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Thermodynamic Observations of the June 2012 Derecho

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The June 2012 mid-Atlantic and Midwest Derecho was one of the most destructive and deadly fast-moving severe thunderstorm events in North American history. The derecho produced wind gusts approaching 100 miles per hour as it traveled more than 600 miles across large sections of the Midwestern United States, the central Appalachians and the Mid-Atlantic States on the afternoon and evening of June 29, 2012 and into the early morning of June 30, 2012. It resulted in 22 deaths, widespread damage and left millions without power for many days throughout the region.

We present continuous temperature and moisture profiles observed by microwave radiometers, and derived forecast indices, along the storm path at locations in Iowa, Ohio and Maryland, providing unique perspective on the evolution of this historic storm. For example, CAPE = 5,000 J/kg and WINDEX = 80 knots were derived from radiometer observations at Germantown, MD, more than eight hours before derecho arrival (Figure 1).

The Germantown radiometer is operated as part of the Earth Networks Boundary Layer Network (BLN) for continuous thermodynamic monitoring of the planetary boundary layer up to 30,000 feet. The BLN uses Radiometrics microwave profilers providing continuous temperature and humidity soundings with radiosonde-equivalent observation accuracy, and unique liquid soundings.

This case study illustrates the promise for severe storm forecast improvement based on continuous temperature and moisture monitoring in the boundary layer and above.

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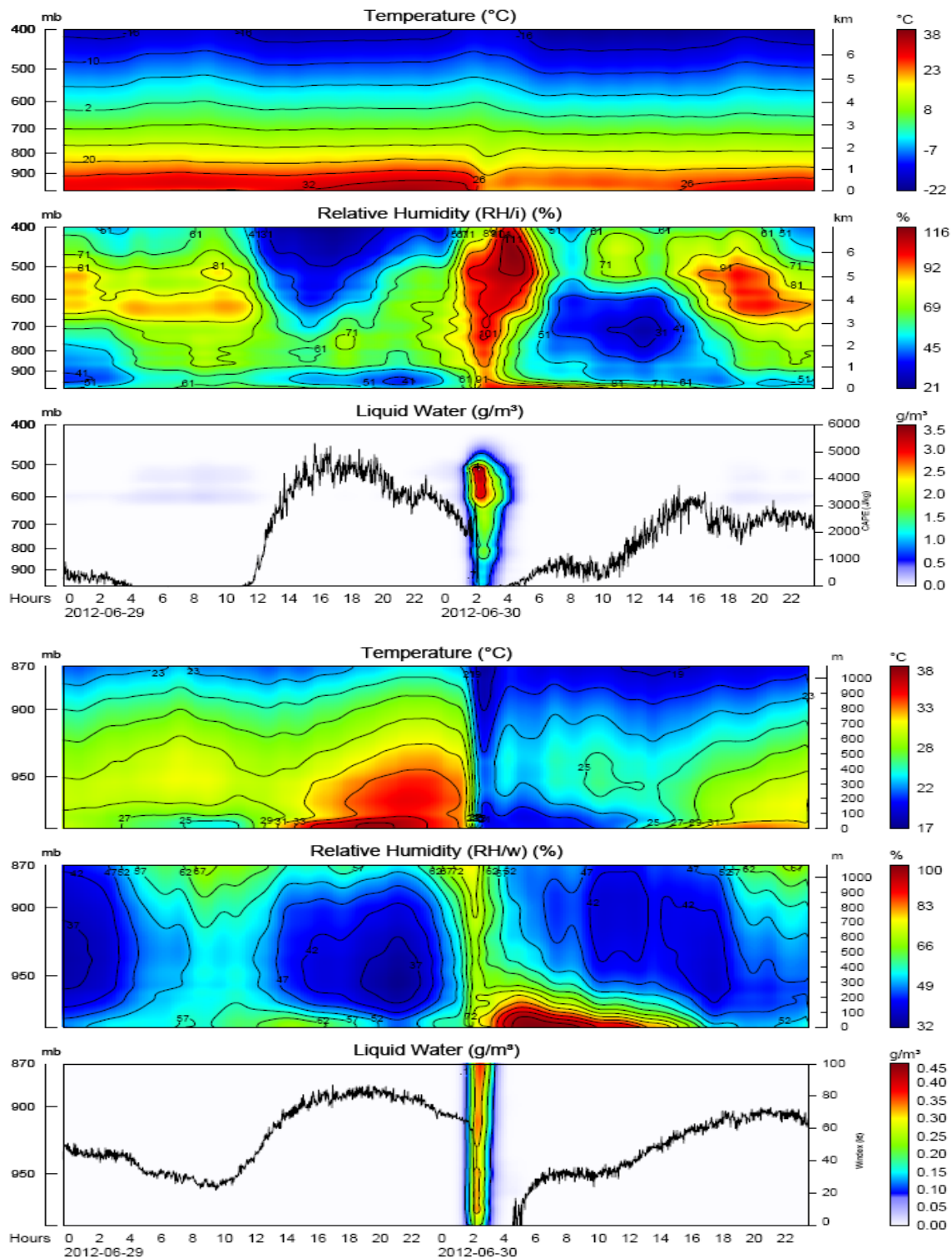


Figure 1. Thermodynamics to 7 and 1 km height observed by the BLN at Germantown, Maryland. CAPE=5,000 J/kg and WINDEX=80 knots were seen more than 8 hours before Derecho arrival.