

# Work plan for ALADIN-2 in 2004

D. Giard, G. Hello and J.F. Geleyn,  
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## 1. Introduction

### *Vocabulary*

The model name is ALARO, whatever the use. Its application at very high resolution is called AROME.

### *References*

This proposal is built from contributions of ALADIN coordinators, the AROME project leader and the CNRM/GMME team, upon the “*ALADIN medium-term research plan*” (2002-2004) and status report (October 2003), discussions along the last ALADIN workshop (November 2003), LACE work plans (January 2004), and the “*Strategic document for the preparation of an ALADIN-2 project*” (December 2003). It uses the new definitions introduced in the revised “*Proposal for a clarification of guidelines and acronyms for work around the ALADIN and AROME models*” and includes corrections proposed by the "extended CSSI" meeting held in Prague on February 2004, 13th.

Most reference documents are available on the ALADIN web site, under item “*publications and documentation*”, i.e at address : <http://www.cnrm.meteo.fr/aladin/scientific/>.

### *Caution*

The work program is still quite huge in this second draft, but its scope extends till mid 2005. Only higher priority topics should be considered first, and the program will be refined afterwards (at mid and end 2004).

## 2. Sub-project INTERFACES

### *Objective*

To offer the highest level of options while preserving the efficiency and portability of the model.

This concept extends beyond the scope of the ALADIN-2 project, towards the ARPEGE-IFS system at least. It will guarantee a smooth convergence of the ALADIN and AROME projects, making validations easier and offering to all the partners any intermediate choice between AROME and the present operational configurations. For 2004, priority must be given to the physics-dynamics interface.

### *Working plan for 2004*

#### **a Physics-dynamics interface (upperair) & time-step management**(× AROME)      **COORDINATOR** : J.F. Geleyn

**a1.** A new physics-dynamics interface must be defined, then designed and coded, first. Once this flexible interface will exist, it will be possible to call either the current ALADIN physics or the Meso-NH physics in the ALARO framework.

– Priority level : 1

– Who ? : *Jean-François Geleyn, Gwenaëlle Hello, Martina Tudor, and either Martin Bellus or Laszlö Kullman*

**a2.** The organisation of the time-step (in peculiar the way the physics is called) is important to allow the use of long time-steps and impose constraints to the work on the above-mentioned interface.

– Priority level : 1

– Who ? : *Jean-François Geleyn, Piet Termonia, Martina Tudor, Gwenaëlle Hello*

**a3.** Definition of the set of required diagnostics (which may also impact on the practical implementation of the interface).

– Priority level : 1

– Who ? : *Sylvie Malardel, CNRM/GMAP/PROC, CNRM/GMME, ?*

#### **b Externalisation of the surface**

**CONTACT POINTS** : F. Bouyssel, V. Masson

**b1.** Further work on the externalization of surface for AROME

– Priority level : 1

– Who ? : *Valery Masson, Sylvie Donier*

**b2.** Design of a simpler interface for the lower-resolution configurations (topic requiring a more precise definition)

– Priority level : 1

– Who ? : *post-doc GMGEC, François Bouyssel, Valery Masson, Laszlo Kullmann or Stjepan Ivatek-Sahdan or Olivier Latinne ?*

**b3.** Definition of the required diagnostics

– Priority level : 1

– Who ? : *Sylvie Malardel, CNRM/GMAP/PROC, CNRM/GMME, Stjepan Ivatek-Sahdan (?)*

**b4.** Update of I/Os for surface fields : choice of the optimal configuration, coding and first tests

– Priority level : 2

– Who ? : *Ryad El Khatib*

**c Assimilation** (× **ALAROPAC**)

**CONTACT POINT** : L. Auger

**c1.** “from Diag-Pack to Var-Pack”, or “do we need a surface analysis ?” (this will test whether we have to keep O.I. or not)

– Priority level : 2

– Who ? : *Ludovic Auger, Françoise Taillefer (?)*

**d Efficiency and Portability**

**COORDINATOR** : R. El Khatib

**d1.** Further improvement of the xrd library and of the consistency of tools

– Priority level : 1

– Who ? : *Oldrich Spaniel, Jean-Daniel Gril, Denis Paradis (?), ?*

**d2.** Management of the extension zone (avoiding calling physics there)

– Priority level : 1

– Who ? : *Ryad El Khatib, Gabor Radnoti (?), Radmila Brozkova*

**d3.** Further externalizations : biperiodization, Full-Pos, ?

– Priority level : 2-3

– Who ? : *Ryad El Khatib*

**e Validation tools** (× **AROME**, × **ALARO - 5 km**, × **ALARO - 10 km**)

**COORDINATOR** : J. Stein

**e1.** Development or refinement of validation / verification tools using radar and satellite data, or new methods (e.g. probabilistic scoring of precipitation, improved use of regional observing networks).

– Priority level : 1

– Who ? : *Tomislav Kovacic, Siham Sbiï, Joël Stein, François Bouttier, ?*

**e2.** Development (or adaptation) of a set of diagnostics available to all physical packages (the wider the better).

– Priority level : 1

– Who ? : *Tomislav Kovacic, Stjepan Ivatek-Sahdan, CNRM/GMAP/PROC, CNRM/GMME, ?*

### **Remarks**

**a:** The work on equations (3b1) should be performed first, since it will define what is not allowed in the design of interfaces.

**c:** This should precise whether we need an "optimal interpolation" analysis for surface.

**e:** The work should start only in the second half of 2004.

## **3. Sub-project AROME**

### **Objective**

Set up and run the AROME model prototype, assess day-one meteorological quality and computer cost, first scientific improvements and computational optimization.

