UNIVERSITY of HAWAI'I MĀNOA

Department of Atmospheric Sciences
Seminar Announcement

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SCHOOL OF OCEAN AND EARTH SCIENCE AND TECHNOLOGY

A Lagrangian view on precipitating convection

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Date: Wednesday, August 9, 2017
Refreshments: 9:45am at KUY lanai
Free Cookies, Coffee & Tea Provided
(Please Bring Your Own Cup)
Seminar Time: 10:15am
Location: Kuykendall Hall, KUY 101

Abstract:

Because of its great societal impact, predicting how precipitation will respond to climate change is a task of considerable importance. In order to achieve this ability, however, a robust, quantitative understanding of the dynamics of precipitating 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 the basic dynamics of deep convective systems, the study of extreme and severe weather systems—such as supercell thunderstorms—and the investigation of the behavior of precipitating convection over land surfaces.