

## **Central Rockies to Great Lakes Winter Storm 22-25 March, 2016**

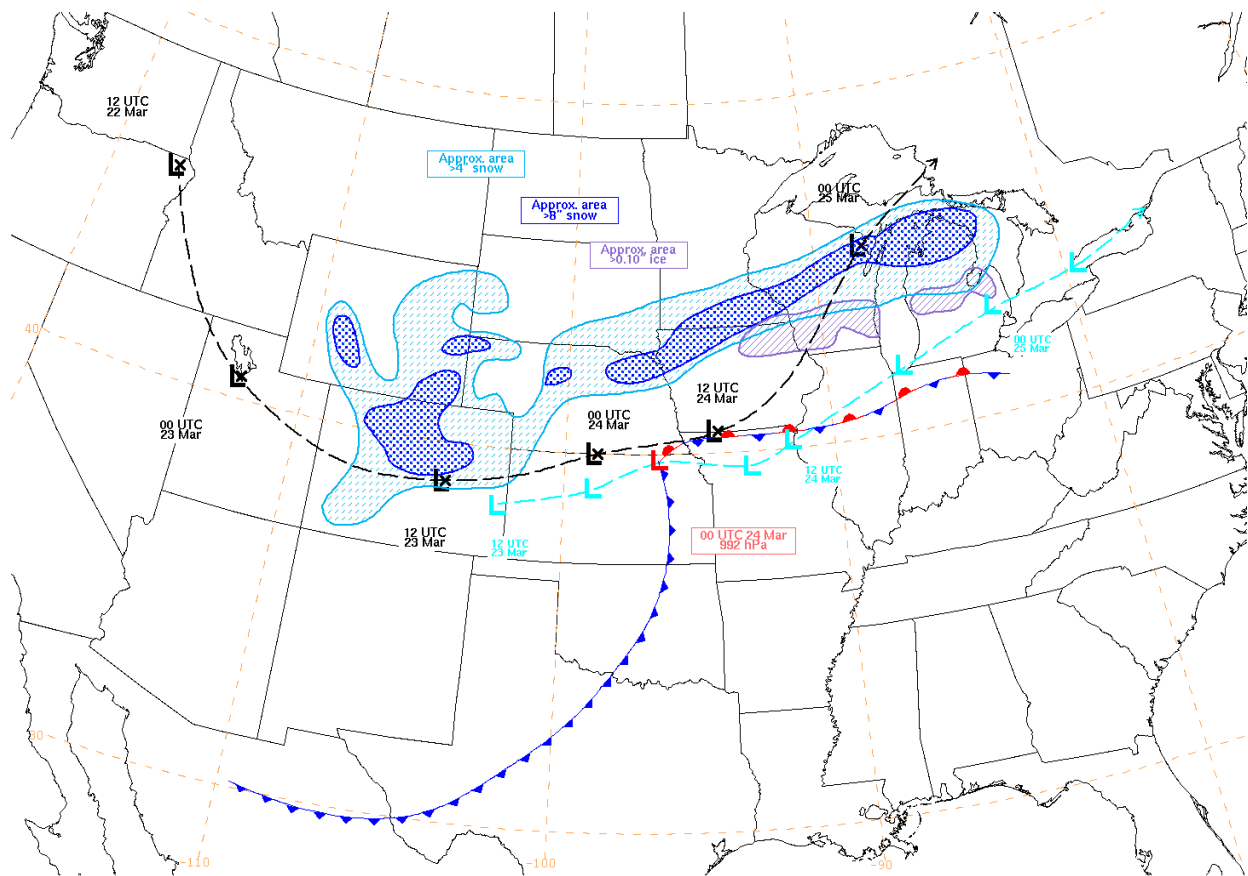
By: Allison Santorelli, WPC Meteorologist

**Meteorological Overview:** An early season spring storm moved through the central U.S. between 22 March and 25 March, 2016 bringing a wide array of precipitation from heavy snowfall and icing to heavy rainfall and severe thunderstorms. Significant snowfall was reported from the central Rockies northeastward toward northern Lower Michigan, with significant icing just to the south, mainly across portions of the Upper Midwest. In the warm sector of the storm, heavy rain and severe thunderstorms impacted an area extending from the southern plains to the middle Mississippi valley with numerous reports of large hail, damaging wind gusts, and even a few tornadoes.

