JAHANSHAH DAVOUDI, University of Toronto

Variability of the equilibrium mass flux distribution with altitude

The equilibrium fluctuations of a field of cumulus clouds under homogeneous large-scale forcing was recently shown to satisfy the Gibbs canonical ensemble from statistical mechanics. In the limit of noninteracting convective cells an analytical expression for the distribution function of total mass flux over a region of given size was derived.

We examine the consistency of the Gibbs canonical ensemble with the mass flux fluctuations in higher altitudes by means of cloud resolving simulations in radiative convective equilibrium. The obtained data exhibits a systematic height dependence in the mass flux probability distribution.