ALADIN

A stabilisation year

EWGLAM/SRNWP, Madrid, 6/10/08

ALADIN 2007=>2008

- One new Partner from 1/1/08: TURKEY!
- Preparation of the ALADIN 4 year plan
  - Ongoing collective effort from:
    - CSSI;
    - Policy Advisory Committee;
    - PM;
  - Final version hopefully available in November.
- AROME and ALARO-0 (with 3MT) reach operational status in 2008.
- The situation is now one of stabilisation for new scientific ambitions, in priority within the HARMONIE framework.

AROME

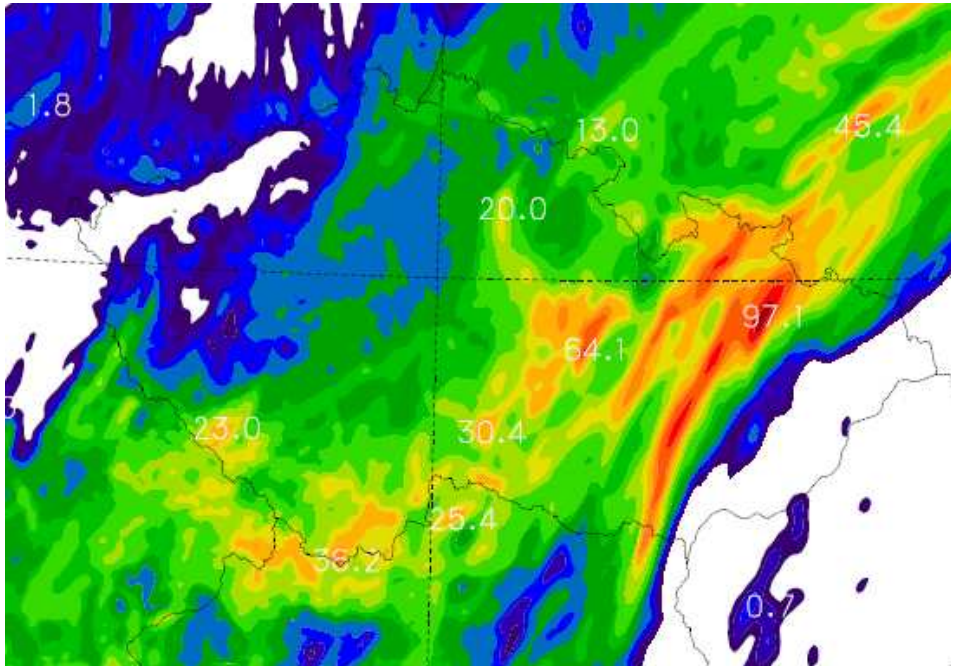
- AROME status at Meteo-France
  - now quasi operational at 2.5km resolution over France, 3DVar assimilation with radial doppler radar winds
  - nested inside ALADIN-MF 10km inside ARPEGE (15km resol over France)
  - brings clear added value (objective scores + usefulness to forecasters)
  - for AROME scientific recent developments and plans: SEE PRESENTATION BY V. MASSON
  - cooperation is expanding with several ALADIN and HIRLAM ('HARMONIE project') NWP centres: local validation, experimentation and developments
  - and continuing IFS cooperation with ECMWF (mostly software + some science) as part of ALADIN+HIRLAM consortia activities

Importance of consistency (1/2)