Other ALADIN partners than Météo-France will contribute to nominal AROME on subjects that may go beyond the convergence but can be tackled outside Toulouse because they are of general interest to justify investment from the partners and do not need training on the full Meso-NH model.

The work plan will have to be refined according to the availability of the 3d prototype (the 1d version is ready), e.g. along the ALADIN workshop in June.

### **Working plan for 2004**

#### **a Dynamics**

**COORDINATORS** : P. Bénard, R. Brozkova

The work on ALADIN-NH is now regarded as a part of the AROME project, with little change to the actual content of the work package. The following points should be addressed :

**a1.** Code maintenance : cleaning and optimization of the ICI NH version-code (including the call to physics), validation aspects (including more case studies). (× **INTERFACES** , × **ALAD1**)

– Priority level : 1

– Who ? : *Jozef Vivoda, Martina Tudor, Pierre Bénard, Gwenaëlle Hello, Radmila Brozkova*

**a2.** Lower Boundary Condition (interactions with horizontal diffusions and SL advection, advection of vertical velocity).

– Priority level : 2

– Who ? : *Jan Masek, Radmila Brozkova, Petra Smolikova*

**a3.** Upper Boundary Condition : Radiative condition, adaptation to variable  $d4$ .

– Priority level : 2

– Who ? : *Martin Janousek, Pierre Bénard, Jan Masek (?), Jozef Vivoda (?)*

**a4.** Diabatic forcing. (× **INTERFACES**)

– Priority level : 3 unless of major importance for the physics-dynamics interface

– Who ? : *Alena Trojakova, Pierre Bénard*

**a5.** SLHD for NH dynamics.

– Priority level : 3 since it has to work first at operational scales

– Who ? : *Filip Vana*

**a6.** Theoretical studies, towards higher resolution (vertical discretization, link between NH and finite elements, problems due to the “terrain-following” coordinate, SRNWP challenges).

– Priority level : 3

– Who ? : *Jan Masek, Radmila Brozkova, Pierre Bénard*

### **b Equations** (× **INTERFACES**)

**COORDINATOR** : J.F. Geleyn

**b1.** Definition of a consistent set of equations and hypotheses compatible with the ALADIN-NH dynamics and Meso-NH physics (follow-on of the work performed by Pierre Bénard, Joël Stein and Sylvie Malardel).

– Priority level : 1

– Who ? : *Martina Tudor, Piet Termonia*

**b2.** Thorough study of the time-discretization.

– Priority level : 2

– Who ? : *Piet Termonia*

**c Physics -1 : not requiring the AROME (3d) prototype**

**CONTACT POINTS** : S. Malardel, V. Masson

**c1.** Learning Meso-NH physics and performing inter-comparison experiments using the ALADIN and AROME 1d models.

– Priority level : 1

– Who ? : *Martin Bellus or Laszlo Kullmann, someone from Austria (?), someone from Algeria (?), ?*

**c2.** Introduction of the operational snow scheme in the AROME surface scheme.(× **INTERFACES**)

– Priority level : 1

– Who ? : *Andrey Bogatchev or Valery Spiridonov ?, Eric Bazile ?*

**c3.** Test and optimization of the ISBA-dif model (with several vertical layers) for a future use in AROME.

– Priority level : 3

– Who ? : ?

**c4.** Development of a 1d lake-model for AROME (then validation and upscaling).

– Priority level : 3

– Who ? : ?

**c5.** Further test and validation of the 1d urban model for AROME (then upscaling ?).

– Priority level : 3

– Who ? : *Valery Masson, Olivier Latinne (?), Mihaela Caian (?)*

**c6.** Validation and improvement of fog forecast.(1d model, then AROME prototype)

– Priority level : 3

– Who ? : ?

**d Physics -2 : requiring the AROME prototype or the Meso-NH model**

**CONTACT POINT** : F. Bouttier

**d1.** Evaluation of the stability and accuracy of AROME physics with long time-steps, control of the robustness of parameterizations (as was done for the ARPEGE/ALADIN package)

– Priority level : 1

– Who ? : *Martina Tudor*

**d2.** Research and development on a 3d turbulent scheme : How to implement it ?

– Priority level : 1

– Who ? : *Jean-Philippe Lafore* (?), *Sylvie Malardel*, **Filip Vana**, *Karim Yessad*, *Gwenaëlle Hello*, **Piet Termonia** (?)

**d3.** Evaluation and optimization in the AROME prototype of the 3d turbulent scheme, once available.

– Priority level : 2

– Who ? : *CNRM/GMAP/PROC*, ?

**d4.** Validation and improvement of sea fluxes.

– Priority level : 3

– Who ? : ?

**d5.** Validation of clouds and precipitation using radar and satellite data at AROME resolutions (coordination with the corresponding SRNWP network is required of course).

– Priority level : 2

– Who : *PREVI/COMPAS* (*Joël Stein*), *François Bouttier*, **Tomislav Kovacic** (?), *Austrian team*, ?

**d6.** Coupling AROME with an interactive chemistry model

– Priority level : 3

– Who ? : *Yann Seity*, ?

**d7.** Phasing with future evolutions of the Méso-NH physics (if any this year, preparation work for future operational applications and scientific classical follow-on of adapted concepts).

