Fourth International Conference on Earth System Modelling
4ICESM-92, 2017

Explicit tropical convection revealed by the ICON high resolution model hierarchy

M. Brueck (1), D. Klocke (2,3), C. Hohenegger (1,2), and B. Stevens (1)

(1) Max Planck Institute for Meteorology, The Atmosphere in the Earth System, Germany (matthias.brueck@mpimet.mpg.de), (2) Hans Ertel Centre for Weather Research, Germany, (3) Deutscher Wetterdienst (DWD), Germany

Convection resolving simulations (2 km to 100 m grid) for the tropical Atlantic region (9000x3300 km) are performed using the icosahedral non-hydrostatic (ICON) model for two seasons. Deactivating the convection parameterization facilitates the explicit evolution of moist convection across horizontal scales, enabling rich interactions with their environment and neighboring convective cells.

The emerging fine scale structure of the ITCZ is linked to the internal structure of its deep convective objects, while the large-scale degree of organization is analyzed in context to mesoscale- and convection induced circulations. Small-scale surface convergence plays an important role in triggering new convection at the leading fronts of larger mesoscale convective clusters. This dynamical component of convection challenges the traditional thermodynamic design of convection parameterizations in which atmospheric instability is balanced locally. Using spatial aggregation methods, we analyze whether convection is driven by surface convergence or its driver.