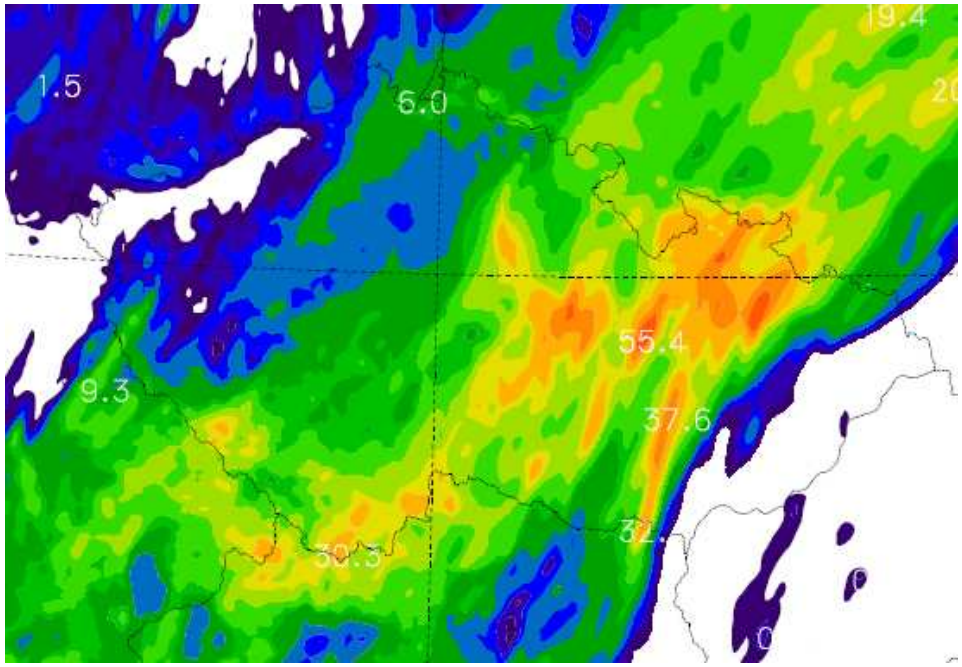
- Example of the consistent computation of energy cycle: pressure gradient term
  - Need to compute the horizontal gradient of RT.
  - When the gradient of the R part does not also account for hydrometeors (unlike in the Laplace equation integration in the vertical), this omission leads to positive feed backs inside important precipitating systems.

Importance of consistency (2/2)

Grad (RT) with qv only; dx = 2.3km



Grad (RT) with all species



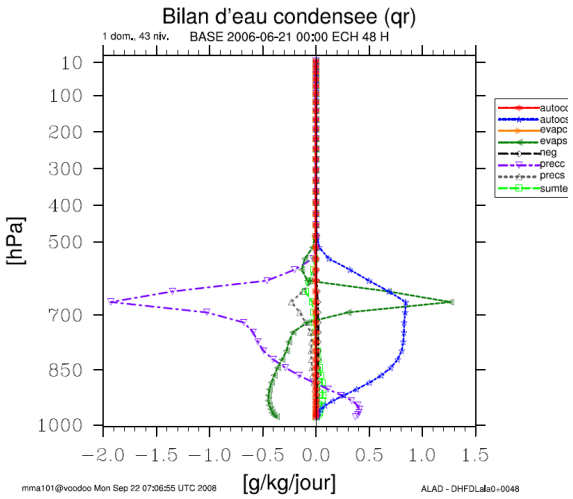
True only at high resolution, in AROME and in ALARO

Value of modularity (1/2)

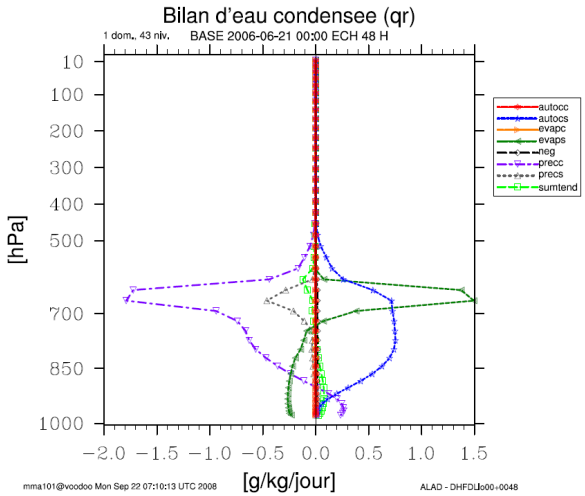
- Modularity is one of strong features of IFS and associated LAMs (IAAAAH).
- It allows:
  - useful comparisons (all other things equal):
    - “competition of ideas”;
    - identification of weaknesses;
  - various level of complexity (cost-benefit considerations from application to application);
  - natural push toward cleaner codes.
- Example (next viewgraph): given the correct code, one can have CRM-like behaviour at 9km mesh integration.