– Priority level : 2 for this (starting) year

– Who ? : *Yann Seity*, *Patrick Jabouille*

**d8.** Minimization of AROME development impacts on operational ALADIN applications. (the AROME prototype will not be phased until later and the only reasonable way to profit from current promising merges (essentially in the physics) is to rely on the forthcoming interface and on the latest ALADIN cycles, in order to avoid future dilemmas). (**× INTERFACES** , **× ALAD1**)

– Priority level : 2 for this (starting) year

– Who ? : ?, *Yann Seity*, *Patrick Jabouille*, ?

**d9.** Evaluation of the AROME prototype in specific situations: (once the 3d prototype usable), e.g. : Norwegian area (comparisons with HIRLAM and UM); Mediterranean (MAP cases), Saharian and tropical Africa areas; recent high-impact European mesoscale weather events

– Priority level : 2 for this (starting) year

– Who : *Yann Seity*, *François Bouttier*, ?

### e Plans for the French AROME team (model)

**COORDINATOR** : F. Bouttier

The model will be developed as a prototype i.e. a non-optimized version to serve as a proof of concept of plugging Meso-NH parametrisations into ALADIN-NH: 1d prognostic turbulence, FM radiation, prognostic cloud microphysics, externalised land surface model. The prototype will then be run on test cases at resolutions ranging between 1 and 10 km for scientific validation, numerical optimization, and computer benchmarking. It will be phased back into the main ALADIN cycle early in 2005, with a second release in 2006.

The model dynamics and physics/dynamics coupling will be done as a part of normal ALADIN activities, adding AROME manpower when possible. The physics itself will be developed by the Meso-NH community in the Meso-NH environment and imported into AROME when ready, the main issues for work in 2004 will be the parametrisation of surface fluxes over sea, the specification of a renewed 3d turbulence scheme and the assessment of a common set of basic hypotheses for AROME and Meso-NH.

– Priority level : 1

– Who : Yann Seity, Frédéric Duret, Pierre Bénard, Sylvie Malardel, Patrick Jabouille, Joël Stein, François Bouttier, ?

### **Remarks**

*a*: The cleaning of NH dynamics will be achieved before summer 2004.

*d*: The (3d) prototype should be ready by June 2004.

Only pure model issues are listed here. AROME topics of interest in the domain of data assimilation, predictability or coupling are covered by **ALAROPAC**, while verification aspects are mentioned in **INTERFACES**.

## **4. Sub-project ALARO - 5 km**

### **Objective**

To possibly solve the problems inherent to the so-called “grey zone”, mainly that convection is partly explicit but not fully resolved (the most advanced work on this topic is the one of Luc Gerard), but other parameterizations may also required attention.

It has to be stressed here that, first “grey-zone” problems appear only in the domain of physical parameterizations, second Météo-France does not want to be involved in this sub-project.

The LACE plan for physics is put here by default. **There will anyway be strong interactions with the ALAD1 and ALARO-10 km sub-projects.**

**COORDINATORS** : T. Haiden, L. Gerard

### **Working plan for 2004**



### **a Deep convection (× ALARO - 10 km)**

**a1.** Enter grey zone (more comparison experiments on 7 km, 4 km, and 2.5 km), maybe it is not as “bad” as anticipated)

– Priority level : 1

– Who ? : *Thomas Haiden, Doina Banciu, ?*

**a2.** Prognostic scheme of Luc Gerard : The development of an integrated treatment of the moist physics implying a coherent connection between prognostic updraught, micro-physics and downdraught, with a common treatment of subgrid and resolved precipitation and cloudiness, is now at the step of 3D testing. Work is going on, on the issues of stiffness / scheme numerical stability, additional enhancements of the triggering of convection, tuning of the amount of precipitation, and a few other issues. Further 3d validation tests are planned using ARPEGE and ALADIN at different resolutions, with a particular attention to the behaviour in the "grey zone" (7-3km mesh). Controll cases experiments using a pseudo-2d model should also be performed.

– Priority level : 1

– Who : *Luc Gerard, Austrian team, ?*

**a3.** Study of the triggering and development stage of deep convection, using radar and satellite data.

– Priority level : 1

– Who : *Franz Wimmer, Martin Bellus, Tomislav Kovacic (?)*

**a4.** Interaction with the representation of orography (envelope versus mean, first tests)

– Priority level : 2

– Who : *Franz Wimmer*

**a5.** Test of the KFB convection scheme at such scales (implying the introduction of missing elements: continuity with the microphysics of the resolved precipitation, prognostic closure, possibility to have a convective fraction of the mesh size growing towards one)

– Priority level : 3 (in case of problem with other schemes)

– Who : ?

### **b Shallow convection and low cloudiness (× ALARO - 10 km, × ALAD1)**

**b1.** Convergence between Xu-Randall and Seidl-Kann schemes, 3d tunings.

– Priority level : 1

– Who : *Alexander Kann*

**b2.** Experiments on inversion formation and sustenance (including 3d cycling experiments).

- Priority level : 1
- Who : *Alexander Kann, Laszlö Kullmann, Gergely Bölöni*

**b3.** Requirements for vertical diffusion and vertical resolution to simulate formation of sharp inversions.

- Priority level : 1
- Who : *Thomas Haiden (1d), André Simon (3d)*

### **c Orographic drag and envelope** (× **ALARO - 10 km** , × **ALAD1**)

**c1.** Experiments with, and validation of, newly revised scheme without envelope

- Priority level : 1
- Who : *Franz Wimmer, Jean-François Geleyn, Bart Catry, Jure Cedilnik*

**c2** Validation of wind forecasts at high mountain stations.

- Priority level : 1
- Who : *Klaus Stadlbacher*

**c3** Evaluation of the “quality” of orography description, new definition of the semi-envelope.

- Priority level : 2
- Who : *Jure Cedilnik*

### **d Prognostic cloud water**(× **ALARO - 10 km**)

**d1.** Sensitivity studies on orographic precipitation cases.

- Priority level : 1
- Who : *Christoph Wittmann, Dunja Drvar (?)*

**d2.** Interaction with other developments (Meso-NH microphysics, “Functional Boxes”, data assimilation, ...)

- Priority level : 1
- Who : *Doina Banciu*

### **Remarks**

**c:** Significant advances achieved along the first 2 months of 2004.

## 5. Sub-project ALARO-10 km (validation, upscaling)

### *Objective*

To ensure that developments designed for smaller scales will improve forecast skill at the current operational ones without too much loss of numerical efficiency.

