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KlimaCampus Kolloquium

Piotr Smolarkiewicz

A finite-volume module for cloud-resolving simulations of global atmospheric flows

The talk highlights the development of the Finite-Volume Module (FVM) of the Integrated Forecasting System (IFS) at ECMWF. FVM represents an alternative dynamical core that enhances the spectral dynamical core of the IFS with new capabilities, such as a compact-stencil finite-volume discretisation, flexible meshes, conservative non-oscillatory MPDATA transport, and all-scale nonhydrostatic governing equations.

As a default, FVM solves the compressible Euler equations in a geospherical framework, using a centred two-time-level time-stepping scheme with 3D implicit treatment of acoustic, buoyant and rotational modes. A hybrid computational mesh, fully unstructured in the horizontal and structured in the vertical, enables efficient global atmospheric modelling. Theoretical considerations are illustrated with results of benchmark simulations of intermediate complexity, and comparison to the operational spectral dynamical core of the IFS. The latter provides an enlightening experience.

Piotr Smolarkiewicz from the European Centre for Medium-Range Weather Forecasts is invited by Peter Korn (MPI-M).

Bundesstraße 53, Room 22/23 (ground floor)