What is going on in dynamics in HIRLAM

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HIRLAM-B
Overview

• Optimal nesting strategy
• Elimination of the extension zone from the grid-point representation
• Taking advantage of Boyd’s biperiodization
• Change of vertical coordinate
• Other developments
  – Semi-analytical
  – Physics-dynamics interface
Optimal nesting strategy

- ECMWF $\rightarrow$ 16 km resolution, 3h interval
  - HARMONIE $\rightarrow$ targetted at $\sim$2.5 km
  - Do we need an intermediate resolution model?
  - Do we gain something with more frequent LBC’s?

- see next presentation by Jana and Javier
Elimination of the extension zone in the grid-point computations

• In the present situation
  – Some grid-points from the extension zone are assigned to processors, others are not
  – Some computations are carried on including the extension zone (GPNORM, for example). In others they are excluded (CPG, partly in CALL_SL).
  – Biperiodization is applied to all fields before writing.
Advantages of the new setup

• Only points in the C+I area “exist” in grid-point space
• No need to biperiodize before writing a grid-point field
• Fields in grid-point format can be coded in GRIB
• Periodization for the spectral transforms do not involve interprocessor communications
Future connection with Boyd’s periodization

• Values of fields in the extension zone and in part of the 1 zone come from the host model (presentation by Steven Caluwaerts)
  – They can be kept from the beginning in spectral space

• Values coming from the LAM model go to \textbf{zero} smoothly on the boundaries.
  – Biperiodization is a simple padding with zeroes
Computations are carried on in C+I, Davies relaxation is applied in I, Boyd’s values are applied in E
Change of the vertical coordinate to a height-based hybrid one

• Use of a time-independent coordinate eliminates the X-term.
• Only derivatives are used in the vertical (no integrals) which simplifies the constraints to arrive at a single Helmholtz equation
• The coordinate is still a hybrid coordinate. The data flow is maintained.
Change of vertical coord (cont)

- Slab model using a vertical hybrid coordinate based on height
Use of ECMWF physics allowed in the LAM version

- Switches LECMWF and LELAM made compatible
- Surface fields are interpolated by “gl” to use the ECMWF soil scheme
- In the HIRLAM setup, set PHYSICS=ecphy and SURFACE=htessls
- Physics parameters depending on resolution computed from EDELX instead of NSMAX
Other projects

• Second-order accurate interface with the physics
• Semi-analytical time-stepping scheme
• Running the physics and the dynamics at different resolutions