

IFS/Arpège Draft Minutes

From: Claude Fischer (MF)

To: (ECMWF) HR, RD Division & Section Heads, List of recipients

To: (Météo-France) Arpège diffusion list, other MF (Arome) correspondents

To: (ALADIN) Piet Termonia

To: (HIRLAM) Ulf Andrae

File:

Subject: Draft minutes of the IFS/Arpège coordination meeting -Cycles 39 and 40 – held at MF on 28th June 2012 (CNRM, salle Joël Noilhan).

Participants:

Météo-France: Alain Joly, Claude Fischer, Karim Yessad, Ryad El Khatib, Stéphane Martinez, Patrick Moll, François Bouyssel

ECMWF: Jean-Noël Thépaut, Deborah Salmond, Anne Fouilloux

Part time: Dominique Giard (CNRM/RETIC, on the Licensing issues)

ALADIN: Piet Termonia

HIRLAM: Ulf Andrae

0. Adoption of Agenda (start at 9am)

two small changes proposed by Claude: specific item for LAM consortia (5) and two separate items for discussing phasing strategy to CY39, and outlook towards CY40-42. This agenda is adopted.

1. Approval of Minutes of Video-Conference of 29th March 2012

approved.

2. Review of list of actions from last meeting

1. *GRIB_API: (1) MF to inform ECMWF about outcome of its analysis and possible adaptation of the GRIB_API/Sigma_b setup code (maybe liaison with Deborah and Mats in Reading) (2) MF to keep ECMWF informed about tests of new GRIB_API versions for NEC either by its NEC support or in Arpège: on sub-item (1), MF have coded a patch for reading the Sigma_b files through the GRIB_API interfaces but*

reading the header section of the GRIB only once. This is a temporary patch which will not be committed to the official code. Email exchanges took place with Mats Hamrud to understand what could be done; a point was made about the complexity of the interface code in IOSTREAM_MIX, which is understood only by a very few people in the community. This might become an issue for re-coding, in some distant future. On sub-item (2), MF have not further assessed GRIB_API performances on their NEC. MF assume they will not come back to this aspect on the NEC/SX9 unless an urgent operational matter occurs. Action closed.

2. *ECMWF will prepare C++ coding guidelines for OOPS: postponed to after the scientific review and its outcome => action open*
3. *ODB2: (1) Anne will send a new version of ODB2 once consolidated (2) Anne proposed to write and send MF a set of test programs illustrating the various manners of using C_binding within COPE and ODB2, to help for porting tests on other platforms => (1) code (ODB-API) has been sent to MF; (2) Anne proposes to use the IDRIS test programs for porting tests. She has sent the corresponding links to Frank Guillaume. Action closed.*
4. *COPE: ECMWF will send the finalized spec documentation to MF and Hirlam (MF already has a version of it). A video-conference should be arranged after this send (JNT, Florence). Anne would visit MF one extra day before or after the June 28 coordination meeting. => the specs documentation has been sent to MF and Hirlam correspondents. The video-conf has been held. Anne visited MF on June 27 to discuss COPE with MF staff (D. Puech, F. Guillaume, P. Moll, F. Rabier). Action closed.*
5. *VORTEX: visit of ECMWF delegation at MF to be fine-tuned (date, participants). => G. Radnoti, M. Fisher, P. Burton and M. Diamantakis visited MF on June 25-26 and discussed Vortex with E. Sevault. The early feedback by the EC delegation seems positive, and EC will have an internal debrief on the outcome of the visit, and a possible future collaboration on Vortex. EC ask about the license for Vortex. MF say that there certainly will be a licensing for Vortex, enabling a wide distribution but keeping a good traceability of the software (who's using it). Action closed.*
6. *GIT: EC will write a technical memorandum and send it to MF. => There are now discussion between RD and OD at EC in order to understand how GIT could be used to enhance code and system exchanges between both Departments. Baudoin Raoult will write a memo on the possible benefits of GIT and of using a common SCR between RD and OD. This doc would however not explain the implementation details. MF confirm they will move to GIT (most likely at the same of doing CY39T1). This action will be continued: EC will keep MF informed about the progress of their internal discussions; EC will send MF Baudoin's memo once ready.*
7. *OpenIFS and source code agreement: exchange first views about licensing issues for the common IFS/Arpège system at the OOPS/SC of May 3, where Erland Källén and Philippe Bougeault will be present. => the issue indeed has been discussed on May 3. Action closed. For more, see item 7 below.*