*COORDINATOR* : G. Hello

### *Working plan for 2004*

#### **a Build and evaluate an ALARO-10 km prototype from the AROME one + the MNH convection scheme (KFB)**

##### **a1.** Building the prototype

- Priority level : 1
- Who : *Gwenaëlle Hello*

##### **a2** Comparison of ALADIN and the ALARO prototype at 10 km, evaluation of the impact of the Meso-NH physics and of the overhead.

- Priority level : 1
- Who : *Gwenaëlle Hello, Tomislav Kovacic (?), Dunja Drvar (?), Austrian team (?), ?*

##### **a3.** Evaluation of other solutions for the convective scheme.(× **ALARO - 5 km**)

- Priority level : 2 (in case of)
- Who : *Jean-François Geleyn, Gwenaëlle Hello, Jean-Marcel Piriou (?), Luc Gerard, ?*

##### **a4.** Definition of an “optimal” choice for the surface, and implementation.(× **INTERFACES**)

- Priority level : 2
- Who : *François Bouyssel, Stjepan Ivatek-Sahdan (?), Mihaela Caian (?), Olivier Latinne (?), Gwenaëlle Hello*

#### **b Optimization of the parametrizations**

##### **b1.** Further work on intermittent radiation schemes (× **ALARO - 5 km** , × **ALAD1**)

- Priority level : 1
- Who : *Jean-François Geleyn, Neva Pristov, Gwenaëlle Hello, Yves Bouteloup, Helga Toth (?)*

##### **b2.** Sub-grid scale orography: drag/lift, in order to remove the envelope orography (× **ALARO - 5 km** , × **ALAD1**)

– Priority level : 1

– Who : *Jean-François Geleyn, Bart Catry, François Bouyssel, Frank Wimmer, Jure Cedilnik, Richard Mladek*

**b3.** Triggering of convection (× **ALARO - 5 km** , × **ALAD1**)

– Priority level : 1

– Who : *Thomas Haiden, Martin Bellus, Jean-Marcel Piriou, Tomislav Kovacic, Luc Gerard*

**b4.** Adaptation of the parametrizations to long time-steps, especially for micro-physics

– Priority level : 1

– Who : *Gwenaëlle Hello, Doina Banciu, Jean-François Geleyn, Luc Gerard, Eric Bazile (?)*

**b5.** Study of the performance of the prototype in the presence of shallow convection and stratiform clouds.

– Priority level : 1

– Who ? : *CNRM/GMAP/PROC, someone from Austria (Thomas Haiden, Alexander Kann) or Hungary (Laszlö Kullmann), ?*

### **Remarks**

**b:** Many common tasks with **ALARO - 5 km** !

## **6. Sub-project ALAROPAC**

### **Objective**

To continue research on issues that concern all scales, roughly as scheduled.

Only the main lines are given for data assimilation and predictability, since a detailed description is available in the document written by Claude Fischer.

### **Working plan for 2004**

#### **a Data assimilation**

**COORDINATORS** : C. Fischer, G. Bölöni

**a1.** Algorithmic aspects

- General maintenance (phasing and validation, evaluation of a new humidity variable)
- Moving to 3d-FGAT

- Evaluation of the CONGRAD minimizer
  - Priority level : 1
  - Who ? : *Claude Fischer, Gergely Bölöni, Loïk Berre, Cornel Soci, Karim Yessad , Hungarian newcomer, Gérald Desroziers*
- Implementation and evaluation of a variational quality control
- Update and evaluation of the TL/AD models
  - Priority level : 2
  - Who ? : *Claude Fischer, Patrick Moll, Cornel Soci, Karim Yessad , André Simon, Bernard Chapnik (?)*
- Model imbalances, initialization and the “Jc-dilemma” (watch)
  - Priority level : 3
  - Who ? : *Claude Fischer, Dominique Giard*

## a2. Cycling

- Analysis-only : further work on 3d-var in ALADIN-HU, first version of 3d-var in ALADIN-France and ALADIN-Roumanie
- Large scale update : DFI-blending in ALADIN-CE, explicit spectral blending in ALADIN-HU, and comparison with Blendvar, Blendvar in ALADIN-NORAF, variational control via the Jk cost-function
  - Priority level : 2
  - Who ? : *Hungarian, French, Moroccan, Romanian teams; Dijana Klaric, Radmila Brozkova*

## a3. Background error covariance description

- Sampling : Ensemble versus NMC methods
- Tunings : ALADIN-France B statistics, a posteriori diagnostics and retunings, comparison with a Loennberg -Hollingsworth approach
- Structure functions : bi-periodic increments, compactly supported correlations, isotropy and off-diagonal terms in B, multivariate humidity analysis,  $\beta$ -plane, wavelet basis, evaluation via single-obs experiments, ...
  - Priority level : 1
  - Who ? : *Loïk Berre, Simona Stefanescu, Vincent Guidard, Thibaut Montmerle, Bernard Chapnik, Wafaa Sadiki, Gergely Bölöni, Kristian Horvath, Claude Fischer, Roger Randriamampianina, Rachida El Ouaraini, Alex Deckmyn, Ludovic Auger*

