

**Participants:** Deborah, Tomas, Olivier, Mats, Marcin (EC), Claude, Ryad, Etienne (MF)  
Roel, Daniel (Met.no & AEMET /Hirlam), Daan (RMI/Aladin)

## 1. OOPS-IFS status in CY46\_OOPS (EC)

- specific aspects recently prepared at EC:
  - restart, VarQC, TOVSCV (Mats/Marcin): now functioning and validated using a CY46+OOPS version. The restart facility will enable to resume 4D-VAR at the start of any outer loop.
  - time (Olivier): Olivier is working on step 2 of the re-factoring, and has progressed well. He further suggests to clean the use of time information in the IFS in order to remove any occurrence not using the new classes.
  - Pending issues in OOPS-IFS w/r to full “classical” IFS 4DVAR
    - Screening: work has started. A prototype solution was implemented in the toy QG-model (Marcin, Peter & Mats). Mats pointed out that some specific codes under LSCREEN (e.g. LMKCMARPL) should be re-factored or simply removed, as they are old and oddly coded. However, this will require coordination with MF, since both IFS and Arpège/Arome probably still use specific parts of those codes.
    - Weak-constraint: the implementation solution for OOPS-IFS has been decided. Work in progress.
    - Digital Filter Initialization: Daan started some analysis about two years ago, which showed problems (at that time) for the backward integration step. Work on adapting the DF code to OOPS probably should be resumed in the coming months or so, as there are potentially two specific needs in the MF-Aladin-Hirlam community (DF in the first and last traj of Arpège 4D-VAR and DF used in initialization or so-called BlendVAR in Aladin).
- status of validation of OOPS-IFS w/r to IFS (Deborah et al): in a low resolution (TL255) OOPS-IFS, the full 4D-VAR solution is comparable (note: not bit-reproducible, but differences are found numerically acceptable) with standard 4D-VAR. New, high resolution tests (Tco399 and Tco1279) are now being investigated, and those still show problems.

## 2. MF information about OOPS recent work

- porting and testing using CY46 (Etienne, Ryad): CY46 Arpège codes and OOPS versions have been ported on PC, compiled with the GMAP standard GMKPACK tool.
- Full-POS (Ryad): as the re-factoring of FP is close to completion, the efforts now go towards testing FP as the change-of-geometry class for Arpège in OOPS. Ryad has coded a specific Fortran-only driver, which enabled him to run and validate a full sequence of HR-FCT => HR-2-LR => LR FCT => LR-2-HR => HR-FCT.
- MF will propose code changes for adapting OOPS classes and Fortran codes with respect to I/O of Arpège files.

## 3. In rather short words, recent progress with cycles in MF and in EC

CY46R1: Will contain some science + OOPS branch. Scheduled for declaration in September 2018.

CY43T2\_bf: a version 08 is likely to become the base version for the next MF e-suite (Arpège 5km

version).

CY46: technical testing of Arpège screening, minimization and CANARI in CY45T1 is ongoing (Florian). Quite a list of bug-fixes already defined (LTRAJHR, etc.). The evaluation of how to port the fixes from CY45T1 to CY46 has started (Etienne & Florian).

CY46T1: scheduled to be built over October-November 2018. Should contain science from GMAP, Aladin and Hirlam, and as many as possible fixes for the assimilation.

#### **4. Start considering a list of post-OOPS cleaning activities (Olivier, Mats, Deborah)**

ECMWF has proposed a list of clean-ups to be discussed in the upcoming meetings, mostly for share of work and implementation after CY47 (unless otherwise specified):

- tidying up of code for MAKECMA-replacement and codes under keys LSCREEN and LMKCMARPL (while not screening code per se)
- cleaning of NODE file (make it smaller, easier to navigate between different minimisations and remove useless print-outs)
- tidy up argument lists where both derived types and components from (the same) types are being passed now. It is likely that a specific script can help detecting the occurrences, but the tidying up itself should then be manual. Contacts at MF will be Ryad and Alexandre.
- Tidy up (make consistent) INTENT statements
- re-organize progressively the Fortran Setup, using OOPS interface blocks (thus, make it very consistent with the Constructors of OOPS-IFS). This will ease maintaining both OOPS and non-OOPS versions of the system, avoid some break-ups of OOPS classes by developers unaware of the OOPS layer, and tidy up anyway the Setup code (new SU0YOMA, SU0YOMB, or no such routines any more ...). This can be done piecewise, a final step being to remove completely the NCONF key from below STEPO.
- Remove MODEL information from OBS\_OPERATOR object. This mostly concerns specific obs operators (surface – PBL) for both IFS and Arpège. Contacts would be Olivier (EC) and Alexandre (MF).
- Clean-up of time information => Olivier would start for the IFS, examples will help checking for the places to clean elsewhere (eg. Arpège physics or LAM/LBC)
- clean-up the MODEL\_MOD class.
- Clean-up the OOPS-IFS interface codes (make them more homogeneous)
- tidy up the FIELDS and INCREMENT classes => implement the FIELD\_CONTAINER class. Mats would work on this specific topic on a part-time basis after the summer. The whole work can be done by pieces. Share of work among partners should be addressed later.
- Make reading of namelist more cost-efficient (possibly read namelist on master MPI task and distribute to others? ...)
- re-write the VarBC class, which at present contains all VarBC information (this is too heavy and code intrusive). Break this class into 3 base classes (B-matrix, background, increment). Mats pointed out that this would then require changes in the scripting work flow, as 3 input files will be required for cycling the VarBC information.

The possible technical solutions, ways forward and share of work where possible, will be addressed in the upcoming technical meetings.

Claude explained that MF's priority in 2018-2019 for OOPS and Arpège would be to resume validation of the assimilation systems in CY46 then CY47, so that the conditions for building an Arpège 4D-VAR and an Arome 3D-VAR based on CY47+{required modset for MF} will become real. Those configurations would be the test versions for research assimilation configurations by end of 2019.

## 5. AOB & next meetings

- Revised format of FLUB from EC (Tomas): EC will redo the FLUB of CY45R1 adding information about changed routines, as available using git\_stats.

next technical video-conference: possibly in the range [11-17 October], to be confirmed in the upcoming coord videoconfs, 14h30 CET / 1.30pm Uk

next video-conference IFS/Arpège coordination meetings: Thu 21 June 14h30 CEST / 1.30pm UK ; Thu 20 Sept 14h30 CEST / 1.30pm UK

next physical IFS/Arpège coordination meeting in March 2019 in Reading (precise date tbc in next coord videoconfs)

### List of specific actions:

1. Daan to send EC (Marcin, Olivier) and MF (Claude) information about his tests and analysis of the digital filter OOPS adaptation (backward integration aspects, any other issue)
2. EC (Deborah, Mats) to send MF (Claude) the details about the suggested pruning of MAKECMA and LSCREEN codes, for further evaluation
3. MF (Claude) to send EC (Deborah) details about the fixes needed for LTRAJHR (misuses) in CY45
4. EC (Olivier) to make code of CY46R1+OOPS available to MF (Etienne, Ryad, Claude)
5. MF (Etienne, Ryad, Claude) to send EC (Marcin, Olivier) the proposed changes for adapting the I/O classes for Arpège files in CY46. EC to check and consider whether this could enter already in CY46R1.
6. Tomas and Claude to exchange about new version of EC FLUB (CY45R1 as example)