Geophysical Research Abstracts
Vol. 20, EGU2018-15058, 2018
EGU General Assembly 2018

Precipitation and Mesoscale Convective Systems over Northern Africa: The Added-value of Explicit Convection in the Cloud Organization

Irene Reinares Martínez and Jean-Pierre Chaboureau

Laboratoire d'Aerologie, University of Toulouse, CNRS, UPS, Toulouse, France (jean-pierre.chaboureau@aero.obs-mip.fr)

Precipitating systems are analyzed during a dust event from 9 to 14 June 2006 over northern Africa. A common analysis is applied to satellite observations and two M ´eso-NH simulations, one convection-permitting (horizontal grid spacing Δx=2.5 km) and the other with parameterized convection (Δx=20 km). The precipitating systems are identified as cloud objects and classified deep convective clouds (DCCs) or other clouds according to their infrared signature. Large DCCs (named mesoscale convective systems (MCSs) hereafter) are tracked, characterized in terms of precipitation and thermodynamic profiles, and analyzed in southern West Africa (SWA), Central Africa and Ethiopia. Precipitation is mostly observed along 0-15[U+25E6]N, with 71% of the total precipitation produced by all DCCs and 55% by long-lived MCSs. It shows a marked diurnal cycle with a peak in the evening, mainly due to long-lived MCSs, which are characterized by an increase in size, zonal speed and duration from east to west, with the largest, fastest and longest-lived found over SWA. This is due to an enhanced African Easterly Jet (AEJ) and monsoon flow leading to stronger shear and greater conditional instability. The simulation with parameterized convection fails to distribute precipitation correctly. The convection-permitting simulation captures most of the observed precipitation features, but lacks the increase in organization of the long-lived MCSs over SWA. Excess moisture in a too zonal AEJ flow suggests that the long-lived MCSs in SWA are poorly located with respect to African Easterly Waves. The convection-permitting model improves the representation of precipitation but without fully resolving the long-lived MCSs.