Geophysical Research Abstracts
Vol. 17, EGU2015-3974, 2015
EGU General Assembly 2015

A study on the role of the convective scheme entrainment and closure in the simulation of the MJO

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Different closure and entrainment options has been implemented and tested for the Tiedtke (1989) convective scheme in the LMD-Z GCM. The aim is to assess the impact of these physical options on the MJO representation. The initial Tiedtke convective scheme, with closure and entrainment mostly based on the humidity divergence, is complemented with two options: (1) the original closure, but with an entrainment rate being a function of the relative humidity (Bechtold et al 2008), and (2) this new entrainment and a closure based on the CAPE. We first discuss the impact of these options in forced simulations of the 1D version of the LMDZ model (rainfall distribution, cloud top distribution, detrainment and moisture in the mid-troposphere, diurnal cycle during dry and active phases, etc.). 3D AMIP-type simulations are thus performed and analyzed using the Local Mode Analysis approach. We discuss the impact of the 3 options in the representation of the MJO by looking at the seasonal variation, the reproducibility and the realism of the intraseasonal perturbation patterns, and the large-scale organization of the convection.