The Utility of the Normalized Rotation Parameter to Diagnose Tornadogenesis in Quasi-Linear Convective Environments

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High shear-low CAPE environments are fairly common across the Tennessee Valley, especially during the cool season. Many times, quasi-linear convective systems develop in advance of cold fronts within these environments. Previous research has indicated approximately 90% of tornadic storms in northern Alabama are associated with convective lines. In fact, several incipient tornadoes have been documented from parent meso-vortices within quasi-linear convective systems. Of the documented tornadoes since 2007 in the Huntsville County Warning Area (CWA), many of them have been significant (EF-2 or greater).

In these cases, warning forecasters have a difficult time issuing tornado warnings with ample lead time, as velocity and reflectivity signatures often develop on very small spatial and temporal scales. However, associated trends in reflectivity structures can provide timely clues to impending tornadogenesis.

Recently, NWS Huntsville forecasters have begun using the GRLevel2 software to assist in radar data analyses. This preliminary study evaluates the use of Normalized Rotation (NROT) trends compared with the use of the more traditional parameters for mesocyclone detection and analysis such as VR shear and rotational velocity. Specifically, EF-2 tornado events associated with quasi-linear convective systems in high shear-low CAPE environments (0-2.5 km bulk shear $\geq$ 40 kt and MLCAPE < 1000 J/kg) were evaluated. Thus far, our results have shown that intensifying values of the NROT parameter were comparable to traditional warning decision parameters, making it a viable tool. This study will help shape future work to determine the viability of NROT for warning decision making of tornadic quasi-linear convective systems events.