• Physical parameterisation – upper air aspects

Introduction

The current ARPEGE, ALADIN, ALARO and AROME physical packages were designed according to the scale (model mesh size) on which the model would run. This way of thinking made the packages diverge and the associated Physics-Dynamics Interfaces (PDI) of the AROME and ALADIN/ARPEGE/ALARO frameworks became incompatible with each other. For the period of application of the present plan it was decided, as outcome of the "Convergence days", that this scale dependent characteristic should fade out, this implying some steps to be taken in order to re-converge the different physics configurations and, when appropriate, their PDIs. The resulting actions of the "Convergence days" can be grouped into two. On the one hand we have actions which are rather straightforward and standalone: diagnostics and physics-dynamics interfacing. On the other hand there are two actions which are more interconnected with the rest: microphysics and use of 3MT in the ARPEGE framework.

Various recent tests made in the HARMONIE framework showed that also from a pure scientific point of view, microphysics and 'deep convection', which can be called 'moist physics' without too much generalisation, have become a troublesome part of the ALADIN-ALARO-AROME-HARMONIE framework, when used at the kilometric-type resolutions. Additional actions will thus have to be initiated and performed (in line with 'convergence-related' actions of course). A separate part of this "Upper air physics section" will therefore be devoted to specific actions in that field.

Besides this, and in more general terms, the evolution of the ARPEGE physics will have in the beginning of the four year period a direct influence on the evolution of the ALADIN physics. The search for more modularity and flexibility however will make it difficult to predict the future impact of the ARPEGE physics on the various versions of physics developed in the ALADIN consortium. The global ARPEGE system itself will be tested at the fairly high-resolution mesoscale (resolution down to about 7 km). Thus, in the following we will group the ARPEGE physics under the ALADIN physics (since the use of what is now ALADIN will remain also at larger scale, e.g. NORAF and GLAM-EPS).

The externalised surface scheme SURFEX will become the standard for R&D and operational applications.

"Convergence issues"

On the one side, the convergence process will concern the ARPEGE NWP/Climate duo (with issues like TKE CBR, sub-grid humidity representation, shallow convection, precipitation, ...). On the other side, the convergence will concern the AROME/ALARO duo: several actions will need to be concretised in order to make the different physical packages re-converge, in the spirit of what has been decided during the "convergence days" (Sept. 2008). These actions mainly concern the microphysics (ALARO vs. AROME) and 3MT.

Microphysics

- ALARO: Finalize the microphysics switches in APLMPHYS for ARPEGE-linked existing options. Include graupel as a prognostic quantity in APLMPHYS (but keeping the

diagnostic treatment under a switch). Allow calls to the externalised ICE3 processes from inside ACACON, ACCOLL and ACEVMEL. One should also search for consistent alternatives for the current probability expressions used in statistical sedimentation scheme and even extend the code towards a two-moment precipitation scheme. Alternative ways to compute the final precipitation fluxes should also be studied. A new data flow should enable the use of the new prognostic species and guarantee compatibility with AROME.

- AROME: Externalisation of the ICE3 processes (with reproducibility).

3*MT*

- ALADIN: Evaluation of the current version of 3MT representing deep convection for a wide range of horizontal resolutions (between 3 and 300 km mesh-sizes say). Aquaplanet tests can be useful. Implement an adequate use of Smith-type cloud fraction in 3MT. Test the impact of the microphysical schemes APLMPHYS vs. ACPLUIZ in 3MT. There is also a need to extend 3MT with a sub-grid non-precipitating convection scheme. A first step is the association of 3MT with the currently used non-precipitating scheme in ARPEGE: KFB. A second step would be to test EDKF in ARPEGE with the Bougeault deep convection scheme and if successful in combination with 3MT. The final step would be to develop a shallow convection scheme which has as objective to allow a continuous transition from shallow non-precipitating to deep precipitating convection.
- ALARO: Exploring the qualitative and even quantitative aspects of the auto-extinction behaviour of convection within 3MT at higher resolution than the operational ones of ALARO-0. Developing a prognostic version for entrainment. Improving the adjustment. Extending 3MT towards shallow convection [may not happen along the same lines as in the above bullet].
- AROME: The possible (and not yet decided) implementation of 3MT in the AROME framework depends on some concretisations of the convergence effort as well as on some common research on 'bridging' topics like microphysics, moist thermodynamic adjustment and the extension towards shallow convection.

