

The 24 February, 2016 Tornado in Northeast Pennsylvania: A Case study of cold-season tornado occurrence within a Quasi-Linear Convective System

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On 24 February, 2016, an EF-1 tornado touched down near Wyalusing, PA and was one of two tornadoes that hit Pennsylvania that day. This event was unique because it was the first time since 1990 that a tornado had been observed in Pennsylvania during the month of February.

The tornado on this day occurred in association with a quasi-linear convective system (QLCS). Previous local research indicates that approximately 30 percent of tornadoes in central New York and northeast Pennsylvania during the period from 2000-2011 developed in association with a QLCS. Local research indicates that these QLCS tornadoes typically form in environments characterized by low convective available potential energy (spell out the first time you use it) (CAPE) with low lifted condensation levels and large wind shear.

Despite the time of the year the pattern was conducive for severe weather. An anomalous closed upper low and surface low, 1 to 3 standard deviations below normal, provided strong forcing for large-scale upward vertical motion. To the east of the surface and upper level lows, a deep southerly flow of air transported copious amounts of moisture northward, with precipitable water values of 3 standard deviations above normal. A low CAPE high shear environment was present, with mixed layer CAPE values around 200 J kg^{-1} , 0 to 1 km bulk shear values of 50 kts, 0 to 1 km storm-relative helicity (SRH) of $500 \text{ m}^2 \text{ s}^{-2}$ and 0 to 3 SRH values of $500 \text{ m}^2 \text{ s}^{-2}$ or greater.

This case study will examine the large scale flow pattern, meso scale pattern, and thermodynamical environment that led up to this event. Comparisons with previous QLCS events will be given. New products will be examined, such as synthetic GOES-R imagery from the 4 km WRF-ARW ($7.34 \mu\text{m}$). The role of a mid-level cold front led to the initiation of the convection. GOES-14 1 minute satellite data will also be analyzed to show how this can be useful to detect the presence of an unstable environment, in low CAPE situations.