Severe Supercell from 12 June 2013

Event Overview

On Wednesday, 12 June 2013 a favorable setup for severe weather was in place across the Midwest. An upper level circulation was sliding southeast from the Dakotas with dry air on the southern side over Nebraska and Iowa. The physical properties of the atmosphere show that rising air occurs ahead of these upper level waves. At the surface an area of low pressure was located across Iowa. Low level warm moist air was surging up from the south. (Fig 1) The combination of these two features set the stage for afternoon organized thunderstorms capable of producing severe weather. Five hours later severe thunderstorms had developed across the region (Fig 2).

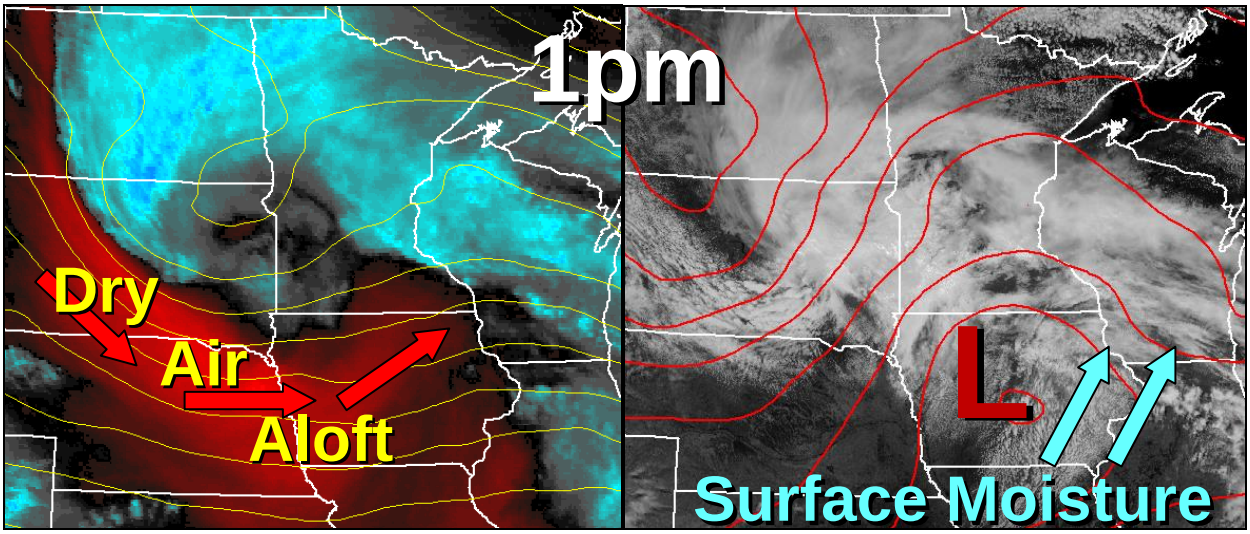

Figure 1: The satellite imagery shows the Water Vapor with 500mb heights (left), and Visible with surface pressure (right) at 1pm Wednesday afternoon. The red shading in the left-hand image shows where dry air is located above the surface, generally 4 miles and higher above ground level. In the right-hand image the cellular clouds in eastern Iowa is where warm moist air at the surface is surging northward east of the surface low.

