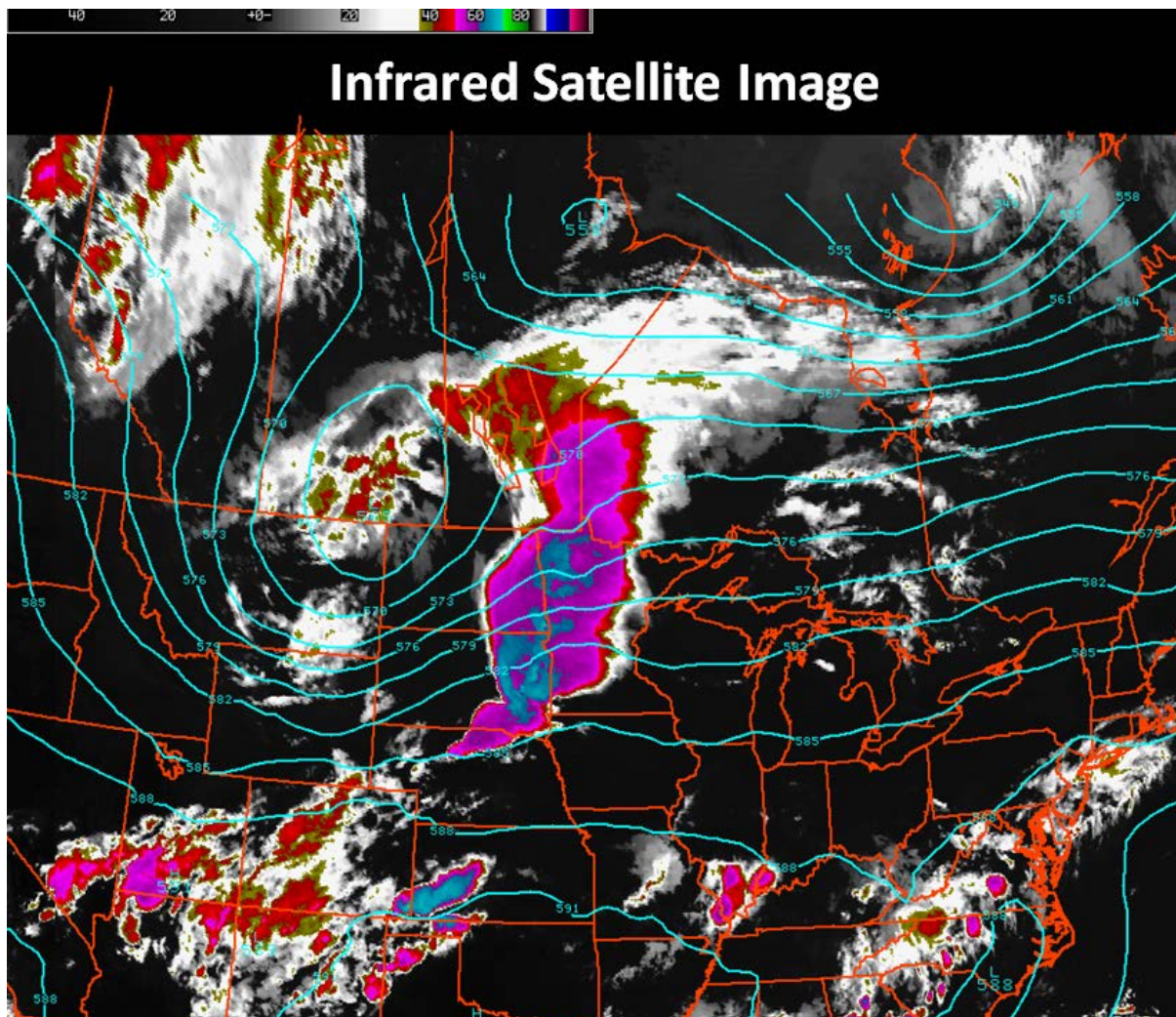


# **A Recap Of The 03 August 2012 Severe Wind Event Across Southern Minnesota And West Central Wisconsin**

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## **Event Overview**

A powerful low pressure area and positively tilted trough were moving east across southern Saskatchewan/northern Montana early Friday. A strong cold front was oriented north to south from the surface low pressure center that was over extreme southeastern Saskatchewan. By midafternoon Friday, the front had moved over the eastern Dakotas and would serve as the primary lifting mechanism to initiate thunderstorm development. South and southeasterly winds at the surface were advecting warmer and moister air into the region. By early evening, temperatures had climbed to the upper 80s with a few low 90s, and dew point temperatures generally ranged from the mid-60s to low 70s. Supercell thunderstorms which initially fired west of Aberdeen, SD and produced numerous reports of golf ball size hail would progress east and morph into a well-defined line of storms by the time they reached western Minnesota. As this occurred, the northern end of the line turned primarily into a wind threat as bowing segments in the line were already apparent before reaching the Minnesota border.

