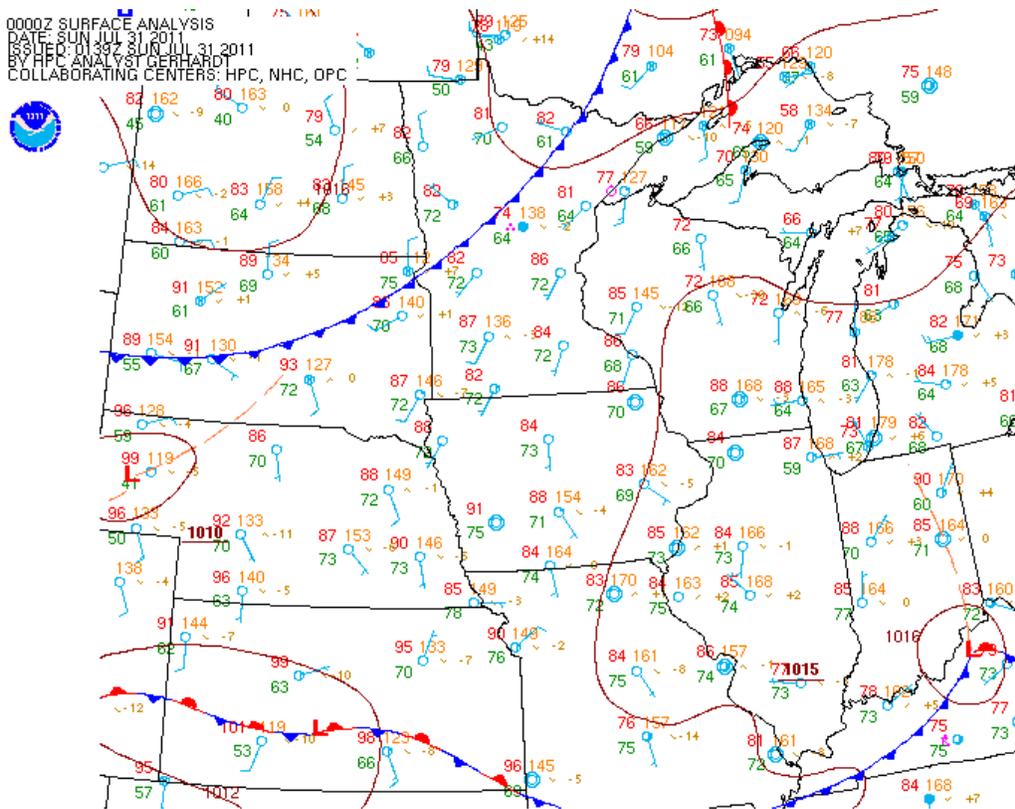


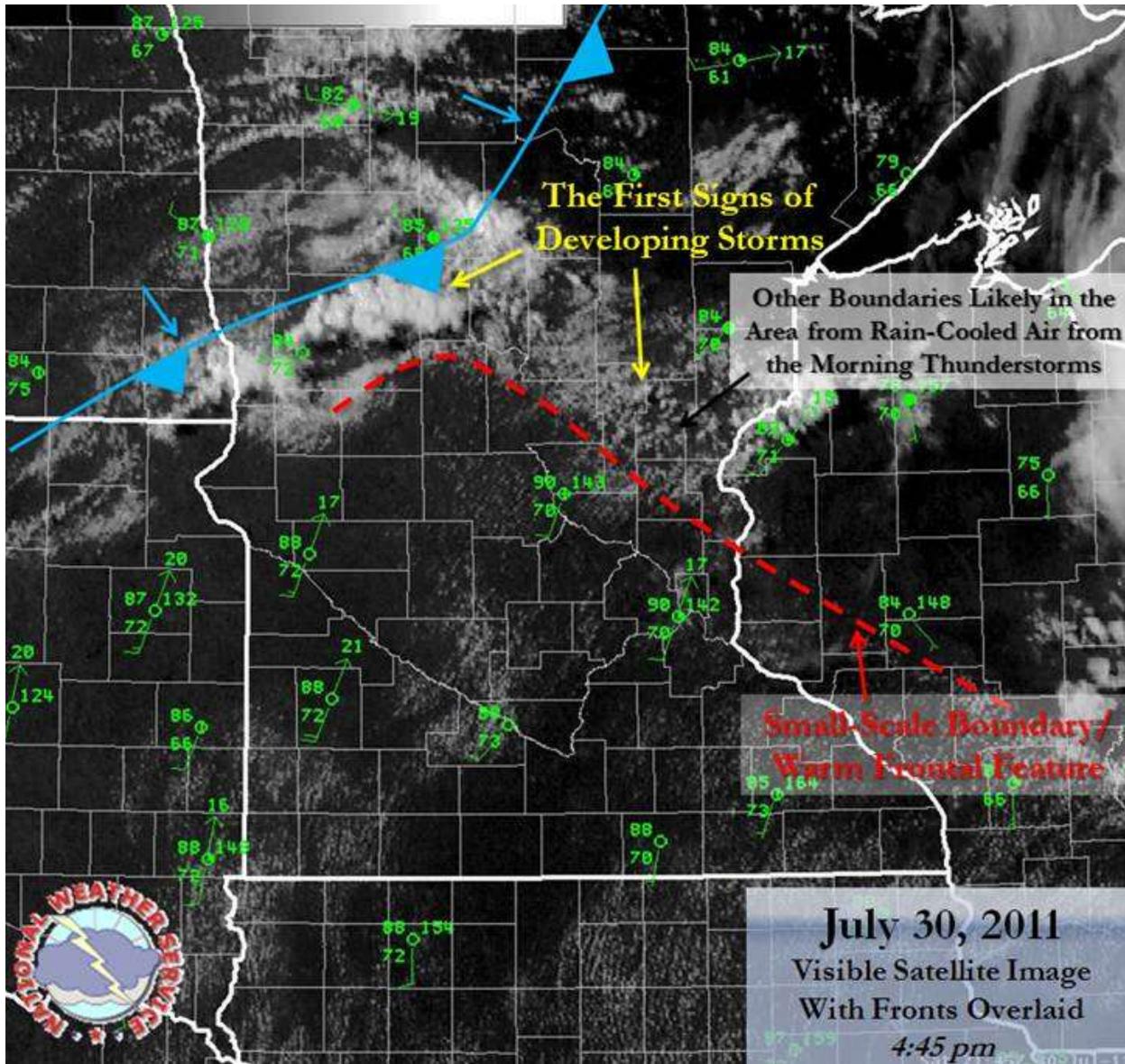
July 30, 2011: Damaging Winds and EF-0 Tornado in Mille Lacs and Isanti Counties

Synopsis

A warm and very moist air mass, in place for much of the past month, was entrenched over the region on Saturday. Morning thunderstorms across the area had produced spotty severe weather, but more importantly had caused a challenging scenario for how and where thunderstorms would develop later in the day. As southerly winds increased during the afternoon, a boundary with warm frontal characteristics began to develop across central Minnesota into northwest and west central Wisconsin. Convergence also increased along remnant rain-cooled outflow boundaries from the morning thunderstorms. As winds in the upper atmosphere also slightly strengthened and a cool front entered the region by late afternoon, thunderstorms began to develop and track along the various boundaries. These would be discrete initially, and then in clusters, becoming severe in places as they evolved southeast through the evening.