3. Progress and Plans of ECMWF (Highlights)

Jean-Noël gave a thorough presentation of the status and the outlook of the scientific plans and technical cycles at EC (slides are available on demand from Jean-Noël and/or Claude). Here are but only some specific excerpts:

Model cycles:

Cy38R1:

EDA-filtering, B, clouds & convection, de-aliasing, swell, EPS perturbations + EDA-mean etc., MHS o/ land, Met-9 ASR (see slides for details)

Cy38R2:

Increase of number of vertical levels to 137 in high-resolution forecasts and DA (see slides for details)

Cy39:

Common ECMWF – Météo-France cycle upgrade

Cy39R1:

EPS L92, surface properties, drizzle, lake model, balance, observation errors, 24-hour DCDA, revision of EDA perturbations,...

Cy40:

Common ECMWF - Météo-France cycle upgrade

Cy40R1:

EDA covariances, new stable boundary layer formulation, humidity control variable...

Throughout the year:

Metop-B, NPP, OSCAT, ground-based GPS etc.

The impact of CY38R1 in operations is essentially positive, with respect to the synthetic comparative score charts (scores w/r to own analysis). Scores w/r to observations are fairly neutral, though. Biggest impacts are obtained from the EDA/Jb changes, the clouds/convection improvements and the de-aliasing (this impact actually is negative on 500hPa geopotential in the Tropics).

CY38R2 is presently being built, and is expected to be declared mid-July. It would go into operations in November/December (as soon as any detrimental impact of this E-suite with respect to CY38R1 is discarded), in order to set down the switch to the new vertical resolution (L137 instead of L91). The L137 suite then is expected to be further improved in the course of 2013. The L137 suite produces an improved model climate w/r to L91, when verified against ERA-interim data.

Jean-Noël also pointed out the somewhat inconsistent specifications for the long-term evolution of CO2 content. In the IFS for instance, CO2 global content is constant in the RTTOV code, but it is an evolving quantity in the IFS radiation scheme (1990 constant + 8 year offset + a continuous increase given by observations).

Deborah mentioned that EC would prune all their use of the old GRIBEX interface from the IFS. The question was raised whether Arpège was still using this interface (uncertain answer at this stage). EC will send MF the full list of occurrences of GRIBEX calls, and MF will check whether it wants to prune some of them (in Arpège-type of configurations). This can be done at any time in the future, and there is no obligation to totally prune this interface. Further liaison about that is between Deborah and Claude (by email) and then if necessary in a technical video-conf.

4. Progress and Plans of Météo-France (Highlights)

Claude gave a description of the content of CY38T1, and expected content of CY39 – CY39T1 – CY40. In addition, he showed the highlighted content of the present MF E-suite based on CY37T1_op1, which is scheduled for operation in September 2012:

- Arpège (and Aladin models): retuned Sigma_o's, more IASI assimilated including cloudy radiances, more GPS data from EGVAP, more ASCAT, model error with inflation factor in AEARP, triggering of convection emphasized only in saturated conditions
- Aladin-overseas: less thinning of satellite data in pre-screening, modification of non-linear balance in Jb
- Arome: new radars (1 assimilated, 2 monitored), higher resolution input orography (GTOPO30), new physiographic databases for soil properties, changes in shallow convection scheme

Some discussion took place about the phasing and validation difficulties encountered at MF with the assimilation in CY38(T1). Part of the long delay is due to manpower. There was also a need to first learn about the new code structures that have entered CY38 (most prominently: obs operator cleaning, phase I). Patrick however insists on the improved quality of the new code, which is also Claude's impression. MF will now need to do some careful pre-phasing of the corrections for Arpège 4D-VAR and Aladin(Arome) 3D-VAR in preparation of CY39, in order for the various bugfixes in the Jo code to enter the next common cycle. We also agreed that an early pre-warning should be sent by email by specific developers, whenever they see/know that they will break code from another partner's configuration. Default correspondents for warnings should be Deborah and Claude, who would forward the info to the relevant colleagues for liaison.

