

Origins of the Granite Falls, MN Tornado, July 25, 2000 Revisited

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ABSTRACT

This paper builds on a recently revisited ([M],[S]) idea of investigating arching vortex lines to better understand the processes leading to tornado genesis. The idea was originally suggested thirty years ago by Ted Fujita but was largely ignored. These arching vortex lines appear to be ubiquitous in supercell thunderstorms ([M],[S]). Moreover they seem to suggest possible ways of unifying mechanisms that may lead to tornado genesis. These vortex lines appear to originate near the surface during the potential tornado-producing phase of the storm and in the middle portions of the storm during all phases of the storms life cycle. We are interested in the formation of tornados resulting from storm mergers. One such situation appears to have occurred in the case of the Granite Falls, MN tornado, of July 25, 2000. From the radar data, it is clear that a supercell thunderstorm southwest of the Granite Falls storm, split off several left moving storms, which merged with the Granite Falls storm. One of these mergers appeared to be connected with the genesis and/or intensification of the Granite Falls tornado, rated a marginal F4. An analysis of the environmental conditions suggested that the tornadoes produced should have been weak.

[M] Markowski, P. M., J. M. Straka, E. N. Rasmussen, R. P. Davies-Jones, Y. Richardson, and J. Trapp, 2008: Vortex lines within low-level mesocyclones obtained from pseudo-dual-Doppler radar observations. *Monthly Weather Review*, **136**, 3513–3535.

[S] Straka, J. M., E. N. Rasmussen, R. P. Davies-Jones, and P. M. Markowski, 2007: An observational and idealized numerical examination of low-level counter-rotating vortices toward the rear flank of supercells. *Electronic Journal of Severe Storms Meteorology*, **2**(8), 1–22.