

Western and Central U.S. Winter Storm
31 January – 03 February, 2016
By: Rich Otto, WPC Meteorologist

Meteorological Overview:

A large winter storm system affected the U.S. between 31 January and 03 February with impacts felt from California to the upper Great Lakes (Fig 1). In addition to producing strong winds and heavy snow in the higher elevations of the Southwest and as much as 30 to 40 inches of snow in the central Rockies, the storm was responsible for producing blizzard conditions from Nebraska into portions of the Midwest. The heaviest snowfall accumulations east of the Rockies were centered over northeastern Colorado, northwestern Kansas and Nebraska where 12 to 18 inches fell.

The storm began on 31 January as a 500 hPa trough began to amplify over California and Nevada (Fig 2). Heavy snow moved into the southern and central stretches of the Sierra Nevada Mountains and Nevada as a surface low tracked across the central California coast into southern Nevada by 0000 UTC on 1 February. Snowfall accumulations were highest in the Sierra Nevada Mountains where 2 to 3 feet fell above elevations of 6000 feet.

As the storm system tracked farther inland on 1 February, a highly anomalous upper level trough moved across the Four Corners region, spreading snowfall across the higher elevations of Utah, Arizona and the southern and central Rockies. Upper level diffluence ahead of the strengthening upper level trough and upper level divergence connected with the left exit region of a 150 kt jet streak at 300 hPa combined with 40 to 50 kts of southwesterly flow at 700 hPa to lead to some of the heaviest snowfall rates from the event. The Sangre De Cristo Mountains were in a favorable spot with respect to these ingredients, recording over 40 inches of snowfall, some of the highest totals from this storm system.

The upper trough axis acquired a negative tilt before closing off into a 5280 m low in western Kansas on the morning of 2 February, shifting the heaviest snow into the central Great Plains along with blizzard conditions (Fig 2). A corresponding 992 hPa surface low tracked northeastward through Kansas, backing surface winds from east to northeast in eastern Nebraska as temperatures fell from the middle 30s to the upper 20s (Fahrenheit) from 0600 UTC to 1800 UTC. During this time, an increasing pressure gradient developed between the advancing low and a high pressure system situated in southern Canada allowing for blizzard conditions to develop. The strongest winds and heaviest snow in the Plains occurred between 1200 and 1800 UTC 2 February, as strong frontogenesis centered near 700 hPa oriented from central Nebraska to northern Iowa. Winter related impacts from the storm began to diminish on 3 February as the closed low tracked northeastward across the upper Mississippi valley while weakening into an open wave. While snowfall from the storm remained noteworthy, accumulations generally remained under a foot east of the Missouri River as snowfall tracked over Iowa, southern Minnesota and Wisconsin.

Impacts:

As the storm made landfall across the West Coast on 31 January, two to four inches of rain caused flooding and flash flooding along the mountains of southern California while strong to severe winds impacted locations from Santa Barbara to San Diego. One death was reported in San Diego due to a tree falling on a car from strong winds. As the storm system reached eastern Colorado, blizzard conditions closed major roadways due to drifts of snow 3 to 6 feet deep. A general halt to commerce occurred

across Colorado during the storm including hundreds of flight cancellations at Denver International Airport. Farther east into the Plains and Upper Midwest, the combination of snow and strong winds caused blizzard conditions and road closures, as well as cancellations of flights at area airports. While no records were broken, the storm produced the second-greatest snowfall on record for Grand Island, NE with 18.3 inches and ranked as the fourth largest two-day storm on record at Hastings, NE with 15.7 inches. Across the southeastern U.S., where precipitation was in the form of rain and thunderstorms, 68 preliminary reports of severe weather were reported over a two day period ending on 3 February by the Storm Prediction Center. These reports consisted of mainly tornadoes and severe straight line winds from Tennessee and Mississippi to the East Coast.