Further plans for the winter 2012-2013 are to start implementing Vortex and move the SCR from clearcase to GIT.

Beginning of 2013, MF will start its last E-suite on NEC/SX9:

- Assimilation: daily cross-correlation structure functions in wavelet space, increase number of members in AEARP at constant total numerical cost, ½ hr timeslots, removal of Jc-DFI
- Observations:
 - Monitoring and/or Assimilation of NPP/ATMS, NPP/CRIS; Metop-B (IASI, AMSU-A, MHS, HIRS, ASCAT, GRAS); Ocean-SCAT; more AIRS data assimilated
 - GPS ZTD : use of VARBC (almost certainly) + dynamical data selection in blacklisting (less certain)
 - Assimilation of GEO radiances from GOES and MTSAT
 - More GPS-RO assimilated
 - SEVIRI infra-red channels over land in Arome
- Arpège/Aladin physics: evaluate the new convection scheme “PCMT” in Arpège; modified EDKF in Arpège
- Arome-France physics and model: use ECOCLIMAP-2 database; implement snow analysis in Arome-France

Jean-Noël mentioned that ECMWF have made tests with Jc-DFI, and found that it was beneficial to slightly increase the weighting of this cost function for surface pressure. The

reason behind this is to better filter gravity waves that have an erroneous phase speed in the TL/AD low resolution / large timestep models, as compared to the full non-linear model (work by Mike Fisher). He will contact Gérald Desroziers about that.

5. LAM partners comments

Piet Termonia presented the coordination meeting the expected contributions from the Aladin community. Those can be split into two different sets:

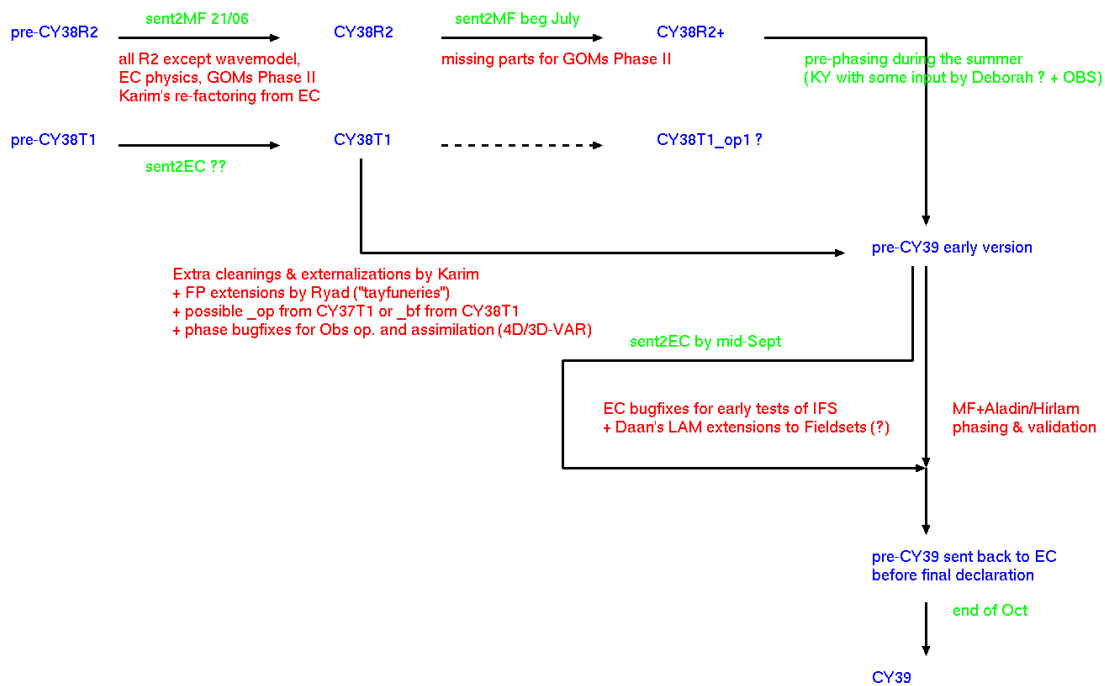
- an extension of the Fieldset Fortran code for OOPS to LAM requirements. This work is based on Daan Degrauwe's study in Brussels, but is presently pending some more in depth decisions on specifications about the content of the State object. In particular, Daan has found that time information would be required in association with the description of the LBC data to be handled in the State. There is however at present no time description. These aspects will be discussed further this summer, by email or by direct discussions (Daan might travel to ECMWF if necessary, or a video-conf could be arranged between relevant people at ECMWF, MF and IRM). Action: Piet will send Daan's questions to Jean-Noël + further liaison in technical video-conf.
- Scientific improvements for the ALARO physics: TOUCANS, ACRANEB_new, new multi-scale convection scheme UCS.

