

OOPS technical video-conference of 22 January 2015
meeting number 3 towards CY42

Participants (MF) : A. Joly, F. Bouyssel, C. Fischer, K. Yessad, R. El Khatib, P. Marguinaud, Y. Bouteloup, E. Arbogast, A. Mary, L. Auger, T. Montmerle, P. Brousseau, G. Desroziers, L. Berre, L.-F. Meunier, P. Cébron

Participants (EC) : Y. Trémolet, D. Salmond, T. Wilhelmsson, O. Marsden

Participants (LAM): P. Termonia, D. Degrauwe, U. Andrae, J. Bojarova

Excused: ---

1. Suggested new strategy for re-factoring of the IFS Fortran codes:

Yannick introduced a new proposal for resuming the re-factoring of the IFS FORTRAN codes.

Firstly, Yannick presented the general organization of the OOPS Project work at ECMWF, now based on a stage-wise approach. A detailed workplan is prepared for the forthcoming stage, and the Project Board evaluates about every 6 months the status of the current stage, and the progress with respect to the general plan and milestones over the full Project life time.

For OOPS, more specifically for the Fortran re-factoring work, the progress is found to be much behind schedule. One reason for this was felt to be the many and complex inter-dependencies of modules between Fortran blocks that otherwise were dealing with very separate scientific configurations. Therefore, EC propose to adopt an alternative strategy, extract blocks from the normal IFS, re-factor them and start building a new code separate from the old IFS. This re-factoring should be easier as each block is smaller than the full IFS, and in each step inter-dependencies with other blocks would primarily be removed from the re-factored block. As a start, an adiabatic dynamical core could be extracted and interfaced with the OOPS layer. Then, other blocks would be tackled: TL/AD, observation operators (the simple ones first), post-processing, I/O etc. The benefits from the cleaning and re-factoring of the last cycles would be automatically taken into account (CY41, CY42), but later, no specific re-factoring would take place in the old IFS anymore.

This new organization of the work (as compared with the module-wise approach and feedback of re-factoring into the normal IFS) should also be more compatible with having extra staff, and dedicated staff, available at EC for performing this work as several tasks could be addressed in parallel.

Among MF and the LAM participants, several comments were raised:

- on the technical side: risk of code duplication, the fact that the most difficult items for extraction and phasing into the new code would come at the very end of the Project plan, many details of the implementation of the new code were not clearly enough addressed in the proposal (list of options to preserve and workload to do this filtering, evaluation of the difficult inter-dependencies)
- on the side of code management: de facto, a new code management and coordination stream will appear, that would come in addition to the normal IFS/Arpège/LAM code collaboration. Another aspect would be that scientific developments will have to be phased from one code

to the other, or decisions need to be taken in which code what scientific novelty should be implemented. One may have to phase more or less large pieces of the normal (still) operational codes into an extracted code that would be two-three years old. How to evaluate the difficulty of this porting, and the necessary resources ?

- on the side of Project management: a major problem with the new proposal was how to ensure that the new code will be able to run the operational version of about 2017. Furthermore, the technical outlines in Yannick's note showed cross-cutting issues with other Projects (Atlas, Polymitos/PantaRhei, ESCAPE), and the perspective to build a new dynamical core creates the risk that this code while being progressively complemented with other blocks, will diverge from the operational versions. On the opposite, to build a new dynamical kernel could also be an opportunity, if scientific novelties were then implemented from scratch. All these considerations were calling for probably having a decision about the re-coding strategy taken at a high level of scientific management (Head of Depts, Scalability Program Board).

Yannick explained that the sequencing of the tasks was done in a way that should minimize the risks and the extra workload: the dynamical core of the IFS would not undergo any major scientific change in the coming two years, complex observation operators and physics could be tackled late in the work plan. The fact that the re-factoring work would now be addressed in a separate code from the normal IFS would make the phasing of old IFS cycles again easier (no crossing issues between re-factoring and scientific changes). Indeed, the need for synchronization of scientific novelties between the old and the new codes would need to be kept as limited as possible in time. It was also believed that the extraction and re-factoring of the blocks would fairly little change the low-level computational code, mostly the control and mid-level routines would be either removed or recoded. The work of removing global variables would continue anyway.

Different or intermediate strategies for re-factoring were also addressed during the discussion: isolate and externalize basic model routines “à la spectral transforms”, enable to re-plug the new dynamical kernel back into the normal IFS. There was no specific consensus about any of these methodologies.

MF (A. Joly) pointed out that a more high-level and cross-cutting Project analysis should be prepared, taking into account this OOPS strategy and other strategical issues (HPC plans, operational targets, long term targets of other Projects).

