Upper Great Lakes to New England Winter Storm

24-25 February, 2016

By: Amy Campbell, WPC Meteorologist

Meteorological Overview: A robust winter storm tracked northeastward from the lower Mississippi valley through the Great Lakes region and across the Ohio valley and the Northeast on 24-25 February, 2016. This system brought rain, freezing rain and snow to portions of the Mississippi, Tennessee and Ohio valleys. Snow fell across much of the Great Lakes region and northern Ohio valley; with heavy snow over the lower Great Lakes and central Appalachians. Numerous showers and thunderstorms moved through the Southeast, Mid-Atlantic and the Northeast. Severe thunderstorms produced very strong wind gusts, heavy rain, flash flooding, hail and a few tornadoes from the eastern Gulf Coast to the Mid-Atlantic region.

Anomalous Gulf of Mexico moisture had transported northward in the days prior and during the event. Precipitable water values of 1 to 1.5 inches from the lowest 400 hPa were widely observed from the Gulf Coast to the Tennessee and Ohio valleys and along the Appalachians up the Mid-Atlantic and Northeast coast. Values of 1.5 to 1.7 inches were present over the lower Mississippi valley and spreading into the Tennessee valley by late in the evening on 23 February as the event was beginning – nearly 200 to 300 percent of normal. Typical monthly averages for February at a few select locations from the Deep South to the Great Lakes range from approximately 0.30 to 0.60 inch.

A 500 hPa trough with a closed low, extending from southern Canada to the Gulf of Mexico, propagated to the east. A moderately strong 300 hPa polar jet maintained wind speeds of 120 to 140 knots through the course of the event. Embedded jet streaks enhanced divergence aloft over portions of the Tennessee valley, which in turn, lowered the surface low's central pressure and supported deep warm sector convection out ahead of a strong cold front for several hours. The bulk of the snow fell parallel to the deformation zone; where the strongest 800-750 hPa Equivalent Potential Vorticity (EPV) was present within the frontogenesis zone.

During the afternoon of 24 February, EPV values of -2 and -3 were present from Michigan to New York. With convective symmetric instability (CSI) aloft in the dendritic growth zone, heavier bands of snow developed over Michigan. Moderate to heavy snow, along with strong wind speeds near 50 to 60 mph, created blizzard or blizzard-like conditions for the portions of the upper Midwest, especially areas south of Lake Michigan and across Lower Michigan where the highest snow totals were observed (Figure 1). Several communities measured over 12 inches although the report of 17 inches near La Porte, Indiana was the greatest. Snowfall intensity decreased over the lower Great Lakes area by late morning of 25 February as the surface low lifted north of Vermont and New Hampshire (Figure 2). During the afternoon the 500 hPa low had weakened from a closed circulation to an open trough. However, with stronger winds still present near the backside of the low pressure center, light to moderate snow showers persisted

downwind of the Great Lakes and across northern New England. Snow tapered off during the overnight hours as the 500 hPa trough quickly approached the Atlantic Ocean.

Impacts: Many impacts were felt during and after this snowstorm, especially near the Great Lakes region where Michigan and northern Indiana had the highest accumulations. Heavy, wet snow caused strain on tree branches which led many communities from Missouri to Michigan to be without power for hours. Numerous schools and even state government offices were closed during this storm across Illinois, Indiana and Michigan. The snow combined with the strong wind gusts caused visibility to drop near zero at times, which lead to treacherous driving conditions. A few state highways and secondary roads were snow-packed, with multiple rescues required of stranded motorists. Numerous flights were grounded across the Midwest – Chicago O'Hare International Airport cancelled approximately 860 flights alone on 24 February. The Saginaw River rose significantly during the morning of 24 February in downtown Bay City, Michigan but remained just below the flood stage of 17 feet. The Bay City Times reported that the strong wind from the winter storm caused the river to swell and appear to flow backwards. Water overtopped the seawall on the East Side, flooding portions of the River Walk at Wenonah Park. A few stretches were covered with 2 to 3 feet of water. The observed water levels were at the highest since the 1990s, and with the strong winds, it drove waves toward many homes along the Saginaw Bay.

