USING DATA FROM THE METEOROLOGICAL DATA COLLECTION AND REPORTING SYSTEM TO ASCERTAIN THE NEAR-STORM ENVIRONMENT NEAR MEMPHIS, TENNESSEE DURING THE 5-6 FEBRUARY 2008 TORNADO OUTBREAK

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The Meteorological Data Collection and Reporting System (MDCRS) developed for the Federal Aviation Administration and the National Weather Service (NWS) enables the collection and organization of real-time weather data from about 1,500 participating aircraft. These data include environmental temperature, wind, and in some cases, water vapor. These data have been shown to aid weather forecasting, particularly in understanding the near-storm environment for severe thunderstorms and are used in NWS operations to make critical warning decisions.

In this study, MDCRS data from aircraft in the vicinity of Memphis, Tennessee, were analyzed to determine how the temperature and wind changed prior to and during the 5-6 February 2008 “Super Tuesday” tornado outbreak.

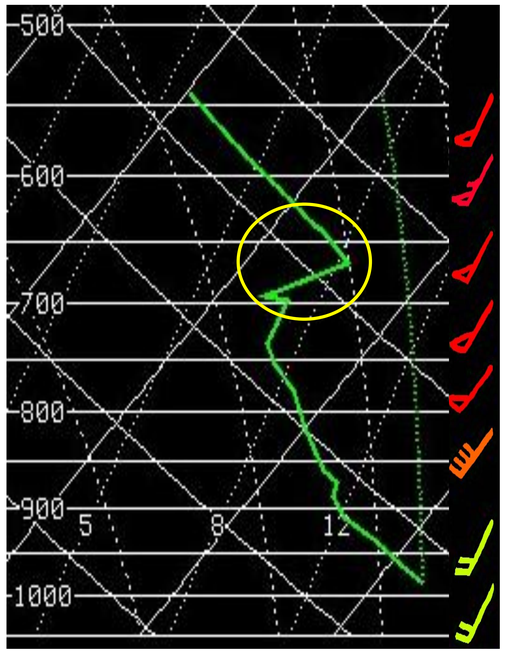

Figure 1.

MDCRS sounding and wind data near Memphis, Tennessee at 1825 UTC 5 February 2008.

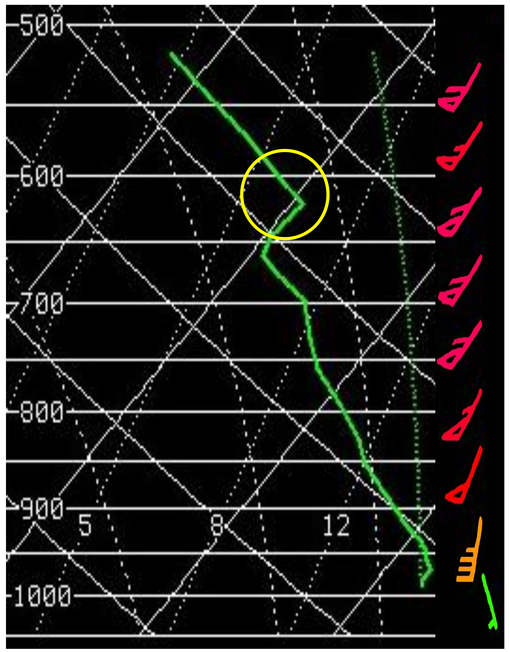

Figure 2.

MDCRS sounding and wind data near Memphis, Tennessee at 2125 UTC 5 February 2008.

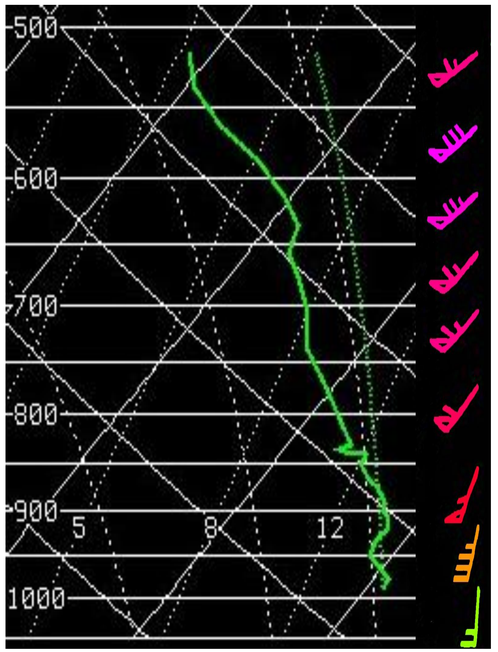

Figure 3.

