



Contribution ID: 25

Type: **not specified**

Towards a more stable formulation for the Non-hydrostatic "constant-coefficient semi-implicit" dynamical core of AROME system

Monday, 14 September 2020 13:15 (45 minutes)

Despite its proven robustness and accuracy for NWP purposes at kilometric scales, the so-called "constant-coefficient" linear approach for solving the system of Euler equations with a semi-implicit scheme may suffer from two serious weaknesses when severe high-resolution flows and steep orography are at stake. Actually, the inconsistency in the boundary treatment between the horizontally homogeneous implicit linear part and the non-linear explicit part of the model, and the absence of implicitly treated orographic metrics terms arising from the use of terrain-following coordinate, may jeopardise the stability of the system at high-resolution. A bespoke solution circumventing these issues without relaxing the constant-coefficient assumption is presented. This solution results in a new formulation of the vertical momentum prognostic equation, that leads to a substantial gain in term of stability for the resulting constant-coefficient semi-implicit dynamical core of AROME model.

Presenter: VOITUS, Fabrice (Météo-France)

Session Classification: Moderator: Christian Kühnlein (ECMWF)