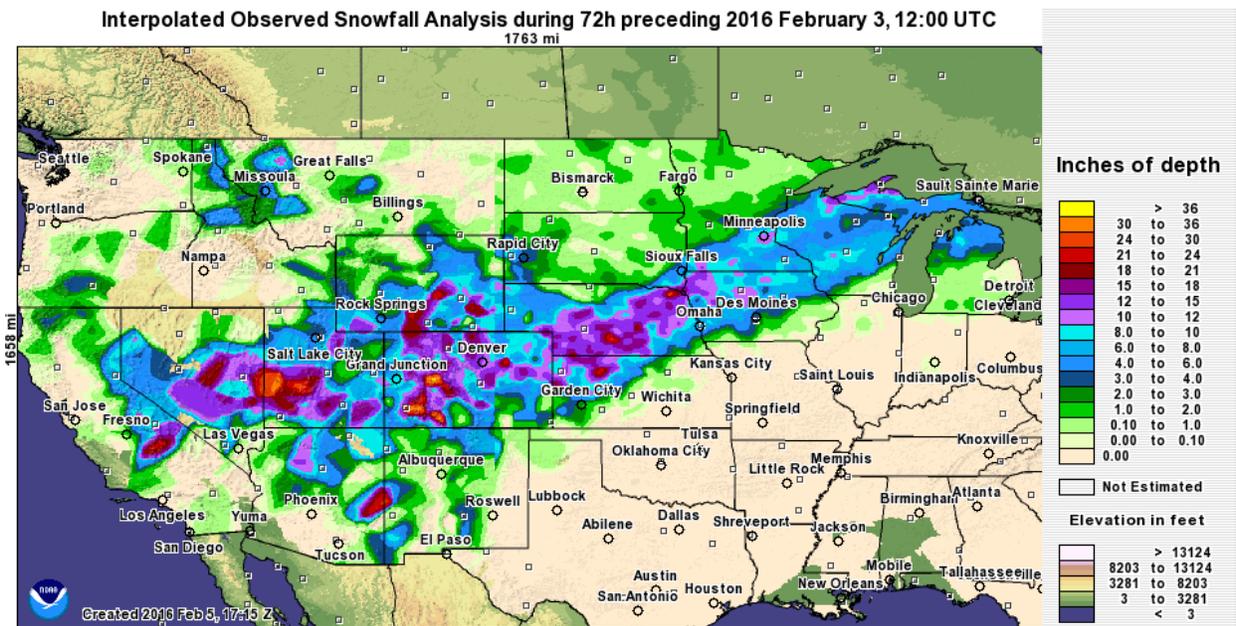


Figure 1: 72hr accumulated snowfall ending 1200 UTC 3 February, 2016 (NOHRSC)

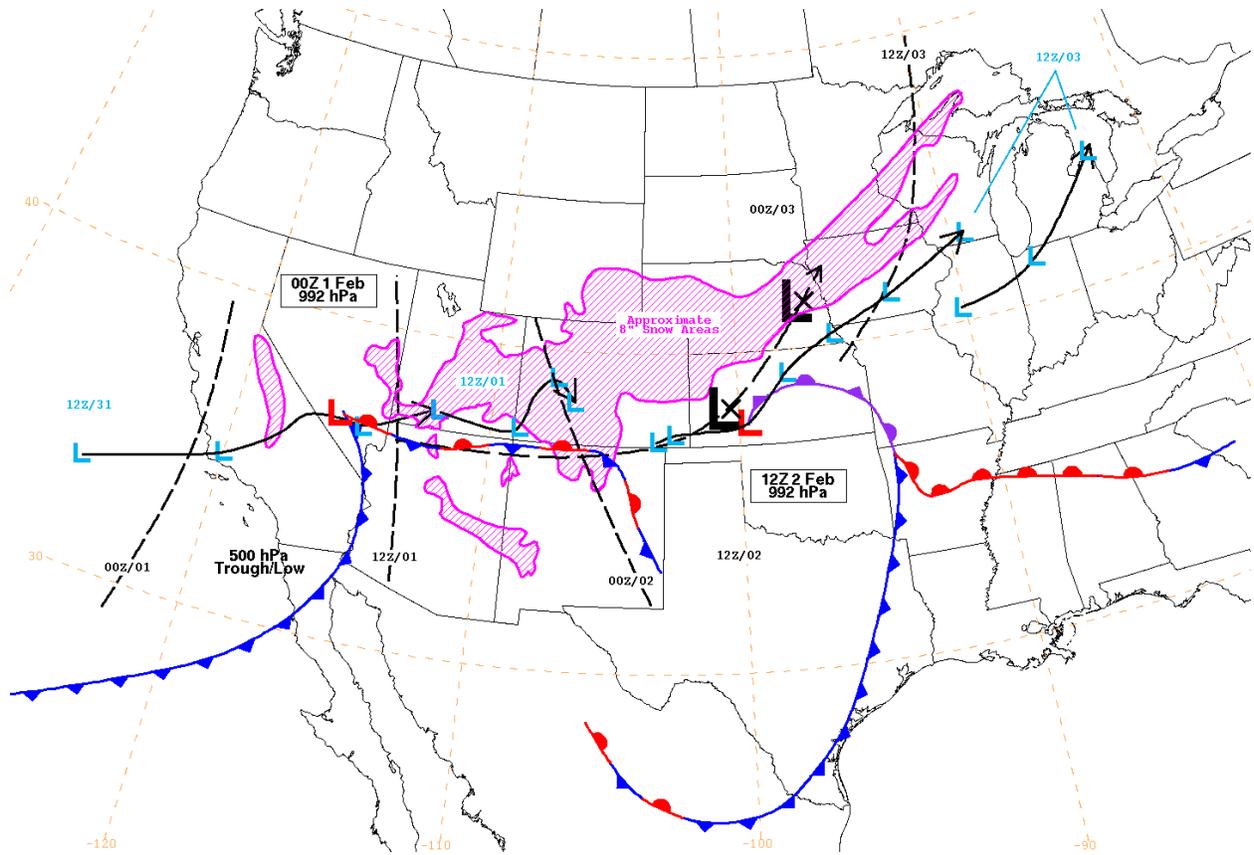


Figure 2: 500 hPa trough axes and low centers every twelve hours starting 0000 UTC 1 February (dashed), surface low tracks every six hours (light blue), surface analyses as the surface lows neared peak intensity (0000 UTC 1 February and 1200 UTC 2 February), approximate areal coverage of locations receiving 8 inches or more of snow between 0000 UTC 31 January and 1200 UTC 3 February (pink shading).