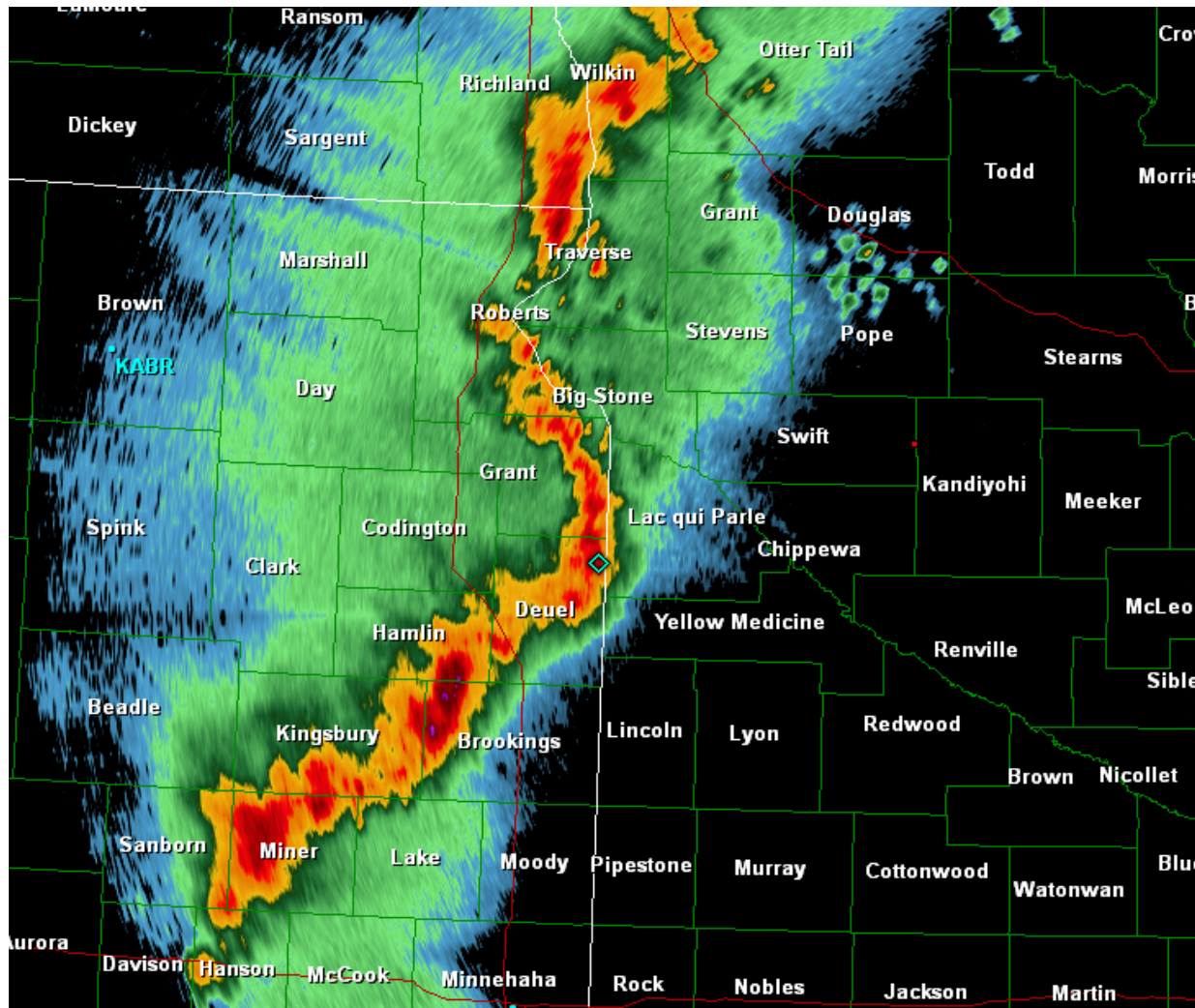


*Figure 1: IR Satellite with 500mb heights give a good depiction of the overall weather pattern at 7:55 pm on August 3rd. The low pressure center in the mid-levels of the atmosphere was centered near southern Saskatchewan and extreme northwestern North Dakota. The IR satellite indicates the coldest cloud top temperatures over the eastern Dakotas, which were associated with the tallest, strongest thunderstorms.*





speeds easily over 60mph in the storm. If the surge of air can mix down to the surface through the heavy precipitation and develop a cold pool of rain-cooled air, the strongest winds can be realized at the surface as the more dense, cooler air descends to the ground.



