

Solar activity was at low to moderate (R1-Minor) levels. The strongest event of the period was an M1/Sn (R1-Minor) flare at 12/0844 UTC from the vicinity of Region 2939 (S15, L=34, class/area=Dho/500 on 01 Feb). A Type II (642 km/s) and Type IV radio sweep were associated with the event. A subsequent CME signature from the W limb was identified and modeled. The results suggested no Earth-directed component was present. Region 2941 (N24, L=370, class/area=Eki/370 on 09 Feb) was the largest and most complex region remaining on the visible disk by the end of the period. Over the past week the leader and trailer spots changed little while the intermediate spots were marked mostly by decay. Of the remaining numbered active regions, only Region 2940 (N22, L=035, class/area=Dki/410 on 01 Feb) produced any C-class X-ray activity, the largest of which was a C9 flare at 12/1708 UTC as it rotated around the W limb.

Other activity included a Type II (547 km/s) radio sweep at 13/0218 UTC. The event was associated with a CME signature off the W limb and was not expected to contain an Earth-directed component.

No proton events were observed at geosynchronous orbit.

The greater than 2 MeV electron flux at geosynchronous orbit reached high levels on 07-11 Feb and 13 Feb, with a maximum flux of 11,400 sfu observed at 08/1535 UTC. Electron flux dropped to normal to moderate levels on 12 Feb in response to elevated geomagnetic activity associated transient influence.

Geomagnetic field activity was at quiet to minor storm (G1-Minor) levels. Waning negative polarity CH HSS influence produced quiet to unsettled levels on 07 Feb. 08-09 Feb were quiet. The arrival of influence from CME that left the Sun on 06 Feb produced a weak discontinuity in the solar wind, first observed after 09/2011 UTC. Only isolated unsettled conditions were observed following the influence of the sheath, which transitioned to the driver around 10/1350 UTC. Subsequent geomagnetic activity increased up to minor storm levels over 10-11 Feb. A peak total magnetic field strength of 21 nT was observed at 11/1737 UTC, near the end of magnetic cloud. The maximum southward deflection of the Bz component was -13 nT at 10/1503 UTC. A transition from CME influence to a negative polarity CH HSS was observed around 11/2211 UTC. Wind speeds increased to near 550 km/s, up from between 375-450 km/s that was observed through most of the CME. The resulting geomagnetic response was mostly unsettled on 12-13 Feb, with the exception of an isolated period of active conditions observed early on 13 Feb.

## **Space Weather Outlook**

### **14 February - 12 March 2022**

Solar activity is expected to be at low levels, with a chance for M-class (R1-R2, Minor-Moderate) flares over 14-16 Feb, primarily due to the flare potential from Region 2941



(N24, L=340, class/area=Eki/370 on 09 Feb). Activity is expected to drop to very low levels as the region rotates beyond 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 normal to high levels. High levels are likely on 14-16 Feb, 23-28 Feb, 04-10 Mar and 12 Mar in response to influence from multiple, recurrent CH HSSs. The remainder of the outlook period is expected to be at normal to moderate levels.

Geomagnetic field activity is expected to range from quiet to minor storm (G1-Minor) geomagnetic storm levels. Minor storm levels are likely on 23 Feb and 04 Mar; active conditions are likely on 22 Feb, 24 Feb, 03 Mar and 11-12 Mar; unsettled conditions are likely on 14 Feb, 20 Feb, 25 Feb and 05-06 Mar. All elevated levels of geomagnetic activity are anticipated in response to multiple, recurrent CH HSSs. 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 <sup>-6</sup> hemi.)	X-ray Background Flux	Flares							
					X-ray			Optical				
					C	M	X	S	1	2	3	4
07 February	127	78	550	B5.3	11	0	0	2	0	0	0	0
08 February	123	86	590	B4.7	2	0	0	1	0	0	0	0
09 February	126	78	700	B4.6	4	0	0	4	0	0	0	0
10 February	118	78	680	B4.1	4	0	0	2	0	0	0	0
11 February	113	86	570	B3.9	3	0	0	2	0	0	0	0
12 February	111	54	450	B5.1	5	1	0	2	0	0	0	0
13 February	105	53	440	B4.2	6	0	0	1	0	0	0	0

