

Progressive Derechos: Their Initiation, Maintenance, and Predictability

By

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Progressive derechos are a type of well-organized mesoscale convective system (MCS). A long-lived, long-track severe weather-producing progressive derecho on 29-30 June 2012 produced significant wind damage along a 1500 km swath from the lower Great Lakes to the Middle Atlantic coast. This derecho took 28 lives, produced widespread power failures, and generated more than \$1B in damages. This derecho also served as a reminder of the forecasting difficulty intense, progressive-type derechos can pose. The reason for the difficulty is twofold: 1) progressive derechos form in regimes of weak synoptic forcing, ultimately being triggered by weak disturbances that have limited predictability, and 2) progressive derechos are often characterized by MCSs that transition from elevated convection on the cool side of a surface boundary to severe, surface-based convection along and on the warm side of the surface boundary as the derecho organizes and intensifies. Predicting the timing and location of the transition from elevated to surface-based convection in an MCS that becomes a severe derecho poses a challenge to forecasters.

The purpose of this presentation is to discuss the initiation, maintenance, and predictability of progressive-type derechos. This will include a climatology of derechos from the modern radar era, derecho-relative composites from the list of severe events in the Storm Prediction Center archives, and select case studies including the 29-30 June 2012 derecho. Patterns favorable to progressive derecho formation and maintenance will be identified from the climatological, composite, and case study analyses, which may help forecaster situational awareness. Attention will be paid to warm-season flow environments in which a continental subtropical anticyclone dominates the contiguous United States. These environmental flow configurations may coincide with heat wave conditions that have also been shown to favor the formation of intense, progressive derechos on the anticyclonic shear side of an upper-level jet. Eastward-moving transient disturbances in the middle and upper troposphere along the poleward flank of a continental subtropical anticyclone can initiate progressive derecho development in high CAPE and moderate shear environments when they migrate eastward along the jet corridor. Predictability issues associated with transient, derecho-forming MCS disturbances will be examined. Null cases in which the synoptic environment appears favorable for progressive derecho formation but none occur will also be discussed.