Observations of a Long-Lived, Mostly Non-Tornadic Supercell

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ABSTRACT

A discrete, long-lived supercell affected south central South Dakota and north central Nebraska during an eight-hour period on 13 July 2009. The supercell displayed significant right-moving propagation, a notable hook echo, bounded weak echo region, and tornadic vortex signatures along most of its 350-km path length. Over 40 reports of hail up to 10.8 cm (4.25 inches) in diameter and severe winds to 70 kts were received, but only one, one-minute-long tornado occurred. Storm chasers observed a cold, aggressive rear flank downdraft (RFD) with the high precipitation supercell. The precipitation-loaded RFD was apparently cold enough to reduce tornado probability in a favorably moist, unstable, and sheared environment, but not sufficient to overcome the balanced inflow of the supercell. Competing observations of aggressive outflow but long-lived, discrete supercell maintenance are investigated using near-storm environmental indicators. A radar analysis is also conducted to further examine warning decision-making difficulty and what clues may have existed to suggest reduced tornado threat despite persistent, deep rotational velocity signatures.