

Gulf Coast and Southeast U.S. Winter Storm 28– 30 January, 2014

By: Rich Otto, WPC Meteorologist

Meteorological Overview: A rare winter storm affected the southern and southeastern United States between 28-30 January, 2014, causing widespread disruptions to businesses, schools and the general public. Severe cold accompanied the storm, resulting in record cold across much of the Nation east of the Rocky Mountains, including the Gulf Coast region. Significant ice accumulations exceeding 0.25 inches occurred along the Gulf Coast of Alabama into the Florida panhandle along with 1 to 3 inches of snow throughout central portions of the Gulf Coast states (Fig. 1 and Fig. 2).

Late in the day on 27 January, a broad northern stream upper level trough was present over the eastern two thirds of the U.S., containing a subtle trough axis extending westward from the Upper Midwest to the northern Rockies. The storm began to develop as the subtle upper level trough axis sharpened and translated southeastward over the next 24 hours, accompanied by a reinforcing shot of cold air at the surface. An arctic cold front had already moved into the Gulf of Mexico early on 27 January, preceded by temperatures between 60 and 70 F across Texas and Louisiana, with these temperatures quickly falling below freezing only 24 hours later. While cold advection was occurring in the low levels, a southern stream upper level trough was tracking eastward across northern Mexico, which was coincident with a backing of low level winds across the western Gulf Coast. Relatively warm and moist air overran the cold air leading to an increase in precipitation from Texas and Louisiana into parts of the Southeast, falling as a mixture of rain, freezing rain and snow. Many areas receiving liquid precipitation slowly transitioned to freezing rain by 12Z on 28 January as surface temperatures continued to fall, beneath a relative warm layer aloft. A mixture of snow, sleet and freezing rain spread eastward throughout the day on 28 January and into the morning of 29 January impacting much of the Deep South, as far south as the central and eastern Gulf Coast. Warm, moist air from the Gulf of Mexico added moisture to what would have otherwise been a dry, arctic air mass, leading to widespread ice accumulations exceeding 0.25 inches.

As the southern stream upper level trough weakened during the day on 29 January while progressing eastward across the western Gulf of Mexico, a northern stream upper level trough axis amplified toward the Southeast. Overrunning wintry precipitation spread into the Southeast as a weak surface low tracked along the front into the western Atlantic. Strong frontogenesis near 850 hPa (Fig. 3) coincided with mesoscale banding of snow, adding up to between 6 and 10 inches of accumulation along the central Middle Atlantic Coast by the morning of 29 January.

Impacts: The impacts from this storm were numerous and widespread, with the greatest disruptions occurring from Mississippi to the Southeastern U.S. coastline. Some notable record low temperatures were reported on 29 January across Mississippi, some in existence since 1966, as documented by Greenville (8 F) and Vicksburg (10 F). Southern latitudes such as these are not equipped to treat and remove snow and ice accumulations of this relatively high magnitude, which resulted in thousands of traffic accidents and at least a dozen automobile deaths, in addition to the closure of major roadways and airports. The city of Atlanta, GA, experienced gridlocked roadways, forcing drivers to sleep in or abandon their cars overnight, while others were forced to sleep at retail stores due to impassible roadways from 2 – 3 inches of snow on 28 January.

