

High-resolution ICON simulations for the EUREC⁴A field campaign

In January/February 2020 the EUREC⁴A¹ campaign will take place in the tropical Atlantic. It aims at improving our understanding of the connection between clouds, convection, and circulation and their role in climate and climate change. To make the campaign and results as useful as possible, high-resolution simulations are a key element to create and test hypotheses. In this project we will perform accompanying high-resolution simulations with the ICON model during and after the campaign. The simulations during the campaign will be used for forecast purposes to adjust and plan the experimental setup, flight planing as well as for near realtime evaluations of the model performance. Another application is the instruments calibration by forward simulating the model output with a state-of-the-art passive and active microwave transfer model (PAMTRA). The advantage of high-resolution simulations is their capability to provide a 4-dimensional context to the measurements which help to test retrievals and necessary assumptions. After the campaign additional and refined simulations will be performed to tackle specific research questions as the formation of precipitation in the observed liquid clouds. A special challenge will be posed by the small scales dominating the cloud formation and the difficulties to compare point measurements with model simulations in this special environment.

Due to the importance of the small scales, a high resolution of the simulations will be necessary. We will use the ICON-LEM with resolutions varying between 600 and 50 m, depending on the necessary domain size and the character of the problem.

In order to compare the simulations with high-level observations as radar reflectivity or brightness temperatures measured from satellites or the aircraft during the campaign, it is important to transform the model output into observable quantities. Within this project, we will follow this model-to-obs approach with PAMTRA in order to make the simulations comparable to the observations and foster the evaluation.

¹<http://eurec4a.eu/>