

Southwest to Midwest Winter Storm

1/24 - 1/26 2021

By: Peter Mullinax, WPC Meteorologist

Meteorological Overview:

On Sunday, January 24, 2021, a 500mb upper level low was located over the Desert Southwest with a deep 250mb trough axis digging into the East Pacific. Diffluence out ahead of the 500mb low supported large scale ascent across the Four Corners states, which combined with a moisture fetch out of the East Pacific led to areas of heavy snow across the higher elevations throughout the region. Farther north, a surface low pressure system and its associated cold front was sweeping across the Upper Midwest, ushering in a reinforcing shot of cold Canadian air. As the day progressed, the upper low ejected east and began to take on a negative tilt as it reached the central High Plains. The best vertical motion became positioned over the same area, which combined with a sub-freezing temperature profile within the atmospheric column, fostered an environment favorable for accumulating snowfall.

Monday, January 25 started with a strengthening area of low pressure over eastern Oklahoma and deep moist convection within the storm's warm sector. Stratiform precipitation north of the warm front and a decaying cold front over northern Illinois fell in the form of snow over parts of the Midwest. Early in the day, the heaviest snowfall was positioned just downstream of a potent 500mb vorticity maximum and a developing 850-700mb low over western Kansas. In addition, an impressive 250mb jet streak over the Great Lakes and Northeast placed its right entrance region over the Midwest, further favoring falling pressure tendencies and upper level ascent over the region. Meanwhile, the combination of troughing over the Great Plains and a subtropical high off the Southeast coast caused a funneling of rich Gulf of Mexico moisture into the Mississippi Valley. Heavy snowfall would continue to fall north of the 700mb low with rates up to 2" per hour at times from Nebraska to Iowa. Meanwhile to the south, periods of moderate to heavy rainfall transpired over the Mid-South with some severe storms also forming from Texas to Georgia. Also, the longwave trough lingering over the Southwest continued to generate heavy mountain snow in the Four Corners region with over 2 feet of snow along the Mogollon Rim of Arizona.

Heading into the afternoon and evening hours, the axis of heavy snow under a classic comma head signature on satellite and radar imagery would work its way east into northern Illinois and southern Wisconsin. Surface observations also indicated areas of freezing rain in central Illinois and Indiana overnight. By the morning of Tuesday, January 26th, the 700mb low was positioned directly over northern Illinois with an elongated 850mb low over the Lower Great Lakes. As a result, areas of moderate to heavy snow continued over the region. There was also disruptive ice accretion in parts of the Ohio Valley and central Appalachians where up to a half inch of ice was measured in parts of Virginia and Pennsylvania. Later in the day, the area of heavy snow would move into the Northeast beneath the aforementioned right entrance region of a 250mb jet streak. Surface analysis indicated the primary surface low would weaken over the interior Northeast Tuesday night as a secondary low developed off the East Coast. Periods of

light-to-moderate snow would continue into the morning of Wednesday, January 27 but would taper off later in the day.

Impacts:

There were quite a few snowfall records or highlights to note. Flagstaff, AZ measured 14.1" of snowfall accumulation on January 25, making it the snowiest day for the city since November 29, 2019. The significant mountain snowfall also provided relief to the drought-stricken Southwest as there was some slight improvement to drought conditions, but overall not enough to break the ongoing drought. In the central U.S., heavy snow blanketed much of Nebraska and Iowa. Lincoln, NE airport reported 14.5" of snowfall on January 25, making it the single snowiest day at the airport on record. Omaha's daily snowfall on January 25 was 11.9", the most measured in a single day since January 10, 1975 (12.1"). Des Moines also received 10.3" on January 25. The last time Des Moines picked up 10.3" of snowfall or more in one day was December 8, 2009. Also, Chicago O'Hare International Airport reported 6.0" of snow for the event. According to the NWS Chicago WFO, it was the first time O'Hare received at least 6" of snow from one snowstorm since November 25-26, 2018.

The winter storm caused numerous travel delays and cancellations in the Midwest. Nebraska state police responded to over 200 weather-related incidents on Monday alone. A section of eastbound I-80 was closed in central Nebraska and many cars slid off roads in central Iowa. Schools were closed on Monday as were COVID-19 vaccination sites. Both major Chicago area airports, in total, cancelled over 150 flights. Freezing rain in central Indiana and southwest Ohio resulted in icy conditions that caused cars to slide off slick roads. There was also dangerous severe weather that unfolded with this storm system. Fultondale, AL was hit by an EF-3 tornado Monday night leaving 1 person dead and 30 injured. Tremendous structural damage was dealt to homes, businesses, and infrastructure with thousands of residents also losing power.