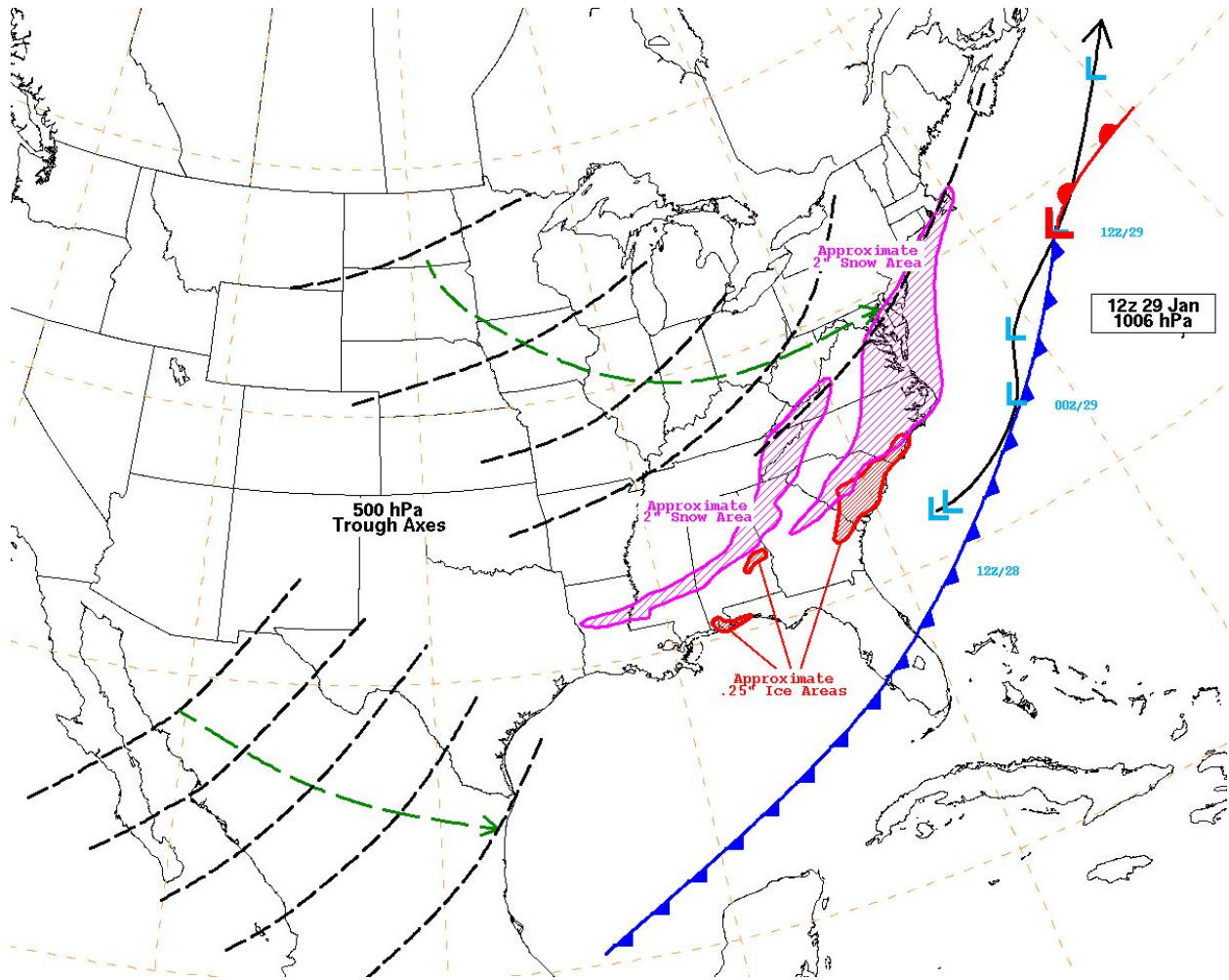


Figure 1: 500 hPa trough axes every twelve hours starting 00Z 28 January (black), surface low tracks every six hours (light blue), surface analysis as the surface low intensified near the end of the storm (12Z 29 January), approximate areal coverage of locations receiving 2 inches of snow (pink) and 0.25 inches ice accumulation (red).

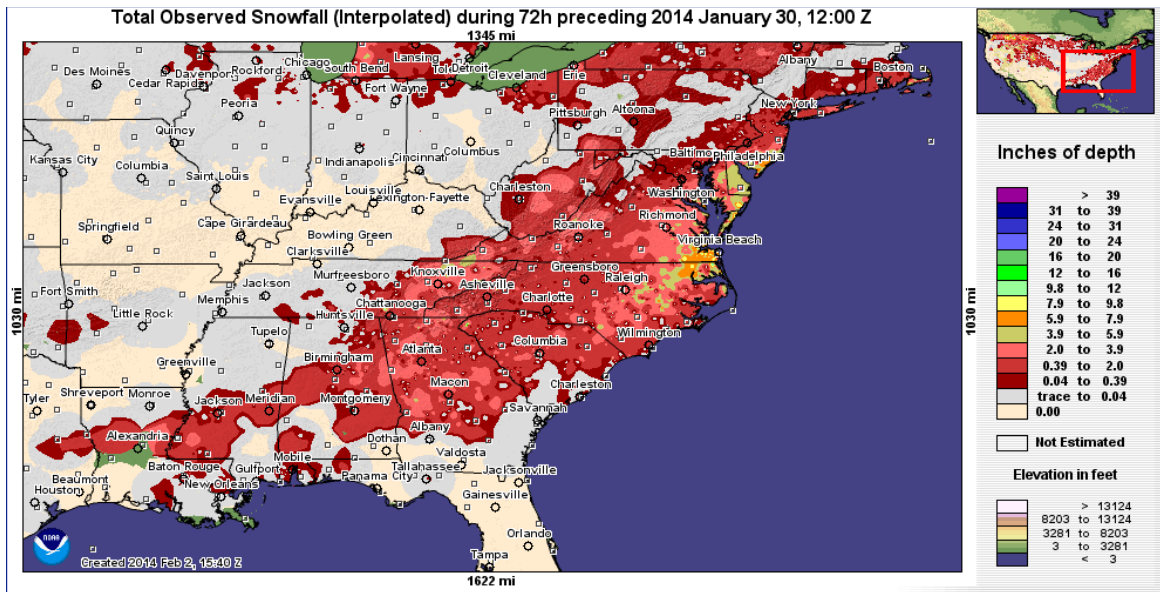


Figure 2: 72 hr snowfall accumulation ending 12Z 30 January, 2014 (National Operational Hydrologic Remote Sensing Center)

