Session: C28 Poster: W50B

A new parametrization of coupling between boundary layer and deep convection

Nicolas Rochetin†; Jean-Yves Grandpeix
† Laboratoire de Meteorologie Dynamique, France
Leading author: Nicolas.Rochetin@lmd.jussieu.fr

It is now largely recognized that deep convection parametrization is a major source of persistant biases in most of GCMs: the simulated climate is highly sensitive to the convection scheme. Depending on the large scale forcing and the local surface conditions, deep convection can be sparsed in several storms as well as being organized in cloud clusters sometimes exceeding 1000km width. The continuous transition from small scale to large scale convection is still partially captured by GCMs. The cold pool mechanism introduces a positive feedback loop between deep convective cloud and its underlying environment, helping convection to propagate and organize itself, even under adverse large scale conditions (night-time over lands for example). The introduction of this mechanism, coupled with the Emanuel's convection scheme (Emanuel 1991) improved the diurnal cycle of precipitation in the LMD GCM (LMDZ) (Grandpeix & Lafore, 2010). This suggests that the deep convection intensity is not only driven by large scale thermodynamics (e.g CAPE) but also by the mechanical power delivered by local subcloud processes. The LMD GCM convection closure computes so an Avalaible Lifting Power (ALP) which governs the cloud base mass flux. In this study we extend this concept to a larger number of boundary layer processes which could likely trigger and feed deep convection; this includes large scale convergence, thermal plumes and turbulent diffusion. We adopt a statistical approach for thermal plumes by introducing a pdf for mass flux and kinetic energy distribution in the ALP computation. First, the main hypotheses and choices are presented. Then the robustness of the parametrization is analysed using the single coulumn version of LMDZ, which is run in an oceanic case study (TOGA COARE) and a continental case study (EUROCS). The value added to the global climate representation in 3D GCM simulations is finally discussed.