Value of modularity (2/2)

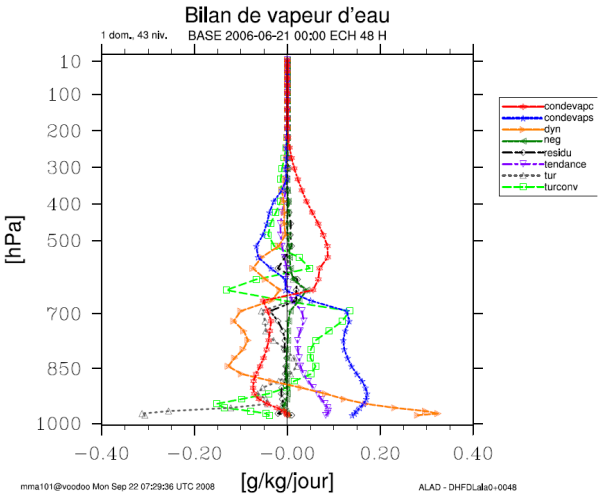
Example: what about ARPEGE microphysics' processes in 3MT: autoconversion, collection, evaporation and melting.



ALARO-0 processes



ARPEGE processes

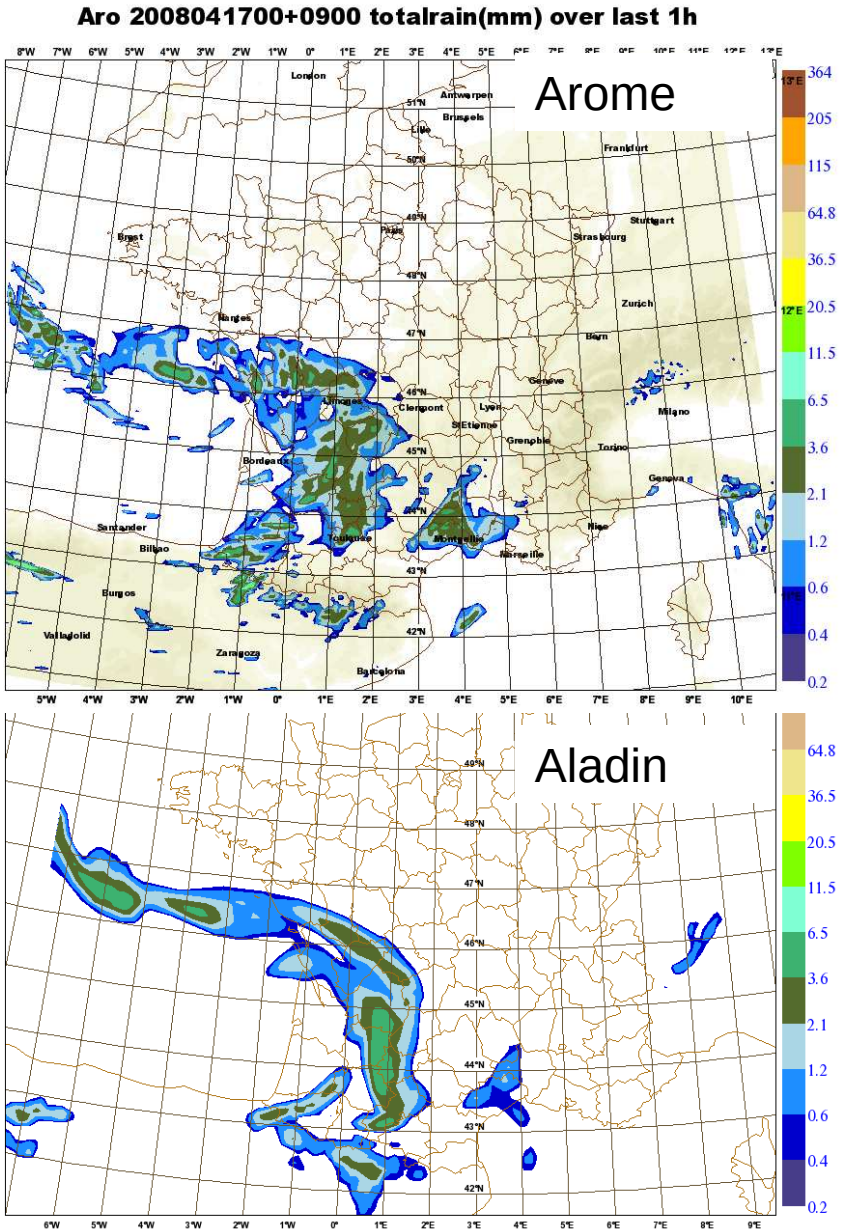