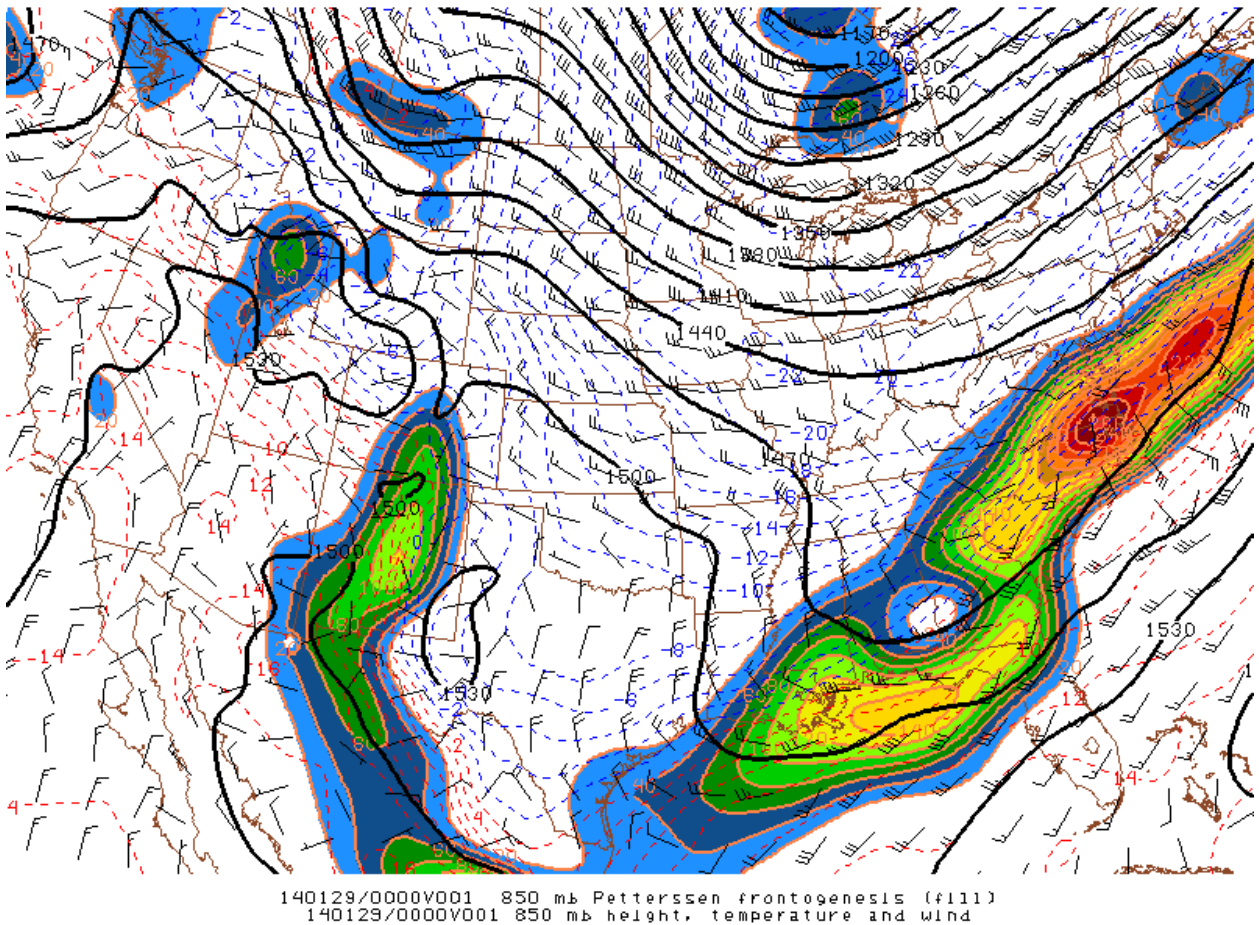


Figure 3: 850 hPa height (m), wind (kt), temperature (C), and Petterssen frontogenesis (shaded) (K/100 km / 3hr) valid 00Z 29 January. (Storm Prediction Center)