### *Daily Particle Data*

Date	Proton Fluence (protons/cm <sup>2</sup> -day -sr)		Electron Fluence (electrons/cm <sup>2</sup> -day -sr)	
	>1 MeV	>10 MeV	>2MeV	
	07 February	4.9e+04	4.2e+04	3.4e+08
08 February	5.6e+04	4.3e+04	5.6e+08	
09 February	5.7e+04	4.3e+04	4.9e+08	
10 February	3.4e+05	4.2e+04	1.3e+08	
11 February	1.8e+06	4.3e+04	9.3e+07	
12 February	6.3e+04	4.3e+04	1.2e+07	
13 February	7.8e+04	4.3e+04	1.2e+08	

### *Daily Geomagnetic Data*

Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
	07 February	4	1-1-0-2-1-2-2-1	7	1-1-2-3-2-3-1-1	7
08 February	3	1-0-1-1-1-1-1-1	7	1-0-1-4-2-2-1-1	5	2-0-1-1-1-2-2-1
09 February	2	0-0-0-1-1-1-1-2	0	0-0-0-0-0-0-0-1	3	1-0-1-1-0-0-1-2
10 February	12	1-2-1-2-3-4-3-3	39	1-1-2-3-3-7-6-5	21	3-2-2-2-3-5-5-4
11 February	12	4-2-2-3-1-2-3-3	14	3-3-3-3-1-2-4-3	20	4-3-2-4-1-3-5-4
12 February	10	3-3-2-1-2-3-2-2	18	3-2-3-4-4-4-3-2	13	3-3-2-2-3-3-3-3
13 February	9	3-2-2-2-3-2-2-2	21	3-2-3-5-5-4-2-1	22	4-3-2-3-3-3-3-3



## *Alerts and Warnings Issued*

<b>Date &amp; Time of Issue UTC</b>	<b>Type of Alert or Warning</b>	<b>Date &amp; Time of Event UTC</b>
07 Feb 0459	CONTINUED ALERT: Electron 2MeV Integral Flux $\geq$ 1000pfu	04/1310
07 Feb 1950	WATCH: Geomagnetic Storm Category G1 predicted	
08 Feb 0505	CONTINUED ALERT: Electron 2MeV Integral Flux $\geq$ 1000pfu	04/1310
08 Feb 2217	ALERT: Type II Radio Emission	08/2141
09 Feb 0501	CONTINUED ALERT: Electron 2MeV Integral Flux $\geq$ 1000pfu	04/1310
09 Feb 2026	WARNING: Geomagnetic Sudden Impulse expected	09/2040 - 2140
09 Feb 2029	WARNING: Geomagnetic K = 4	09/2045 - 10/0600
09 Feb 2140	SUMMARY: Geomagnetic Sudden Impulse	09/2100
10 Feb 0523	CONTINUED ALERT: Electron 2MeV Integral Flux $\geq$ 1000pfu	04/1310
10 Feb 1353	WARNING: Geomagnetic K = 4	10/1400 - 2359
10 Feb 1418	WARNING: Geomagnetic K = 5	10/1420 - 2359
10 Feb 1628	ALERT: Geomagnetic K = 4	10/1625
10 Feb 1707	ALERT: Geomagnetic K = 5	10/1702
10 Feb 2041	ALERT: Geomagnetic K = 5	10/2030
10 Feb 2313	EXTENDED WARNING: Geomagnetic K = 4	10/1400 - 11/0600
10 Feb 2328	EXTENDED WARNING: Geomagnetic K = 5	10/1420 - 11/0300
11 Feb 0543	EXTENDED WARNING: Geomagnetic K = 4	10/1400 - 11/1200
11 Feb 1125	EXTENDED WARNING: Geomagnetic K = 4	10/1400 - 11/1800
11 Feb 1222	CONTINUED ALERT: Electron 2MeV Integral Flux $\geq$ 1000pfu	04/1310
11 Feb 1754	EXTENDED WARNING: Geomagnetic K = 4	10/1400 - 12/0600
11 Feb 2028	WARNING: Geomagnetic K = 5	11/2028 - 12/0300
11 Feb 2105	ALERT: Geomagnetic K = 5	11/2059
12 Feb 0555	EXTENDED WARNING: Geomagnetic K = 4	10/1400 - 12/1200
12 Feb 0849	ALERT: Type II Radio Emission	12/0833
12 Feb 0936	ALERT: Type IV Radio Emission	12/0847
12 Feb 2016	WARNING: Geomagnetic K = 4	12/2016 - 13/0600