Physics-dynamics interfacing (and thus implicitly diagnostics)

Extract from the ALADIN Strategic document, 2008-2017:

"*In the timeframe 2008-2012 one will aim at using as basis the Euler equations for shallow atmosphere (...) together with energy-conserving barycentric equations for the thermodynamics"*.

The above aim for the thermodynamic equations is already implemented in the ALARO framework and remains to be implemented in the ALADIN (just completion) and AROME configurations. At "Convergence days" it was agreed that all configurations inside the ALADIN world should try to share a common PDI based for its equations on the principle above. The design of such an interface is not relevant for this section of the plan but it will of course have an impact on the physical parameterisations (e.g. the various microphysical ones) and interfaces (APLPAR and APL_AROME). Some specific medium- long-term actions are thus mentioned in the lists of issues below.

- cleaning of APLPAR and APL_AROME and if possible use FORTRAN features to reduce the number of arguments in the data flow
- extend the data flow in ALADIN/ALARO for new water species

- study the treatment of falling cloud species in the ALADIN/ALARO frameworks
- search for a common physics-dynamics interface (shared by ALADIN, ALARO and AROME) in the spirit of MAPFI

Moist physics

First of all, in order to tackle the various issues related to the moist physics it has become clear that one should:

- mobilize more manpower (there is a clear shortage of people aware of the various aspects of microphysics and deep convection)
- search for solutions suitable for and with the knowledge of both the ALADIN and HIRLAM worlds and this for both the short and long term (i.e. avoid another divergence of solutions)

Second, it is our aim that at the end of the four year period of this plan one should have (a) moist physics package(s) with the following characteristics:

- it operates at all operationally possible scales, from AROME to ARPEGE (this requires some flexibility to handle the different time step lengths)
- the deep convection part produces similar precipitation amounts and patterns for different resolutions (resolution independent)
- (extended) geometrical considerations for the deep convection part

Deep convection validation exercises using AROME, ALARO and HARMONIE however showed that the proposed actions of the "Convergence days" will not be sufficient and more efforts will have to be made. The following additional issues seem rather imperative to achieve the above aims:

- Study the new strategy proposed by Luc Gerard to make 3MT really scale independent (use the time tendency of the updraft area fraction)
- Study the idea for a "natural transition" from shallow to deep convection (e.g. associate 3MT with KFB or EDKF)
- Control the (too) high sensitivity of lateral mixing of water species.
- Revisit the cloud and precipitation geometrical considerations.
- Reduce the outflow problems using issues 1 or 2, 3 and 4 above.
- Correctly account for the mass and energy transfers by phase changes and precipitation leaving the atmosphere.

Other or specific ALADIN issues

- Turbulence/shallow convection: Validation and improvement of the CBR-turbulence scheme and the EDKF shallow convection scheme (same ones as in AROME). The links between the two schemes will be improved [see also AROME issues].
- Microphysics and clouds: Validation of clouds using satellite observations from CALIPSO and CLOUDSAT. Improving the ice microphysics.
- Radiation: Evaluation of the new shortwave radiation scheme (RRTM) and of the Monte-Carlo Independent Column Approximation (McICA) used in IFS. Improvement of ozone and aerosols: use of finer climatologies or link with MOCAGE model.

- Research will also be done on some specific demands of the users, e.g. sand and dust modelling for NORAF (starting in 2008).

Other or specific ALARO issues

All future developments remain in the spirit of modularity and flexibility with respect to other frameworks (ALADIN, AROME and HIRLAM).

1. Gravity wave drag: the gwd-scheme is needed for mesh sizes above 2.5 km. In the current scheme, one should revisit the resonance issue. In the first half of 2008, a multi-directional version of the scheme will be further enhanced and validated.
2. Deep convection - 3MT: 3MT is ready for operational use at the 10 km scale. In 2008 some ongoing validation of the multi-scale property is planned so that 3MT can also be activated operationally with 5 km mesh sizes.
3. Radiation: The modularisation of the ALARO-0 radiation scheme is an ongoing action in 2008. Other topics which will be addressed are:
   - find more accurate fits of gas transmission functions using the RRTM database
   - optimisation of the modularised ACRANEB code
   - integration of climatology for aerosol's distribution in the scheme
   - implementation of relatively cheap clear-sky fluxes computation for an intermittent radiative scheme
4. Turbulence - pTKE: The present turbulent scheme (pTKE) can be extended to a full TKE formalism (the analytical exercise was already done). Implementation and validation is still needed. HIRLAM shows interest to cooperate on this topic, probably around the QNSE ideas.

