

Transition from shallow to deep convection in a semi-arid environment analyzed with LES and observations: a focus on the role of surface and environmental conditions

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A modelling case-study designed from observations from the African Monsoon Multidisciplinary Analysis (AMMA) is presented and discussed. It aims at investigating the issue of convection initiation in a semi-arid environment. This case corresponds to the development of local daytime convection mainly controlled by boundary-layer characteristics rather than by atmospheric synoptic circulations and it has been particularly well observed. NWP models were not able to forecast this initiation of convection. A high-resolution three-dimensional simulation is presented and extensively evaluated against the numerous observations available for the 10 July 2006 from the AMMA campaign. The simulation, run over a domain of 100 km x 100 km, is able to represent main boundary-layer structures and processes leading to deep convection initiation as well as the development of convectively-generated density currents. In this talk, a particular emphasis will be brought to the role of the atmospheric environment (thermodynamical and dynamical conditions as well as large-scale advection) and of the surface properties to the transition to deep convection.