Minutes of 19 November 2019 technical IFS/Arpège video-conference

Participants:
ECMWF: Olivier Marsden, Michael Sleigh / Tomas was excused
MF: Claude Fischer, Stéphane Martinez, Etienne Arbogast, Harold Petithomme, Ryad El Khatib / Alexandre was excused (Bull Sequana training session!)
Aladin: Daan Degrauwe; Hirlam: Daniel Santos-Munoz

1- list of actions from last tech videocon (3 July)

1. Olivier offered to provide MF staff access to the ECMWF bit-bucket environment, where the WS test tools are uploaded. Action on Claude to provide Olivier with the list of MF names for granting access. => *EC can provide access to MF staff on-demand (Claude stressed that case-by-case access should be considered for the time being). Olivier will provide a standard e-mail text for the request. Olivier and Claude will update the list of MF users. Action open.*
2. MF (Ryad) to provide Olivier and Alexandre an Arpège T30 forecast test (without SURFEX, which is a source code that is not at present being shared in the exchanged codes) => *see below discussion & actions in Item 4. This action closed.*
3. EC (Olivier) to provide Alexandre and Ryad with a T21 IFS forecast test (note: in practice, this may simply mean to upgrade the T21/IFS test that Ryad used to share with Deborah) => *Olivier confirmed that he had sent a tar-ball file with the examples for IFS T21 to Alexandre. See below discussion & actions in Item 4. This action closed.*
4. We expect to get back to this topic [validation process] by about the beginning of 2020, after MF have started to use the new tool [davaï] and feedback from the staff is available. => *see below discussion in Item 4. This action closed.*
5. Olivier will check whether ATLAS working days are being planned at EC for this autumn. => *Olivier confirmed that EC (Willem De Coninck) will organize the first ATLAS training session in the first half of 2020 (probably late spring or beginning of summer). The sessions shall be announced on EC's web-pages. In addition, Olivier may remind the announcement to MF, Aladin and Hirlam contacts in our meetings. Action closed.*

2- status of CY47, CY47T1, CY47R1

At MF: after declaration of CY47_main end of August, MF built a CY47T0 (technical interim cycle for OOPS-Arpège interfacing + array bound check facility), followed by the scientific cycle CY47T1. 47T1 is still under construction and validation though much of its expected contributions now are 'in'. For the technical validation, MF are using the standard "mitraillette" tests, some additional benchmarking on PC, and a set of OOPS-binary based unit tests of DA components (obs operators NL-TL-AD; small truncation forecast, screening, minimization, all in global geometry only so far). Several bugs for DA have been spotted thanks to these tests. MF are now trying to run screening and 4D-VAR minimization from the classical FORTRAN binary using the same namelist settings as in the OOPS case, in order to test OOPS/MASTERODB bit reproducibility.

At EC: most of the scientific content of CY47R1 is now committed and tested. This code version is expected to be completed and declared by X-mas, for handover to Operations. It is expected that the associated e-suite would stay for about 6 months on the Cray and switch to operations would occur by mid-2020. This change would then be followed by a period of 6 months of freeze of the IFS suites, and

work would focus on the move of the Data Center to Bologna, and migration to the new HPC (thus, this is the 2nd half of 2020). The next e-suite version of the IFS codes would not be built before the beginning of 2021, or even slightly later, thus leaving a large gap of about one year between the handover of CY47R1 and the build of a CY48R1.

Michael explained that intermediate research versions might be created, especially for a possible merge with MF within this specific large lapse of time. Furthermore, Michael confirmed that the move to Bologna was delayed by about 6 months, while the official announcement of the next HPC solution would occur at the December EC Council.

Another issue for discussion was the status of CY47_main, which was pending complete validation in the IFS 4D-VAR after the declaration of end of August. Olivier explained that he and Alan Geer were now investigating issues with bit-reproducibility (w/r to CY46R1), which were hard to find. Indeed, for now, this technical problem has prevented EC from merging the CY47_main (which is one out of many development branches in their GIT) with the rest of CY47R1 (i.e. CY47R1 strictly speaking rather is a CY46R2). EC confirmed that the two code versions (CY47R1 and CY47_main) will have to be fully merged, before starting CY48 with MF.

3- preparation of phasing for CY48

Upon agreement that the build of CY48 must start from a common code basis, namely CY47_main as background, timing constraints have been addressed. EC would need more time to fully validate IFS 4D-VAR, and was suggesting a one month shift of the start of the build, from beginning of December to beginning of January. MF will check whether such delay can be feasible for them, their own constraint being that the shift almost certainly would mean that part of the build would overlap with the major migration efforts of the NWP suites on the new BULL Sequana computers. Claude will check within GMAP and GCO what the drawbacks for them would be. A final decision about the start time of CY48 will be taken at the upcoming coordination videocon of Friday 29 Nov.

Michael mentioned that yet a third scenario should be kept in mind, though this one rather is an "emergency case scenario". What if 4D-VAR/IFS in CY47_main requires significantly more time than what is expected or sustainable for concrete planning? On the side of EC, they would then not merge CY47_main into CY47R1, not to delay e-suite and operations. MF suggested that, in this "hard" case, EC should consider merging their CY47R1 on top of CY47_main, thus building a kind of "CY47R1b", which could be the EC input for the CY48 merge. Certainly, later, fixes would have to be carefully exchanged and implemented on both sides, on top of this CY48. EC agreed on this possibility.

Action: Claude to check whether a one month shift of the CY48 merge is feasible for MF.

4- update on davaï by MF & exchange of cross-tests IFS/Arpège, etc.