Other or specific AROME issues

Meso-NH will continue to help AROME developments by being a useful test-bed for kilometric-scale physics, and also for finer resolution studies (LES). For the relevant parts of the physics code package, the compatibility (and whenever possible identity) between Meso-NH's MASDEV library and AROME's CYxxTy will be maintained.

5. Clouds and microphysics:
   - experimental (LES) study of the entrainment process inside the cloud
   - improvements in the explicit representation of microphysical processes (in comparison with 2-moment and bin schemes)
   - for the sub-grid condensed water species, study the impact of heterogeneous mixing of aerosols and cloud nuclei on the creation of precipitations (drizzle) and interaction with the radiative transfer
   - introduction of sub-grid microphysical effects
   - evaluation and improvement of the key parameters for the auto-conversion of cold clouds (containing ice), by comparison of model outputs with observations of high-level clouds
6. Fog:
   -evaluation of the potential of Arome outputs for the forecast of fog (occurrence, localisation, structure). Link with the assimilation of fog and low-level clouds in Arome
7. Turbulence and PBL clouds:
   - Further improvements of EDKF: switch and test the scheme in ARPEGE/ALADIN/AROME/ Méso-NH and ARPEGE-Climate; careful study of the interactions between cloud/turbulence/radiation. The links between CBR and EDKF will be improved (such as triggering, TKE production, mixing length, ...)

- Study of the interactions between turbulence/Sc representation and entrainment at the top of the cloudy PBL (via LES simulations)

8. Turbulence from micro-to-kilometric scales:

   - Study of the properties of lateral entrainment in Cb clouds: possible proposal of a parameterisation of lateral «cross-cloud» gradients and horizontal fluxes for Méso-NH; the adaptation for AROME will be investigated but might remain out of the scope of the 4 year period
   - Study of the transition of turbulence from the very high resolution 3D turbulence to the kilometric-scale 1D turbulence. LES simulations at about 100 m resolutions will be carried out, and the continuous transition of the properties of turbulence as one goes to coarser grids (up to about 1 km) will be investigated for various PBL types
   - Turbulence in mountainous areas: effects of slopes, orographic drag, differential heating, mountain breezes and strong inversions, valley/ridge contrasts

- # System aspects

First Sub-item of Section VIII: Networking, Maintenance and Operational switches

Networking

The distribution of research, development, maintenance and operational activities of the ALADIN consortium will continue in the next period. More specialized expert teams will emerge especially if local collaboration with national academic institutions is successful. The maintenance process will be further distributed, especially on externalized packages. More models (ALADIN/ALARO/AROME) will be operated by Partners having different options and tunings of the implementation. All those factors will further increase demand for efficient communication and information sharing.
The traditional information exchange means like e-mail lists, documentation repository, the web site and the Newsletter will keep playing their indispensable role in the community life. However, as documentation is traditionally a weak point of ALADIN (and documentation *maintenance* in particular) new communication means on one hand being more flexible than a static web and on the other hand allowing better backtracking than a sole e-mail exchange should be explored.

- A well moderated computer forum can offer discussion board for example for working groups or as a melting pot for maturing Frequently Asked Question files. Usage of a forum asks for new habits (one will have to actively check the site if there is a new contribution, unless the forum can be consulted as a mailing list distribution) but it offers a new service of keeping of the discussion on one place for later reference and search. Pilot studies can be conducted on the following topics :

  Support for porting new versions of the code
  Support of an ALADIN research version for Academia.
  LTM discussion and test reporting linked to coordinated operational switches

-The existing ALADIN documentation web site is a very good first step but it should be extended towards a more open wiki-like system. Wiki offers an opportunity to solve the long-lasting lack of concise and up-to-date user guide.

Since such web tools have never been used by whole ALADIN community, RC/LACE and HIRLAM experience in these matters should be considered. It should be mentionned that training on new webtools is time consuming, too.
Ideally, the forum and/or wiki site and the official ALADIN website should be built in a complex portal, remaining at the same time consistent with HIRLAM web tools. It is proposed to set up a working group composed of ALADIN ST, relevant CSSI members, representative of RC LACE (which operates a portal site) and representative of HIRLAM (which run a wiki system).