*Figure 3: This radar image, captured at 7:51 pm, shows a bow shape in the line of thunderstorms moving into Lac qui Parle County.*

Multiple severe thunderstorm warnings were issued as the line of thunderstorms moved east into south central Minnesota. Many automated weather observation sites recorded wind gusts from 45 to 55 mph, but severe criteria winds (58mph or greater, or damage to structures or trees) were only observed in isolated areas. As the storms moved further east, warning forecasters debated whether or not to continue issuing warnings on the storms as very few reports of severe strength winds or wind damage were received. However, storms began strengthening as they approached the western edge of the Twin Cities metro area.

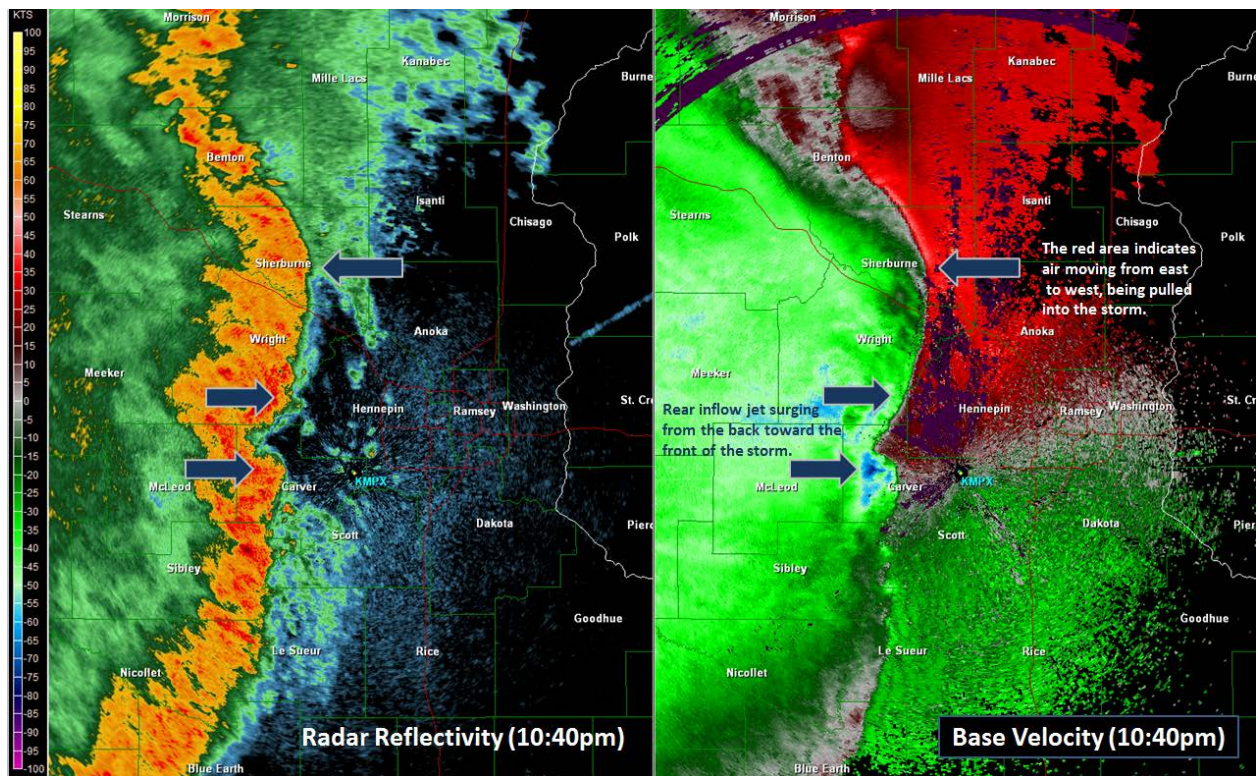


Figure 4: This is a two panel radar image from 10:40 pm on August 3<sup>rd</sup>. The image on the left shows standard reflectivity. The image on the right is base velocity, which depicts in what direction and how fast the air is moving in and around the thunderstorms. The dark blue area in Carver County indicates west winds of 80 to 90 mph roughly 850 feet above the ground. Conditions were favorable to mix at least some of the momentum down to the ground, which did result in measured wind speeds at the surface of 61mph and 64mph as the storm moved east.