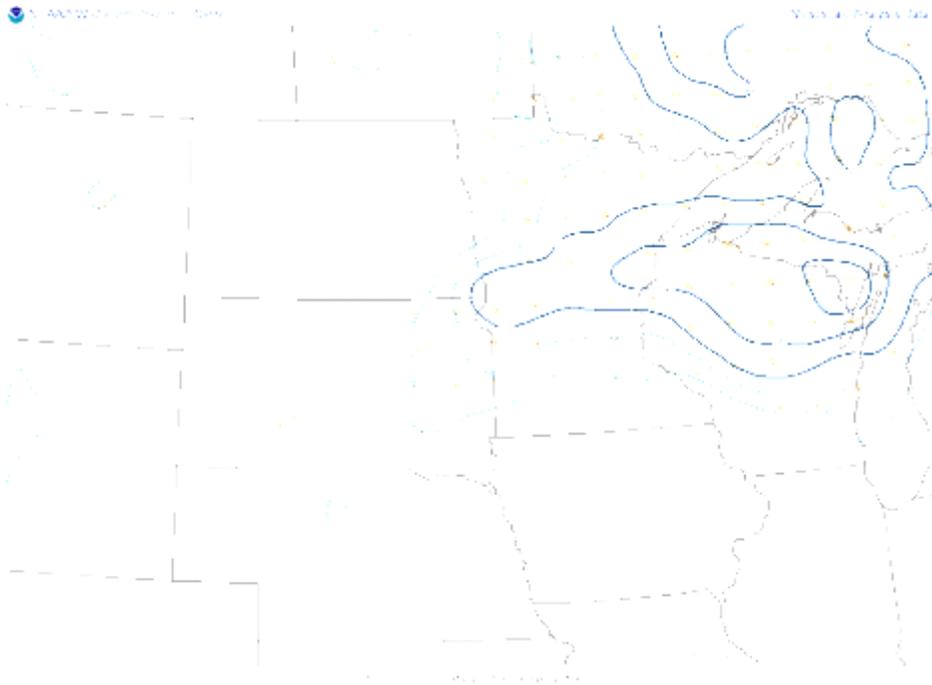


7 pm Surface Map



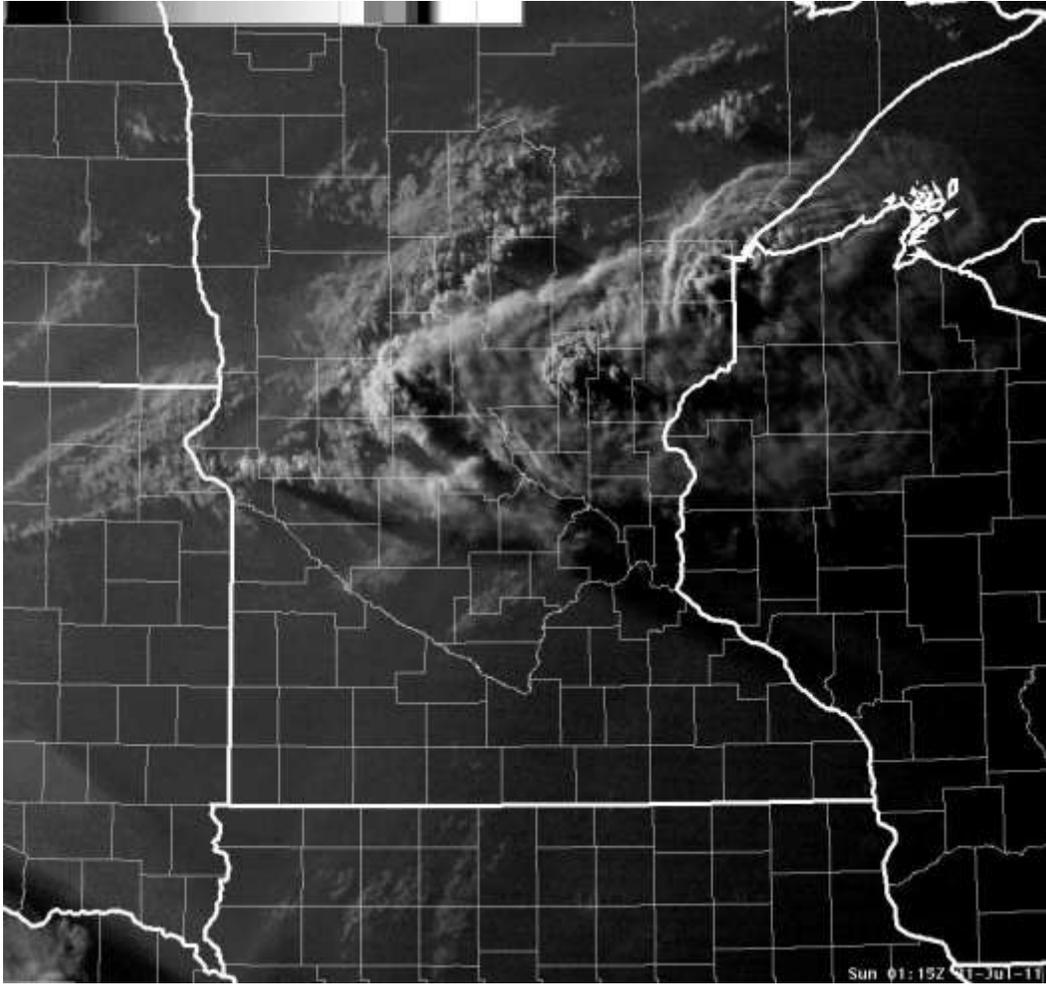
Late Afternoon Visible Satellite Image with Fronts Overlaid