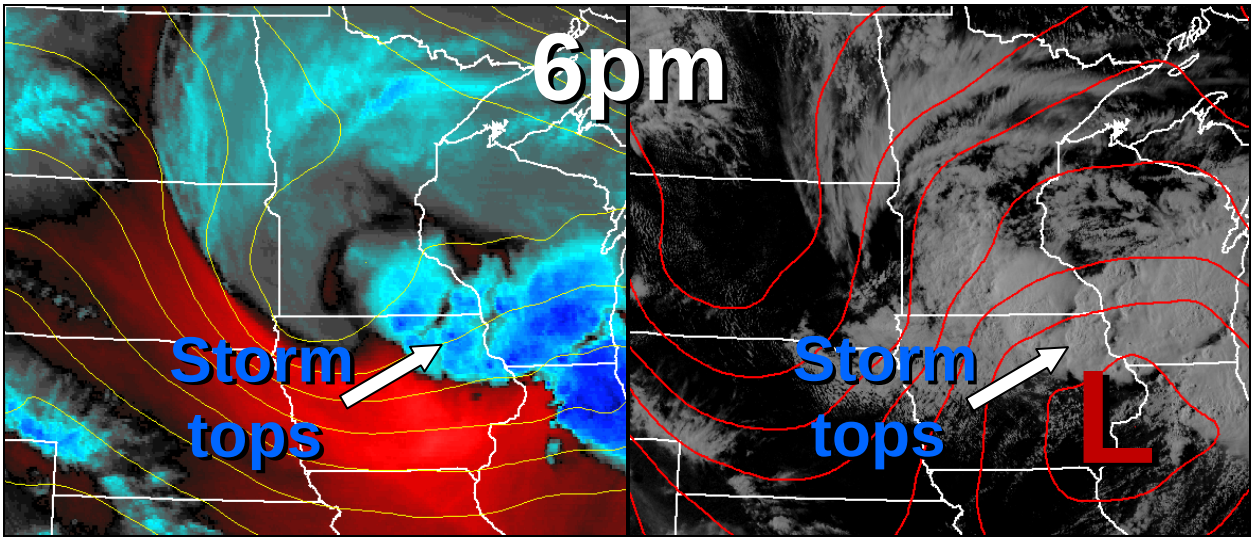

Figure 2: Same as above, only these images are from 6pm Wednesday evening. The blue colors in the left-hand image shows moisture that is located high above the surface as a result of the thunderstorms' anvil clouds spreading out. The visible satellite on the right verifies where the thunderstorms are located.

One storm in particular developed across south central Minnesota and strengthened as it moved southeast through Blue Earth, Faribault, and Freeborn counties. This was a supercell thunderstorm, meaning it had a rotating updraft (Fig 3). Because the updraft rotates, it can persist for hours and support very large hail. The supercell's updraft extends several thousand feet above ground (Fig 4). In this case, baseball size hail was reported near Wells MN, along with extensive wind damage, and rainfall rates of 3 inches per hour.

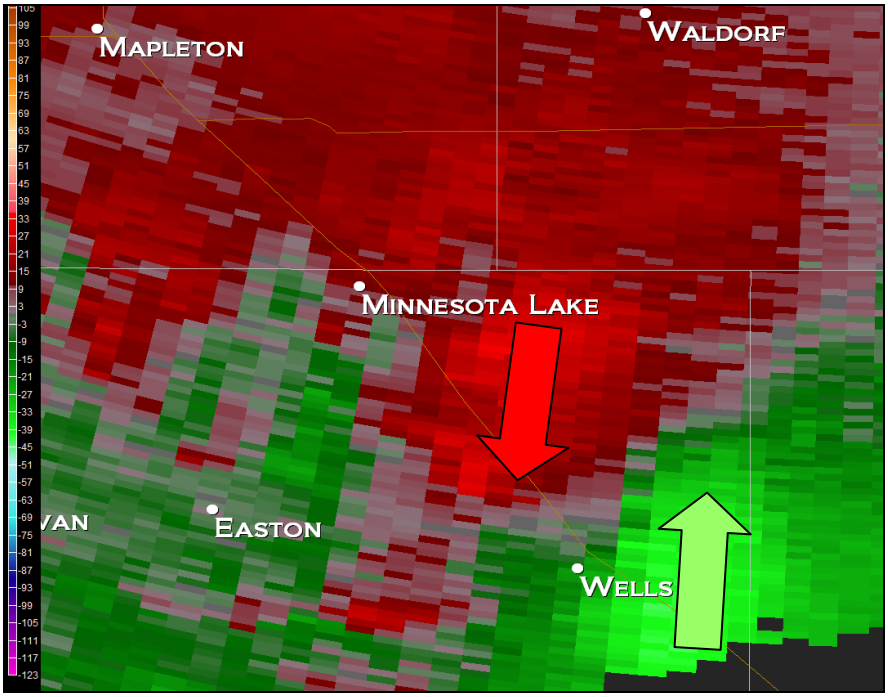

Figure 3: The image to the left shows how the air is moving in the storm. The red colors are away from the radar, and the green colors are toward the radar. The radar is located to the north in Chanhassen MN, which is not shown on this map. This radar velocity signature tells us that the storm was cyclonically rotating, and therefore a supercell.