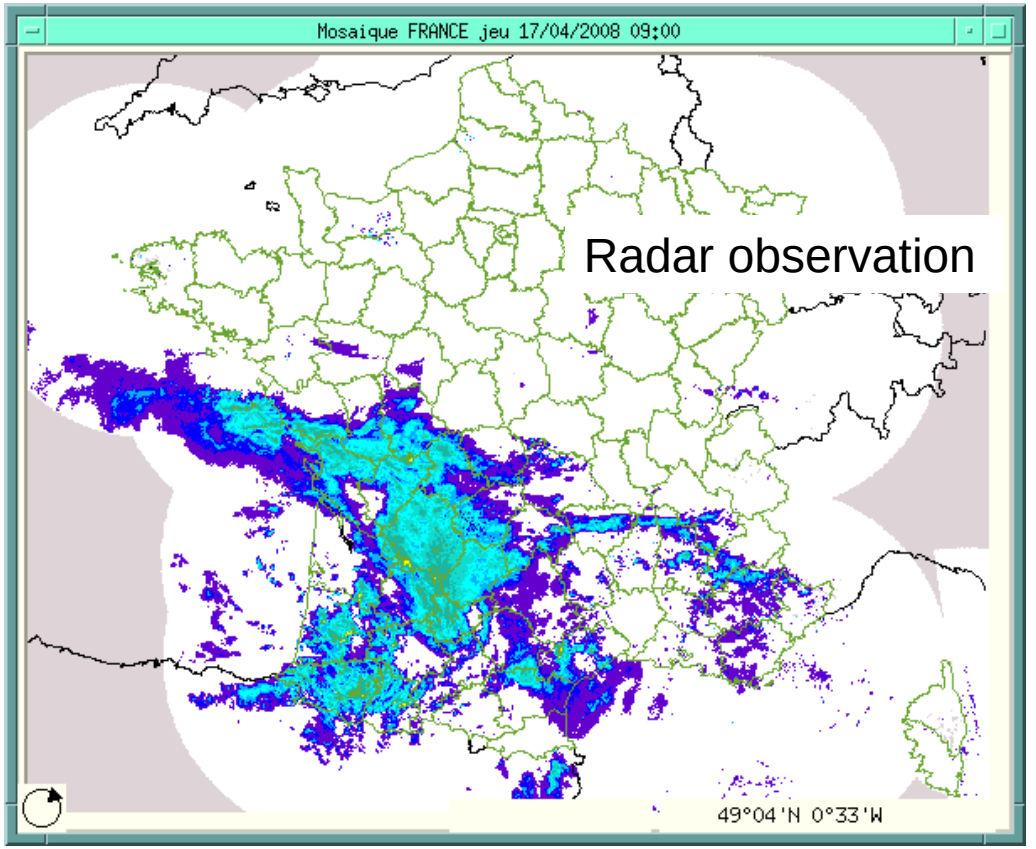
Difference of qv budget: interesting feedback on precipitation activity => despite similar 'shapes' higher "resolved/conv" ratio for the ARPEGE-type forcing

About ‘scales’

(3 short issues)