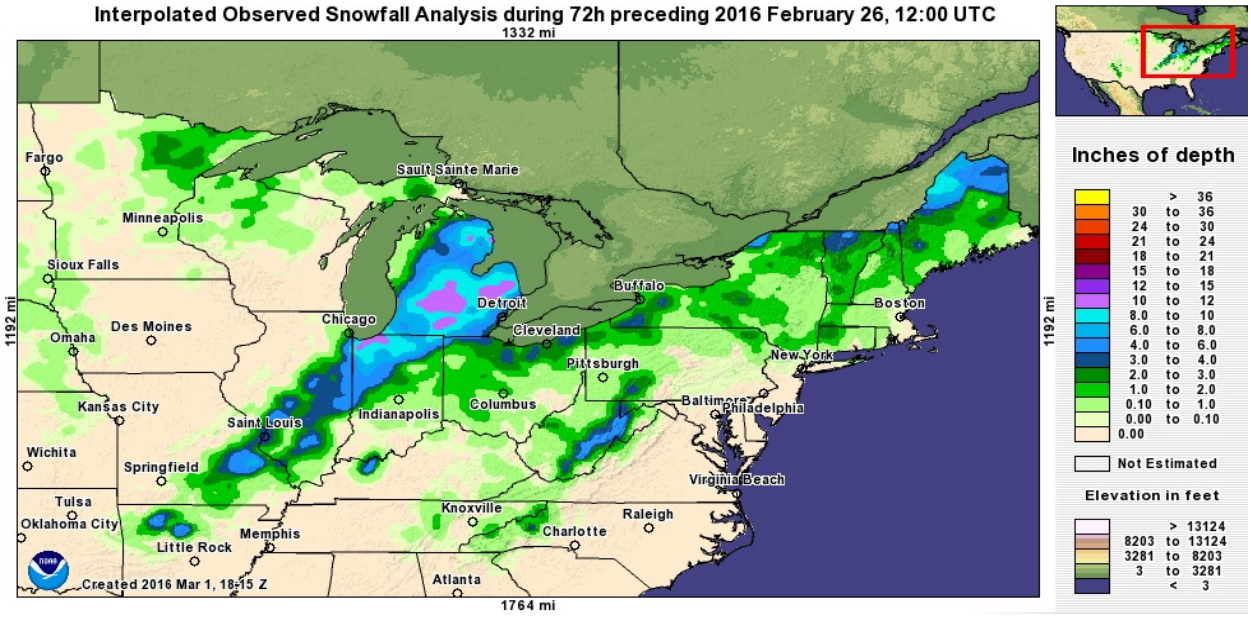

Figure 1: Snowfall amounts over a 72-hr period from 1200 UTC 23-26 Feb 2016 (NOHRSC).

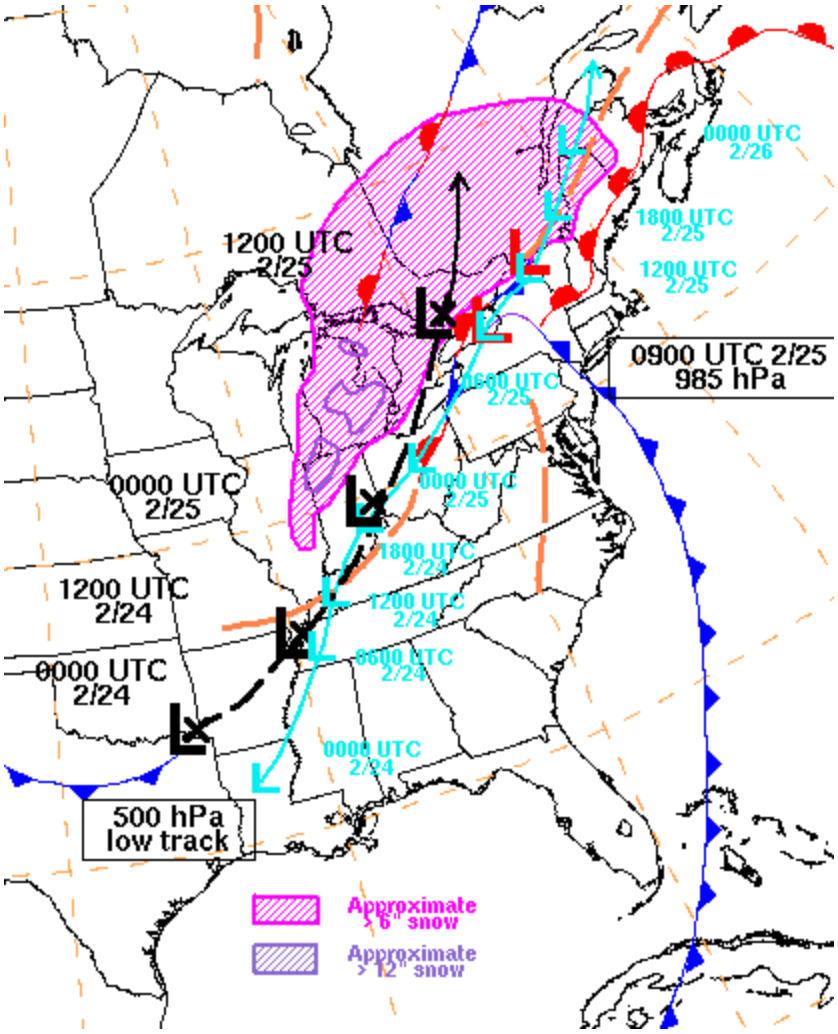

Figure 2: Surface low track (cyan), 500 hPa low track (black), approximate areas of snow greater than 6 inches (pink) and 12 inches (purple) and surface fronts at 0900 UTC 25 Feb.