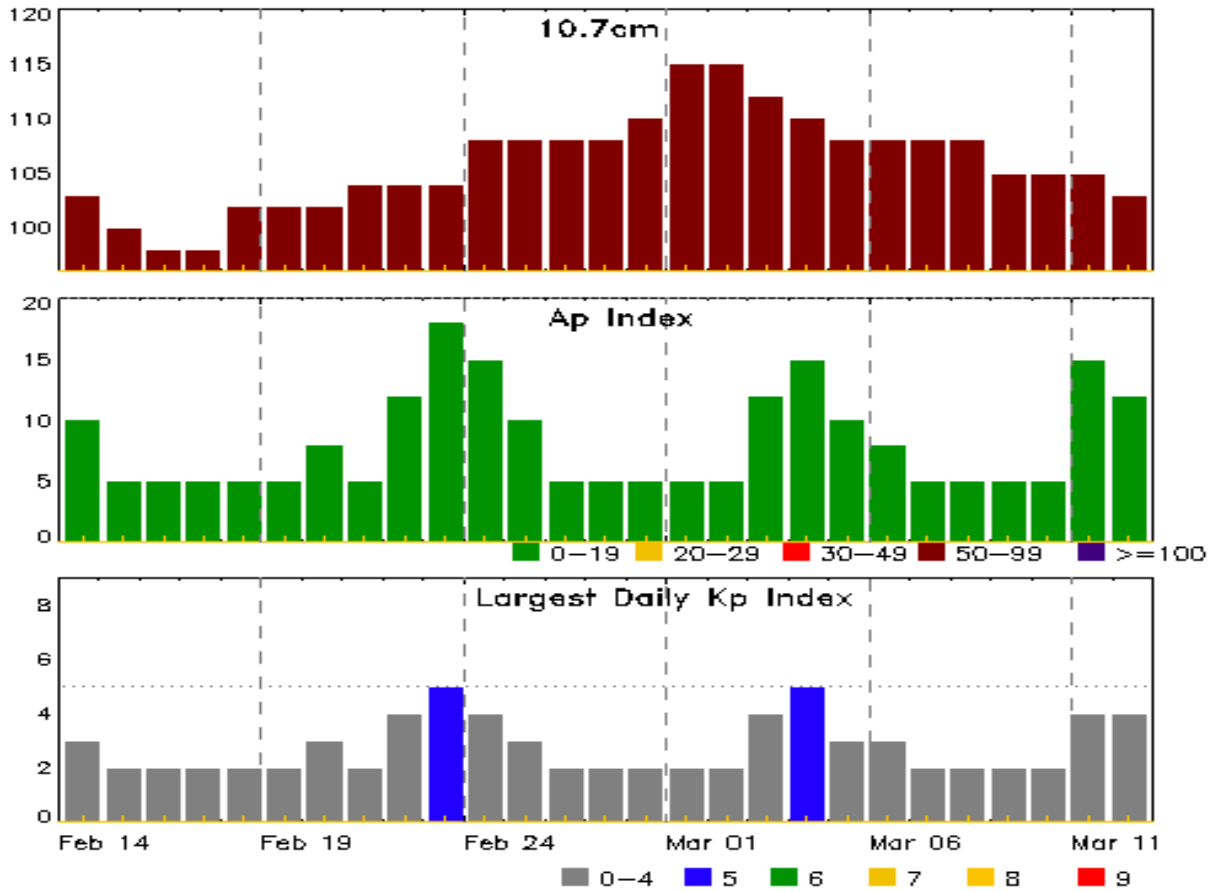


### *Alerts and Warnings Issued*

<b>Date &amp; Time of Issue UTC</b>	<b>Type of Alert or Warning</b>	<b>Date &amp; Time of Event UTC</b>
13 Feb 0227	ALERT: Geomagnetic K = 4	13/0224
13 Feb 0310	ALERT: Type II Radio Emission	13/0218
13 Feb 0556	EXTENDED WARNING: Geomagnetic K = 4	12/2016 - 13/0900
13 Feb 1321	ALERT: Electron 2MeV Integral Flux $\geq$ 1000pfu	13/1300
13 Feb 1739	WARNING: Geomagnetic K = 4	13/1740 - 14/0000