With a moisture rich air mass and temperatures around 90° inching northward through the Twin Cities and St. Cloud, instability from the surface to several thousand feet aloft increased by late afternoon. Mixed-layer CAPE values were moderate to extreme with 3,000 to 4,500 J/kg as observed on weather balloons at 3 and 7 pm at NWS Chanhassen (7 pm shown to the right) and on an analysis (shown below). Combined with deep layer wind shear of 30 to 40 kts, organized thunderstorms, including supercells initially were favored and did occur. With 0-1 km shear values at 20-25 kts in central Minnesota, well-defined supercells were favored especially along boundaries. With that would come the potential for a few tornadoes.



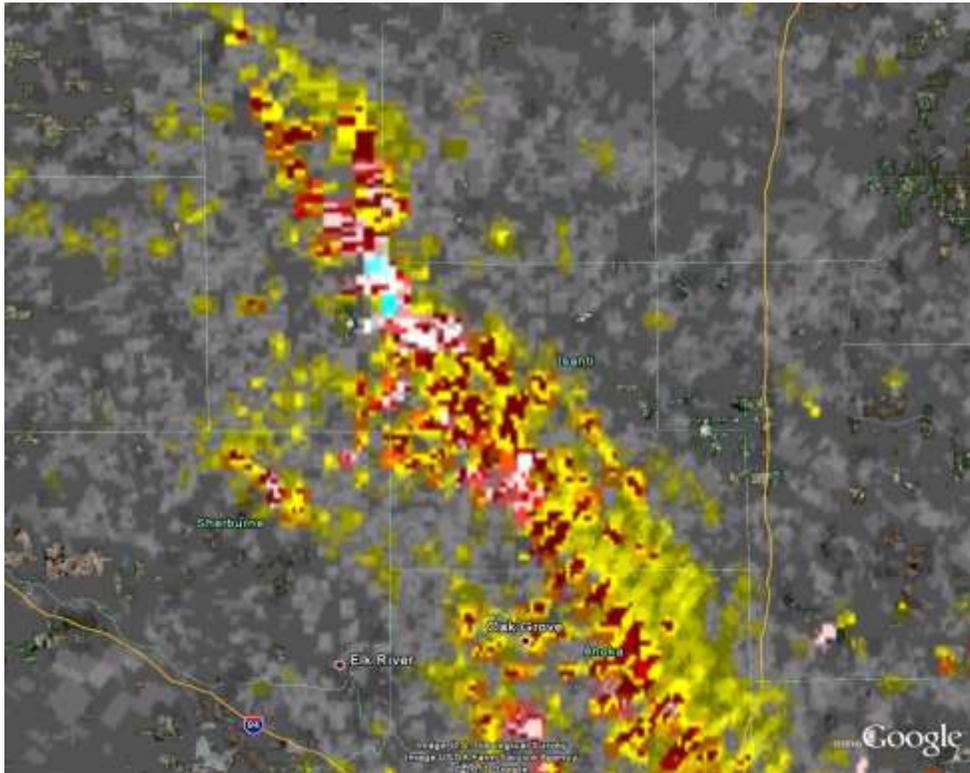
0-1km Shear

The initial storms that developed across central Minnesota were supercellular at times, and did produce periodic large hail, damaging winds, and tornado threats. There were a handful of tornado warnings for these storms issued by the National Weather Service (seen below under Service). There were a cluster of severe storms in Otter Tail, eastern Douglas, and Todd Counties that tracked southward into Stearns County. A longer-lived high-precipitation (HP) supercell thunderstorm took shape over Mille Lacs County not long after 6:30 pm and would evolve south southeast into Isanti County. This