Severe Weather Event of 22 July 2005

FIC Report by Bill Schaub, 24 July 2005

Event Summary

This report addresses the severe weather event that occurred on the evening shift of July 22, 2005. Two rounds of severe thunderstorms occurred over the northeast border area of AL with TN.

The first round was between 4 pm and 6 pm, during which time 3 SVRs were issued, two for Jackson county and one for Dekalb. The second round was from 9 pm until midnight. This time there were 8 SVRs at various times for Franklin and Lincoln counties in TN, and Madison and Jackson counties, plus a FFW for Lincoln, Madison and Jackson. As of the date of this report, 7 of the 11 SVRs and 2 of the 3 FFWs have been verified.

The LMA data, in concert with radar observed reflectivity core strength and height, as well as VIL and VIL density, were excellent indicators of strong updraft cores. As in previous pulse storm events, increases in the LMA heralded the strengthening of updrafts.

The three meteorologists on duty were able to handle the event for the most part until both midnight shift meteorologists arrived shortly before 11 pm. This was due to the fact that both rounds of severe weather involved only one cluster of storms.

Operations would have been smoother had the FEP not crashed and taken the CRS down shortly after 930 pm. This occurred after the first two warnings in severe round two were issued, so many of the warnings went unaired. One meteorologist was tied up with this problem for over an hour, as he received recovery instructions by phone from the ESA.

Synoptic Discussion

During the night of July 21st, a MCS moved east over the Ohio valley. By the early morning hours of July 22nd, a surface outflow boundary had pushed into northern AL and GA. This feature continued south through the morning into southern AL. However, a residual surface wind convergence zone remained from north-central TN southward into northeast AL. It was this convergence zone that focused scattered thunderstorm development by the mid afternoon in the southeast section of the Nashville CWA.

At mid afternoon the atmosphere was highly unstable, as it had been for days, with LIs of -6 or less and CAPEs in excess of 4000 Jkg^{-1}. The environment was basically favorable for pulse type storms with low vertical wind shear, and a mid-level dry intrusion from the north with potential to enhance downdrafts and promote downbursts.

As a thunderstorm moved south over Marion county TN shortly before 4 pm, it became stronger over the southern parts of that county. This cell prompted the first SVR for Jackson county in northeast AL a few minutes after 4 pm. The cell was about 45 degrees off the Hytop radar radial and showed velocity of 40-45 knots at around 2,000ft AGL. Assuming the outflow from the cell would be from the north, the actual velocity would be around 60 knots. Wind damage occurred in Bridgeport and Stevenson 25-30 minutes after the warning was issued.

The next warning extended the one for Jackson county, and included a warning for Dekalb county. During the course of this warning, no damage reports were received as the initial multi-cell storm fanned out into an arc of individual cells. However, with the expiration of this warning, a follow-on SPS was issued for wind gusts up to 50 mph. After the cells had exited our CWA, a report came in of a tree down in Powell in Dekalb county during the valid time of the warning. Then a little later, another report came in of a barn roof blown off and trees down in western Dekalb county during the valid time of the SPS. A look back at the radar data showed no obvious severe signatures at the time.

As the first round of activity diminished after 6 pm, we thought that severe weather was probably done for the night. There was a scattered line of convection oriented west to east across central TN that was sinking slowly south. This activity was focused in a narrow zone of high theta-e air and wind convergence as seen at the 925-mb level in the RUC40 model. While the RUC40 indicated that the activity would slip into northern AL before dissipating around midnight, we were at first skeptical since daytime heating was over. We became believers later around 730 pm when a couple cells on the eastern end of the line were heading south toward Franklin county and strengthening!

Apparently, the boundary sinking south through TN was interacting with the earlier boundary over our eastern counties. As cells got closer to northern Franklin county around 8 pm, they were handled with significant weather alerts. After two cells merged in Franklin county, lightning became continuous over the southwest section of the county. A report of wind gusts over 50 mph from the Huntland spotter, and high VILs from the KOHX radar, prompted a SVR for Franklin county. This was followed in the next half hour by SVRs and FFWs for Lincoln, Madison, And Jackson counties.

Between 930 pm and 1030 pm, the multi-cell severe cluster mushroomed into a MCC that covered the northeast quadrant of our CWA. During that time, numerous reports were received of damaging wind gusts around 60 mph in the warned counties, as outflow from the collapsing cluster spread west and south. Base velocity values from the Hytop radar indicated 50-knot winds around 2,000 ft AGL in the bowing outflow. Flash flooding was confirmed later by deep water over highways in Lincoln and Madison counties.

The last two SVRs were issued for Lincoln county for a cell that developed over the westward propagating outflow of the dissipating parent cluster. This was an intense cell, but no severe reports were received.

It should be mentioned that as this cluster of storms drew close to the Hytop radar, it was not well sampled, especially in volume products such as VIL and precipitation. As you know, when storms are very close to Hytop, it is important to make further interrogation from the KOHX radar.