Around maintenance prevention

Because of the policy sides which the problems of maintenance have, it is difficult to write down a reliable workplan for the next years. What is sure is that the growing of the constraints is inviting us to explore new maintenance procedures and to use (or if not possible: to develop) advanced technical tools. Therefore the text below is rather an enumeration of propositions - that have not

always been proven feasible so far - which cover mixed aspects: automatisation, documentation, communication and normalisations.

- Whenever possible, automatised procedures should be used to improve the security of code phasing. Among automatic tools to improve and to conform the submission of codes modsets, we could setup a normalized and automatic source-code contribution form. When processed automatically, such electronic forms could feed the source-code database as well as the documentation (memorenda)

- Documentations should be systematically delivered at the closure of each phasing exercise. Aditionally to source code or namelists evolutions memorenda, it would be helpful to update a "history" of the problems encountered along the evolution of the software: not only bugs, but also communications miss, etc ... Just having such an account of continuing maintenance issues should have a pedagogical virtue.

- Training course on maintenance and the software architecture should be organised on a regular basis. There should be a renewing of the teachers to enforce the maintenance knowledge to spread among the newcomers. During such training course we should also propagate our knowledge about portability and optimisations aspects.

- The source code rationalisations should be emphasised in the maintenance work.
The Coding Standards recommendations should continue to be monitored on a regular basis, and effort should continue to reduce the amount of norms violations. The Coding Standards themselves should be revisited in order to fit a more object-oriented approach in the code conception and coding style.
The source code modularisation should increase taking into account projects under discussion in the whole of the ARPEGE/IFS/LAM community (e.g. toward an Object Oriented spirit following the so-called "OO" project at ECMWF). Externalisation of large pieces of code should continue as well, as it participates to the "OO" approach in a clearer partition of the code.
For each new cycle, several computer architectures and compilers should be tested on basic model runs : this is an efficient bug-killing activity and it early prevents from portability failures.

- Computational performances should be monitored, as a final step during phasing exercises with the help of automatic tools. Normalized tables or figures should be produced in order to monitor computational cost with respect to the scientific innovations. The same information would be re-usable to control the computational efficiency from one platform to another and could contribute to the ITTs of all the partners.

- The HARMONIE source code repository (SCR) on-line tools will be evaluated by ALADIN to get familiar with them and to get involved in their evolution. Progressively, test actions on these tools will be proposed to HIRLAM considering both scientific and technical aspects.

The future of the compilation system

During the next 4 years the main build system in use for ALADIN (and by extension: ODB, AROME ...) should remain the same procedure as the one used nowadays (gmkpack).

Today the advantages of this tool are double:
- its own needs for maintenance and developments have remained relatively reasonable so far, compared to the size and variety of the source-codes, and the number of developers (it is estimated

2 person x months per year plus less than 1 person x week per year and per country), and its flexibility has been proven sufficient.
- in spite of its non-standard way of working, it satisfies the majority of the users thanks to its user-oriented interface and its portability to various platforms, which limits the maintenance effort as soon as new source-code release should be installed all over the computers of the consortia.

However, and concerning the maintenance especially, the source-code administrators and the experts are aware of its weaknesses, like its limited ability to "ingest" external source codes coming with their own making rules, or to update itself when the rules for making an executable change in a new release. In the scope of increasing cooperation with Academia and the general tendency to externalize the source-code (for the sake of its maintenance, fighting against increasing complexity), the cost of the maintenance of the build system is quite likely to rise. Unfortunately it is difficult to find developers motivated in such a topic.
It is noticeable that having problems with the build system is not a specificity of the ALADIN consortia : today ECMWF is looking at improving its build system ; the comprehensive build system of the UKMO (FCM) is warranted only for the UKMO source-codes, and needs as well that the source-codes follow specific rules.

Nevertheless, two milestones can change the situation:
1) if ECMWF adopts a new build system, we would evaluate it for our own needs. Maintenance should be easier if ALADIN and ECMWF could share the same build system; however:
- The fact that, for ALADIN, the installations are disseminated in many countries (with various platforms and size of teams) makes the maintenance more complex than at ECMWF.
- Beside the shared source-code between IFS/ARPEGE and ALADIN, more source-code libraries (SURFEX for instance) have to be maintained.
- A modern build system cannot be disconnected from a source-code management software. Such a software needs supplementary knowledge and maintenance, and the choice of the software depends of the price to pay and the complexity of the phasing exercises to handle.
In conclusion, sharing a new build system with ECMWF could also be more maintenance-demanding for the partners. An audacious solution would be to convince ECMWF to adopt our own build system.
2) When HIRLAM has fully turned to ALADIN, we shall have a stronger workforce to develop and maintain a comprehensive build system (not necessarily starting from scratch), able both to handle various codes and to install itself in small or big centres.
Therefore we must pay attention to existing alternative software pieces.
Meanwhile gmkpack will have to be maintained and developed toward:
- less maintenance: progressively, what is source-code-specific will be externalized and available as plug-ins.
- easier installation: Academia should be able to install the source code with a minimal support from the meteorological services. Therefore the installation procedure from bottom to top will be made more automatic, and a comprehensive tutorial will be finalized.
- promotion : it should also become a possible alternative for an ECMWF solution.

