

IFS/Arpège Memorandum

From: Claude Fischer (Météo-France)

To: (ECMWF) DR, RD Division & Section Heads

To: (Météo-France) Arpège diffusion list

To: (ALADIN) Piet Termonia, Daan Degrauwe

To: (HIRLAM) Daniel Santos-Muñoz

File: RD19-xxx

Subject: Draft minutes of the IFS/Arpège coordination videoconference meeting of 29 January 2019.

Participants:

Meeting room (Toulouse): CNRM Videoconf room R. Durbe.

Météo-France: François Bouyssel, Claude Fischer, Ryad El Khatib, Karim Yessad, Stéphane Martinez, Fabrice Voitus, Harold Petithomme, Alexandre Mary

ECMWF: Stephen English, Michael Sleigh, Olivier Marsden

ALADIN: Daan Degrauwe

HIRLAM: Daniel Santos-Muñoz (absent)

1. Adoption of Agenda

adopted

2. Approval of Minutes of meeting of 25 September 2018

approved

3. Review of list of actions from last meeting

1. MF and EC: continue investigate the codes for LSPRT=.T. and exchange information on any further testing or code fixing. => *Olivier has coded an alternative implementation of LSPRT (with the key embedded in the FIELDS object). This version requires more testing and could enter an IFS cycle after CY47. Olivier and Sébastien Massart will work on that. MF have decided to switch off LSPRT completely from all their variational configurations, after Etienne, Gérald and Loik pinpointed a number of bugs or potential problems in IFS/Arpège (ref. Their note from 2018). Action closed.*

2. In the meeting of 25/09, the issue was raised whether a cycle documentation containing both the scientific description of a change, and the technical list of modified routines (or other code details), could be provided for IFS cycles (instead of JIRA ticket refs for instance). The meeting participants altogether found it useful both for internal communication and for the collaboration. The point is where should this doc be ? Should the FLUBs be updated, or should there be a more explicit documentary section within Confluence or JIRA (with access for partners) ? Action on EC to check with the IFS-Section people what can be done. => *Mike confirmed that it would be fairly easy to add the list of new/modified/deleted routines of any given GIT branch to the FLUBs for IFS. MF add that information systematically for Toulouse cycles. It was agreed that EC and MF would continue adding the information of the list of files to their FLUBs. Action closed.*

3. [taken up from last tech videoconf] Claude to send Olivier LMKCMARPL feedback from OBS team; Olivier to check status of pruning with Mats. => *Claude confirmed that the code under LMKCMARPL was still being used for bias-correcting RS temperatures (Arpège). Olivier checked with Mats, and there is no plan to prune this key before CY47. For after CY47: Olivier will check further with Mats and keep MF informed. Action closed.*

4. [taken up from last tech videoconf] MF to provide their OOPS CY46T1 code changes in EC's GIT (Etienne). EC to provide feedback after proof-reading the code, and merge the agreed code with the Master trunk for CY47 (Marcin, Olivier). Ensure the proper OOPS version is being tagged for CY47 (Marcin to set the tag; Olivier, Claude, Etienne, Stéphane to all make sure the tagged version is used on both sides). => *Etienne sent his C++ changes to Marcin and Olivier. Marcin included them in the official OOPS GIT repository. Olivier confirmed that the changes are included in the OOPS/C++ codes that have been tested with CY46R1+OOPS. Action closed.*

Note: slides from the talks by Mike and Ryad can be obtained from Claude upon request.

4. MF information about progress and plans of E-suites and cycles (François, Claude)

François gave an update about the progress of MF's e-suite based on CY43T2_op1. Recently, new diagnostic model outputs have been added to the test suite, and an important bug has been fixed related to GRIB2 (the bug had an impact on the amount of screen-level observations that entered screening in data assimilation). The timing for the switch to operations is now set to end of May or beginning of June.

Claude added that CY43T2 also was the most recent code basis for the export version with the Aladin partners. Since October 2018, several Aladin teams reported that they have installed this code and it has become operational in some places (eg. CHMI/Prague).

The next e-suite should be built from June onwards, and it will have a fairly tight and constrained calendar. The installation in the operational environment should start as early as September, in order to make sure it can match a switch to operations by the beginning of 2020. Then, in the early scenarios of the installation of the next HPC in MF, the NWP suites would be frozen to prepare for migration. The scientific and technical goals of this e-suite would be new observations and move to CY46 (including RTTOV-12).