Ulf Andrae indicated HIRLAM will also discuss and prepare its list of contributions. As for CY38T1, those will be coordinated via a video-conf between HIRLAM and MF. HIRLAM correspondents for CY39 (and CY39T1) will be Ulf and Trygve Aspelien.

6. Cycles: status and content of future releases

6.1. Merging strategy towards CY39

Below is a graphical view of the proposed strategy for summer 2012. There will be various source code exchanges by email or tar packages between Deborah, Stéphane and Karim. Deborah envisages an early testing of the IFS in September, and possibly also of an Arpège forecast. The goal is to achieve a validation of the forecast runs during September, and as much as possible of the global 4D-VARs in October. The eventual target is to declare CY39 by end of October.



6.2. Draft contents and timings of CY40, CY41, CY42

A trial schedule of the common and interim cycles after CY39 has been discussed. The outcome is summarized in the Table below:

Common c.	ECMWF	MF	Start pre-φ	Declaration	Misc.
CY39			End Aug. 12	End Oct. 12	
	CY39R1			In Jan. 13	
		CY39T1	In Dec. 12	In Jan. 13	
CY40			In late Feb. 13	In May 13	
	CY40R1			In Sept. 13	
		CY40T1		Early 2014 ?	
	CY40R2			In Feb. 14	
CY41				In June 14 ?	
CY42				?	

About the various constraints:

- MF will start porting to its next HPC in late June/ early July 2013. CY40T1 would mostly contain porting aspects and changes required for the high resolution E-suites (Arpège T1200C2.2, Arome-1.3 km). Those probably will all enter as catch-ups from the actual porting cycle which will be a CY39T1 or a CY38T1/T2 (as back-up if CY39T1 is too much delayed)
- ECMWF's porting constraints will come in mid-2014, probably after CY41.

7. Specific managerial issues

7.1. Update content of the annexes of the IFS/Arpège software agreement

This item was put on the agenda as an action from the last OOPS Steering Committee. It eventually turned into a more general discussion about the licensing strategies; ECMWF for instance wished to know more about MF's situation with respect to licensing its software. Therefore, Dominique Giard who was in charge of compiling all software products from MF, has been invited to the meeting. She explained that for CNRM software, the licensing rules must also comply with CNRS policy, which should lead to the use of CeCILL (CEA CNRS INRIA Logiciel Libre) licenses when open source distribution is required. These licenses allow free use, modification and distribution of the initial software and are compatible both with the GNU (L)GPL guidelines and the French law. There is no restriction on downstream usage (research, operations, commercial). The versions (B or C) of the CeCILL licenses considered for NWP components shouldn't impact the license type for derivative softwares or related modules. ECMWF explained that for them, it is essential that ownership can be transferred, in order to avoid that "alien" software would be incorporated into ECMWF software and make further proprietary rights difficult or impossible.

ECMWF already has performed an extensive licensing of much of its software, with the IFS system being one of the major exceptions. It seems agreed that ownership of this code would be shared by ECMWF, MF and the LAM partners (*note: this was said at the OOPS/SC and is repeated in these minutes for clarity*).

At MF, there is no firm timetable for the whole licensing procedure. As concerns the IFS/Arpège software agreement, we keep the present text active, based on the version published on ECMWF's website.

7.2. Wrap-up status on Open-IFS / Licenses

There is an ongoing discussion between ECMWF and MF about the specific licensing for OpenIFS.

As this code should be freely distributed, it is important to agree commonly on the content (scope) of this system. Thus, there will also be more exchanges between both centres about the precise technical content of OpenIFS. At present, for instance, the NH dynamics would not be part of it, while DDH and the necessary code for post-processing of model output fields (part of Full-POS) are under discussion to be in.

