

## **Central Plains to Upper Great Lakes Winter Storm 20-22 November, 2015**

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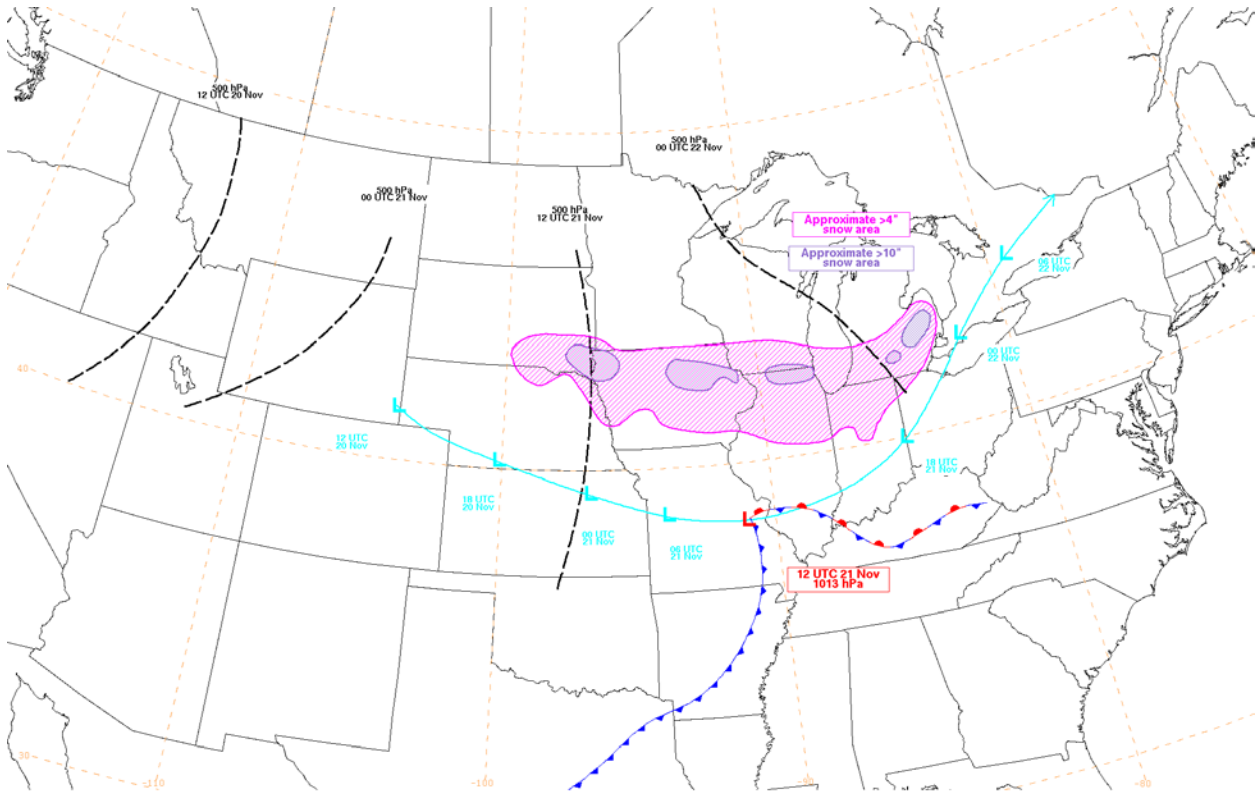
**Meteorological Overview:** A record breaking snowstorm, which was also the first of the winter season for the central and northern Plains and the Midwest occurred from 20 through 22 November 2015. The storm produced a swath of heavy snow and gusty winds from southern South Dakota eastward into Lower Michigan. A few days prior to this event, temperatures were near 60 degrees Fahrenheit, but a strong cold front moved through this region the day before which brought in a cold arctic air mass.

At 12 UTC on 20 November, an upper-level shortwave was ejecting out of the Northwest U.S. and moving into the Northern and Central Rockies. At the surface by this time, an area of low pressure had already formed in the lee of the mountains. The approaching shortwave helped to strengthen this low and push it eastward into the Plains. Heavy snow began to fall across portions of southern South Dakota, and quickly spread across the state and into the Upper Midwest by the afternoon of 20 November. By that evening, a tight baroclinic zone and significant mid-level frontogenesis, both in conjunction with the favorable left exit region of the upper-level jet, had developed across the middle Mississippi valley and the Midwest. This contributed to intensifying and narrow mesoscale snow banding across portions of the Upper Midwest, northern Ohio valley, and Lower Michigan in the overnight and early morning hours of 20 November to 21 November. As the surface low moved across the middle Mississippi valley into the Ohio valley, heavy snowfall continued throughout the day on 21 November. By 00 UTC on 22 November, the upper-level shortwave had taken on a negative tilt across the Upper Great Lakes causing the low at the surface to deepen and accelerate into southeast Canada. With the exception of light deformation band snowfall and a few lake effect snow showers downwind of Lake Michigan, the heaviest of the snow came to an end by the overnight hours of 22 November.