Claude gave a short summary about the test cases available in ***davaï*** (obs operator NL-TL-AD, low truncation forecasts, screening, minim and use of OOPS binaries for the DA component testing). These tests have been implemented and been used when building CY47T0 and CY47T1 at MF. Since Alexandre was excused for this meeting, MF proposed to provide a specific summary about the status and the use of "davaï" at the next IFS/Arpège coordination videocon on 29 Nov.

The other discussion was an open exchange about cross-testing and how to possibly define and exchange common test data. Hereafter is a list of items that popped up from that discussion:

- exchange simple forecast tests: Olivier recently sent data for an IFS T21 forecast to Alexandre (open action); MF have to define a simple Arpège forecast test for *davaï* which would then also serve for the cross-testing (open question was whether such simple test should or can follow closely changes in the Arpège operational forecast version).
- DA components testing: which level of fine-grain testing should we aim for? MF intend to systematically use the OOPS unit tests; EC start from simple screening and minim cases, then the full IFS configuration. Olivier explained that he has started to investigate how to design specific DA steps, before minimization, that could be defined and implemented without reference to the EC IT-environment (eg. MARS etc.); this is ongoing work. It seems agreed that simple DA tests should be aimed for, but before defining which ones, a first important step is to be able to cross-test the creation of ODB files.
- Cross-testing the creation of ODB files. A possible strategy was drafted:
  - exchange values of the number of updates (so-called "nuptra" parameter in the IFS 4D-VAR code), which controls the specific number of tables in part of the data base structure.
  - both MF and EC should build an ODB-file structure corresponding to the other center's assumed options, each using their own build environment.
  - The "MF-built ODB-à-la-EC" file would be sent to EC for validation, and vice versa.
  - After this first step, a reduced set of observations should be defined, common to the IFS and Arpège DA suites, and prepared in a very standard (and possibly easy-to-edit) input format (plain ascii style?).
- then, define the specific configurations that could be tested by both centers (i.e. where to start from).
- DA cycling seems out of reach for cross-testing.
- Claude mentioned that MF would also define a few specific LAM forecast tests for *davaï*, and a later step could be to assess whether a simple LAM forecast test could be shared.

Daan asked whether EC could provide information or examples of how "cmake" is being used with new cycles. Olivier pointed out that the "cmake" and compile files indeed were not part of the code exchanges between EC and MF, but specific information could be provided as example. Claude stressed that if quite a few partners in Aladin and/or Hirtlam would show interest in "cmake", then this should later be brought up within the LAM-consortium discussions. Daniel confirmed Hirlam already had access to "cmake" and their system group was evaluating it against other tools.

Actions derived from this discussion:

- both MF and EC: to discuss the steps for cross-testing ODB construction with relevant staff (led by Olivier and Claude)
- resume the definition and the exchange of simple forecast tests for IFS and Arpège (Olivier, Alexandre)
- Olivier to provide MF (Alexandre, Claude) and Aladin (Daan) information and examples of the "cmake" compile parameters.

5- AOB. Claude listed a few items for information:

 -- visit by Sébastien Massart to MF on 4-6 Dec, including technical work on Control Vector codes with MF in view of pre-CY48

-- co-development of VFE codes between EC (Filip Vana), MF and Aladin (Jozef Vivoda, Petra Smolikova), with potentially some need for cross-coordination between partners in view of a future code phasing

-- Hirlam dev: SPP and SPG => discussion with EC and MF started. EC (M. Leutbecher) will propose all partners a re-design of the SPP codes. Hirlam (U. Andrae from SMHI) will phase the SPP extensions of IFS and Harmonie-Arome on top of CY47, based on the present SPP code structure. This phased branch could be used for code scrutiny or testing. However, for the common codes, the discussion should start in about 2-3 months time, based on the design proposal by EC.

-- Sept 2019: IFS/Arpège/LAM code training days (focus on objects in forecast and post-processing confs)

Some material available at: http://www.umr-cnrm.fr/aladin/spip.php?article347

-- DA code training days in 2020 in MF ? => the Sept 2019 code training days had a focus on the forecast models and Full-POS. The feedback from the participants (MF and Aladin staff) was very positive, as they all felt that the training was efficiently addressing the new code structures and how to now develop new features in a re-factoring compliant manner. The idea came up to extend such training days to the data assimilation components. MF will further investigate the possibilities, and approach EC to get their plans (or possibly organize such technical training jointly?).

6- Date of next tech videocon:

for reminder: other upcoming IFS/Arpège related meetings are
- IFS/Arpège coordination videoconference on Friday 29 November, 10h-13h MET / 9-12am UK
- Scientific bilateral workshop (Paris, 27-29 January) led by Andy Brown and Marc Pontaud
- physical IFS/Arpège coordination meeting on Monday 23 March in Toulouse

List of actions decided on 19 November:
1. MF staff access to the ECMWF bit-bucket environment, where the WS test tools are uploaded. EC can provide access to MF staff on-demand (Claude stressed that case-by-case access should be considered for the time being). Olivier will provide a standard e-mail text for the request. Olivier and Claude will update the list of MF users.
2. MF to check whether a one month shift of the start of merge of CY48 is feasible for them (i.e. from early December to early January). Final decision to be taken by EC and MF at the upcoming coord videocon on 29 Nov.
3. Cross-testing IFS/Arpège configurations:
   a) MF and EC to discuss the steps for cross-testing ODB construction with relevant staff (led by Olivier and Claude)
   b) resume the definition and the exchange of simple forecast tests for IFS and Arpège (Olivier, Alexandre)
   c) Olivier to provide MF (Alexandre, Claude) and Aladin (Daan) information and examples of the "cmake" compile parameters.