#### **a4.** Observations and observation operators

- Radar (reflectivity)
  - Priority level : 1
  - Who ? : **Marian Jurasek**, **Patrick Moll**, **Doina Banciu**, **Rashyd Zaaboul**, **Sandor Kertesz**, **Eric Wattrelot**, **Eric Bazile**, **Olivier Caumont**, **Véronique Ducrocq**, **Claude Fischer**, **François Bouttier**
  
- ATOVS (AMSU-A, AMSU-B, HIRS, SSM/I(S))
- MSG
- AIRS
- Screen-level data
- Wind profiler data
- AMDAR data
- QUICKSCAT data
  - Priority level : 2 (mainly continuation of the present work or adaptation to ALADIN)
  - Who ? : **Elisabeth Gérard**, **Roger Randriamampianina**, **R. Szotak**, **Zahra Sahlaoui**, **Nadia Fourrié**, **Thibaut Montmerle**, **Mohamed Dahoui**, **Thomas Auligné**, **Malgorzata Szczech**, **Florence Rabier**, **Patrick Moll**, **M. Majek**, **Gabriella Csima**, **Hungarian student**, **Christophe Payan**
  
- Humidity "bogus"
- Ground GPS
  - Priority level : 3
  - Who ? : **Véronique Ducrocq**, **Fatima Hdidou**, **Mathieu Nuret**, **H. Brenot**

#### **a5.** Surface analysis

- improvement of the operational initialization of surface variables (data assimilation in ARPEGE or ALADIN, smoothing of the soil wetness index, introduction of soil wetness indices in Full-Pos, ...)
  - Priority level : 2
  - Who ? : **François Bouyssel**, **Mohamed Jidane**, **Françoise Taillefer**, **Stjepan Ivatek-Sahdan** (?), ?

- simplified 2d-var / dynamical optimal interpolation for mean soil moisture (further validation, use of infra-red brightness temperatures), and mean soil temperature
- extraction of high resolution products and impact studies : SST, snow, albedo, ice
- use of snow analysis for T2m forecast, comparison of several snow products
  - Priority level : 3
  - Who ? : **Karim Bergaoui, François Bouyssel, Mohamed Jidane (?), Françoise Taillefer, Helga Toth, ?**

[+ Var-Pack (× INTERFACES) ]

### **b Predictability**

**COORDINATORS** : A. Horanyi, J. Nicolau

#### **b1.** ALADIN-France EPS

- Priority level : **2** (must start)
- Who ? : *Jean-Marie Lepioufle, Jean Nicolau, Loïk Berre, François Bouttier*

#### **b2.** Ensemble Kalman filter at ZAMG

- Priority level : **2** (must start)
- Who ? : *Yong Wang and Austrian colleagues*

#### **b3.** ALADIN-Hungary LAMEPS project : optimize global singular vectors (SV) to initialise the LAMEPS, force LAMEPS by perturbations from the French PEACE, evaluate local LAM SVs, develop and/or install diagnostic and performance products

- Priority level : **2** (must start)
- Who ? : *Sandor Kertesz, E. Hagel, G. Szepszo, Gabor Radnoti*

other contributions : *Mihaela Caian, Jean Nemeghaire, GMAP/RECYF team (Alain Joly and co), ?*

### **c Coupling**

**CONTACT POINTS** : J.-M. Audoin, P. Termonia

#### **c1.** Spectral coupling

- Priority level : **1**
- Who ? : *Raluca Radu, Gabor Radnoti (?), Jean-Marc Audoin (?)*

#### **c2.** Transparent boundary conditions in a spectral model (esp. problem of the extension zone)

– Priority level : 1

– Who ? : *Ilian Gospodinov, Martin Gera (?), Piet Termonia, Gabor Radnoti (?), Jean-Marc Audoin (?)*

**c3.** The never-ending story of the tendency-coupling for surface pressure (new domains, new options ?)

– Priority level : 2

– Who ? : *Jean-Marc Audoin, Gabor Radnoti (?)*

**c4.** Update and validation whenever new fields are introduced

– Priority level : 2

– Who ? : *Jean-Marc Audoin, Ryad El Khatib for 927 (?), ?*

**c5.** Two-way nesting in a spectral model

– Priority level : 3

– Who ? : *Martin Gera (?), ?*

**c6.** Definition of a coupling strategy for AROME (gridpoint and/or spectral, transparent boundary conditions or not, resolution ratios, ...); Impact of the above choices on the format of coupling files; Physical aspects of coupling for AROME

– Priority level : 3 (prospective)

– Who ? : ?

### **Remarks**

**a:** None is working on non-diagonal B matrix any more.

**b:** Stronger coordination required, in order to get more than a collection of national targets.

**c:** Help is very likely to be required !

## **7. Sub-project ALAD1**

### **Objective**

To further improve the skill of the operational suites, including progress in verification and maintenance / update of the source code.

### **Working plan for 2004**



### **a Update of the operational suites (all of them !)**

*CONTACT POINTS : GCO team, F. Bouyssel*

**a1.** Update of the source code library : a move directly up to cycle 28T1 (ready in June ?) is strongly suggested, since this cleaned library will contain major scientific developments, including the basic code for the AROME and ALARO-10 km prototypes (themselves based on pre-27) apart from the call to Meso-NH physics.

