Dynamics

Small summary

Coupling (LBC)

- Difficult topic (mine field …)
- Better scheme than Davies … ? Perhaps, but not for tomorrow.
- Ongoing work:
  - Tools:
    - academic 1D to test new ideas;
    - 3D-type of test to validate coupling (frequency, linear vs quadratic interpolation in time, later new approaches);
    - Warning index in coupling files on rapidly propagating small-scale features (MCUF; role of DFI to be reviewed)
  - New ideas: "externalization of coupling"; how to cope with the spectral method (hope to be able to apply transparent boundaries in a spectral model).

Organization of the time-step

➢ Coupling with physics: stability and accuracy

- Current way (level t, Origin point; before dynamics) is only first order accurate;

- Find something better (partly lagged physics – but not to call it twice) more attempts should be done;

- How to test properly the stability properties.

Semi-Lagrangian

➢ SLHD

- Better tuning: wider range of resolutions; finer tuning because of physics;
- Problem of "eating" weak rain (there is a link to SLHD, but which one?);
- New interpolators (very promising!)

VFE for NH dynamical core

➢ Very good progress: the feasibility is proven. There is an iterative solver, suitable for variable map factor (stretched sphere or large LAM). Stable 3D tests with dt=120s for dx=2.5km.

➢ Remaining problem: so-called X-term, a cross-term of

$$\nabla \Phi \cdot \frac{\partial \vec{V}}{\partial \Phi}$$

"chimney-like" symptom; inconsistent discretization?

➢ Alternative (other pair of prognostic variables: Phi and w)?

Daily runs

➢ HIRLAM community gets familiar with ALADIN system, development of the convertors.

NH dynamical core: compressible or anelastic?

- Fully compressible models: numerical solutions must take care for acoustic waves if one wants an efficient scheme.

- Semi-elastic dynamics: intuitively speaking, it should be easier to build efficient and stable SISL schemes. But:
  - Is this really true?
  - Could those models be realistic enough for NWP?

- Work addressing these issues will continue with HIRLAM-NH version.

Conclusion

➤ There are many common areas of research interest between both consortia