

Tennessee Valley to the Northeast Winter Storm

14-16 February, 2016

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Meteorological Overview:

On 14 February a broad upper-level trough extended across the central and eastern U.S. At the surface, a quasi-stationary frontal boundary stretched from the Southeast to the southern Great Plains. North of the boundary an arctic air mass was in place across much of the eastern U.S. Cold weather records were set as temperatures fell below zero degrees Fahrenheit across portions of the Northeast that morning. During the late night hours of 14 February into the early morning hours of 15 February, a 700 hPa jet of 40-50 knots drew deeper moisture east-northeastward from the lower Mississippi and Tennessee valleys. Orographic lift associated with this jet brought locally heavy snow accumulations across the mountains of southeastern West Virginia and southwestern Virginia. Farther to the northeast, strong 700 hPa frontogenesis and 850 hPa warm air advection ahead of a shortwave trough that was advancing across the Great Lakes and Ohio valley helped produce a band of locally heavy snows that extended across portions of north-central Virginia into southern Maryland and the Eastern Shore of Maryland.

During the late morning and early afternoon hours of 15 February, a mid-upper level trough amplified as it moved from the central and southern Great Plains into the mid and lower Mississippi valley (*Fig 1*). In response, a strengthening surface low tracked along the frontal boundary from northeastern Texas into northern Louisiana. Precipitation continued to fall from the lower Mississippi valley to the Mid-Atlantic States. Winter precipitation changed to rain across the Tennessee and lower Ohio valleys as strong warm advection ahead of the shortwave eroded the cold air.

During the late afternoon and evening hours of 15 February, as the mid-upper level shortwave trough moved from the Mississippi valley into the lower Ohio and Tennessee valleys, the surface low tracked across the Tennessee valley toward the southern Appalachians. As warm, moist air advected northward across the Mid-Atlantic and Northeast coastal plains, shallow cold air remained dammed in east of the central and northern Appalachians. While temperatures surged into the 60s along the southern Mid-Atlantic coast, they remained in the lower 30s and upper 20s across the Piedmont and Appalachians. As a result, precipitation fell in the form of sleet and/or freezing rain across the southern and central Appalachians and along the adjacent Piedmont.

Precipitation continued to spread northward into the Northeast as backing winds ahead of the advancing shortwave drew warm, moist air into the region. During the early morning hours of 16 February, a wintry mix was reported across the northern Mid-Atlantic region, southern New York and southern New England, with snow further to the north. As the shortwave continued to lift steadily to the northeast, the associated surface low tracked into the upper Ohio valley. Warm air continued to surge northward ahead of the low; therefore, most areas from the northern Mid-Atlantic states to central New England transitioned to all rain by the late morning. However, snow continued to fall across the upper Ohio valley into the lower Great Lakes region. Robust 850-700 hPa frontogenesis and strong upper divergence along the right-entrance region of a 120-140 knot 300 hPa jet contributed to heavy snowfall north and east of the low.

By late 16 February, while the surface low began to lift into southern Quebec snow diminished across the western New York, while rain advanced steadily eastward across Maine. The storm lifted into eastern Canada during the early morning hours of 17 February, bringing precipitation to an end across most of the Northeast.

Impacts:

Snowfall accumulations exceeded 6 inches across portions of the Ohio valley and central Appalachians (*Fig 2*). A narrow band of heavier accumulations was also reported from north-central Virginia to the Eastern Shore of Maryland. The heaviest snowfall accumulations of the event were centered across western New York – where totals of up to 22 inches were reported. Rochester, NY which received 18.3 inches of snow, established a new daily snowfall record for 16 February. A new daily snowfall record was also established at Buffalo, NY. Widespread ice accumulations of 0.10 to 0.25 inch, with locally heavier amounts, were reported across the Appalachians, Mid-Atlantic States and the Northeast. The accumulated snow and ice disrupted travel across the region, with more than 6,000 flights delayed across the region. Ronald Reagan Washington National, Newark Liberty and LaGuardia were among the worst airports affected. Thousands of motor vehicle accidents were reported during this storm, with more than a thousand in North Carolina alone. Several of these accidents resulted in road closures, including the New York State Thruway near Albany, which was closed for several hours following a pair of tractor-trailer crashes. Thousands were affected by power outages as well, including more than 80,000 reported outages in Virginia and North Carolina.

