**A Unified Eddy-Diffusivity/Mass-Flux Approach for Modeling Atmospheric Convection**

**Kay Suselj**, Marcin Kurowski, Joao Teixeira

We describe a fully unified parameterization of boundary layer and moist convection. The new parameterization is based on the stochastic multi-plume eddy-diffusivity/mass-flux approach. The convective plumes represent both surface-forced updrafts and evaporatively driven downdrafts. The type of convection (i.e., dry, shallow, or deep) represented by the updrafts is not defined a priori, but depends on the near-surface updraft properties and the stochastic interactions between the plumes and the environment through lateral entrainment. Such a formulation is void of trigger functions and additional closures typical of traditional parameterizations. The updrafts are coupled to relatively simple warm-, mixed-, and ice-phase microphysics. The downdrafts control the development of cold pools near the surface that can invigorate convection. The new parameterization is validated against large-eddy simulations for precipitating marine and continental cases.