storm had hail and wind potential for over two hours, and while to a lesser extent even 2 to 3 hours longer as it became more of a line of storms and tracked through the eastern Twin Cities metro area between 9:30 and 11:00 pm. Within southern Mille Lacs County into northwest Isanti County, the storm developed characteristics of potentially producing a tornado, with strong low-level rotation, deep inflow, and rear-flank downdraft signatures wrapping around the western and southwestern side of the updraft (see radar loops below). Damage was reported with this storm, primarily a high amount of downed trees. This storm also had developed a top near 60,000 ft, producing an overshooting top detected on the late day visible satellite image below.

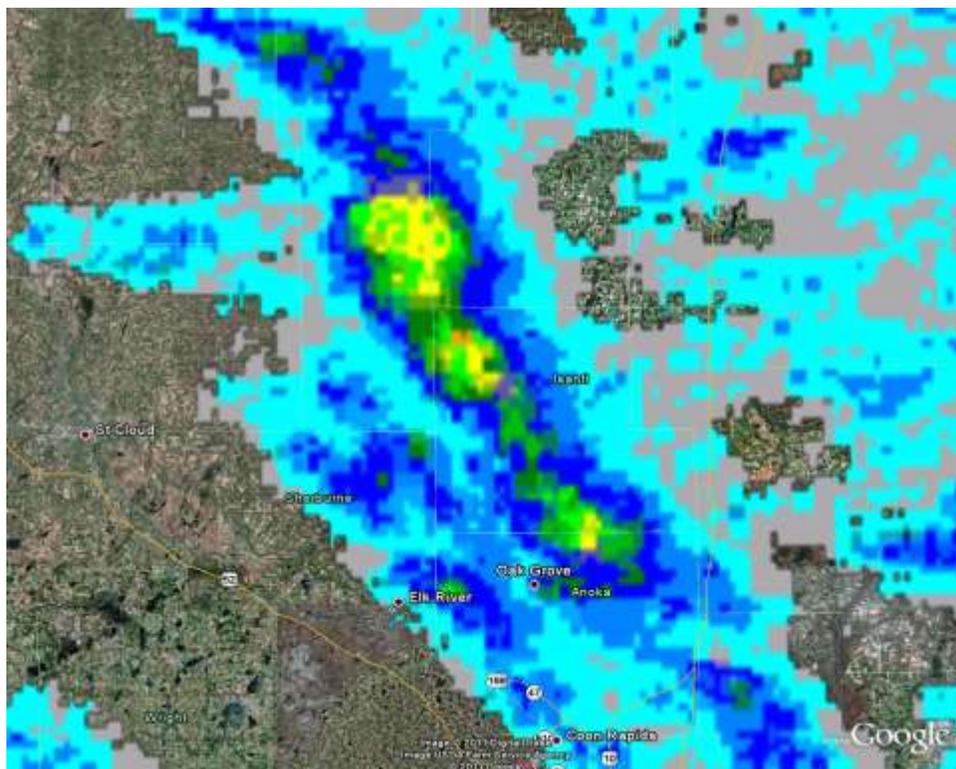


Visible Satellite Picture of Overshooting Tops, Including on the Storm in Mille Lacs County

Radar-Indicated Features with the Storm in Mille Lacs and Isanti Counties



Rotation Tracks



Maximum Estimated Hail Size

Damage Survey Results

PUBLIC INFORMATION STATEMENT
NATIONAL WEATHER SERVICE TWIN CITIES/CHANHASSEN MN
1000 AM CDT MON AUG 1 2011

...MILLE LACS COUNTY/ISANTI COUNTY TORNADO RATED EF-0...

A NATIONAL WEATHER SERVICE STORM DAMAGE SURVEY TEAM ASSESSED DAMAGE THAT OCCURRED ON SATURDAY EVENING IN SOUTHERN MILLE LACS AND NORTHWESTERN ISANTI COUNTIES.