Steve asked whether MF had been developing any specific code in Arpège/Arome for handling additional variables related to the two-moment microphysics scheme (like concentrations in addition to specific humidity for cloud, ice, rain, snow, graupel etc.), and either as prognostic variables or as extra arrays for diagnostics. **Action on MF: François and Claude to check.**

5. EC information about progress and plans of E-suites and cycles (Michael)

Mike presented the progress with CY46R1. The cycle was declared after a fairly long period of validation, on 21 December 2018. It should go into operations in June 2019. For now, the scorecards are largely positive.

A major constraint then will be the freeze of the operational suites and the preparation for the migration of the Compute Center to Bologna. The expectation is that CY46R1 will be the porting cycle but this choice could change for CY47R1 if the HPC/Bologna migration would slip by a few extra months. The build of CY47R1 will also be extremely constrained by the start of migration, which will require manpower from the technical Sections, especially since a familiarisation system of the future HPC solution should be available in July 2019. In the nominal calendar, CY47R1 would not become an operational cycle.

6. Technical status on CY46T1, CY46R1 and merge of CY47

Olivier sent the preliminary CY46R1 + OOPS branch to MF on 21 January 2019. Stéphane (compilation tests on BULL) and Karim (check setup and dynamics codes) sent several comments back to Olivier, who will liaise as appropriate with experts at ECMWF. If feasible, these changes will be added by Olivier in the final CY46R1 for the send in February. The merge of CY47 will start in MF in mid-February, and it is anticipated that the whole build process will last into April and May, given the other constraints like e-suites, workshops and school holidays. EC will test in parallel to MF (MF to send an early pre-CY47 by end of March) and add the pre-CY47 codes as a contribution branch for CY47R1. Because of the tight calendar for CY47R1, EC will build this R1 in parallel to CY47, using several RD branches + CY47 as a branch.

Ryad pointed out that the “F90-stuff” information should be exchanged more regularly between MF and EC, as this would ease the update of the compilation steps at each new cycle (for creating the interface blocks). Olivier explained that EC are now using the Interface Generator developed by the Met Office. **Action on EC: Olivier to send MF information about the Interface Generator. EC and MF to further discuss whether both could converge to a same tool or how to exchange efficiently the information for handling interfaces at compilation.**

Olivier confirmed that ECMWF are able to run a fairly complete version of the 4D-VAR minimization with OOPS-IFS, using the CY46R1+OOPS Fortran codes and the associated C++ codes. Screening was almost ready but won't fully work with either CY46R1 or CY47 (this will be needed later for running continuous DA with OOPS-IFS binaries). The restart mechanism is ready, the results for VarBC seem acceptable (numerical differences remain but are not considered to be problematic). A few specific options for the full incremental 4D-VAR still are missing (variable timestep, weak constraint, Jc-DFI) so that the comparison between classical and OOPS 4D-VAR must be done after preparing a reduced classical 4D-VAR reference.

Claude explained that MF are preparing a set of prototype test jobs with CY46T1, for assessing OOPS configurations: observation operators (all obs or specific types), forecast model, TL and AD models, Full-POS etc. All these tests presently are for Arpège and global geometry but it is planned to complement them later with tests for LAM (question by Daan). The OOPS tests run with low truncations (T31 and T149). This is the first time MF are able to construct an OOPS test suite based on a (locally) synchronized version of the Fortran and C++ codes (the latter came from an RD branch by Deborah).

For the classical Arpège and Arome assimilation tests, significant progress has been reached since end of November with CY46T1 preliminary versions: single screening and 4D-VAR minimization have run with all obs types (perhaps one caution about Open-MP in screening still ?), Arome screening and 3D-VAR as well. The surface OI CANARI code was run on CY46+fixes, and tests will be resumed with CY46T1.

On request by MF, EC confirmed that for CY47, they intended to test and validate a single 4D-VAR minimization, and that this test will become part of the standard validation procedure in Reading.

7. Specific topics

7.1. Making array bound violation tests work with any IFS/Arpège binary (MF)

Ryad introduced a proposal for adapting the IFS codes so that the full Fortran code could be run with array-bound violation options. At present, indeed, about a dozen routines have to be compiled without bound checks since they contain explicit violations (depending on how model options are being activated or not). Many of these routines are in the middle of the model call tree, so that this by-pass frequently is a problem when debugging IFS/Arpège.

