



How entrainment rules the atmosphere, and how to let it rule a GCM

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Convective entrainment has long been recognized as a major challenge in atmospheric dynamics. It is a process that is extremely difficult to study and parameterize, and, by many accounts, the uncertainty in how to parameterize it is the single largest source of uncertainty in our estimates of Earth's sensitivity to a doubling of carbon dioxide concentrations. Here, I will argue that entrainment also plays an important role in regulating the intensity and frequency of severe weather and lightning. Of course, entrainment does many other important things, including generating the spectrum of convective thermodynamic properties that, in turn, sets the profile of convective mass flux. To properly represent entrainment in a global climate model (GCM), we need a convective parameterization that faithfully captures this important connection. The Stochastic Parcel Model (SPM) is a convective parameterization that has been designed to do this in the way it is observed to occur in large-eddy simulations. The SPM calculates the convective tendencies generated by the deterministic limit of an infinite number of stochastically entraining parcels, and does so in a computationally efficient way. Currently under development for DOE, it will soon be available in unofficial versions of CAM.

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Thursday, 12 May 2016, 3:30 PM
Refreshments 3:15 PM
NCAR-Foothills Laboratory
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