

**A Multi-Scale Examination of the 1 March 2007  
Millers Ferry Alabama EF-4 Tornado-Producing Mesocyclone**

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As part of the notable 1 March 2007 US Deep South tornado outbreak, a long-lived EF-4 tornado-producing mesocyclone developed from two merging updrafts over southeastern Mississippi at 1639 UTC and later moved eastward across much of southern Alabama during ensuing hours. In a pre-storm environment characterized by 0-3 km storm-relative helicity ( $365 \text{ m}^2 \text{ s}^{-2}$ ) and surface-based convective available potential energy ( $2177 \text{ J kg}^{-1}$ ) values respectively, the southern-most updraft became dominant and was characterized by two distinctive impulses. At 1719 UTC, the first was strong but did not produce a tornado. The second developed at 1805 UTC and produced an EF-4 tornado at 1828 UTC that was approximately 25 km in path length over portions of Wilcox and Dallas counties of Alabama and 460 m in diameter (at its widest point) near Millers Ferry, Alabama. The tornado claimed one life

This research presents a multi-scale analysis of the event. Particular attention is paid to the kinematics of the flow field, the evolution (and distribution) of the vertical wind shear profile and to layer advective processes that altered the environmental lapse rate and moisture distribution prior to tornado production. Finally, radar data are used to present the overall evolution and morphology of the Millers Ferry mesocyclone and to focus on salient points regarding radar sampling issues and how they factor into the warning decision process.