

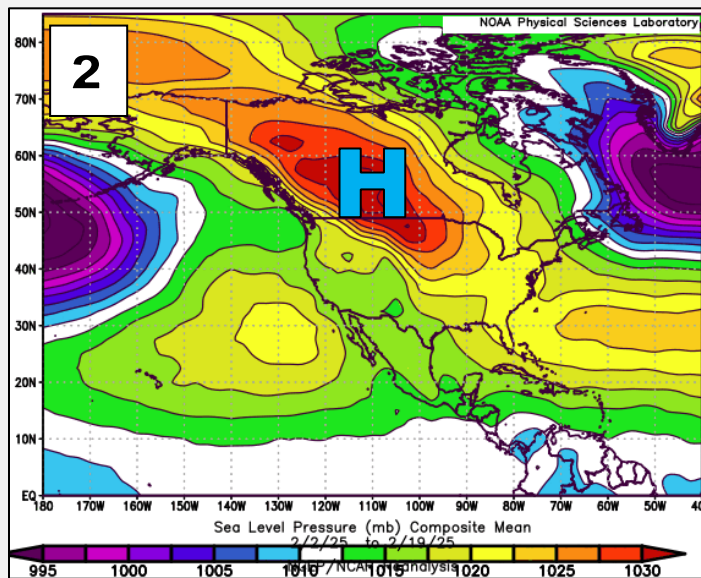
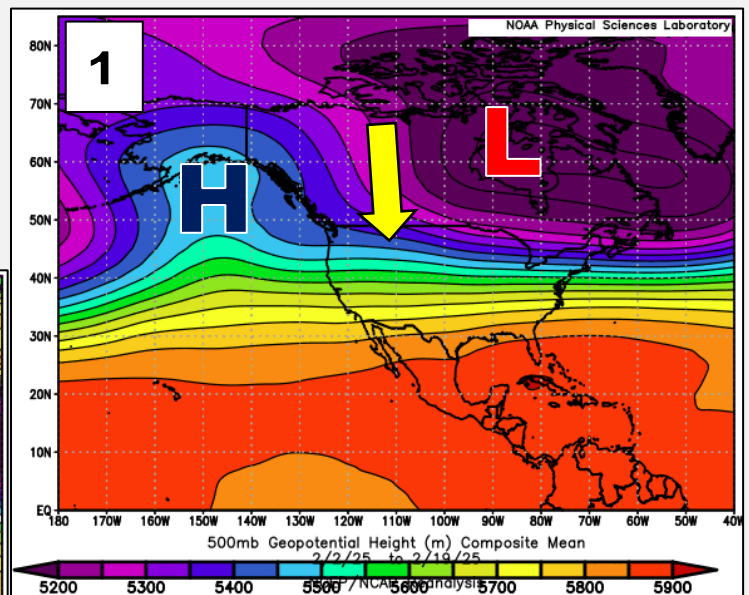
Extended Period of Cold & Snow

February 2-19, 2025

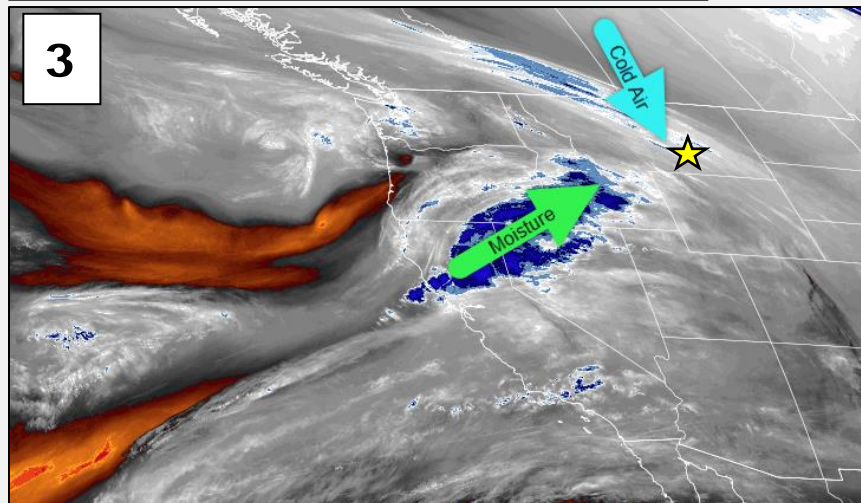
National Weather Service – Billings, MT

OVERVIEW: Although February 1st was quite warm (temps in the 50s) a cold front arrived that night, and this was followed by a nearly 3-week stretch of below normal temperatures and frequent snowfalls. Climatology in the northern high plains is characterized by fluctuations between cold/snowy and warm/dry/windy. The reason for this is our proximity to the Rocky Mountains. Locations on the east side of the mountains see periodic surges of warm “downslope” winds in the mid-winter, when it is not unusual to see many days with temperatures the 40s & 50s. It’s much more unusual to see persistent cold like we did this month.

