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# Size and intensity of vortex structures in a simulated idealized supercell as seen from the kinematic vorticity number

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This work deals with the analysis of vortex structures in a simulated idealized supercell. The idealized supercell test case scenario of WRF was used with the standard input sounding of Weisman and Klemp (1982, Mon. Wea. Rev., 110, 504-520). In order to compare the distribution of the vortex structures in different environments, the directional shear (linear, quarter, and half-circle shear) of the original sounding is modified. The results are compared for different horizontal resolutions of the original simulation.

A kinematic method - called the kinematic vorticity number - is used for the analysis of the vortex properties. Mathematical basis is the velocity gradient tensor and its invariants. The kinematic vorticity number compares at every point in the field the size of the rotation with the size of the deformation. A vortex is identified when the rotation prevails over the deformation. The method is able to extract vortex structures even in shear dominated regions. The kinematic vorticity number method allows to determine the horizontal and vertical extent, and the intensity (circulation) of vortices in a consistent way.

The analysis of the kinematic vorticity number shows a quite complex pattern evolving over time in the simulated supercell. This indicates that supercells are not only represented by a single rotating updraft, but by multiple smaller-scale vortices of different intensities and sizes embedded in the supercell.