ALADIN, ARPEGE and operational switches

ALADIN-France for the time-being, or later something that would play the same role, will continue to be considered as the LAM declination of the ARPEGE latest choices, and hence as the ‘reference’ configuration for bridging the work between global (IFS/ARPEGE) aspects on one side and LAM aspects on the other side.

The particular role played by the phasing actions in Toulouse will be preserved to anticipate and early harmonise LAM developments with any constraint coming from the algorithmic specificities of the IFS/ARPEGE backbone

The well-established coordination of ALADIN and ARPEGE operational switches will be maintained and further improved. The following major sources of coordinated switches are anticipated for next 4 years:

- Following resolution increase of ARPEGE by a corresponding grid change in ALADIN coupling transmission files. The responsibility for coupling domain set-up will be delegated to their users which will increase flexibility to change domains parameters whenever a Partner or their group will need it. This will also include evolving needs of Partners' operational applications on new coupling fields (e.g. hydrometeors) in (currently unlikely) case their coupling is found beneficial for coupled model.
- The changes of format of coupling files. This includes changes like internal compression of fields or using frames instead of full spectral fields. The development of new coupling methods can also bring new demands for coupling fields' composition and consequent coordinated operational implementation.
- The changes in surface scheme. The migration from ISBA to SURFEX in ARPEGE might call for a coordinated operational change of all ALADIN coupling files due to the changes in the climate databases used by SURFEX.

Second Sub-item of Section VIII: Coordinations and links with phasing

An initiative for annual HARMONIE coordination meeting will be proposed. This kind of meeting would serve as a coordination mechanism for the cycles more in the spirit of the current IFS/ARPEGE coordination meetings. The main aims of such action would rather be 'HARMONIE towards IFS' and 'needed back-phasing for truly common scientific efforts'. Such meeting could be probably organized in piggy-back with some HIRLAM management group meeting or via teleconferencing. The exact means of organization must still be discussed on both sides.

ALADIN will deliver 'official export versions' less frequently but with higher "Quality Assurance" at the level of meteorological results and directly related technical aspects (portability, bug-fixes, computational performance). The achievement of a sufficient "QA" level for a release identified as such will require that ALADIN people quickly return to it for consolidation (code modifications as well as namelists for quasi-operational usage).

The establishment of "QA" versions will involve decentralized, coordinated actions and staff work in ALADIN and HIRLAM, increasing the habits for common work and "language". In this spirit, HIRLAM and ALADIN management should jointly find a common solution for ALADIN people to perform some work in the HARMONIE system remotely, outside Toulouse, (together with HIRLAM's 'system experts') in order to increase the level of "QA" in some chosen releases. The exact scope and detailed aspects have to be checked, and where help from ALADIN side would be required, shall be discussed at the proposed HARMONIE coordination meetings.

Beside the ARPEGE/IFS common cycles, HARMONIE R&D reference cycles will need to be carefully synchronised between ALADIN and HIRLAM, as it is now between IFS and ARPEGE/ALADIN. As one should avoid the risk of HIRLAM contributions being temporarily frozen for entering only the releases targeted for joint "QA" efforts, as well as HIRLAM-sided

branches of code unable to re-enter the main trunk because of IFS/ARPEGE "in between" backbone constraints, the HARMONIE coordination meetings should and will review such aspects as status of cycles, progress and plans and preparation of the next release (which cycle with respect to ARPEGE/IFS, which content, analysis of possible conflicts and list of actions).