– Priority level : 1

– Who : *all ALADIN teams*

**a2.** First update of the operational namelists : checkings for dynamics, move to a more recent version of physics, local retunings (including the verification of orography description).

– Priority level : 1

– Who : *all ALADIN teams*

**a3.** Update of the operational suites considering the outcome from research both in ALARO and in ARPEGE (both up- and down-scaling)

– Priority level : 2 (unless major improvements come rapidly)

– Who : *Jean-François Geleyn, Gwenaelle Hello, Maria Derkova, François Bouyssel, and all ALADIN teams*

**a4.** First test : coordinated operational implementation of higher resolution databases for orography and surface !

– Priority level : 2 (not yet ready)

– Who : *François Bouyssel, Françoise Taillefer, Mohamed Jidane, Olivier Latinne, GCO team, and all ALADIN teams*

### **b Changes in coupling files**

*COORDINATOR : B. Lacroix*

**b1.** Evaluation of the impact of the change of cut-off times in ARPEGE

– Priority level : 2 (since delayed)

– Who : *Gérald Desroziers or Bruno Lacroix for informations, all ALADIN teams for the expression of constraints*

**b2.** Enhanced compression of coupling files (for surface fields, for all fields)

– Priority level : 1

– Who : *Ryad El Khatib, Jean Clochard, all ALADIN teams for preliminary tests*

**b3.** Implementation in ARPEGE of a monitoring of coupling files production (warning index).

– Priority level : 1

– Who : *Piet Termonia, Karim Yessad, Ryad El Khatib, Jean-Marc Audoin (?), all ALADIN teams for the choice of strategy*

### c Verification

**COORDINATORS** : J. Jerman, J. Stein, D. Klaric

- c1.** Operational implementation of the “objective verification project”
  - Priority level : 1
  - Who : *Slovenian team, helped by all ALADIN teams*
- c2.** Definition and use of new verification methods (× **INTERFACES** , × **ALARO-\***)
  - Priority level : 2
  - Who : *all ALADIN teams*
- c3.** “MAP reanalysis” using ALADIN (LACE project)
  - Priority level : 3
  - Who : *Stjepan Ivatek-Sahdan, Yong Wang, ?*
- c4.** Case studies, analysis of forecast failures or success
  - Priority level : 2
  - Who : *Doina Banciu, Maria Derkova, and all ALADIN teams*

### d Source code maintenance

**COORDINATOR** : C. Fischer

- d1.** Phasings : CY28T0 and CY28T1 in spring, CY29T1 in Autumn (× **INTERFACES**)
  - Priority level : 1
  - Who : *Claude Fischer, Adam Dziedzic, Martina Tudor, Gergely Bölöni, Oldrich Spaniel, Stjepan Ivatek-Sahdan, Ryad El Khatib, Yann Seity, Gwenaëlle Hello, Patrick Saez, Karim Yessad, and at least 6 others for the Autumn phasing !*  
*Help is always welcome, and every team must feel involved !*
- d2.** Update of gmckpack
  - Priority level : 1
  - Who : *Ryad El Khatib*
- d3.** Update and cleaning of configuration 923 (up to cycle 28T1), new diagnostic tools and scripts
  - Priority level : 2 (risky bet)
  - Who : *Dominique Giard, Jure Cedilnik, Françoise Taillefer, ?*
- d4.** Update of diagnostics for physics in ALADIN (DDH, physical tendencies in DM, model to satellite) (× **INTERFACES**)

– Priority level : 1

– Who : *Tomislav Kovacic, Stjepan Ivatek-Sahdan, Siham Sbiï, Jean-Marcel Piriou, CNRM/GMAP/PROC, who for DDH ?*

**d5.** Documentation (pursuing the effort)

– Priority level : 2

– Who : ?

**e Finalization of the work on SLHD**

**COORDINATOR** : F. Vana

Towards an operational implementation, as far as possible.

– Priority level : 1

– Who : *Filip Vana*

**f Improvement of the operational version of ARPEGE (model)**

**COORDINATOR** : F. Bouyssel

The main developments considered for 2004 by the CNRM/GMAP/PROC team are the following :

- improvement of the radiation scheme
- implementation of Lopez' micro-physics, end of the work on "Functional boxes"
- improvement of soil moisture initialization
- implementation of new databases for surface, vegetation, orography, ...
- improvement of orographic forcing
- ...

Who ? : *CNRM/GMAP/PROC* mainly, help from ALADIN partners welcome however.

## 8. Balances

To check whether the available task force is correctly distributed between sub-projects, priorities, and partners...

<b>BREAKDOWN OF TASKS BY SUB-PROJECT</b>							
Sub-project	INTERFACES	AROME <sup>1</sup>	ALARO – 5 km	ALARO – 10 km	ALAROPAC	ALAD1 <sup>2</sup>	total
items with priority 1	10	7	10	7	9	9	52
items with priority 2	3	8	2	2	16	7	38
items with priority 3	0	9	1	0	8	1	19
total	13	24	13	9	33	17	109