As the storms moved through the Twin Cities metro, they produced multiple reports of severe strength winds and knocked down trees and branches. They retained their strength as they crossed the state border into Wisconsin, before showing signs of weakening around 12:30am, August 4<sup>th</sup>.



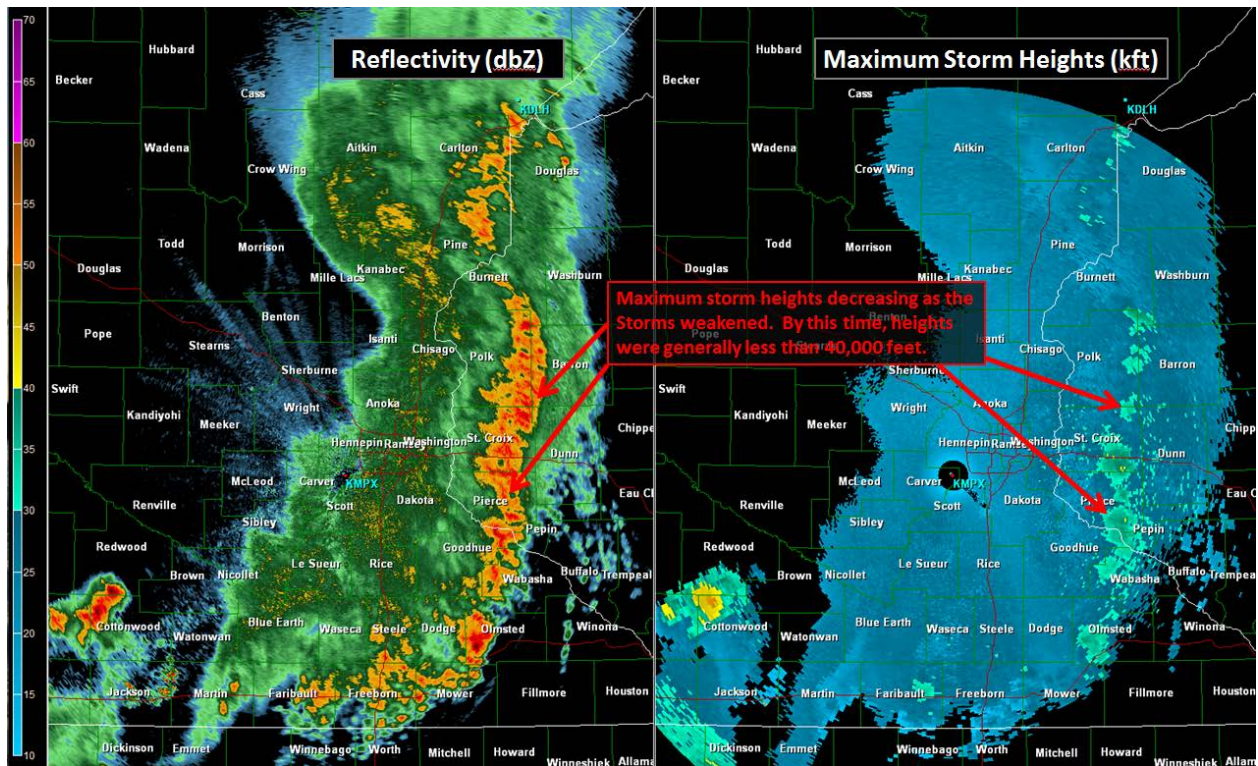


Figure 5: The maximum storm heights on the right illustrate the weakening storms as they came down to under 40,000 feet (scale on far left side of the image). This image also shows radar reflectivity at 12:30am, August 4<sup>th</sup>. By this time, the atmospheric conditions were becoming less favorable for severe strength winds to reach the surface, and the storms were weakening. Severe thunderstorm warnings over west central Wisconsin were allowed to expire shortly thereafter.

