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Atmospheric boundary layer effects in a two-mode multicloud model

Intermediate models with low vertical resolution are an important tool in the study of tropical convection and convectively coupled waves. They are comprehensive enough to reproduce many features of convection, yet tractable enough to permit detailed analysis, particularly of wave structure and stability. In this talk, we employ such a model to examine the dynamics of the atmospheric boundary layer in convectively-coupled gravity waves. Bulk boundary layer equations, which include the effects of environmental and convective mass fluxes, are developed using ideas from Stevens (Theor. Comput. Fluid Dyn. **20**(2006), 279). These equations are coupled to the Khouider–Majda multicloud model, a system of shallow-water equations for two baroclinic modes with parameterized deep, congestus, and stratiform convection (Khouider & Majda, J. Atmos. Sci. **63**(2006), 1308). Linear stability analyses and preliminary nonlinear simulations will be discussed.