

Southern Plains to Northeast Winter Storm

7-10 December, 2017

By: Sean Ryan, WPC Meteorologist

Meteorological Overview:

On 7 December, an Arctic cold front overspread areas from the southern plains to the southeastern states. Farther south, a lingering polar front in the Gulf of Mexico and amplifying mid/upper-level shortwave crossing the southern plains would set the stage for the development of a frontal wave in the Gulf, and a large and relatively intense winter weather event across much of the southern U.S., from the Texas Gulf Coast to the southern Appalachians (*Fig 1*).

An amplifying upper trough across the southern plains from 7-8 December resulted in a broad area of deep southwesterly flow from the Gulf of Mexico into the southern/southeastern U.S. As a wave of low pressure developed along a surface frontal boundary in the Gulf of Mexico, low-level southerly flow increased, resulting in a broad area of isentropic lift north of the front, which was further enhanced by the arrival of an Arctic air mass across the southern U.S. A zone of intense low/mid-level frontogenetic forcing was established near the Texas coast, which extended northeastward through time, across the southeastern U.S., as the wave of low pressure in the Gulf tracked northeastward toward the Big Bend region of Florida. Throughout this zone of forcing, a large area of moderate to heavy snow developed, and persisted for a period of 8-12 hours at many locations. The heaviest snows fell within a relatively narrow band extending from east central Alabama, across northern Georgia, and into western North Carolina, with widespread accumulations of 6 to 12 inches within this area (*Fig. 2*). Isolated reports of as much as 18 inches of snow occurred in Mountain City, Georgia and near Cashiers, North Carolina.

As the upper-level shortwave moved into the southeastern U.S. early on 9 December, another wave of low pressure developed along the surface front off the coast of the Carolinas. While not a particularly deep surface low in the context of historic coastal storms (this low only deepened to 988 hPa by the time of reached the Canadian Maritimes), the system did produce a swath of 4 to 8 inch snowfall accumulations across portions of the Mid-Atlantic and Northeast.

Impacts:

Heavy snow accumulations resulted in downed trees and power lines, resulting in power outages and blocked roadways as well as numerous traffic accidents for much of the southern and southeastern U.S. This even included some areas near the Gulf Coast, such as Corpus Christi, Texas, where 4-7 inches of snowfall were measured. Across portions of northern Georgia, where some of the heavier snowfall totals were reported, some roads remained impassable for days, and many residents were without power for hours to days. Three fatalities (due to hypothermia) were directly attributed to the event in Texas, with two additional injuries resulting from the same cause. Total property damage of \$1 million was attributed to the event (likely an underestimate), primarily due to damage caused by the weight of heavy snow on trees and power lines. The storm ranked as a Category 2 for the Southeast on the RSI (Regional Snowfall Index) scale, with a value of 3.077. The storm affected a total population of over 97 million people.

