

Weekly Seminar: Spring 2009

Date: Friday April 17

Time: 11:00 AM

Location: Maryland Hall 110

Speaker: *Rupert Klein, Freie Universitaet Berlin, Germany*

Title: *"A multiscale model for deep convective cloud--internal wave interaction"*

Abstract

According to observations and cloud resolving simulations, deep convection occurs through ensembles of individual narrow convective towers with typical horizontal scales of 1 km extending vertically over depths comparable to the pressure scale height of 8-10 km. We take advantage of this anisotropic scaling in constructing a multiscale asymptotic model. This model involves short time scales of a few minutes and allows us to study cloud-internal wave interactions.

I will briefly summarize the general analytical framework within which these developments have been pursued. I will then show that an analytical closure is possible in this cloud-wave interaction regime through techniques of multiple scales asymptotics. Numerical solutions of the resulting effective equations reveal how cloud ensembles can strongly filter internal waves. This influence involves not only the expected modification of the strength of the atmosphere's mean stratification by the clouds. Rather, there is an additional coupling of the large scale wave dynamics to the conditionally averaged vertical velocity and buoyancy perturbations within the individual convective towers.