

OOPS technical video-conference of 12 February 2015
meeting number 4 towards CY42

Participants (MF) : C. Fischer, K. Yessad, R. El Khatib, A. Mary,

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

Participants (LAM): U. Andrae,

Excused: Daan, Jelena

1. Wrap-up of list of actions from last meetings

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.
 - 1.1. *Deborah to provide the exact list of routines to move*
 - 1.2. *Stéphane to do the moves during build of pre-CY42 in Toulouse*
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. => *implemented inside the ASSOCIATE-script exchanged with MF. Action closed.*
3. Tomas and Yves shall liaise about the encapsulation of model physics variables: => *encapsulation done in IFS CY41R2 and Arpège CY41T1. Action closed.*
 - 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) => *action moved to the discussion about the refactoring of the obs operators. This action closed.*
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). => *ECMWF is preparing a Python script for adapting the code to passing most variables by arguments. The script would ensure that specific objects have their arguments passed by INTENT(IN) which would forbid that someone breaks their structure or values. Furthermore, it is suggested that INTENT(IN) arguments should be declared in first positions, followed by INOUT and OUT arguments. Possibly, the reverse should be done for adjoint codes (to be confirmed).*
 - 5.2. Test programs should be coded at C++ level for checking the multiple instantiation of MODEL objects of IFS-Arpège-LAM versions. => *Tomas explained he now can run a T159 and a T21 forecast from the same executable. However, the second forecast is not bit-reproducible with respect to its single-execution mirror. One reason is*

that some fields would have non-zero values in the initialization, because of the way the memory would be re-affected from one setup call to the next (the problem rather occurs in the sequence T159 => T21). This action closed (exchange will continue on regular basis of information)

- 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). => *the USE statements will be semi-automatically removed via a Python script (see above 5.1.). This action closed.*
- 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. => *Action closed.*
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. => *this action moved to the upcoming discussion about refactoring the obs operators. This action closed.*
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 ?). => *Claude has sent out the Atlas slides by Willem to external partners. Action closed.*
8. LETKF re-sampling in OOPS: Yannick and Jelena should liaise for a review of the code. => *Jelena should send out her slides or a technical note describing her work, the analysis and the questions. Contacts for the discussion will be Yannick with Deborah (EC) and Etienne with Claude (MF). Open issues depending on needs: have a common discussion in a forthcoming videoconference or Jelena + Ole Vignes to visit MF later in 2015. Unfortunately, this discussion is being slowed down because at EC, Yannick's priorities for 2014 are not on DA algorithms (rather OOPS refactoring and project management), and at MF they need first to prepare for CY42 and Fortran refactoring work recently discussed with EC (eg. obs operators). This action suggested to be kept open.*

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. => *Deborah and Ulf have sorted out the issues. Action closed.*
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). => *there were two new sets of F2003 features proposed for acceptance: Pointer in Function (MF) and standard object-oriented statements (CLASSES etc.) (Hirlam). Both eventually have been found acceptable from CY43 onwards. **For the general object-oriented F03 statements, we have set the restriction that they should not be used to recode existing IFS-Arpège-LAM codes, but only for coding new features. Also, they should not be mixed up at the data assimilation / model control level with the OOPS C++ approach.** Action closed.*
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. => *the list was updated by Deborah and Claude. Claude will present the list of accepted F03 features at the next Aladin LTM meeting for information to the Aladin partners (Copenhagen, 14 April). Action closed.*

2. Content and timing of CY42

2.1. CY41R2 technical aspects

ECMWF is close to complete the deadline and contributions for CY41R2, which will receive a number of technical features such as the IFS model variables encapsulation, optimizations in the ODB, a new FFT library (optional) etc.

EC stressed that they had been adapting MF's IO Server to the IFS, and now obtained significant speed-up with the IO Server. Therefore, it will become part of their next E-suite for high resolution IFS, along with the possible implementation of a cubic grid (TC1023 – 10km gridpoint resolution – and TC1279 – 8 km – are being tested presently).

2.2. CY41T1 technical aspects

MF is finalizing CY41T1, which was built beginning of December. Among other technical and optimization features, this cycle contains the Arpège-LAM model variables encapsulation. Also, the LBC code for LAM models is now encapsulated à-la-OOPS.

Claude stressed that the validation of Arpège and LAM configurations had progressed well, with even Arome 3D-Var being at a fairly advanced state of validation. Alas, since CY41, global 4D-Var is broken (wrong gradient in minimization) and this is now the blocking aspect for any further step.

CY42 will be the result of the merge of these above two interim cycles. EC would send their R2 cycle (or pre-cycle version) on beginning of March to MF first for code scrutiny (Deborah => Stéphane, Karim, Claude). The final send of R2 would be done around 20 March. MF will start the merge at the beginning of April.

In parallel to the code merger, we agreed to test the Python script under preparation by EC (O. Marsden) for moving all USE variables to passing by arguments list. Olivier mentioned that it might be necessary to first adapt locally some code, before applying successfully the script. Nevertheless, Tomas believed we could start passing by arguments the FIELDSET object (GMV, GFL etc.), already for CY42. If so, then we should apply the script at the end of the normal phasing of CY42. We decided to leave the final decision open for the time being. So there are actions !:

- Olivier to send the passing-by-argument Python script to MF (Alexandre Mary will be the main contact person)
- both EC and MF to apply the script on the FIELDSET object, check the codes (code scrutiny and bit-reproducibility)
- resume discussion at 23 April videoconference (or by e-mail before) and take decision about implementation in CY42

3. AOB

none.

4. Next meetings

next technical video-conferences:

For observation operator refactoring: in March 2015 , 14h30 MET / 1.30pm UK
Date to be set by Deborah and Claude.

For update about CY42 and other business: 23 April 2015, 14h30 MET / 1.30pm UK

[IFS/Arpège coordination meeting (video-conf): 12 March 2015, 1.30 UK time]

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

List of actions updated:

Next technical videoconference:

- Deborah and Stéphane shall liaise during the phasing process of CY42 in order to perform the move changes of Appendix C, sub-item C1a.
 - *Deborah to provide the exact list of routines to move*
 - *Stéphane to do the moves during build of pre-CY42 in Toulouse*
- passing-by-arguments-list with Python script:
 - Olivier to send the passing-by-argument Python script to MF (Alexandre Mary will be the main contact person)
 - both EC and MF to apply the script on the FIELDSET object, check the codes (code scrutiny and bit-reproducibility)
 - resume discussion at 23 April videoconference (or by e-mail before) and take decision about implementation in CY42
- LETKF re-sampling code in OOPS: Jelena to send out her slides or a technical note to EC (YT, DS) and MF (EA, CF). Exchange by e-mail or videoconference or later visit (MF).

videoconference about refactoring of the observation operators:

- 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)
- 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