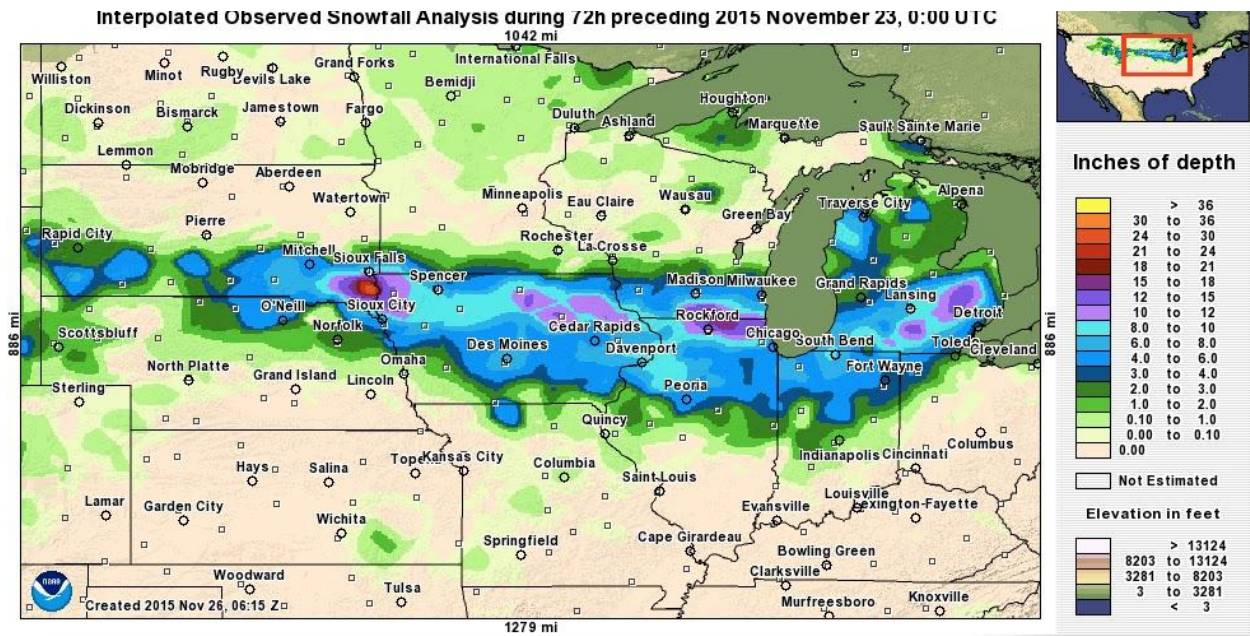
Overall, this storm brought anywhere from 4 to 18 inches of snow to places from the central plains to the Ohio valley and Upper Great Lakes (Figure 2). The highest reported snow total of 18.5 inches came out of Capron, IL in far northern Illinois, but several places along a narrow axis from Sioux Falls, SD to Detroit, MI (where the heavy snow banding set up) saw greater than a foot of snow. This storm broke records all across the region and for many ranks as one of the top biggest snowstorms for the month. For Chicago, IL this was the second largest November snow storm on record, making November of 2015 the fourth snowiest month ever. Additionally, a record daily maximum snowfall was set in Chicago on both November 20 (4.2 inches) and November 21 (7.0 inches), breaking the previous records set back in 1996 and 1893, respectively.

**Impacts:** The arctic air mass in the wake of the system on top of the already cold conditions from the previous cold front, allowed for temperatures to drop to near 20 degrees Fahrenheit, which combined with gusty winds to produce wind chills in the teens and single digits. These cold temperatures, combined with the heavy snowfall, created icy and dangerous road

conditions. In western Michigan, there was a 15 car pileup on I-196 and one woman was struck by another vehicle as she got out of her car along the highway. In Indiana, a toll road banned tractor trailers during the height of the storm because of dangerous conditions. Air travel was also compromised with over 500 flights cancelled or delayed at Chicago's two major airports.



**Figure 1:** 500 hPa shortwave trough (black), surface low track (cyan), frontal analysis valid at 12 UTC on 21 Nov, and approximate areas of greater than 4" snow (pink) and 10" snow (purple)



**Figure 2:** Total accumulated snowfall for the 72 hour period from 00 UTC 20 November through 00 UTC 23 November (Image courtesy of NOHRSC)