## 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
14 Feb	103	10	3	28 Feb	110	5	2
15	100	5	2	01 Mar	115	5	2
16	98	5	2	02	115	5	2
17	98	5	2	03	112	12	4
18	102	5	2	04	110	15	5
19	102	5	2	05	108	10	3
20	102	8	3	06	108	8	3
21	104	5	2	07	108	5	2
22	104	12	4	08	108	5	2
23	104	18	5	09	105	5	2
24	108	15	4	10	105	5	2
25	108	10	3	11	105	15	4
26	108	5	2	12	103	12	4
27	108	5	2				



### *Energetic Events*

Date	Time			X-ray	Optical Information			Peak		Sweep Freq		
	Begin	Max	Half Max	Class	Integ Flux	Imp/ Brtns	Location Lat CMD	Rgn #	Radio Flux 245	2695	Intensity II	IV
12 Feb	0825	0844	0856	M1.4	0.016	SN	S19W84		7900		2	1

### *Flare List*

Date	Time			X-ray Class	Optical		
	Begin	Max	End		Imp/ Brtns	Location Lat CMD	Rgn #
07 Feb	0007	0026	0102	C1.2			
07 Feb	0223	0231	0241	C1.0	SF	S18W23	2939
07 Feb	0520	0533	0546	C2.6			
07 Feb	0628	0638	0648	B9.3	SF	S19W24	2939
07 Feb	0719	0728	0732	C1.1			
07 Feb	0805	0810	0817	B9.1			
07 Feb	0821	0824	0828	C1.6			2941
07 Feb	0858	0903	0908	C1.1			
07 Feb	1101	1108	1112	C1.3			2939
07 Feb	1112	1121	1127	C1.6			
07 Feb	1151	1156	1200	B9.8			2939
07 Feb	1226	1239	1246	C3.8			
07 Feb	1650	1700	1709	C2.4			
07 Feb	2257	2306	2310	C1.2			2941
08 Feb	0519	0524	0530	B7.3			2940
08 Feb	0707	0717	0726	B9.7			2940
08 Feb	1625	1639	1652	C1.1			2939
08 Feb	1720	1727	1735	B8.1			2941
08 Feb	2129	2145	2156	C5.1	SN	S16W42	2939
09 Feb	0435	0438	0443	B5.5			2941
09 Feb	0544	0553	0558	B8.2	SF	N20E07	2941
09 Feb	0728	0736	0747	B6.0			2941
09 Feb	0822	0827	0835	B7.2	SF	N24E08	2941
09 Feb	0953	0957	1001	B7.7			2939
09 Feb	1425	1447	1501	C1.0			
09 Feb	1727	1736	1755	C5.7	SF	S16W57	2939
09 Feb	1853	1939	1945	C3.1	SF	N22W01	2941
09 Feb	2351	0002	0010	C1.2			2939
10 Feb	0157	0208	0219	C3.0	SF	N18W56	2940
10 Feb	0422	0438	0443	C4.0	SF	N21W05	2941



