Historic Eastern U.S. Winter Storm
22-25 January, 2016
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Meteorological Overview: Over the course of a few days, a remarkable record-breaking storm dropped a large swath of heavy snow from Louisiana to Maine along with ice accumulations in the Mid-Atlantic States and Carolinas. The evolution of the surface low moving from the southeastern U.S. to the Northeast was a classic secondary coastal low development seen in many major East Coast blizzards. Cold air was already in place with Arctic high pressure wedged across the Mid-Atlantic and the Northeast. On the morning of 21 January, a potent short wave moved through the southern plains and into the lower Mississippi valley. At the surface, a low was located in central Texas along with a cold front draped across west Texas and a warm front moving across the Southeast. As both the short wave and the surface low tracked toward the Southeast, moisture from the Gulf of Mexico began streaming across the lower Mississippi valley. With a significant amount of precipitable water in place along with plenty of instability, a line of convection began to form around the Texas/Louisiana border in the early afternoon. By the time the surface low rapidly deepened during the evening of 21 January, these thunderstorms produced tornadoes, hail, and strong straight line winds.

During the early morning hours of 22 January, precipitation spread farther north and began to transition from rain to a mix of sleet and freezing rain across Kentucky. As the day progressed, moderate to heavy snow advanced across the southern and central Appalachians and by mid-day, areas across the Mid-Atlantic were beginning to see accumulating moderate to heavy snow. Overnight Friday, the primary low in the Southeast began to weaken in favor of secondary low development along the Carolina coast. As a result, the moderate snow across the Ohio and Tennessee valleys began to taper off. However, with the coastal low intensifying rapidly, the pressure gradient began to tighten across the Mid-Atlantic and wind speeds gusting up to 75 mph were reported along the Virginia/North Carolina coast during the early hours of 23 January through that afternoon. Farther inland, sustained winds greater than 35 mph brought blizzard conditions to parts of the Mid-Atlantic region. The heavy snow peaked in the Mid-Atlantic region where snowfall accumulations upwards of 22 inches were reported from the Washington DC metro region into Long Island, NY as the surface low skirted the Delmarva Peninsula.

As the surface low tracked farther offshore during 23 January, snow began tapering off for the Mid-Atlantic and the Northeast. By 12 UTC on 24 January, the last of the snowflakes fell in coastal Massachusetts as the storm system moved offshore.

Interestingly, although there was such a widespread amount of snow across a very large area, there was an extreme gradient in these amounts due to a sharp drop off in precipitation amounts (Figure 2).

Impacts:

The winter storm of 22-25 January, 2016 was ranked as Category 4, or “crippling” on the NESIS scale, with a NESIS value of 7.66 (https://www.ncdc.noaa.gov/snow-and-ice/rsi/nesis). This storm ranks 4th among all storms ranked by the NESIS scale, across the northeastern U.S.,

dating back to 1956. The storm also ranked as Category 4 on the RSI scale, with a value of 17.758, making it the 6th most impactful storm ever ranked on that scale for the northeastern U.S (dating back to 1900). The storm affected a total population of almost 53 million people.

Four major airports broke 24 hour snowfall records: JFK Airport, LaGuardia, Newark, and Baltimore-Washington International. Both Ronald Reagan National Airport and Philadelphia International Airport came close to their 24 hour record at 4th and 6th of all time, respectively. Two people died as a direct result from this snowstorm. This snowstorm impacted 102.8 million people, with 1.5 million people receiving at least 30 inches of snowfall or more and 24 million people receiving 20 inches (Figure 1). Hundreds of thousands lost power and schools were shut down for a week, along with the federal government in the Washington, DC area closing 25-26 January. In terms of transit, over 11,000 flights were cancelled between 22 – 24 January. Another impact was moderate to major coastal flooding along the Delaware and New Jersey beaches which caused major beach erosion and some property damage (Figure 3).

