



ATS/CIRA Colloquium

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Visiting ATS from Harvard

A Lagrangian view on precipitating convection

Hosted by Sue van den Heever

Friday, April 13, 2018

ATS room 101

Discussion will begin at 11:15 a.m.

Refreshments will be served at 10:45 a.m. in the weather lab

Because of the great societal impact that convective precipitation can have, producing accurate forecasts of convective systems and predicting how precipitation will respond to climate change are tasks of considerable importance. In order to accomplish such tasks, however, a robust, quantitative understanding of the dynamics of precipitating convective systems is first necessary. In this talk, I will illustrate how a Lagrangian perspective can be used to take important steps in this direction. The main focus will be on the dynamics of cold pools, which, although neglected by most convective parameterizations, are crucial ingredients of deep convective systems. I will start by showing how Lagrangian particles can be used to study key properties—such as the initial height and the driving mechanisms—of the precipitation-driven downdrafts that give rise to cold pools and set their properties. I will then discuss how a careful examination of the history of Lagrangian particles can shed light on the sources of the positive moisture anomalies that develop around cold pools during their life cycle and that play a role in the formation of new clouds. I will then introduce a novel method to identify and track cold pools in a numerical model based on Lagrangian techniques and show how this can be employed to quantify the importance of different mechanisms by which cold pools trigger new convective cells. Finally, I will discuss ongoing and future work using the Lagrangian methods I have developed, including additional questions pertaining to the basic dynamics of deep convective systems and the study of extreme and severe weather systems, such as supercell storms.

Link to colloquia page: <https://www.atmos.colostate.edu/colloquia/>