## *Flare List*

Date	Time			X-ray Class	Optical		Rgn #
	Begin	Max	End		Imp/ Brtns	Location Lat CMD	
10 Feb	0623	0630	0642	C1.2			2940
10 Feb	0907	0922	0945	C1.0			
10 Feb	1252	1259	1310	B7.6			2940
10 Feb	1806	1824	1845	B7.4			
10 Feb	1845	1850	1855	B6.6			
11 Feb	0005	0012	0018	B7.6	SF	N23W14	2941
11 Feb	0119	0128	0135	B9.7			2939
11 Feb	0649	0657	0703	B7.6	SF	S16W66	2939
11 Feb	0801	0807	0815	B4.8			
11 Feb	1016	1020	1027	C1.2			
11 Feb	1241	1250	1259	C1.1			2940
11 Feb	1724	1742	1813	C2.5			2940
12 Feb	0253	0321	0346	C1.5			2939
12 Feb	0453	0501	0505	B8.4			2944
12 Feb	0739	0748	0759	C1.0			2940
12 Feb	0747	0748	0752		SF	S12E62	2946
12 Feb	0825	0844	0856	M1.4	SN	S19W84	
12 Feb	1703	1708	1712	C9.2			2940
12 Feb	1719	1726	1738	C8.0			2944
12 Feb	1945	1955	2009	C1.1			2940
13 Feb	0048	0120	0143	C3.2			2940
13 Feb	0143	0147	0151	C6.1			2941
13 Feb	0312	0318	0323	C2.4			2941
13 Feb	0359	0405	0422	B8.5			2941
13 Feb	0428	0432	0443	B8.6			2944
13 Feb	0517	0530	0541	B7.4			2941
13 Feb	0721	0728	0743	B6.8			2941
13 Feb	0824	0830	0837	B6.8			2944
13 Feb	1523	1527	1533	C1.0			2941
13 Feb	1641	1651	1702	C1.0			2941
13 Feb	1930	1937	1942	B6.5			2941
13 Feb	2127	2142	2154	C7.1	SF	N25W52	2941





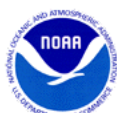
## Region Summary

Date	Location		Sunspot Characteristics				Flares																
	Lat CMD	Lon	Helio 10 <sup>6</sup> hemi.	Area	Extent (helio)	Spot Class	Spot Count	Mag Class	X-ray			Optical											
									C	M	X	S	1	2	3	4							
<b>Region 2938</b>																							
26 Jan	N18E68		92	10	2	Bxo	2	B															
27 Jan	N17E56		90	10	8	Bxo	3	B						1									
28 Jan	N19E48		86	10	4	Bxo	2	B															
29 Jan	N19E34		87	plage																			
30 Jan	N18E14		93	plage																			
31 Jan	N18W01		95	10	1	Axx	2	A															
01 Feb	N18W20		95	20	2	Cro	3	B															
02 Feb	N16W29		95	20	8	Cro	4	B															
03 Feb	N14W48		103	10	1	Hrx	1	A															
04 Feb	N15W61		103	30	6	Cro	4	B															
05 Feb	N16W71		100	30	5	Cro	4	B															
06 Feb	N19W85		100	30	4	Bxo	4	B															
														0	0	0	1	0	0	0	0	0	

Crossed West Limb.  
Absolute heliographic longitude: 95

<b>Region 2939</b>																							
29 Jan	S15E84		37	plage										2									
30 Jan	S15E70		37	120	5	Cso	4	B															
31 Jan	S15E62		34	280	5	Dho	7	B															
01 Feb	S15E47		34	500	5	Dho	7	B	1														
02 Feb	S16E34		28	300	6	Dho	3	B															
03 Feb	S16E22		33	260	9	Dho	4	B															
04 Feb	S16E10		32	220	9	Dso	4	B	1														
05 Feb	S17W03		32	200	6	Cso	4	B															
06 Feb	S16W20		35	200	5	Cso	4	B	1					1									
07 Feb	S16W33		35	180	4	Cso	5	B	2					2									
08 Feb	S17W44		32	160	4	Cso	4	B	2					1									
09 Feb	S18W60		35	180	4	Cso	3	B	2					1									
10 Feb	S17W70		32	160	4	Cso	3	B															
11 Feb	S16W85		35	120	3	Hsx	1	A						1									
														11	0	0	6	0	0	0	0	0	

