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A Diabatic Lagrangian Technique for the Analysis of Convective Storms

Abstract

A new diabatic Lagrangian analysis (DLA) technique has been developed to derive forecasted fields, including potential temperature, water vapor, cloud water mixing ratios, and virtual buoyancy, from three-dimensional, time-variant wind and reflectivity fields. The DLA technique relies on the computation of thermodynamic and microphysical trends along trajectories, which begin within the storm's environment and conclude at analysis grid points, corresponding to the designated analysis time. Uniquely, the DLA technique proceeds by starting from radar-diagnosed precipitation contents and microphysical processes.

In Part I, the DLA technique is demonstrated through an observing system simulation experiment (OSSE), which is compared with the known output of buoyancy and water substance fields in the simulated storm case. Moving to Part II, the performance of the DLA method is demonstrated using the radar-observed supercell storm in Greensburg, Kansas, on June 9, 2009, during VORTEX2, providing a more robust test of the DLA in a real case scenario. Through the analysis and comparison between OSSE and actual observations, the DLA method demonstrates its advantages.

Keyword

Cold pool

Diabatic Lagrangian Analysis (DLA)

Reference

Ziegler, C. L., 2013: A Diabatic Lagrangian Technique for the Analysis of Convective Storms. Part I: Description and Validation via an Observing System Simulation Experiment. *J. Atmos. Oceanic Technol.*, **30**, 2248–2265, https://doi.org/10.1175/JTECH-D-12-00194.1.

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