8. Specific technical issues

8.1. Overview of OOPS-actions; coordination of technical issues (make sure info is exchanged efficiently)

Deborah presented the list of technical documentation written by Karim. This is an important effort, as these notes are essential cornerstones for the discussions about the IFS code cleaning, towards OOPS and beyond. The coordination meeting welcomed these notes and the important documentary effort by Karim:

- OOPS variable naming:
 - ptr2011_oops_variables_v4.pdf

- ykvarname_2012.pdf
- Command line: ptr2012_commandline_v2.pdf
- GFL: ptr2012_gfl_v2.pdf
- Physics/Dynamics interface: ptr2012_intphysdyn_v2.pdf
- LASCAW: status_interpolators_v7_juin2012.pdf
- CDCONF: status_clconf_cy38_v2_janv2012.pdf
- General cleaning : ptr2012_cleanings_in_arp_v7d.pdf

Furthermore, Deborah summarized the new GOM structure proposed and coded by Alan Geer at ECMWF for CY39. This also is a significant work going in the right direction for making the code cleaner for understanding and future developments.

For instance, the total number of lines involved has been decreased from 10000 to 2000. Alan will give a talk at ECMWF about this new structure. As this talk also if of interest to the other partners, we agreed on at least one video-conference between ECMWF and MF, for Alan to give his talk to MF attendees. Action: Deborah and Claude to arrange a video-conference for Alan's talk for MF delegation. The target attendees are OBS people and beyond, as Alan would show some more general features of code cleaning using F95 features. If possible, this talk should be arranged for July 2012.

Eventually, the coordination meeting assessed the benefits of the technical video-conferences, which were found to improve the overall discussions on coding issues and strategies, as well as organisation of this work (timetables, cycles). The next technical video-conference should take place in late September or beginning of October, in order to address what should now become the major item for further code re-factoring, namely the disentangling of Setup routines. For this topic, we all agreed that a very intensive exchange of information, beyond the video-conferencing, will be essential. At ECMWF, Tomas Wilhelmsson is the major contact; at MF, this is Karim (with other staff being kept informed, like Claude, Ludovic Auger and Alexandre Mary). For ALADIN, Daan Degrauwe will be involved for LAM/Fieldset/State aspects; for HIRLAM, Niko Sokka is the correspondent.

8.2. Wrap-up status on works and vision around Scalability and dynamical model kernels

Deborah presented results of porting to Power7. She has illustrated the gains on run times, that indicate a good speed-up between Power6 and Power7, by about 1.4/1.5 on the same number of nodes, depending on the configuration.

9. AOB

none.

10. Date and Place of Next Meeting

Next video conference: Wednesday December 5, 2012, at 1.30pm Reading / 14h30 Toulouse

Next Technical video conf: late September or early October 2012

Next Coordination Meeting in Reading: Monday May 27, 2013, in Reading

11. List of Actions

1. *ECMWF will prepare C++ coding guidelines for OOPS: postponed to after the scientific review and its outcome*
2. *GIT: EC will keep MF informed about the progress of their internal discussions; EC will send MF Baudoin's memo once ready.*
3. *Old GRIBEX interface: EC would prune all their use of the old GRIBEX interface from the IFS. The question was raised whether Arpège was still using this interface (uncertain answer at this stage). EC will send MF the full list of occurrences of GRIBEX calls, and MF will check whether it wants to prune some of them (in Arpège-type of configurations). This can be done at any time in the future, and there is no obligation to totally prune this interface. Further liaison about that is between Deborah and Claude (by email) and then if necessary in a technical video-conf.*
4. *Fieldsets, States and LAM requirements (time info, etc ...): Action: Piet will send Daan's questions to Jean-Noël + further liaison in technical video-conf.*
5. *New GOM structure in CY39: Deborah and Claude to arrange a video-conference for Alan's talk for MF delegation. The target attendees are OBS people and beyond, as Alan would show some more general features of code cleaning using F95 features. If possible, this talk should be arranged for July 2012.*
6. *technical video-conference to discuss (especially) the work about disentangling of the Setup routines: in late September or beginning of October. From ALADIN, Daan Degrauwe should be involved directly in this video-conference, either by physically visiting ECMWF (or MF ?) or by calling in the conference.*