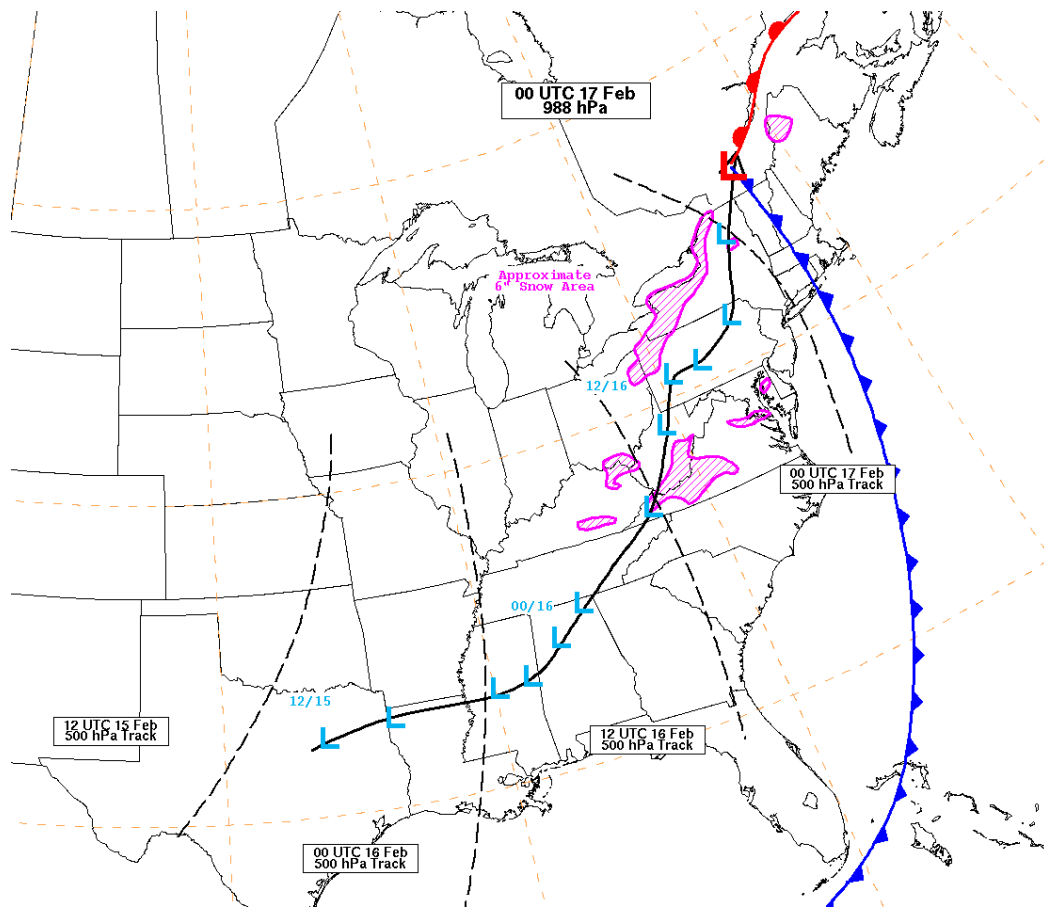


Fig 1: Surface low (blue) track, area of snow (magenta).

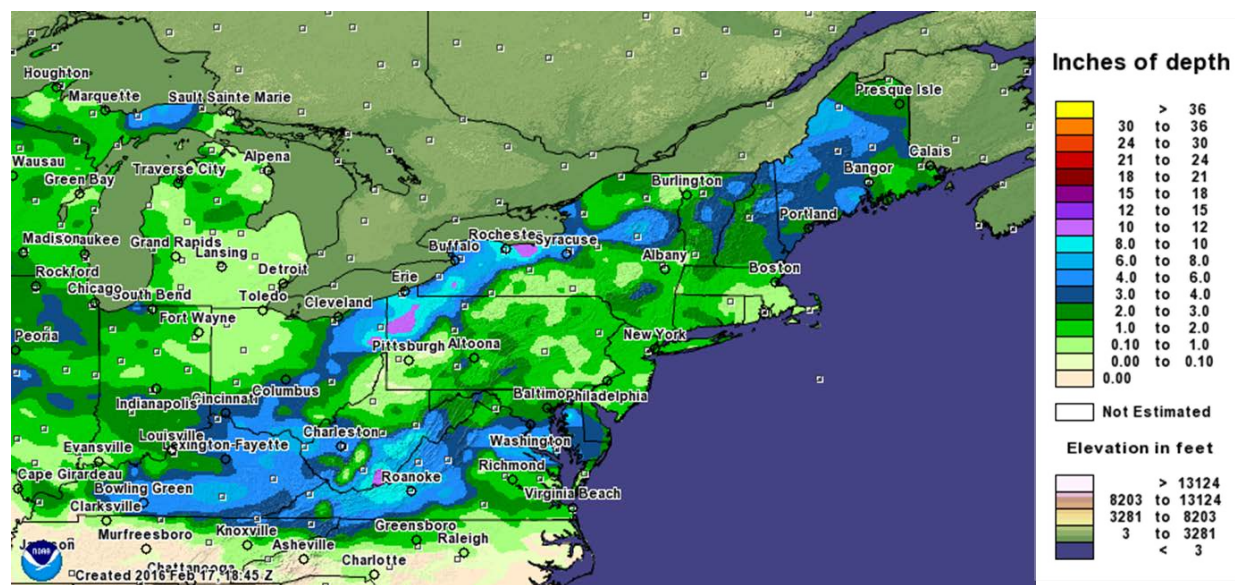


Fig 2: Total observed snowfall (interpolated) during 72h preceding 12 UTC on 17 February, 2016 (NOHRSC)