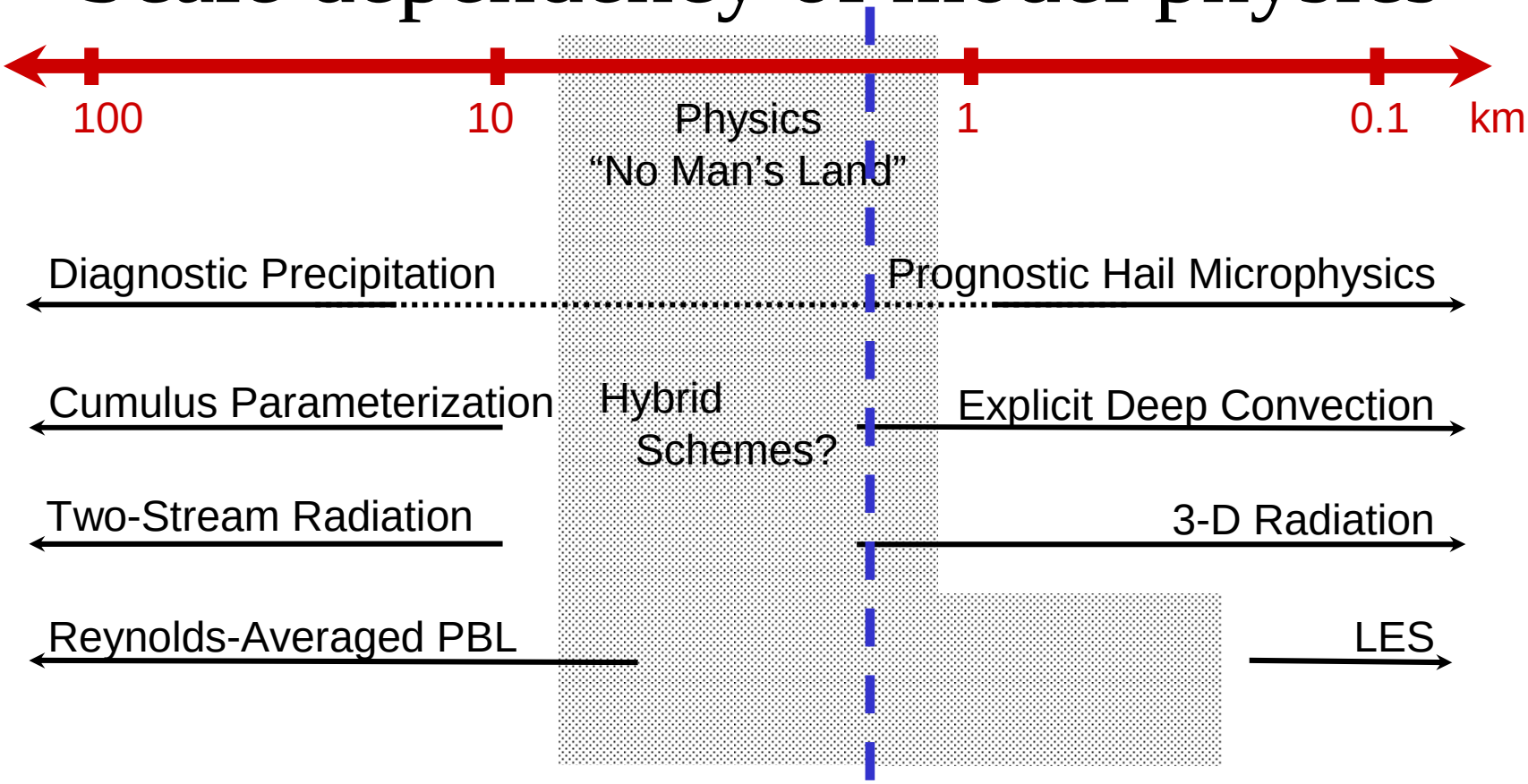
AROME's resolved convection : a deep change for products' perception and for verification





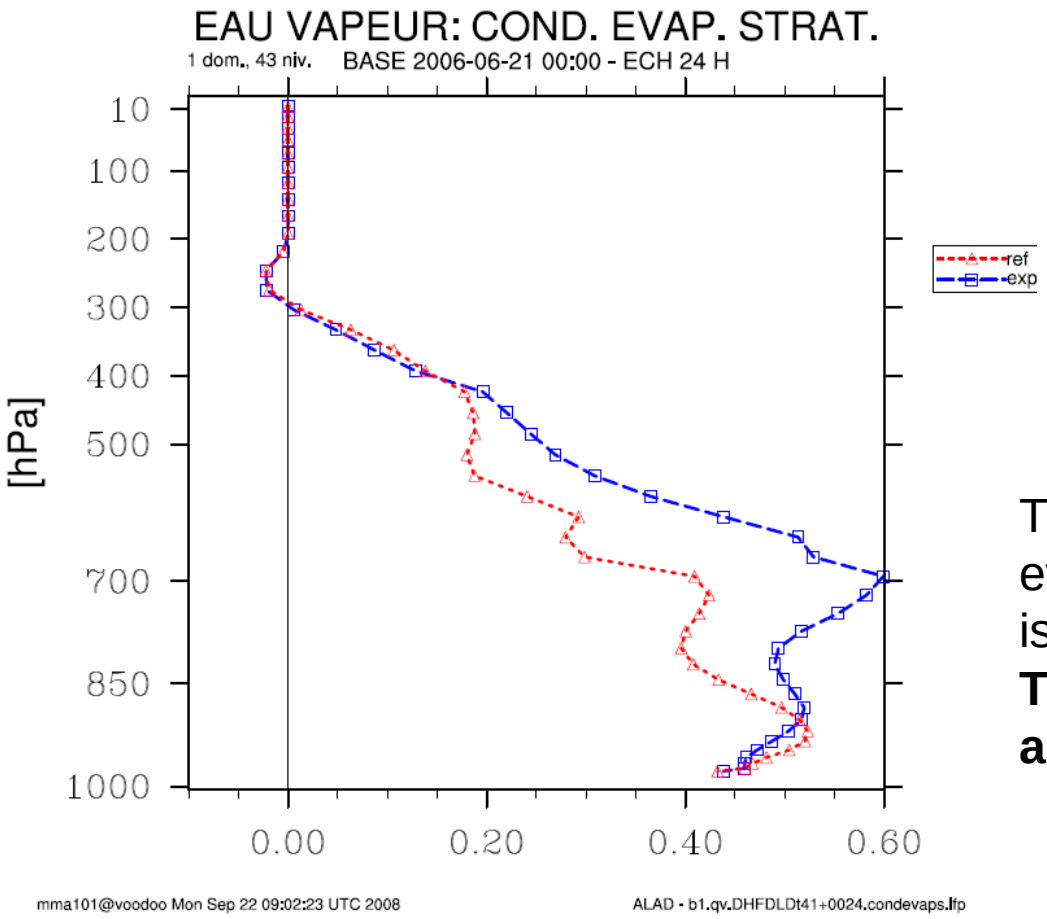
The 'application side' of the 'double penalty' syndrome for verification: details of AROME bring good information about the structure of the field but they might be more misleading about the life-cycles at small scale than their ALADIN counterparts at a larger scale