MDCRS sounding and wind data near Memphis, Tennessee at 0035 UTC 6 February 2008.

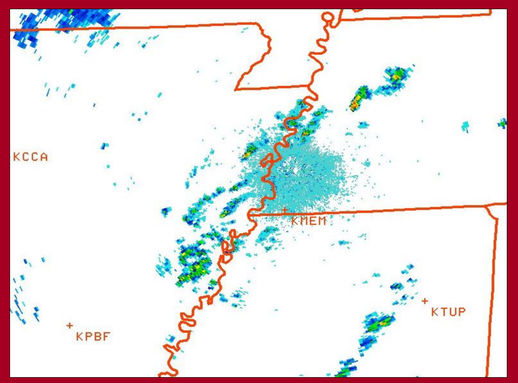

Figure 4.

0.5º reflectivity data from the KNQA WSR-88D at 1800 UTC 5 February 2008.

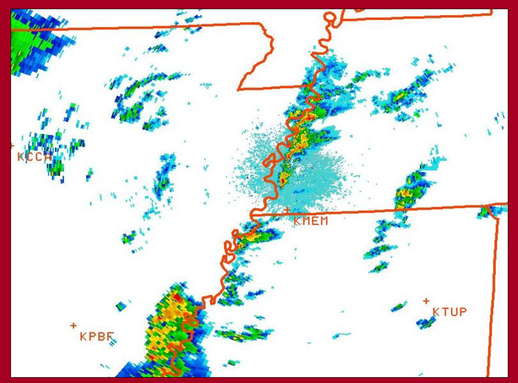

Figure 5.

0.5º reflectivity data from the KNQA WSR-88D at 2125 UTC 5 February 2008.

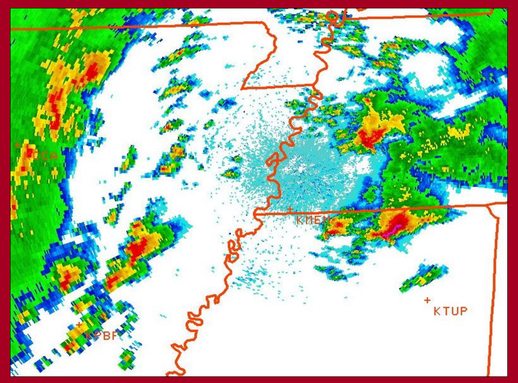

Figure 6.

0.5º reflectivity data from the KNQA WSR-88D at 0036 UTC 6 February 2008.

The MDCRS data indicated a pronounced weakening of a capping temperature inversion between 600 and 700 hPa prior to the tornado outbreak. This later allowed for deep moist convection to occur in an unstable airmass.

These data also depicted a noticeable increase in atmospheric winds, which resulted in greater shear and storm relative helicities. This led to the development of supercell thunderstorms.

An outbreak of tornadoes resulted across the Mid-South near Memphis, Tennessee, as well as the Tennessee and Lower Ohio Valleys. Some tornadoes were long-lived and caused loss of life as well as considerable damage.

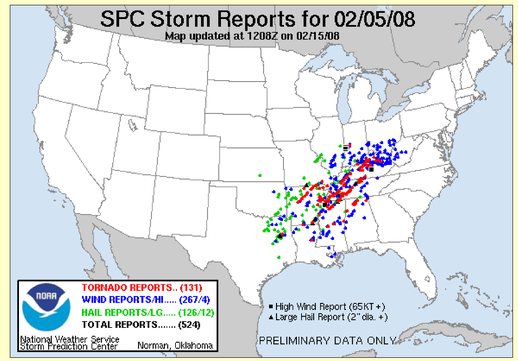

Figure 7.

NWS Storm Prediction Center Storm Reports for 5 February 2008.