MF also asked why OOPS had progressed so slowly until now ? EC explained that this was much due to the lack of resources (only about 0.5 FTE working on code re-factoring until end of 2014).

Next steps for the decision-making: an internal meeting is planned in GMAP (28 January), LAM partners might further discuss at their management level, an OOPS Board meeting is planned (date to be decided, a tentative schedule was [6-9-10 February]).

2. AOB:

- Agree on list of actions from last meetings (see appendix), tbd in a next teleconf
- technical questions raised by Jelena about the OOPS code for ETKF.
- other ?

The AOBs eventually have not been addressed due to lack of time.

3. Date of next technical video-conference

next technical video-conference: Thursday 12 February 2015 , 14h30 MET / 1.30pm UK
suggested content:

- procedure for phasing of CY42 (Deborah, MF)
- wrap-up of list of actions from previous meetings (see appendix)
- technical questions raised by Jelena about the OOPS code for ETKF
- any item arising from the FORTRAN code re-factoring strategy and start of work

[IFS/Arpège coordination meeting (video-conf): 17 March 2015, 1.30 UK time]

[IFS/Arpège coordination meeting (physical): 15 June 2015 (Reading/ECMWF)]

APPENDIX:

Wrap-up of actions from last video-conference: *those will be discussed in a next teleconf. For 12 Feb, we should agree on this list (which is a compilation of two meetings now) and remove some long-living open actions that do not seem on a critical path (tbd by Claude and Deborah)*

1. Deborah and Stéphane shall liaise during the phasing process of CY42 in order to perform the move changes of Appendix C, sub-item C1a.
2. EC will write a script to reorder the ASSOCIATE and the CALL DR_HOOK statements, and liaise with MF. The script will be applied while building CY42.
3. Tomas and Yves shall liaise about the encapsulation of model physics variables:
 - 3.1. Tomas, Karim and Yves to agree on the set of Arpège MODULES, to be done at MF
 - 3.2. Tomas to send the last version of his Python script to Etienne
 - 3.3. MF to perform the Arpège encapsulation work: Yves, Yann (link with some Arome code), Cécile (linear physics), Karim (link with dynamics), Etienne (use of scripts and some tests). The ideal goal would be to have this task done for CY41T1, by end of November.
4. Alan Geer would send an e-mail to MF, about the work towards a single call to COBSALL and the results of validation (contacts: Eric Wattrelot, Jean-François Mahfouf, Claude Fischer)
5. Actions for ensuring that the IFS Fortran code will remain OOPS-compliant from cycle to cycle:
 - 5.1. Tomas will write down recommendations for general Set-up ordering, especially in order not to break specific Object-oriented rules (like a Geometry should be fully initialized without a Model dependency, so a Model can be defined from it).
 - 5.2. Test programs should be coded at C++ level for checking the multiple instantiation of MODEL objects of IFS-Arpège-LAM versions.

- 5.3. develop a piece of Python script able to scan the code and check that no USE MODULE statement is present / was recently implement, where it shouldn't be used (use passing by argument instead).
- 5.4. A new proposal was to write a document describing at a general level what the main object of OOPS-IFS were, and why they existed: GEOMETRY, MODEL, etc.
6. evolution of the VarBC code: EC, MF and Hirlam agree to recheck in future video-conferences the requirements for making the VarBC code scientifically more flexible. Contacts at EC (A. Geer), MF (LF Meunier, V. Guidard), Hirlam (Ulf). Plus other scientists involved in VarBC aspects for input.
7. Introduction to ATLAS: Claude will disseminate the slides by Willem within MF staff and to LAM contacts. Remarks and questions shall be addressed at a forthcoming meeting, when required (coordination meeting ?).
8. LETKF re-sampling in OOPS: Yannick and Jelena should liaise for a review of the code.

Wrap-up of actions moved from the last coordination video-conference (13 November 2014):

1. EC and Hirlam to liaise about code normalization features (include files) implemented by Hirlam in CY41: Ulf/Rimvydas and Deborah to exchange list of concerned files, and agree on possibility to prune some of the include files for CY42.
2. EC, MF and Aladin/Hirlam to check the two new F2003 features promoted by Hirlam (Surfex code so far) and MF (pointers in functions). Disseminate the examples to all partners and check whether these features can be implemented (with a target for after CY42 ?). Note for Aladin: specific inquiry by the network coordinator (ACNA).
3. update the complete list of already agreed F2003 features: Deborah agreed to update the list and the set of simple code examples; Claude/Ulf/Piet to make sure this list is distributed to all LAM partners for information.