux >= 1000pfu	23/1225
26 Nov 1422	CONTINUED ALERT: Electron 2MeV Integral Flux >= 1000pfu	23/1225
27 Nov 1212	CONTINUED ALERT: Electron 2MeV Integral Flux >= 1000pfu	23/1225
28 Nov 0426	WARNING: Geomagnetic K = 4	28/0425 - 1200
28 Nov 1247	CONTINUED ALERT: Electron 2MeV Integral Flux >= 1000pfu	23/1225
29 Nov 1044	CONTINUED ALERT: Electron 2MeV Integral Flux >= 1000pfu	23/1225
29 Nov 1326	ALERT: Type II Radio Emission	29/1257
29 Nov 1348	SUMMARY: 10cm Radio Burst	29/1250 - 1324

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
30 Nov	115	5	2	14 Dec	82	5	2
01 Dec	113	12	4	15	82	5	2
02	113	12	4	16	82	5	2
03	113	5	2	17	85	5	2
04	110	5	2	18	90	12	4
05	105	5	2	19	100	20	5
06	103	5	2	20	105	8	3
07	95	5	2	21	105	5	2
08	95	5	2	22	108	5	2
09	92	5	2	23	110	8	3
10	88	5	2	24	110	10	3
11	85	5	2	25	110	8	3
12	85	5	2	26	115	5	2
13	82	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
29 Nov	1234		1311	1341	M4.4	0.094			110	240	2	

Flare List

	Time			Optical			
Date	Begin	Max	End	X-ray Class	Imp/ Brtns	Location Lat CMD	Rgn #
23 Nov	0620	0627	0631	B8.0	SF	S22E04	2783
23 Nov	0837	0841	0846	B8.0	1F	S23E03	2783
23 Nov	2249	2255	2259	C1.4			2785
24 Nov	0410	0517	0533	C1.0			2785
24 Nov	0533	0542	0543	C1.0			2785
24 Nov	1908	1915	1932	B5.4			
24 Nov	2000	2014	2033	B8.6			
25 Nov	0004	0014	0022	B6.5			2786
25 Nov	0022	0025	0030	B7.4			2785
25 Nov	0127	0136	0143	B5.6			2786
25 Nov	0347	0402	0421	C3.4	SF	S16E62	2786
25 Nov	1041	1044	1053	B7.1			2786
25 Nov	1319	1323	1327	B5.6			2786
25 Nov	1327	1333	1337	B8.9			2786
25 Nov	1330	1331	1334		SF	S21E67	2786
25 Nov	1440	1448	1452	B7.2	SF	S19E66	2786
25 Nov	1537	1546	1555	B7.8			2786
26 Nov	0038	0047	0057	B6.1			2786
26 Nov	0223	0227	0239		SF	S19E54	2786
26 Nov	0652	0655	0659	C1.8	SF	S21E48	2786
26 Nov	0751	0755	0759	B7.6			2786
26 Nov	1242	1253	1307	C3.8	SF	S17E51	2786
26 Nov	1535	1540	1544	C1.0	SF	S12E41	2786
26 Nov	1711	1720	1726	B5.4	SF	S24E41	2786
26 Nov	1856	1859	1901		SF	S22E27	2785
26 Nov	1920	2123	2353	C2.6			
26 Nov	2145	2146	2149		SF	S22E27	2785
27 Nov	0703	0713	0726	B6.8	SF	S17E38	2786
27 Nov	1338	1353	1413	B9.0	SF	S17E32	2786
27 Nov	1645	1659	1729	C1.5	SF	S16E35	2786

Flare List

Date	Time			Optical			
	Begin	Max	End	X-ray Class	Imp/ Brtns	Location Lat CMD	Rgn #
27 Nov	2056	2102	2107	B8.8	SF	S16E35	2786
27 Nov	2243	2250	2256	B5.9	SF	S17E31	2786
28 Nov	0105	0109	0113	B6.2			
28 Nov	0121	0135	0156	C1.5	SF	S17E31	2786
28 Nov	0158	0158	0202		SF	S26E17	2785
28 Nov	0617	0623	0644	B7.9			2786
28 Nov	0713	0726	0736	C1.0			
28 Nov	1051	1057	1107	B7.1			2786
28 Nov	1326	1335	1343	C2.9			2786
28 Nov	1729	1738	1759	C1.2	SF	S15E22	2786
28 Nov	1808	1808	1817		SF	S12E12	2786
28 Nov	2259	2318	2332	C3.1	SF	S19E16	2786
29 Nov	0050	0116	0148	C1.3			2786
29 Nov	0246	0248	0250		SF	S17E19	2786
29 Nov	0251	0302	0306		SF	S25E05	2785
29 Nov	1124	1144	1203	C1.6			2786
29 Nov	1234	1311	1341	M4.4			