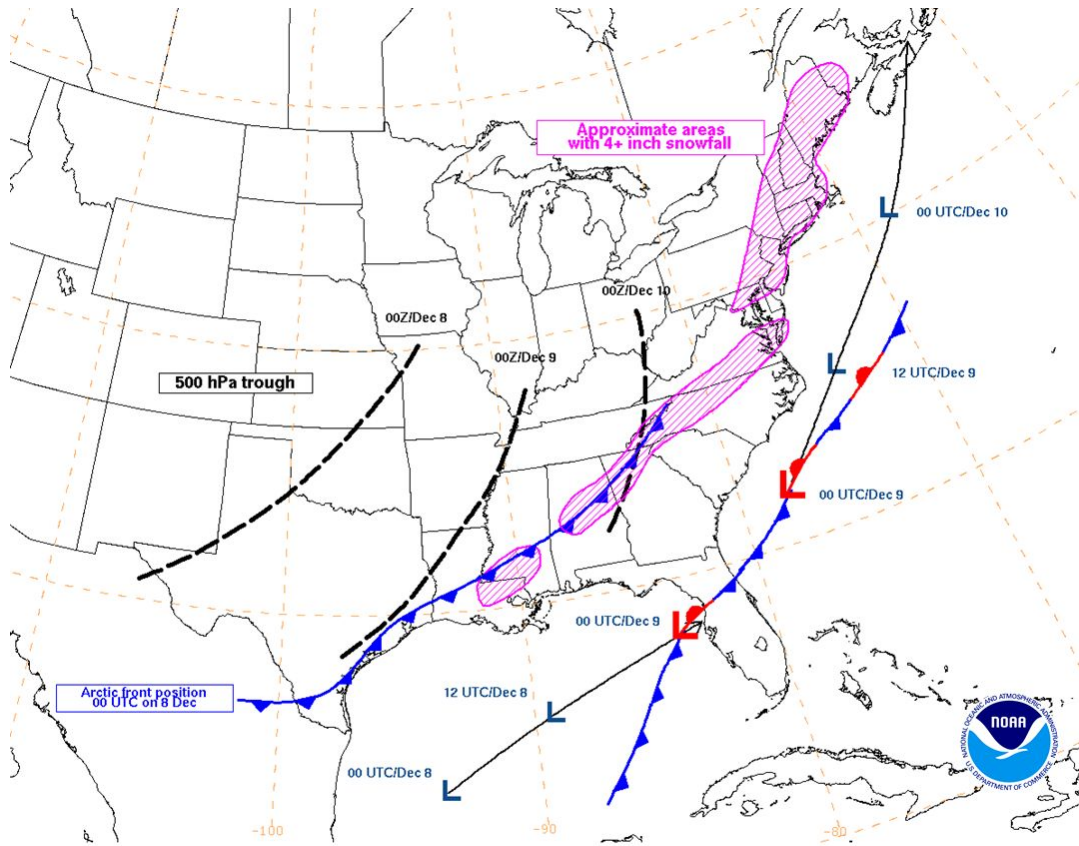


Figure 1: 500 hPa trough (black), surface low track (dark blue), approximate areas of snow accumulations greater than 4 inches (magenta). Arctic surface front is shown at 00 UTC on 8 Dec, and Southeast coastal front is shown at 00 UTC on 9 Dec.

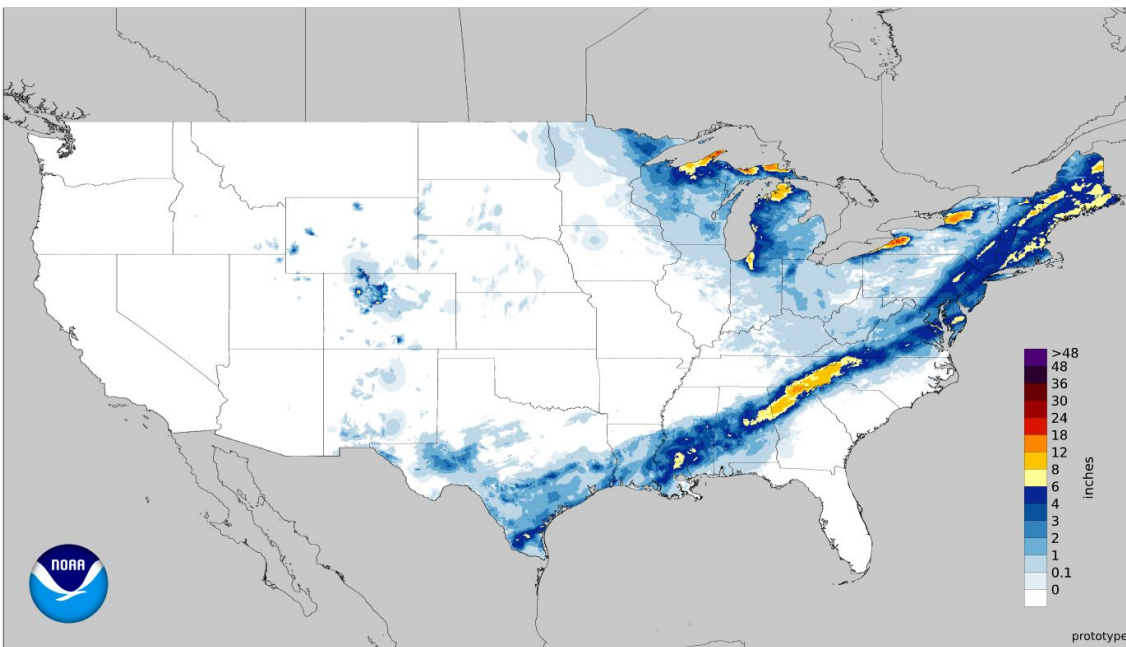


Figure 2: Total snowfall accumulation for the 72-hour period ending at 12 UTC on 10 December, 2017 (NOHRSC).