Scale dependency of model physics



(adapted from Klemp 2007, by Seifert [GCSS, Toulouse, June 2008])

Sub-grid scale geometry in microphysics (in ALARO-0)



Two options are tested:

- Maximum overlap of clouds (more realistic) – reference;
-Random overlap of clouds – exp 1

The impact (here shown for evaporation of falling species) is not negligible.
The problem cannot be treated as linear.

Highlights of the ALADIN 4-year plan (1/2)

- ***Data assimilation (DA) tools***: Joint thrust with HIRLAM towards high resolution on one side and 4D-Var on the other side.
- ***Use of observations***: Diversification of the data input but within a single IFS-bound scope, also in a joint effort with HIRLAM.
- ***Diagnostics, validation and verification***: Catching up with the state of the art (!) and relying if appropriate on the SRNWP Programme.
- ***Dynamics items independent from LAM status***: Aladin/NH⇔VFE, new s.-Lag. interpolators, SLHD, mass-conservation and [p,T] heat projection in compressible mode, how to go towards finer mesh-sizes.
- ***Numerical efficiency***: Links with DA and with phys-dyn coupling.
- ***LAM related dynamics issues***: Large domain SI problem, Boyd's solution for 'biperiodisation', scale-selective DFI, transparent LBC in spectral, all in a joint effort with HIRLAM.
- ***LAM Climate***: Consolidate the nice potential of ALADIN-Climate, in its various versions, for 'climate regionalisation' efforts.

Highlights of the ALADIN 4-year plan (2/2)

- ***Links with nowcasting***: Seeking maximum harmonisation with INCA.
- ***Upper air physical parameterisations***: Many streams of development (ARPEGE, ALARO, AROME) and a search for consistency in stabilisation of the multiscale potential of ALL of them.
- ***Predictability and EPS***: Increasing the contribution to GLAMEPS (and later EurEPS?) while keeping alive M-F and RC-LACE specificities (global character & compact geography, respectively).
- ***Surface and soil processes (Model & DA)***: Common effort with HIRLAM around SURFEX and a future offline simplified EKF, with the aim both to keep the advantage of externalisation and to add relevant modularity to it.
- ***System aspects (within the Interoperability Programme's scope)***:
  - Classical efforts on 'Maintenance' and 'Compilation' issues as well as tools;
  - Improvement of 'Networking aspects', especially in view of HARMONIE.

Outlook (until next EWGLAM at least)

- For “ALADIN” (AAA):
  - After many years of ‘drive towards operational deliveries’, get back scientific priorities to stable longer-term issues (including ‘convergence’ in a multi-scale spirit);
  - Continue to increase the efforts on ‘dynamics and LBCs’ (in a wide sense).
- For HARMONIE:
  - Extend the good example of ‘DA’ to dynamics (ongoing), LAM-EPS (potentially there) and physics;
  - Create conditions for a better benefit from each sides’ cross validations.