The severe weather event on August 3<sup>rd</sup> was primarily a wind threat across Minnesota and Wisconsin as thunderstorms evolved into a multicell line after earlier supercells in South Dakota produced large hail. By the time the storms moved into Minnesota, they were racing east at about 40 to 50 mph, and were no longer conducive to producing large hail. Wind damage reports were very isolated across western Minnesota, but many more reports were received after the storms moved east of a line from near St. Cloud to Mankato, as you can see in Figure 6. Obviously, the population density being much higher in eastern Minnesota played into that fact. Still, information received from Skywarn Storm Spotters proved to be extremely valuable once again. Storm reports helped warning forecasters decide on whether or not to issue additional warnings and provided ground truth. Thank you to all who sent in storm reports and/or pictures.

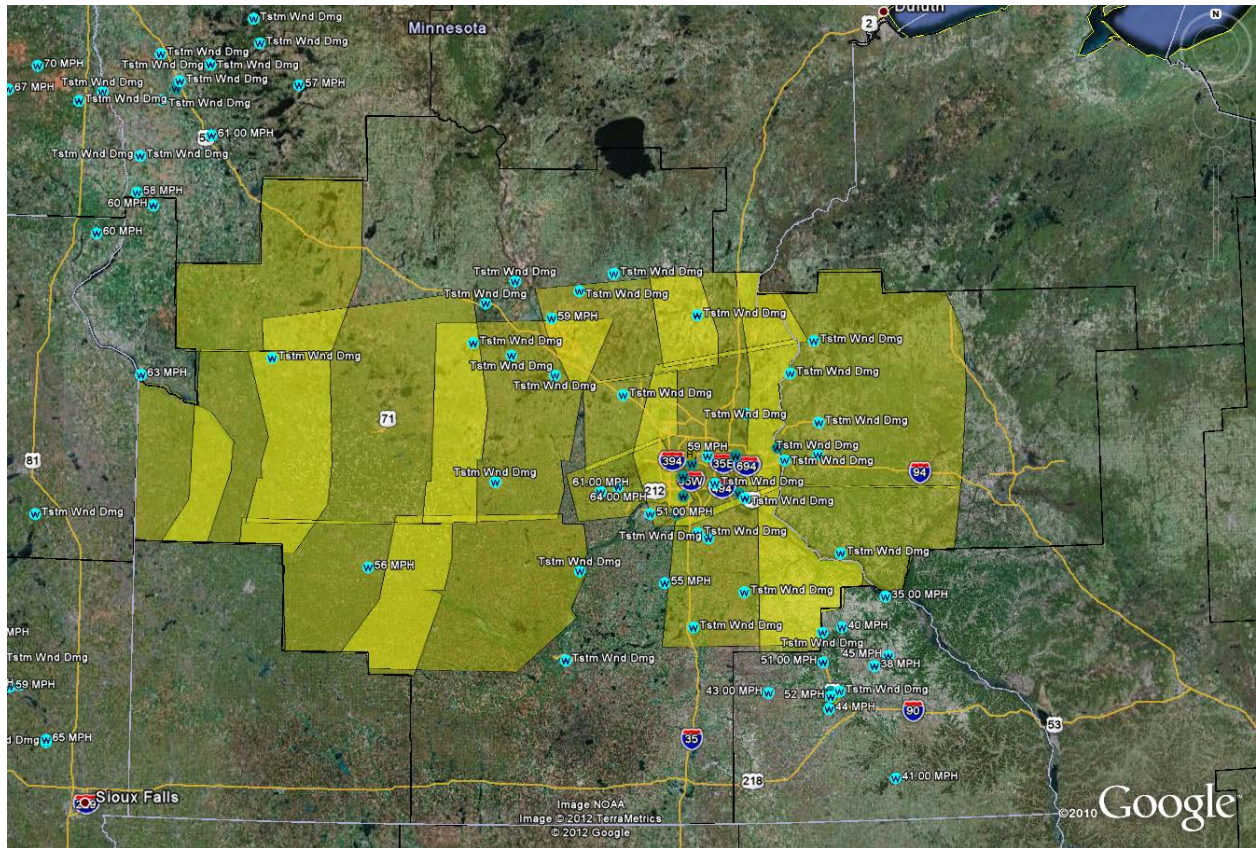


Figure 6: A Google Earth image showing the severe thunderstorm warning polygons (yellow) and the severe weather reports (cyan) on the night of August 3<sup>rd</sup> into the very early morning hours of August 4<sup>th</sup>. The black lines show the National Weather Service County Warning areas (CWAs). Only the severe thunderstorm warnings issued by the NWS Twin Cities/Chanhassen office are displayed in this image.