WFO Huntsville Quick Event Review

Date/Time of Event: December 22–23, 2004

Forecaster(s) performing review: Bill Schaub

Type (and significance) of event: Freezing Rain Event – Greatest Threat to NW Alabama

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Overview of event:

Days ahead of time, December 22-23, 2004 was highlighted to our customers as a period that could pose a threat of flooding, followed by wintry precipitation.

Early on December 22nd, the strongest cold front of the season was approaching from western Tennessee and Mississippi. It would clash with air over northern Alabama and southern middle Tennessee with temperatures mostly in the 57- to 62-degree range. The Gulf of Mexico was open, with more unstable air to the south as usual. Disturbances rounding the base of a 500-mb trough over the western Gulf of Mexico were bringing occasional clusters of moderate to heavy rain, with isolated thunder, northeastward over Mississippi and northwest Alabama. In anticipation of locally heavy rains with flooding potential, a flood watch had been issued the night of December 21st for the entire CWA.

Forecast soundings from the 22/12Z MesoEta model for points within our CWA indicated that as temperatures dropped sharply after the front passed (far northwest corner on the 22nd at 5 pm to the far northeast corner at 5 am on the 23rd), rain would change to freezing rain mixed with sleet at times, and end as a brief period of sleet then light snow. Since the ground was still relatively warm, it was estimated that it would take about 3 hours after frontal passage before elevated surfaces, trees, and power lines would be able to freeze rain on contact. The QPF from the same model indicated that 0.50 inch would be available over the northwest Alabama counties and Tennessee counties between 9 pm and 3 am. Concurrently, the front would be through the three northwest Alabama counties by 9 pm, and from Franklin county Tennessee to Cullman county by midnight, with a wave on it over Morgan county.

The wave was forecast to accelerate into far eastern Tennessee very rapidly overnight, and take the deep moisture with it. Thus, the greatest threat for significant ice accumulations was over the area roughly west of I-65, with lesser accumulations to the east. In a briefing to the EMAs at 10 am on the 22nd, it was mentioned that ice accumulations of up to ¼ inch would be possible on elevated surfaces in northwest Alabama and the Tennessee counties, as well as in western parts of Limestone and Morgan counties. Elsewhere to the east, ice accumulation would drop off sharply as the wave passed through, with up to 1/8 inch possible, mainly in the higher terrain. Another briefing was scheduled for 2 pm. The ice accumulation amounts were basically taken as half of the available QPF, assuming that about half of it would fall before freezing on contact

began.

Based on some refinements to the forecast prior to the 2 pm briefing, it was decided to go with a winter storm warning for Lauderdale, Colbert, Franklin, Limestone, and Lawrence counties from 9 pm to 4 am, and a winter weather advisory for the rest of the CWA from midnight to 9 am. The same ice accumulations were expected.

Among many good questions asked by county officials at the 2 pm briefing, two in particular stood out. They were (paraphrased), "How confident are you of the ice accumulation predictions", and "What's the chance that the front will slow down and cause an extended period of even thicker ice?" Our answers were that confidence was good concerning the ice accumulations based on run to run consistency in the model we were using, and that the system appeared to be progressive with very little chance of a slow down occurring.

As it turned out, the flood watch was cancelled during the evening of December 22nd. The precipitation amounts up to that point had only been near one inch in parts of the CWA, mainly northwest Alabama, the Tennessee counties, and eastern sections of Cullman county. Also, the winter weather warning was downgraded to a winter weather advisory. Both of these were done because the main short wave over Arkansas, and the rain cluster ahead of it, accelerated faster than expected. Also, there was probably some reduction in moisture advection into our area due to more intense convection over the gulf coast region. Thus, rainfall ahead of the front during the early evening only added another ½ inch or so to the northwest counties, with much less available for a significant icing threat after the front. Basically, the deep moisture outran the cold air for our CWA.

Later reports indicated that some freezing rain of less than 0.15 inch fell over part of far northwest Lauderdale county, and observations from KMSL showed that freezing rain occurred between 12:48 am and 1:17 am on December 23rd with only 0.01 inch shown on the 12Z observation. However, icing was indeed a big problem on the 23rd for the counties of Lauderdale, Colbert, Franklin (AL), Lincoln, Moore, and Franklin (TN), not due to freezing precipitation, but due to standing water that froze after the front passed. Numerous roads in those counties remained icy through the day.

Thing(s) that went well or as expected (and why):

The Eta Bufr soundings gave excellent profiles in this case, obviously due to their finer resolution.

Thing(s) that didn't go so well or as expected (and why):

The models showed that the 500-mb high center at 21/00Z was farther south over Tennessee.

The reason for the ACCAS development was not readily evident in horizontal or layer forecast

fields in the models. It took a little chart analysis and a look at soundings to figure it out.

The "why" is related to initialization and mesoscale limitations in the models.

Other lessons we can apply to future events:

The models tend to place high/low centers based on the highest height/pressure. Thus it is important when doing our own chart analyses, to locate the actual centers by examining the wind field, i.e., streamlines.

If horizontal or layer forecasts in the models give no clue about why a particular phenomenon is occurring, check the soundings.