METEOROLOGY: The weather pattern for the first two-thirds of February allowed for a persistent flow of cold air from the north. High pressure aloft was anchored in the north Pacific, and northerly flow over western Canada was persistent (figure 1 shows the 18-day average 500mb Height and locations of high and low pressure). This pattern largely prevented surges of warm



air descending from the mountains to our west. The cold air was associated with surface high pressure, and this was also a persistent feature (figure 2 shows the 18-day average mean sea level pressure). Finally, the Pacific flow to our southwest provided surges of moisture that “overran” the cold air in place, producing periods of accumulating snowfall. Figure 3 shows a satellite image from the morning of February 16th, the beginning of a 3-day period of overrunning snowfall. None of the weather systems were dynamic storms. The flow of Pacific moisture over the cold air on the lee side of the mountains were the key ingredients for producing snowfall.



COLD: Most of the 18-day cold stretch did not have record cold from a daily temperature standpoint, but the long duration of below normal temperatures was truly remarkable. Here are notable streaks at each of our climate stations:

- Billings: 13 consecutive days with high temps below 17° (2nd longest on record, longest since 1985)
- Livingston: 13 consecutive days with high temps below 26° (3rd longest on record, longest since 1985)
- Miles City: 18 consecutive days with high temps below 18° (longest on record)
- Sheridan: 13 consecutive days with high temps below 29° (15th longest on record, longest since 1993)

Average temperatures over the lengthy cold snap were among the coldest our area has ever seen, for any time of year.

SITE	AVERAGE TEMP	COLDEST 18 DAYS SINCE...	COLDEST TEMP	DATE OF COLDEST TEMP
Baker	- 6.2°	coldest (1998)	-38°	Feb 11
Plevna	- 5.0°	1979	-39°	Feb 11
Ingomar 9E	- 4.6°	1996	-43°	Feb 11
Huntley	- 2.9°	1969	-48°	Feb 19
Forsyth	- 2.7°	1979	-35°	Feb 11
Hysham 25SSE	- 1.7°	1996	-37°	Feb 11
Roundup 15SW	- 1.3°	coldest (2004)	-35°	Feb 19
Ekalaka	- 0.7°	1996	-34°	Feb 11
Brandenberg	- 0.6°	1996	-38°	Feb 11
Ridgeway 1S	- 0.4°	1996	-31°	Feb 11
Columbus	2.4°	1969	-32°	Feb 11
Hardin	2.5°	1996	-30°	Feb 13
Billings Airport	2.5°	1996	-19°	Feb 19
Broadus	2.8°	1991	-31°	Feb 19
Bridger 2N	3.7°	1991	-26°	Feb 19
Sheridan	4.8°	1996	-27°	Feb 19
Livingston	5.7°	2019	-23°	Feb 12
Red Lodge	5.9°	2019	-23°	Feb 11