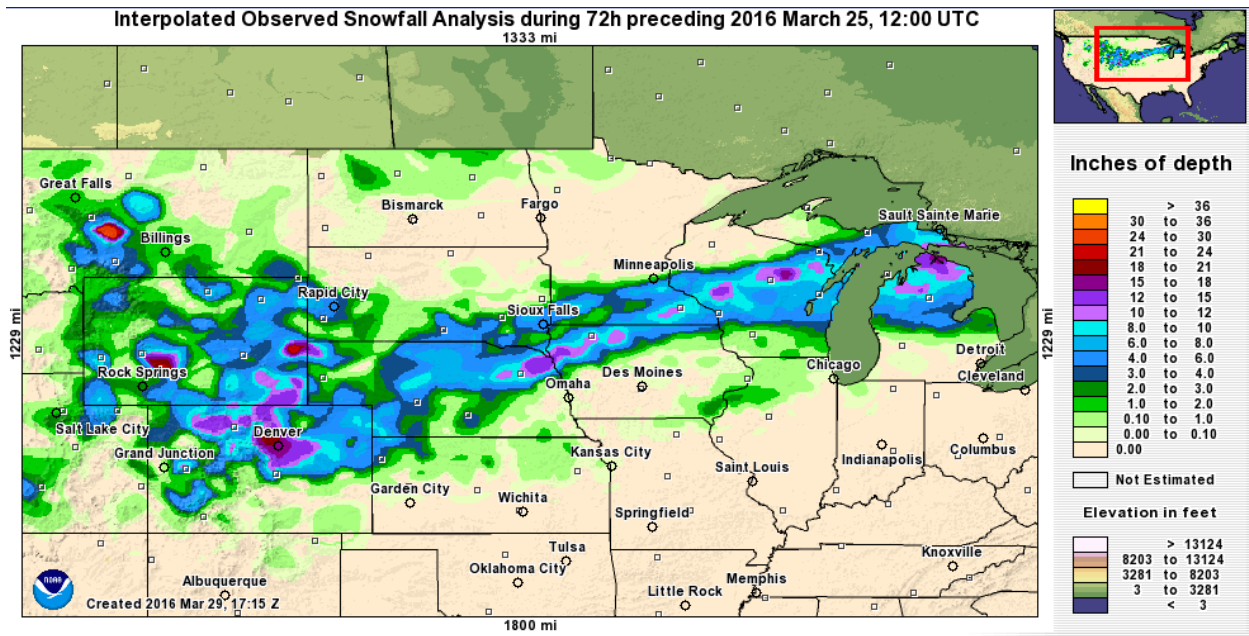
On 22 March, an upper level shortwave trough was dropping quickly through the western U.S. as a cold front at the surface was ushering in a fresh batch of arctic air all across the Intermountain West and Rockies. Once the shortwave reached the Intermountain West by that afternoon, snow had begun to fall in the higher terrain of the central Rockies. By 12 UTC on 23 March, the shortwave had closed off into an upper-level low while an area of low pressure was developing at the surface in the lee of the Rockies. By this point, heavy snowfall was already falling along the Front Range of the Colorado Rockies as well as in the higher terrain of Colorado and Wyoming. The snow continued through much of the day and quickly came to an end overnight once the better support in the upper levels moved farther into the central plains (Figure 1). As much as 2 to 3 feet of snow fell in the mountains and Front Range of the Colorado Rockies, with 20-24" reported near Denver. Lesser amounts, up to 2 feet, were reported farther north in the mountains and high plains of eastern Wyoming (Figure 2).

Farther east, snow began in the central plains by early in the day on 23 March. As the surface low moved eastward across the central plains, middle Mississippi valley, and into the Ohio valley, heavy snowfall developed to the north of a quasi-stationary boundary draped from the lower Great Lakes back to the surface low. Heavy snowfall continued throughout the day on 23 March, and into the next morning, coming to an end by late evening on 24 March across northern Michigan (Figure 1). From the central plains eastward, the heaviest snow fell in a narrow axis from northeast Nebraska to northern Lower Michigan in an area of favorable upper level divergence just to the north of a sharp 850 hPa thermal gradient. As much as 1 to 2 feet of snow was reported in this region, with the highest reported total of 18" in Tower, Michigan. To the south of the snow area, significant icing occurred with up to half an inch of ice reported across northern Iowa, southern Wisconsin, and central Lower Michigan (Figure 2). In addition to the heavy snow and ice, an intense pressure gradient surrounding the surface low led to strong winds in excess of 30 to 40 miles per hour, with gusts as high as 60 to 75 miles per hour from the Central Rockies through the Upper Midwest. This created dangerous blizzard and white out conditions.

**Impacts:** The heavy snow and ice accumulations spanning from the Central Rockies to the Upper Great Lakes led to closures and long delays at area airports, multiple school closures, and significant power outages. As many as 300,000 power outages were reported in Colorado alone, which made this event the largest single-day outage event in history for XCel Energy. In addition, the dangerous combination of high winds and heavy snow led to several traffic accidents, stranded motorists, and shutdowns of major interstates all across the High Plains and Midwest including over 300 miles of the busy I-80 in Wyoming. In Wisconsin, two people were killed when they lost control of their vehicle on icy roads. Interstate shutdowns and blizzard conditions also forced a popular rock band to cancel their concert in Colorado Springs, CO scheduled for 23 March.



**Figure 1:** Graphic showing upper level shortwave/low track (black), surface low track (cyan), approximate areas of significant snow greater than 6 inches (light blue), snow greater than 8 inches (dark blue), and ice greater than 0.10 inches (purple), and frontal position valid at 00 UTC on 24 March.



**Figure 2:** 72 hour total accumulated snowfall analysis valid from 12 UTC on 22 March through 12 UTC on 25 March (courtesy of NOHRSC).