1 but the program of the French team is not detailed

2. the work on ARPEGE is not considered here

<b>BREAKDOWN OF PERSONS BY SUB-PROJECT : outside MF vs MF</b>										
Sub-project	INTERFACES		AROME <sup>1</sup>		ALARO – 5 km		ALARO – 10 km		ALAROPAC	
items with priority 1	11	11	10	11	15	1	15	5	22	18
items with priority 2	0	4	8	5	2	0	4	4	21	23

only development is considered here

<b>PRIORITY 1</b>				
Sub-project	Topic	Action	Persons	Effort (pm)
INTERFACES	a. Physics-dynamics interface ; Time-step management	<b>a1.</b> New physics-dynamics interface	Geleyn, Hello, Tudor, Bellus or Kullmann	8
		<b>a2.</b> Organisation of the time-step	Geleyn, Termonia, Tudor, Hello	8
		<b>a3.</b> Definition of the set of diagnostics	S Malardel, CNRM/GMAP, CNRM/GMME, ?	+ <b>b3</b> = 6
	b. Externalisation of the surface	<b>b1.</b> Externalization of surface for AROME	Masson, Donier	
		<b>b2.</b> Design of a simpler interface	CNRM, Ivatek-Sahdan or Kullmann or Latinne, ?	
		<b>b3.</b> Definition of required diagnostics	Malardel, CNRM/GMAP, CNRM/GMME, Ivatek-Sahdan, ?	+ <b>a3</b> = 6
	d. Efficiency and Portability	<b>d1.</b> Further improvement of the xrd library	Spaniel, Gril, Paradis, ?	
		<b>d2.</b> Management of the extension zone	El Khatib, Radnoti, Brozkova	
	e. Validation tools	<b>e1.</b> Development of verification tools	Kovacic, Sbi, Stein, Bouttier, ?	
		<b>e2.</b> Development of diagnostics	Kovacic, Ivatek-Sahdan, CNRM/GMAP, CNRM/GMME, ?	

AROME	a. Dynamics	<i>a1.</i> Code maintenance	Vivoda, Tudor, Bénard, Hello, Brozkova	6
	b. Equations	<i>b1.</i> Definition of a consistent set of equation	Tudor, Termonia	
	c. Physics -1 : not requiring the AROME (3d) prototype	<i>c1.</i> Learning Meso-NH physics, 1d comparisons	Bellus or Kullmann, Austrian team, Algerian team, ?	
		<i>c2.</i> Introduction of the operational snow scheme	Bogatchev or Spiridonov, Bazile, ?	
	d. Physics -2 : requiring the AROME prototype	<i>d1</i> Stability and accuracy of AROME physics	Tudor	3
<i>d2</i> Research on 3d turbulent scheme		Lafore, Malardel, Vana, Yessad, Hello, Termonia		
e. Plans for the French AROME team (model)	<i>e1.</i> cf text	Seity, Duret, Bénard, Malardel, Jabouille, Stein, Bouttier, ?		
ALARO-5 km	a. Deep convection	<i>a1.</i> Enter grey zone	Haiden, Banciu, ?	
		<i>a2.</i> Prognostic scheme of Luc Gerard	Gerard, Austrian team, ?	13
		<i>a3.</i> Study of the triggering and development stage of deep convection	Wimmer, Bellus, Kovacic	3
	b. Shallow convection and low cloudiness	<i>b1.</i> Convergence between Xu-Randall and Seidl-Kann schemes, 3d tunings.	Kann	1
		<i>b2.</i> Experiments on inversion formation and sustenance (including 3d cycling)	Kann, Kullmann, Bölöni	3
		<i>b3.</i> Requirements for vertical diffusion and resolution to simulate sharp inversions.	Haiden (1d), Simon (3d)	6
	c. Orographic drag and envelope	<i>c1.</i> Experiments with, and validation of, newly revised scheme without envelope	Wimmer, Geleyn, Catry, Cedilnik	4+?
		<i>c2</i> Validation of wind forecasts at high mountain stations.	Stadlbacher	1
	d. Prognostic cloud water	<i>d2.</i> Sensitivity studies :orographic precipitations	Wittmann, Drvar	2
<i>d3.</i> Interaction with other developments		Banciu	1	

ALARO-10 km	a. Build and evaluate an ALARO-10 km prototype	<i>a1.</i> Building the prototype	Hello	
		<i>a2.</i> Comparison of ALADIN and the ALARO prototype at 10 km, evaluation of the impact of the Meso-NH physics and of the overhead.	Hello, Kovacic, Drvar, Austrian team, ?	
	b. Optimization of the parametrizations	<i>b1.</i> Radiation	Geleyn, Pristov, Bouteloup, Toth, Hello	
		<i>b2.</i> Subgrid scale orography: drag/lift, in order to remove the envelope orography	Geleyn, Catry, Bouyssel, Wimmer, Cedilnik, Mladek	
		<i>b3.</i> Triggering of convection	Haiden, Bellus, Piriou, Kovacic, Gerard	
	<i>b4.</i> Adaptation of the parametrizations to long time-steps	Hello, Tudor, Banciu, Geleyn, Gerard ?		
	<i>b5.</i> Performance of the prototype in presence of shallow convection and stratiform clouds	CNRM/GMAP, Austrian team, Kullmann, Sbi, ?		
ALAROPAC	a. Data assimilation	<i>a1.</i> Algorithmic aspects	French and Hungarian teams	
		<i>a3.</i> Background error covariance modelisation	Berre, Stefanescu, Guidard, Montmerle, Chapnik, Sadiki, Bölöni, Horvath, Fischer, Randriamampianina, El Ouaraini, Deckmyn, Auger	
		<i>a4.</i> Observations and observation operators	Jurasek, Moll, Banciu, Zaaboul, Kertesz, Wattrelot, Bazile, Caumont, Ducrocq, Fischer, Bouttier	
	c. Coupling	<i>c1.</i> Spectral coupling	Radu, Radnoti, Audoin	
<i>c2.</i> Transparent boundary conditions		Gospodinov, Termonia, Audoin, Gera, Radnoti, ?		
ALADI	a. Update of the operational suites	<i>a1.</i> Update of the source code library	all ALADIN teams	
		<i>a2.</i> First update of the operational namelists	all ALADIN teams	
	b. Changes in coupling files	<i>b2.</i> Enhanced compression of coupling files	El Khatib, Clochard, all ALADIN teams	
		<i>b3.</i> Monitoring of coupling files production	Termonia, Audoin, El Khatib, Yessad, all ALADIN teams	2
	c. Verification	<i>c1.</i> Operational implementation of the “objective verification project”	Slovenian team, helped by all ALADIN teams	
	d. Source code maintenance	<i>d1.</i> Phasings	Fischer, Dziedzic, Tudor, Bölöni, Spaniel, Ivatek-Sahdan, El Khatib, Seity, Hello, Saez, Yessad, and at least 6 others !	
		<i>d2.</i> Update of gmckpack	El Khatib	
<i>d4.</i> Diagnostics for physics in ALADIN		Kovacic, Ivatek-Sahdan, Sbi, Piriou, ?		
e. Further work on SLHD		Vana	6	
f. Improvement of ARPEGE		CNRM/GMAP		