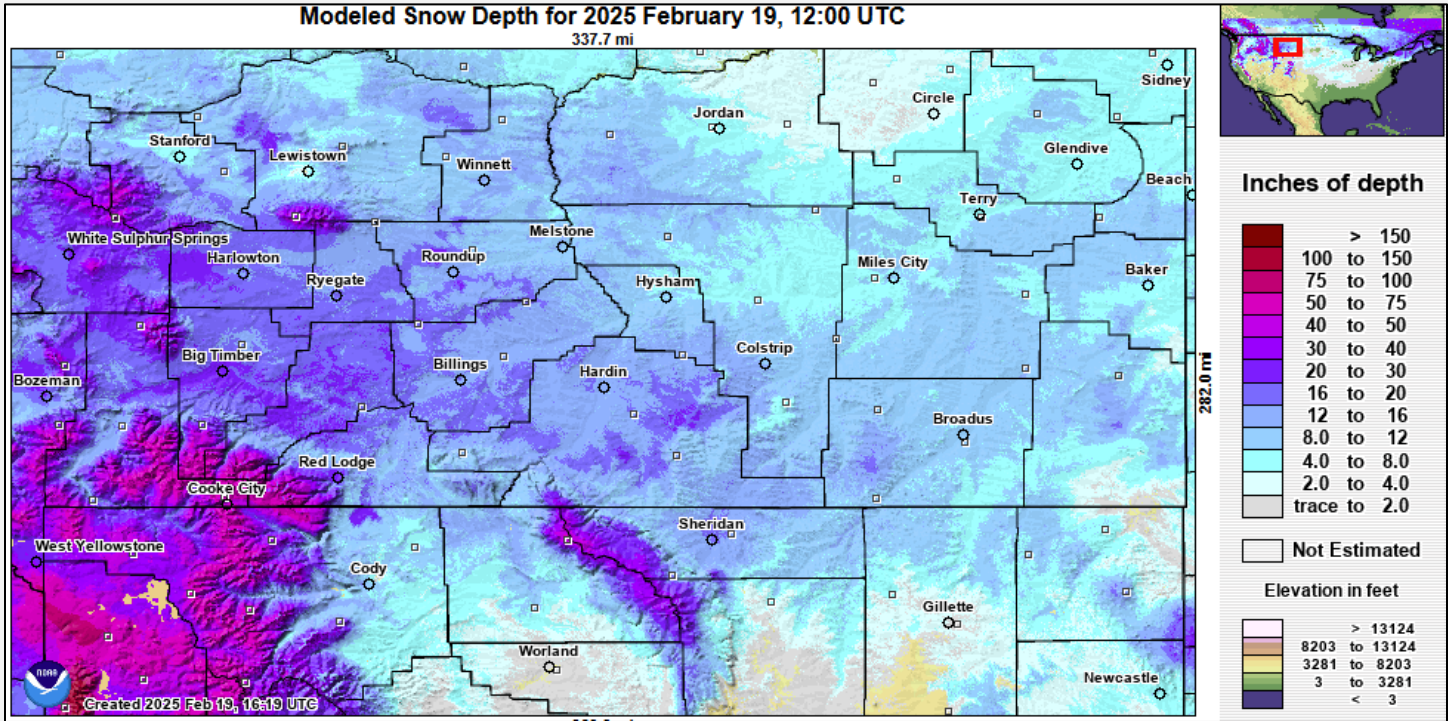
Several sites in southeast MT had sub-zero average temperatures over the 18-day period. The table at left summarizes average and extreme temperatures at several airport and cooperative observer stations around the region. Of course, there were some daily temperature records set too. Baker's low temp of -38° on the 11th was the coldest on record since the station began reporting at the airport in 1998. Sheridan's low of -27° on the 19th was a daily record low, and the coldest it's been this late in the winter since the station began in 1907.

SNOWFALL: Snowfall over the entire 18 days was significant, not only for the totals, but also the snow cover that was able to be achieved without any intermittent melting. Heaviest amounts were over the west half of our forecast area (i.e., west of Rosebud County). For many locations, what was previously a poor snow season improved to near or above average. For example, when the snow finally ended at Billings on the 18th, the seasonal snow at the airport was up to 48.0", over 10" above the normal amount of 37.4" through the date. To the right is a summary of total snowfall and peak snow depth at several cooperative observer stations, as well as the Billings airport. Not shown are mountain stations. The high country also received significant snowfall during these 18 days, perhaps most impressively at the very beginning of the month when the mountains near Cooke City picked up roughly 3" of snow water and an estimated 45" of snow in about three days.

SITE	TOTAL SNOWFALL	PEAK SNOW DEPTH
Mystic Lake	55.4"	41"
Livingston 1WSW	40.3"	22"
Melville 4W	40.1"	24"
Livingston 12S	38.3"	31"
Columbus	36.3"	25"
Red Lodge	35.6"	30"
Big Timber	35.5"	24"
Billings	30.7"	18"
Huntley	29.3"	15"
Park City	29.0"	18"
Springdale	27.2"	25"
Hardin	23.4"	13"
Roundup 15SW	23.0"	12"
Ryegate 18NNW	22.0"	14"
Pompey's Pillar 15N	21.4"	14"
Big Horn	20.7"	14"
Dayton	20.0"	16"
Bridger 2N	18.0"	18"
Hysham	17.7"	10"
Forsyth	12.0"	7"

SNOW DEPTH: The following map, produced by the National Operational Hydrologic Remote Sensing Center (NOHRSC), shows snow depth around the region on the

morning of the 19th. As you can see from the map, most lower elevations in the west had 12-20" of snow depth, while 6-12" existed over the east.



PHOTOS: Below are a few photos and web camera images.