Third Sub-item of Section VIII: SRNWP interoperability Project

Interoperability Project (IOP) will be the first practical activity financed by C-SRNWP Programme aiming at improvement of conditions for NWP data exchange and sharing between European models and consortia. IOP will not only facilitate the data exchange but it will prepare important component of the environment for future European trans-consortia projects like Verification Project or EurEPS. IOP will mainly focus on definition and implementation of a unified exchange data format and physical meaning, with the emphasis on NWP model gridded data outputs and inputs and in lesser extent on the observations data.
ALADIN consortium will take part in IOP in a concerted action with RC LACE. IOP being coordinated by UK MetOffice essentially assumes active participation of all European NWP consortia in both finding the right definition of the interoperable data format and content and in development of adaptor software for conversion from every model internal data formats. This will also offer an opportunity for ALADIN Consortium for improvement and consolidation of some post-processing tools and potential enhancement of product exchange between Partners.
In the scope of the SRNWP interoperability project, ALADIN and LACE consortia should make themselves ready together in 2009-2010 for the minimum deliverables (D1 to D4).
Two approaches are possible:
- either go straightforward and fast towards the (minimal) objectives,
- or include the tasks in a more general framework to improve the flexibility (at users interface) and try to limit the price of the maintenance of the software pieces.

Depending on the manpower needed after the specifications of the Interoperability standard format and adaptator software have been agreed, either the second approach will be adopted, or the first one will be adopted, keeping an eye onto the second.

D1,D2 (set-up of interoperability standard output format)
Involvement of experts in dynamics, physics and soil and surface processes will be necessary to specify horizontal and vertical representations of the model data as well as the list of soil and surface and upper-air parameters for the interoperability standard format. A special decision will have to be made regarding the surface and soil variables depending on the progress of the migration from ISBA to SURFEX scheme at the Partners. Moreover, data assimilation experts will also participate in IOP review of standards and practices in coding observations.
ALADIN consortium will take turn in the maintenance of the agreed standards documentation.

D3 (specifications of the adaptator software, and its maintenance aspect)
Involved experts will review and agree on methods how to create fields with the physical meaning imposed by the Interoperability format, in terms of interpolation methods, grid definitions, staggering, space representation etc. The Interoperability Project has decided to leave the implementation of conversion to each Consortium. This decision should enable the ALADIN Consortium to keep with the methods used in the ALADIN model to allow code design compliant with requirements of portability, flexibility, computational efficiency and readability of the software for this piece of work.

ALADIN consortium can offer its know-how on procedures for maintenance and coding standards (the legacy of ARPEGE/IFS and now also recommended in HIRLAM).

D4 (adaptator toward interoperability format)
Since the Interoperability Project has decided that each Consortium would provide their datasets in the native grids (horizontal and vertical), the adaptor from ALADIN internal "FA" format to interoperability format will consist of the following two steps:

- The ALADIN FullPos configuration, possibly enhanced to address the interoperability requirements on the variables. Should the interoperability format require specific soil parameters the issue will have to be addressed depending on the state of migration from ISBA to SURFEX.
- The convertor form ALADIN "FA" format into the Interoperability format (GRIB-2). One path to pursue would be to start from existing convertors "FA"-to-GRIB-1 and adapt it to GRIB-2. This solution should be considered in case of lack of time and/or manpower. But more ambitious solutions should be evaluated as well :
  i) An external multi-format converter (interpolation-free), preparing a possible switch from GRIB-2 to another format like NETCDF.
  ii) Pluging-in of the adaptator software inside FullPos. In the long term this approach looks like the most promising one but it needs a strategic agreement.

D5-D6 (Enhancements of existing tools to enable one model to process data from other ones)
The configuration ALADIN E901 converting GRIB-1 files to ALADIN FA files developed in 1995 for COMPARE exercise will be first rehabilitated and its documentation updated, then enhanced to support GRIB-2 files in input. Next, we shall study methods to process input data from the other SRNWP models. This may be achieved by pluging inside this configuration external tools provided by other consortia.
Having other SRNWP models outputs directly readable either by ARPEGE or ALADIN looks out of scope in a four-year plan.
Toolbox like EGGX to handle the Aladin geometry, together with a documentation, will be made available to other SRNWP consortia.

In a broader context and beyond IOP scope ALADIN Partners should contribute to the maintenance of the ARPEGE 901 configuration, in particular to reflex changes in ARPEGE/ALADIN surface scheme (ISBA to SURFEX) and to respond to future changes in the IFS surface scheme. The 901 configuration is essential for various ECMWF Reanalysis ALADIN downscaling studies which will stay interesting for Partners given the ambitious plans of ECMWF in future reanalysis projects.