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ICON - the new global nonhydrostatic model of DWD and MPI-M

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ICON (ICOsahedral Nonhydrostatic model) is a novel general circulation model that is currently being developed jointly at German Weather Service (DWD) and the Max-Planck-Institute for Meteorology (MPI-M). It is based on an icosahedral-triangular Arakawa-C grid, using a combination of finite-volume and finite-difference discretizations. The dynamical core solves the compressible nonhydrostatic equations of motion, which means that it is suitable even for mesh sizes of 1 km or less. Such mesh sizes are not yet computationally feasible on global grids with uniform spatial resolution, however they are accessible on regional subdomains due to the static mesh refinement capability of ICON. This capability allows for one-way nesting and two-way nesting, the latter meaning that the coarse-grid prognostic variables are replaced with upscaled fields from the refined grid at every large time step. Transport of tracer variables (e.g. moisture, clouds and precipitation) is treated with finite-volume methods, for which a hierarchy of schemes with varying complexity and accuracy is available. The dynamical core is coupled with a full suite of physics parameterisations needed for numerical weather prediction (NWP), and regular test suites with externally provided analysis data have already been running for several months. Ongoing work primarily comprises the coupling with the 3D-VAR data assimilation scheme running operational with the GME model, and fine tuning of the physics parameterisations in order to optimize the forecast quality.

In the presentation, an overview of the current status of development will be given, focusing on the current forecast quality in NWP applications and on the flexibility ICON will offer for future research applications.