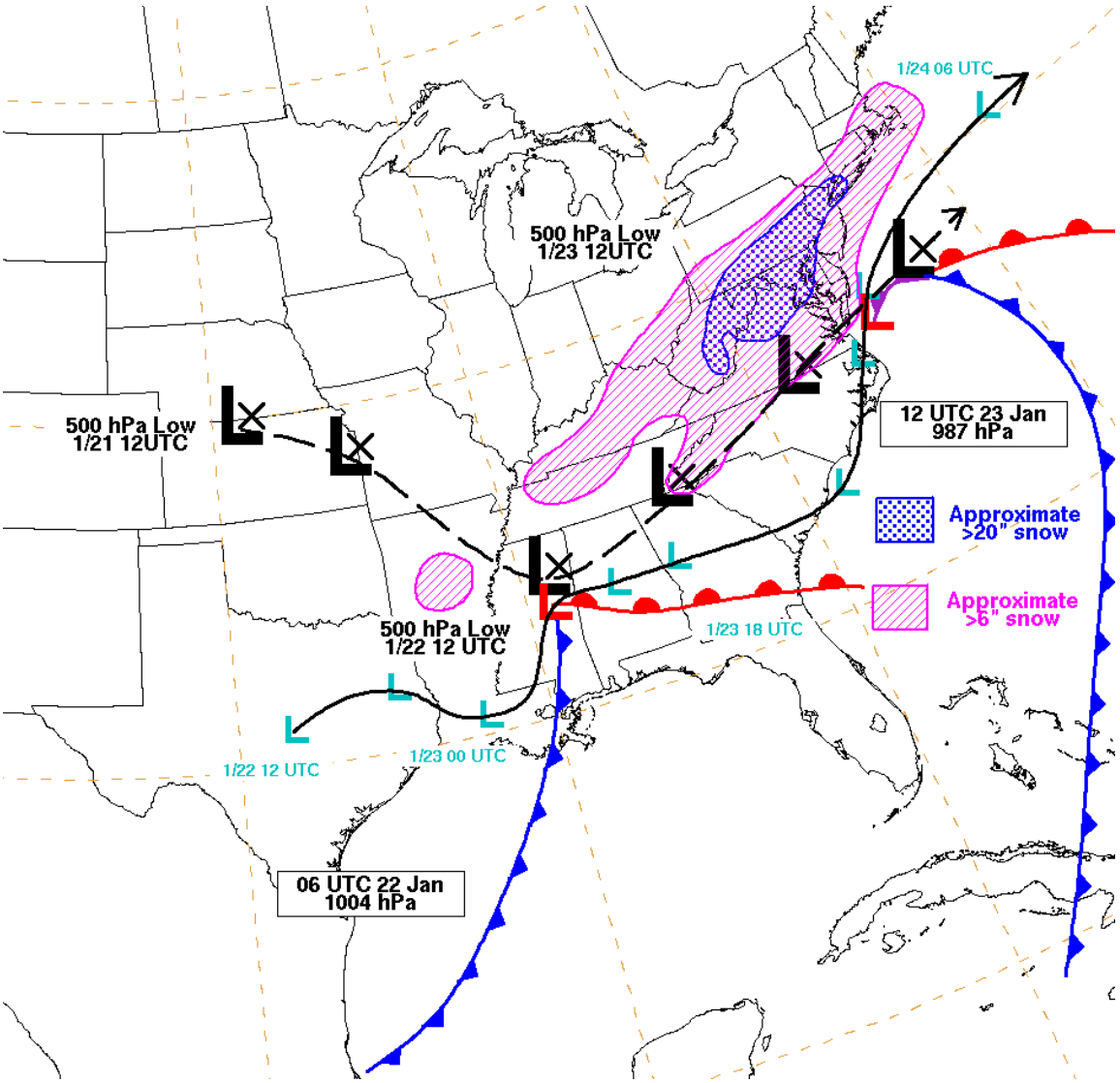

Figure 1: 500 hPa low (black L) track, surface low (blue) track, area of snow (blue and magenta), and the surface front during various phases.