Crossed West Limb.  
Absolute heliographic longitude: 32



### *Region Summary - continued*

Date	Location		Sunspot Characteristics					Flares															
	Lat CMD	Lon	Helio 10 <sup>-6</sup> hemi.	Area	Extent (helio)	Spot Class	Spot Count	Mag Class	X-ray			Optical											
									C	M	X	S	1	2	3	4							
<b>Region 2940</b>																							
30 Jan	S15E84	37	plage									4											
31 Jan	N17E61	34	160	4	Cso	5	B	6					11										
01 Feb	N22E46	35	410	5	Dki	18	B	3															
02 Feb	N18E33	34	320	10	Dao	16	BG	7					2										
03 Feb	N17E20	35	180	10	Cai	14	B	1															
04 Feb	N17E07	35	150	10	Dai	17	B																
05 Feb	N17W06	35	200	10	Dao	18	B																
06 Feb	N16W19	34	200	10	Dao	12	B																
07 Feb	N17W32	34	140	10	Dao	19	B																
08 Feb	N17W45	33	140	8	Dao	9	B																
09 Feb	N16W60	35	140	8	Dao	9	B																
10 Feb	N16W71	33	130	6	Dao	6	B	2					1										
11 Feb	N17W82	32	30	1	Hrx	1	A	2															
								25	0	0	14	0	0	0	0	0							

Crossed West Limb.  
Absolute heliographic longitude: 35

<b>Region 2941</b>																							
03 Feb	N25E71	344	180	6	Cao	3	B																
04 Feb	N25E61	341	280	12	Eho	6	B	1															
05 Feb	N24E48	341	300	12	Eho	9	B	3					1										
06 Feb	N24E35	340	290	11	Eho	10	B																
07 Feb	N25E24	338	220	14	Eao	11	B	2															
08 Feb	N23E10	338	260	13	Eki	20	BG																
09 Feb	N24W05	340	370	15	Eki	24	B	1					3										
10 Feb	N24W15	337	370	15	Eki	28	B	1					1										
11 Feb	N24W28	338	280	17	Fki	12	B						1										
12 Feb	N24W40	336	310	17	Fki	8	BG																
13 Feb	N24W54	337	330	17	Fki	11	BG	5					1										
								13	0	0	7	0	0	0	0	0							

Still on Disk.  
Absolute heliographic longitude: 340

<b>Region 2942</b>																							
06 Feb	S11W62	77	20	3	Bxo	3	B																
07 Feb	S12W76	78	10	4	Bxo	3	B																
08 Feb	S11W88	77	10		Axx	1	A																
								0	0	0	0	0	0	0	0	0	0						

Crossed West Limb.  
Absolute heliographic longitude: 77



**Region Summary - continued**

Date	Location		Sunspot Characteristics				Flares											
	Lat CMD	Lon	Helio 10 <sup>6</sup> hemi.	Extent (helio)	Spot Class	Spot Count	Mag Class	X-ray			Optical							
								C	M	X	S	1	2	3	4			
<b>Region 2943</b>																		
08 Feb	S19E48	300	20	4	Bxo	2	B											
09 Feb	S18E33	302	10	4	Axx	2	A											
10 Feb	S18E21	300	plage															
11 Feb	S18E07	303	plage															
12 Feb	S18W07	303	plage															
13 Feb	S18W21	304	plage															
												0	0	0	0	0	0	0

Still on Disk.  
Absolute heliographic longitude: 303

<b>Region 2944</b>																		
10 Feb	S26W70	32	20		Hrx	1	A											
11 Feb	S25W84	34	20	2	Cro	4	B											
												0	0	0	0	0	0	0

Crossed West Limb.  
Absolute heliographic longitude: 32

<b>Region 2945</b>																		
11 Feb	S21W35	345	30	4	Cro	6	B											
12 Feb	S20W47	343	30	6	Cro	10	B											
13 Feb	S21W62	345	20	4	Bxo	4	B											
												0	0	0	0	0	0	0

Still on Disk.  
Absolute heliographic longitude: 345

<b>Region 2946</b>																			
11 Feb	S09E66	244	90	4	Dso	2	B												
12 Feb	S08E54	242	110	5	Dso	6	B					1							
13 Feb	S08E39	244	90	4	Cso	8	B												
												0	0	0	1	0	0	0	0

Still on Disk.  
Absolute heliographic longitude: 244



## ***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

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