Ryad provided code examples for his proposal, that are available on ecgate :

```
/home/ms/fr/rme/public/bounds_violation/  
cpg_drv.F90_original  
cpg_drv.F90_version_A  
cpg_drv.F90_version_B  
sc2prg_mod.F90
```

or on beaufix :

```
/home/gmap/mrpm/khatib/public/bounds_violation/
```

Participants are invited to further check the proposal and send comments to Ryad. The potential code changes are for after CY47, so that there is time to resume the discussion and testing for a technical videoconference in 2019.

7.2. OOPS Progress (EC & MF)

See item 6.

8. Comments by LAM partners

Daan asked about LAM versions of the OOPS tests in MF (see item 6). Claude pointed out that the extension and share/use of LAM OOPS tests could be addressed at the next Aladin/Hirlam workshop in Madrid (1-5 April), either in a side meeting, or the system meeting or HMG/CSSI.

9. Content and timing of cycles

Below is an updated version of the overview Table of Cycles, after discussion. There still are a few “??” due to the uncertainties about the calendar of HPC operations both in MF (switch of operations to new HPC planned between August 2020 and March 2021) and at EC (confirm dates of the move to Bologna+new HPC).

It was stressed that there was a potential risk to have two follow-up joint cycles separated by significantly more than 1 year (CY47 – CY48). The recommendation in the 19 March (2018) meeting was not to allow more than one year delay between joint cycles.

Claude noted that two scenarios could be discussed further, at the upcoming physical meeting (8 March 2019):

1. a “one-year interval” scenario with CY48 built in the period [January – June 2020] (thus about one year between CY47 and CY48). In this scenario, MF and the LAM partners would build a scientific/technical CY47T1.
2. an “early CY48” scenario with a build of CY48 in November – December 2019. One potential reason to do so would be if the OOPS tests based on CY47 would not be completed enough, and would hamper too much the coordination of OOPS testing between EC and MF. Another, now perhaps more likely reason, could be the precise timing of e-suites and HPC migration in MF and EC. In this scenario, MF would definitely cancel any CY47T1 (or that would be a very short technical update cycle before CY48).

Joint cycle	ECMWF	MF	Start of phasing	Declaration	Misc. / Oper plans
CY45			March 2017	28 June 2017	MODEL object re-factoring
		CY45T1	2nd October 2017	24 January 2018	Including Aladin and Hirlam
	CY45R1		May 31 st 2017	August 2017	Operational June 2018
	CY45R2		Mar 31 st 2018		Technical cycle for introduction of ecBuild
CY46			Start Jan 15 th , 2018	10 April 2018	<i>OOPS aspects added as extra branch on CY45R1 for CY46</i>
		CY46T1	Oct-Dec 2018	Mid-February	Technical update

				2019	for fixes (assimilation) plus some science
	CY46R1		31 May 2018	Feb 2019	OOPS updates + science
	CY46R2			<i>cancelled</i>	Research section version only if CY46R1 is frozen for operations before Bologna
CY47			Mid-February 2019	May 2019	Target joint cycle for baseline OOPS in Research mode
		CY47T1	Autumn 2019 or <i>cancelled ??</i>		Could contain OOPS fixes for Arpège and Arome
	CY47R1		April 2019	July 2019	This R1 will be built from several parallel RD branches, plus a CY47 branch
CY48				End of 2019 or Q1-Q2 2020 ??	See joint notice above.

10. AOB

Claude asked who to contact for information about the source code tools for OpenIFS. Mike said Glenn Carver would be the right person to contact.

11. Next meetings

Next technical video conferences:

⇒ Tuesday 26 March (tbc, otherwise shifted into 2nd half of April), 14h30 CET / 1.30pm UK

Next Coordination video conferences:

⇒ tbd 14h30 CET / 1.30pm UK

Next physical Coordination Meeting:

⇒ 8 March 2019, meeting to take place in Reading (full day).

List of actions decided:

1. Steve asked whether MF had been developing any specific code in Arpège/Arome for handling additional variables related to the two-moment microphysics scheme (like concentrations in addition to specific humidity for cloud, ice, rain, snow, graupel etc.), and either as prognostic variables or as extra arrays for diagnostics. Action on MF: François and Claude to check.
2. Action on EC: Olivier to send MF (Ryad, Stéphane, Claude) information about the Interface Generator. EC and MF to further discuss whether both could converge to a same tool or how to exchange efficiently the information for handling interfaces at compilation.