

**An Examination of North Central Gulf Coast Cold Season  
Pre-Tornadic Vertical Wind Shear Environments since 1996**

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**ABSTRACT**

The purpose of this research is to document and investigate pre-existing ambient vertical wind shear characteristics immediately prior to the occurrence of cold-season (October-April) F1 and EF-1 or higher rating tornado-producing mesocyclones occurring across the US Central Gulf Coast region from 1996-2007. Thus far, fourteen separate event days yielding twenty-three tornadoes have been examined. Using the KMOB WSR-88D Velocity Azimuth Display (VAD) winds for all tornadoes within ~120 km (60 n mi) of Mobile, Alabama, hodographs were constructed closest to the time of tornado occurrence using VAD winds every 305 m (1 kft) to a height of 6.1 km (~20 kft). The time-matched KMOB METAR observations were used for the surface wind.

Particular attention is paid to both the distribution of vertical wind shear and the observed storm motion and their contributions to various layer storm-relative helicity computations. It is desired to establish a local benchmark for an improved interpretation of various vertical wind shear quantities and the corresponding short-term prediction of the occurrence of such events. This study also represents the beginning stages of a regional vertical wind shear climatology that can be quickly integrated into National Weather Service radar warning operations to assist with the diagnosis of these tornado events. This research will also compare the predicted supercell motions to observed tornado-producing mesocyclone motions in order to assess predictive accuracy. Results from this study will be updated as additional events become available and will eventually include data from the Eglin Air Force base (KEVX WSR-88D) for completeness.