

# **The Discontinuous Galerkin method as a possible alternative dynamical core for the ICON model**

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## *Abstract:*

The ICON model bases on a dynamical core (i.e. a solver for the Euler equations) that uses mixed finite-volume/finite-difference discretizations and a predictor-corrector HEVI time integration scheme. This leads to an overall second order discretization. Moreover, ICON is mass and tracer mass conserving and is stable in mountainous regions with very steep slopes. Since the beginning of the operational use of ICON at DWD in 2014 it has proven its advantageous properties also in the comparison with other global forecast models worldwide.

Nevertheless, it is tempting to explore other numerical methods that promise additional positive properties. One of these methods is the Discontinuous Galerkin (DG) approach. It allows higher order discretizations (both in space and time), conserves all of the prognostic variables, and is easily applicable on arbitrary unstructured grids. Moreover, it is well-designed for massively parallel computers. On the other hand, DG methods are infamous to be quite expensive concerning computational resources.

The talk presents first steps towards a full-fledged dynamical core for ICON based on the DG method. The method and its properties will be described and its ability will be demonstrated by several standard test cases on the sphere and for regional models.