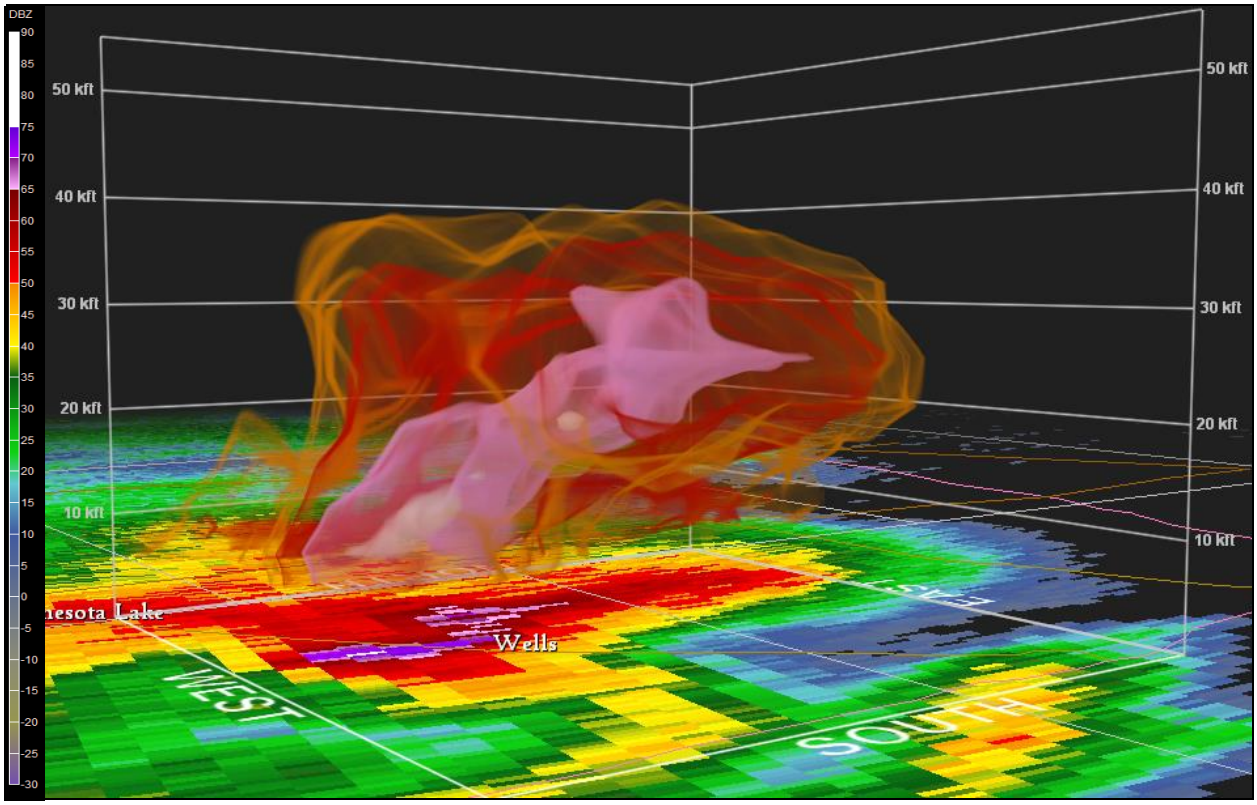

Figure 4: This last image is a 3D volume scan of the storm as it was moving across Wells. Notice the high reflectivity core (pink) extending beyond 30,000 ft above ground level. This is the hail core of the storm, and it is descending to the ground just north of Wells. Baseball size hail was observed with this storm.