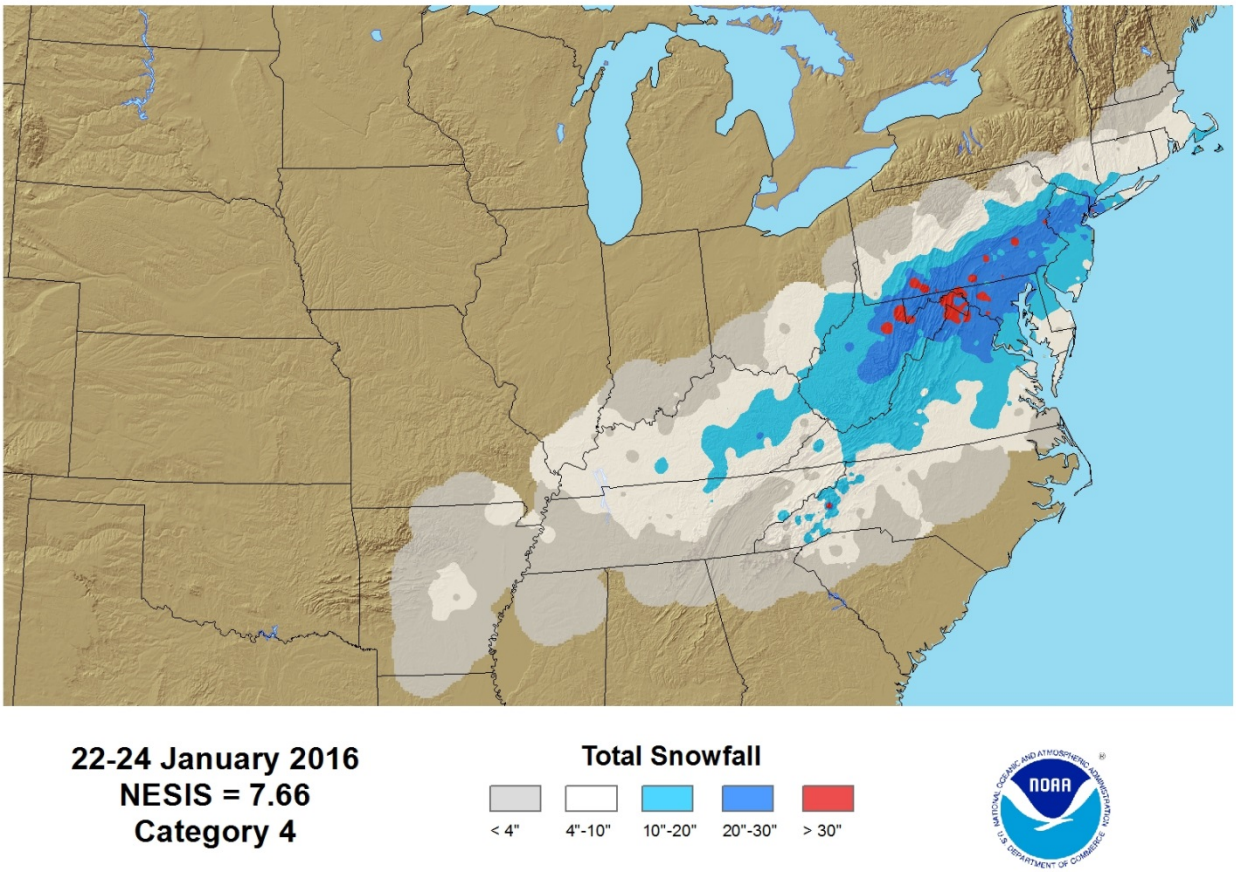

Figure 2: Map showing snowfall accumulations through the duration of the event from 22-25 January, 2016 (NCEI).

Figure 3: Erosion on Bethany Beach, DE
(courtesy of Alex Liggitt, @ABC7Alex).