Geophysical Research Abstracts
Vol. 20, EGU2018-15525, 2018
EGU General Assembly 2018

Revisiting high-order finite difference on a reduced latitude-longitude unstaggered grid

Michael Glinton and Pierre Bénard
CNRM Météo France, GMAP/ALGO, France (michael.glinton@meteo.fr)

The global atmospheric models ARPEGE and IFS currently operational at Météo-France and ECMWF respectively use a spectral technique as part of the horizontal discretisation, which is favoured for its high accuracy, but contains a potential scalability bottle-neck because it requires global data communication. One possible alternative being investigated at Météo-France as part of the ESCAPE project (Energy-efficient Scalable Algorithms for Weather Prediction at Exascale, coordinated by ECMWF) is high-order finite difference derivatives on a reduced latitude-longitude unstaggered grid. The aim is to maintain a high degree of accuracy that can be used with the existing model architecture of IFS/ARPEGE whilst circumventing the scalability issue by only requiring a fixed halo of data that needs to be communicated between compute nodes.

A shallow water model has been developed to test and validate the technique. An overview of model design will be given. Stability and accuracy properties will be shown through results from test cases of solid body rotation and the Scott et al./Galewsky et al. barotropic jet instability release.