EVENT...EF-0 TORNADO.

LOCATION...THE TORNADO TOUCHED DOWN JUST NORTH OF COUNTY ROAD 10 IN MILLE LACS COUNTY...LESS THAN A QUARTER MILE WEST OF THE ISANTI COUNTY BORDER. THE TORNADO PROGRESSED SOUTHEAST INTO NORTHWESTERN ISANTI COUNTY AND EVENTUALLY TURNED DIRECTLY SOUTH ALONG COUNTY ROAD 58 JUST WEST OF DALBO. THE TORNADO TRACK ENDED LESS THAN HALF A MILE NORTH OF SOUTH STANCHFIELD LAKE.

PATH LENGTH...APPROXIMATELY FIVE MILES.

MAXIMUM WIND SPEED...70 TO 80 MPH.

MAXIMUM WIDTH...APPROXIMATELY 100 YARDS.

MOST INTENSE DAMAGE...ALONG COUNTY ROAD 58...CONCENTRATED TREE DAMAGE OCCURRED WITH LARGE TREES BEING SNAPPED AND UPROOTED. A GARAGE OF ONE PARTICULAR RESIDENCE WAS SHIFTED OFF ITS FOUNDATION...WHILE ANOTHER RESIDENCE HAD A SMALL STRUCTURE DESTROYED. TWO TRAILERS AT THE RESIDENCE SLID A SHORT DISTANCE DUE TO THE WIND...WHILE ONE OF THE TRAILERS WAS FLIPPED OVER.

TIMING...BASED ON RADAR AND STORM REPORTS...THE ESTIMATED TIME OF TOUCHDOWN WAS 826 PM. THE TIMING OF THE TORNADO LIFTING BASED ON RADAR IS APPROXIMATELY 844 PM.

ADDITIONAL DAMAGE...AT THE RESIDENCES ALONG COUNTY ROAD 58 WEST OF DALBO...MINIMAL STRUCTURAL DAMAGE OCCURRED TO THE HOMES...EXCEPT FOR SOME SHINGLES HAVING BEEN BLOWN OFF. BEFORE THE TORNADO IMPACTED THE RESIDENCES ALONG COUNTY ROAD 58...IT CAUSED PRIMARILY TREE AND CROP DAMAGE.

NON-TORNADIC DAMAGE...NORTHWESTERN ISANTI COUNTY SAW SCATTERED TREE AND CROP DAMAGE IN ADDITION TO THE CONCENTRATED DAMAGE CAUSED BY THE TORNADO. THIS DAMAGE WAS CAUSED BY STRONG DOWNBURSTS FROM THE SEVERE THUNDERSTORM. MUCH OF DALBO TOWNSHIP HAD SCATTERED TREE AND CROP DAMAGE ASSOCIATED WITH THE DOWNBURSTS.

...DOWNBURST DAMAGE IN SOUTHEASTERN MILLE LACS COUNTY...

EVENT...STRONG DOWNBURST.

LOCATION...STRONGEST DAMAGE OCCURRED NEAR BOCK.

MAXIMUM WIND SPEED...65 TO 75 MPH.

MOST INTENSE DAMAGE...THE STRONGEST DAMAGE NEAR BOCK INCLUDED MULTIPLE LARGE TREES UPROOTED. ONE TREE WAS APPROXIMATELY THREE FEET IN DIAMETER ON THE SOUTH SIDE OF BOCK.

TIMING...JUST TO THE WEST OF BOCK...A MESONET ALONG HIGHWAY 169 MEASURED A WIND GUST OF 60 MPH AT 819 PM. BASED ON THIS AND RADAR...THE DAMAGE NEAR BOCK OCCURRED AT APPROXIMATELY 821 PM.

REMARKS...ROTATION IN THIS STORM INTENSIFIED JUST NORTHWEST OF BOCK...LEADING TO STRONG DOWNBURSTS AROUND BOCK. THE ROTATION TIGHTENED AND INTENSIFIED FURTHER AFTER IT WAS SOUTHEAST OF BOCK...AND PRODUCED THE EF-0 TORNADO.

Tornado Track Map

