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OOPS technical video-conference of 26 August, 2014
meeting number 1 towards CY42

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Participants (MF) : Claude Fischer, Karim Yessad, Ryad El Khatib, Etienne Arbogast, Alexandre Mary, Stéphane Martinez, Yves Bouteloup
Participants (EC) : Deborah Salmond, Yannick Trémolet
Participants (LAM): Ulf Andrae, Jelena Bojarova

Tomas Wilhelmsson and Daan Degrauwe were excused.

1. Post-mortem about CY41:

MF had found significant difficulties with the Stage 2 of the phasing process of CY41, because of the critical character of any, even rather short, delay in the timing of the code exchanges in the final weeks of phasing. This is because it is then difficult to hire extra staff for code maintenance, with a very short notice. Also, ALADIN phasers are almost all gone at the end of the phasing period.

Furthermore, several technical problems were found with the V2 of pre-CY41, making the final part of validation more cumbersome as in previous cycles:
- the generalization of SPECTRAL_FIELDS caused three types of problems: use of the spectral field structure SPA3 while the structure was not allocated with ALLOCATE_SPEC; distribution of surface pressure on processors incompatible between sualspa.F90 and ALLOC_SPEC; some hard-coded KMSMAX set to simply 0 in calling sequences (rather than for instance a CALL ABORT with a comment)
- the ASSOCIATE statement created a few localized problems when later the local arrays were allocated in a SUBROUTINE (only Aladin case)
- ordering of ASSOCIATE with respect to DR_HOOK in the IFS code: the ordering should be reviewed, as it now violates the coding norms. This overhaul can be done by an automatic script => Action: EC will write a script to reorder ASSOCIATE and DR_HOOK, and liaise with MF. The script will be applied while building CY42.
- Problems with ASSOCIATE in specific places in the IO_server: they were removed in CY41
- Problem in the IO_server at the final deallocation step of the model data

EC mention that they would like to remove some #include statements put in by HIRLAM in non-standard places in ODB. Ulf will inform Rimvydas.
Deborah further mentioned that re-phasing CY40R3 on top of CY41 had been a difficult work per se. In addition, this effort collided with the migration tasks on CRAY. It is not yet clear whether we will need again a 2-stage phasing for CY42 (to be discussed in a forthcoming video-conference).

2. List of actions from previous video-conferences:

1. Deborah and Stéphane shall liaise during the phasing process of CY41 in order to perform the move changes of Appendix C, sub-item C1a. ***Open for CY42.***
2. Ryad to test the implementation of "command_argument_count" and send results to EC. If green light, MF would implement this routine while validating pre-CY41.2 in end of June. ***Closed***

3. Olda, Ryad and Deborah to liaise and send information about compiler release versions for compiling pre-CY41 to Claude. We will add a list of recommended compiler versions in the minutes of the 13 May video-conference. ***Closed***
4. EC to check Karim's proposal for reorganisation of dynamics variables in the IFS after CY41, and send comments and/or green light to MF by end of June. ***Closed***
5. 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) ***Open***
6. 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). ***Open. The action is somewhat extended to ensuring any useful new Unitary test is implement at C++ level for testing IFS objects, and to developing later a script able to check whether USE MODULE statements are present where they shouldn't (Python script).***
7. 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. ***Open***

3. Encapsulation work to be done for CY42

A number of detailed technical changes for the forthcoming cycles have been addressed, with an emphasis on the continued encapsulation of model variables (for the OOPS-IFS Model object).

EC plan to implement in their CY41R1 some final cleaning by Yannick (use of SPECTRAL_FIELDS instead of SPA3/SPA2 everywhere, removal of SUALSPA, handling of surface pressure spectral field) + Karim's code reorganisation in the dynamics. Action: Karim and Deborah shall liaise for the implementation of Karim's dynamics reorganisation in CY41R1.

Tomas will resume the encapsulation effort, with the target to have the work completed by end of October (in view of CY41R2). The Arpège physics variables shall be encapsulated by MF. Action: Tomas and Yves shall liaise about the encapsulation of model physics variables:
1. Tomas and Yves to agree on the set of Arpège define MODULEs, to be done at MF
2. Tomas to send regular updates of the code in progress to MF (Yves, with Karim and Claude in copy)
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.

EC plan to further re-factor the model code, by passing the encapsulated model Fields structures (GMV, GFL, surface and spectral fields) by list of arguments below CNT4. This work will be performed beginning of 2015, with the help of an OOPS extra staff (Olivier Marsden, who joins EC beginning of January 2015, on a 4 year contract). This action is a necessary major item, before being able to run a single-resolution 4D-VAR from OOPS (all outer loops and all minimisations are at the same resolution).
If time is left, the Geometry structure also will be passed by arguments before CY42 is being built.

4**. Other code cleaning actions (based on Karim's input)**

Karim and Deborah have agreed on the detailed process for implementing Karim's dynamics changes from this summer, into CY41R1. Karim will provide recommendations for the validation of the modified code.

Furthermore, decision was taken *not* to implement any further code cleaning (as listed in Karim's celebrated Note). Focus will now be given to OOPS re-factoring, which will probably help cleaning the one or other aspect listed by Karim (it is being recalled that Karim's cleaning note shrank from about 35 to 15 pages over the past three years).

5. Other re-factoring features planned by EC for CY42

One specific aspect that will have to be tackled in some future is the handling of NAMELIST statements in the OOPS version of the IFS/Arpège codes. Indeed, solutions for handling namelists for multiple instantiations of objects inside a unique binary will have to be investigated.
It was agreed to resume this discussion in a technical video-conference after CY42, rather in late spring or summer 2015, and find a suitable technical solution for CY43.

EC confirmed the list of other code re-factoring items that are being addressed in view of CY42 (as listed for the OOPS/SC of 3 June 2014):
- Model derived types through argument lists
- COBSALL (single call)
- STEPO, STEPOTL & STEPOAD => no more STEPO_OOPS
- JB, TOVSCV and change of variable
- VarBC linked to OOPS + clean-up
- Other Obs types
- Scripts + testing
  => Simple/Single resolution 4D-Var

6. AOB

Jelena asked about how the code re-factoring aspects were linked with other code changes necessary to run the VAR prototypes for Arpège or Arome. Claude confirmed that indeed, both were totally independent. The changes for implementing the prototypes were patches, that mostly only apply to the given base cycle (for instance, at present, MF have a CY40 + patches).

Jelena asked how in future one would ensure that new Fortran code changes would not break the needed compliance of the Fortran structures and code sequences with OOPS. Yannick explained that Unit tests should be implemented at C++ level, so that anybody can (possibly should/has to) test his modification with respect to the object instantiation.

7. Next meetings:

next technical video-conference: Thursday 16 October, 1.30 UK time.

[IFS/Arpège coordination meeting (video-conf): 13 November, 1.30 UK time]

List of Actions:

1. Deborah and Stéphane shall liaise during the phasing process of CY41 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. Karim and Deborah shall liaise for the implementation of Karim's dynamics reorganisation in CY41R1.
4. Tomas and Yves shall liaise about the encapsulation of model physics variables:
    4.1. Tomas and Yves to agree on the set of Arpège define MODULEs, to be done at MF
    4.2. Tomas to send regular updates of the code in progress to MF (Yves, with Karim and Claude in copy)
    4.3. 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.
5. 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)
6. Actions for ensuring that the IFS Fortran code will remain OOPS-compliant from cycle to cycle:
    6.1. 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).
    6.2. New Unitary tests should be coded at C++ level for testing IFS objects (Geometry, Model, ...)
    6.3. 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).
7. 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.