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 2782												
11 Nov	S31E64	154	20	11	Cro	3	B	1			1				
12 Nov	S31E50	155	30	10	Cro	6	B	2			1				
13 Nov	S31E37	156	20	10	Bxo	3	B								
14 Nov	S31E25	154	plage												
15 Nov	S31E11	155	plage												
16 Nov	S31W03	156	plage												
17 Nov	S31W17	156	plage												
18 Nov	S31W31	158	plage												
19 Nov	S23W33	156	plage												
20 Nov	S23W47	147	plage												
21 Nov	S23W61	148	plage												
22 Nov	S23W75	149	plage												
23 Nov	S23W89	150	plage												
								3	0	0	2	0	0	0	0

Crossed West Limb.
Absolute heliographic longitude: 156

			Region 2783												
17 Nov	S22E68	71	30	2	Hsx	1	A								
18 Nov	S23E53	72	80	1	Hsx	1	A								
19 Nov	S22E40	72	70	2	Hsx	1	A								
20 Nov	S23E27	73	70	2	Hsx	1	A	1				1			
21 Nov	S23E15	72	80	2	Hsx	1	A				1				
22 Nov	S23E02	72	70	2	Hsx	1	A								
23 Nov	S18W07	67	90	9	Dso	6	B				1	1			
24 Nov	S20W19	66	100	8	Cso	4	B								
25 Nov	S21W34	68	80	7	Cso	3	B								
26 Nov	S22W47	68	80	8	Cso	3	B								
27 Nov	S22W59	67	60	5	Cso	3	B								
28 Nov	S22W75	70	50	2	Hsx	1	A								
29 Nov	S22W89	71	20	2	Hsx	1	A								
								1	0	0	2	2	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 2784												
21 Nov	N33E28	59	30	3	Cro	2	B								
22 Nov	N32E14	60	30	5	Bxo	3	B								
23 Nov	N32E01	60	plage												
24 Nov	N32W13	61	plage												
25 Nov	N32W27	61	plage												
26 Nov	N32W41	62	plage												
27 Nov	N32W55	63	plage												
28 Nov	N32W69	64	plage												
29 Nov	N32W83	65	plage												
								0	0	0	0	0	0	0	0

Still on Disk.
Absolute heliographic longitude: 60

			Region 2785												
22 Nov	S23E74	359	60	2	Hsx	1	A	3			1				
23 Nov	S22E57	2	120	2	Cso	1	B	1							
24 Nov	S20E44	2	140	2	Hsx	1	A	2							
25 Nov	S21E31	2	100	2	Hsx	1	A								
26 Nov	S21E18	3	100	2	Hsx	1	A				2				
27 Nov	S22E12	356	110	15	Cso	2	B								
28 Nov	S25W01	356	120	18	Fso	8	B				1				
29 Nov	S23W22	4	90	3	Hsx	1	A				1				
								6	0	0	5	0	0	0	0

Still on Disk.
Absolute heliographic longitude: 356

			Region 2786												
22 Nov	S16E82	353	plage					1							
23 Nov	S16E71	349	120	5	Hsx	1	A								
24 Nov	S15E59	347	380	4	Cko	2	B								
25 Nov	S17E53	343	1000	11	Cko	6	B	1			3				
26 Nov	S17E41	340	840	19	Fko	9	BG	3			5				
27 Nov	S18E29	339	800	18	Fko	14	BG	1			5				
28 Nov	S18E15	340	780	18	Fko	17	BG	4			4				
29 Nov	S17E03	339	770	18	Fki	13	BG	2			1				
								12	0	0	18	0	0	0	0

Still on Disk.
Absolute heliographic longitude: 339

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 2787													
27 Nov	N29E64	304	10	1	Axx	1	A								
28 Nov	N29E51	304	10	1	Axx	1	A								
29 Nov	N29E37	305	10	1	Axx	1	A								
								0	0	0	0	0	0	0	0

Still on Disk.
Absolute heliographic longitude: 305

		Region 2788													
29 Nov	S26W07	349	30	6	Cro	7	B								
								0	0	0	0	0	0	0	0

Still on Disk.
Absolute heliographic longitude: 349

		Region 2789													
29 Nov	S25E43	299	10	1	Axx	1	A								
								0	0	0	0	0	0	0	0

Still on Disk.
Absolute heliographic longitude: 299

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