Severe Weather Event of 7 April 2006

FIC Report by Bill Schaub
Evening shift, 7 April 2006

13 April 2006

1. Event Summary

This brief FIC report addresses the significant severe weather event that started in the HUN CWA just after 5:00 pm on Friday 7 April 2006. Its effects which included large hail, damaging wind, tornadoes, and flash flooding were felt mainly through midnight that evening. Lingering minor effects due to excess runoff persisted near some area waterways through the weekend. While there were fortunately no known injuries, *Huntsville Times* accounts by area insurance companies indicate that the majority of property claims thus far have been hail related.

The event was anticipated several days ahead of time in the HWOHUN, and a SPS was issued on 5 April 2006 to heighten the public awareness of the severe weather potential. Our briefings to the EMAs and the media began the morning of 6 April 2006. Around noontime that same day, the SPC in a rare move put our CWA in a high risk area for 7 April 2006 with a 60% probability for severe thunderstorms.

On 7 April 2006, a tornado watch was issued at 10:20 am which included our southern middle Tennessee counties. Here are some excerpts from the bulletin:

...THIS IS A PARTICULARLY DANGEROUS SITUATION...

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VERY POTENT TORNADIC SUPERCELL ENVIRONMENT IN PLACE ACROSS TN VALLEY
AHEAD OF DEEP SURFACE LOW OVER NERN KS.  STRONG DEEP LAYER SHEAR...VERY
STEEP MID LEVEL LAPSE RATES...AND MDT TO STRONG INSTABILITY WILL LEAD
TO RAPID DEVELOPMENT OF SEVERE THUNDERSTORMS OVER LOWER OH AND TN
VALLEYS BY EARLY AFTERNOON. TORNADIC SUPERCELLS ARE EXPECTED WITH
POTENTIAL FOR VIOLENT/LONG TRACK TORNADOES.
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The next tornado watch for our area was issued at 11:35 am and was valid until 8:00 pm. It included all but Marshall, Jackson and Dekalb counties in northeast Alabama. The last tornado watch for us came out at 7:30 pm and was valid until 4:00 am on 8 April 2006. This one included our whole CWA.

To account for expected training of thunderstorms, and in view of the fact that our area was identified by the HPC as likely to have excess rainfall, a flash flood watch was issued at 5:58 pm and was valid until 4:00 am on 8 April 2006. This included all but Cullman and Dekalb counties. A SPENES was issued about an hour later which highlighted northern Alabama as the area most likely to see flooding.

2. Synoptic Situation

A cold core low over the central plains states on 6 April 2006 was forecast to begin moving southeast toward the lower Mississippi valley the next day. Ahead of the upper low, deep southwest flow existed over the southeast states. By 07/12Z, a band of 40-knot wind at 850 mb was over central Mississippi and extended to eastern Tennessee. At the same time, an 80-knot 500-mb jet streak was over Arkansas directed toward western Tennessee where the flow at that level became noticeably difluent.

The Nashville sounding for 07/12Z showed a "loaded gun" type profile with good low-level moisture in the layer from 3 to 7 thousand feet topped by a deep dry layer. The wind profile was veering and highly sheared. The 0- 3-km SRH was 311 m^2 s^{-2} with the CAPE at 398 J kg^{-1} and the LCL at 6,479 feet. At 18Z the cap was broken, apparently as the 500-mb jet streak moved over the area. The southwest winds at 500 mb had increased to 75 knots, up from 63 knots at 12Z. The SRH was 297 m^2 s^{-2} with the CAPE up to 1,536 J kg^{-1} and the LCL at 4,308 feet. Between noontime and 1:00 pm on 7 April 2006, huge scattered supercells with large hail and tornadoes developed in the Memphis and Nashville CWAs and spread northeast into Kentucky as the afternoon progressed.

Based on the 08/00Z 500-mb chart, the upper low center had moved southeast to over southwest Missouri with another jet streak of 70 knots over Louisiana and northern Mississippi and difluent flow over the Arklamiss. It seems that the approach of this second jet streak is what helped to fire the severe weather in the JAN and HUN CWAs. Inspection of the sky on my drive to work indicated that the local atmosphere was still capped since cumulus clouds were not growing vertically. This changed quickly as the upper jet streak approached. The initial reports of severe weather with this system were large hail, first in the JAN CWA just before 4:00 pm, and then in our CWA a few minutes after 5:00 pm in Colbert county.

Due to the slow southeast progress of the upper low, a broad band of repeating supercells developed in a low-level convergence zone that started over west-central Mississippi and became narrowly focused over northwest Alabama by 7:00 pm. A streamline analysis of the 08/00Z 925-mb chart showed this feature with a warm 30-knot jet at its core punching into northwest Alabama. Thus at the start of severe weather over northwest Alabama, there was low-level convergence and warm advection topped by mid-level divergence and cold advection with resultant steep lapse rates. Thunderstorms that continually formed in the low-level convergence zone developed strong rotating updrafts due to the highly sheared veering wind profile.

The thunderstorms probably gained additional energy for their mesocyclones within the low-level convergence zone. As has been shown in the literature and was part of our spring training, such a zone can be a breeding ground for tornadoes. Vertical vorticity generated in the zone can be stretched upward by thunderstorms with strong rotating updrafts as they move over it, thereby augmenting their mesocyclone strength.

The convergence zone gradually oriented itself southwest to northeast across our CWA as the evening progressed with a very slow drift to the southeast. The IR satellite imagery depicted a MCS with cold cloud tops that started in west-central Alabama and expanded northeastward with time over northern Alabama and southern middle Tennessee.

3. The Event

As severe thunderstorms spread northeast from west-central Mississippi into northwest Alabama, the counties of Lauderdale and Colbert were the first to experience severe weather. Between 5:00 pm and 6:00 pm both counties had reports of golf ball size hail and Colbert county had a tornado report just north of Cherokee. A train of repeating severe thunderstorms continued through the evening with a slow sinking to the southeast.

a. Warnings and verification

A total of 41 tornado warnings, 20 severe thunderstorm warnings, and 14 flash flood warnings (one for each county) were issued between 5:07 pm on 7 April 2006 and 12:41 am on 8 April 2006. Some of the tornado and severe thunderstorm warnings were by necessity extensions of previous warnings due to the training storms. The first 11 warnings between 5:07 pm and 7:30 pm were all tornado warnings for the counties of Lauderdale, Colbert, Franklin (AL), Lincoln, Moore and Franklin (TN). The next long string of tornado warnings was between 9:54 pm and 11:02 pm when 10 were issued for the counties of Lawrence, Morgan, Limestone, Madison, Cullman, Marshall and Jackson.

As of 13 April 2006, 18 tornadoes (F0 to F1) have been confirmed by surveys in the HUN CWA. Twelve tornado reports appear in the most recent summary LSR with specific times. Eight of the severe thunderstorm warnings and 4 of the flash flood warnings have been verified. The main concern was obviously for tornadoes and most people were not venturing out to witness other severe weather and flash flooding.

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