<b>PRIORITY 2</b>				
Sub-project	Topic	Action	Persons	Effort
INTERFACES	b. Externalisation of surface	<b>b4.</b> Update of I/Os for surface fields	El Khatib	
	c. Assimilation	<b>c1.</b> “from Diag-Pack to Var-Pack”	Auger, Taillefer	6
	d. Efficiency and Portability	<b>d3.</b> Externalization of the biperiodization	El Khatib, ?	
AROME	a. Dynamics	<b>a2.</b> Lower Boundary Condition	Masek, Brozkova, Smoliková	4
		<b>a3.</b> Upper Boundary Condition	Janousek, Bénard, Masek, Vivoda	4
	b. Equations	<b>b2.</b> Thorough study of the time-discretization	Termonia	6
	d. Physics -2 : requiring the AROME prototype	<b>d4.</b> Evaluation and optimization in the AROME prototype of the 3d turbulent scheme.	CNRM/GMAP, ?	
		<b>d5.</b> Validation of clouds and precipitations	Stein, Bouttier, Kovacic, Austrian team, ?	
		<b>d7.</b> Phasing with future evolutions of physics	Seity, Jabouille	
		<b>d8.</b> Minimization of AROME development impacts on operational ALADIN applications.	Seity, Jabouille, ?	
		<b>d9.</b> Evaluation of the AROME prototype in specific situations	Seity, Bouttier, ?	
ALARO–5 km	a. Deep convection	<b>a4.</b> Interaction with representation of orography	Wimmer	
	c. Orographic drag and envelope	<b>c3</b> Evaluation of the “quality” of orography, new definition of the semi-envelope.	Cedilnik	
ALARO–10 km	a. Build and evaluate an ALARO-10 km prototype	<b>a3.</b> Evaluation of other convective schemes	Geleyn, Hello, Piriou, Gerard, ?	
		<b>a4.</b> Definition of an “optimal” choice for the surface, and implementation.	Bouyssel, Ivatek-Sahdan, Caian, Latinne, Hello, ?	

ALAROPAC	a. Data assimilation	<i>a1.</i> Algorithmic aspects	Fischer, Moll, Soci, Yessad, Simon, Chapnik	
		<i>a2.</i> Cycling	Hungarian, French, Moroccan, Romanian teams; Klaric, Brozkova	
		<i>a4.</i> Observations and observation operators	Gérard, Randriamampianina, Szotak, Sahlaoui, Fourrié, Montmerle, Dahoui, Auligné, Szczech, Rabier, Moll, Majek, Csima, Hungarian student, Payan	
		<i>a5.</i> Surface analysis	Bouyssel, Jidane, Taillefer, Ivatek-Sahdan, ?	
	b. Predictability	<i>b1.</i> ALADIN-France EPS	Lepioufle, Nicolau, Berre, Bouttier	
		<i>b2.</i> Ensemble Kalman filter at ZAMG	Wang, ?	
		<i>b3.</i> ALADIN-Hungary LAMEPS project	Kertesz, Hagel, Szepszo, Radnoti	
	c. Coupling	<i>c3.</i> Tendency coupling	Audoin, Radnoti	
		<i>c4.</i> Update and validation for new fields	Audoin, El Khatib, ?	
	ALAD1	a. Update of the operational suites	<i>a3.</i> Update of the operational suites considering the outcome from research	Geleyn, Hello, Derkova, Bouyssel, and all ALADIN teams
<i>a4.</i> Coordinated operational move to higher resolution databases for orography and surface !			Bouyssel, Taillefer, Jidane, Latinne, GCO team, and all ALADIN teams	
b. Changes in coupling files		<i>b1.</i> Changes of cut-off times in ARPEGE	Desroziers, Lacroix, all ALADIN teams	
c. Verification		<i>c2.</i> Definition + use of new verification tools	all ALADIN teams	
		<i>c4.</i> Case studies	Banciu, Derkova, and all ALADIN teams	
d. Source code maintenance		<i>d3.</i> Update and cleaning of configuration 923	Giard, Cedilnik, Taillefer, ?	
		<i>d5.</i> Documentation	?	
e. Improvement of ARPEGE			CNRM/GMAP/PROC + ?	