

IFS/Arpège Memorandum

From: Claude Fischer

To: (ECMWF) J.-N. Thépaut, D. Salmond

To: (Météo-France) Arpège diffusion list

To: (ALADIN) R. Brožková

To: (HIRLAM) X. Yang

File: (...)

Subject: IFS/Arpège phone call conference of November 18th 2008.

Participants:

Météo-France: Alain Joly, Claude Fischer, Karim Yessad, Ryad El Khatib, Stéphane Martinez, Guillaume Beffrey, Vincent Guidard, Patrick Moll

ECMWF: Jean-Noël Thépaut, Deborah Salmond

Aladin : none

Hirlam : none

1. Final debriefing on the creation of CY34/CY35:

MF has completed the bugfixes for the Arpège and Aladin variational assimilations in beginning of September. The bugfix branch is required for running either the Arpège 4D-VAR or the Aladin 3D-VAR.

The library and source file reorganization from CY34 to CY35 has been successful, with fairly limited problems on both sides to adapt (source code repository, compilation tools). The careful preliminary testing with Mats' scripting tool was helpful for this matter.

2. Review of actions listed at the last coordination meeting:

** First specifications for the externalization of observation operators shall be sent by ECMWF to MF in the autumn (2008)*

This action is merged with the 6th bullet below (F2003) => IFS re-coding in a more object-oriented manner

** Paul Burton should contact Ryad and keep him informed on his investigations with compilation tools*

Discussions shall start when Ryad goes to Reading (for SRNWP/Interoperability), with Paul Burton and Deborah (December 1-3). Deborah shall arrange a meeting. Action otherwise closed.

** Ryad and Deborah shall check whether both Centers can share a common "dependency-file" for specific compilation and linking rules (ADM-Aeolus)*

** Ryad and Paul Poli shall contact David Tan to assess whether some code adaptations are possible (ADM-Aeolus)*

Ryad has been already in touch with David Tan on the problematics posed by the ADM-Aeolus package. David Tan has reacted very positively to MF's remarks and comments. It is anticipated that MF and EC will continue to check together the possible problems for installation and compilation of the ADM-Aeolus library, with feedback to the development team (KNMI mostly) when necessary. Action is closed as concerns Arp/IFS coordination.

** MF will do performance checks of RTTOV9 on the NEC vector computer (Vincent Guidard) and send their results to EC (Deborah)*

MF will perform the performance tests in January 2009 => Vincent Guidard. More on this item at the next phone call.

** Yannick Trémolet will prepare an input document listing some incentives and initial proposals, for further discussion inside the IFS/Arpège coordination. The topic of F2003 shall then be revisited regularly. => in the meanwhile, MF and the observers might start informing also the Aladin and Hirlam partners about the F2003 issue*

Yannick and Mike Fisher have proposed to tackle the object-oriented ("OO" in the sequel) re-coding of the IFS from the level of the high-level control routines, with a specific study on the variational (and related) configurations (simulator, singular vectors, gradients, TL and AD tests ...). Mike has written a short memo which can be disseminated also to relevant Aladin and Hirlam contacts (action MF).

Next steps at ECMWF include:

- write down a more concrete memo on the planning of the preliminary investigation and specification work (Mike): this first period would cover the winter 2008/9 and concern a number of specialized staff at ECMWF. The planning will be sent to MF , whose contact for the coordination in Toulouse will be Claude.
- early 2009, an informal ECMWF seminar should deal with all the different aspects of the OO recoding
- by spring 2009, Yannick and Mike would have coded a toy model (Lorentz model) with its incremental 4D-VAR assimilation
- next, a transposition of the OO algorithmic code to a quasi-geostrophic model application would be performed (Mike and Yannick)
- interactions with the scripting system also are anticipated

Claude will be the main entry point for MF (and Aladin/Hirlam) related aspects, and coordination in MF.

Several comments have been already raised by MF staff:

- how is the OO recoding linked with the scalability project (Mats Hamrud's work) ? Jean-Noël confirms that the aspects of message passing, data distribution and performance issues on massively parallel platforms will be part of the specifications and investigations. It is recognized that the specifications for data distribution and layout will become hidden fairly deep inside the new objects, and that these specifications will need to be coded with great care.
- the question of the exact level of OO recoding in the IFS will be crucial for MF's applications, including the LAM ones. Indeed, the data layout of spectral and gridpoint fields in LAM/bi-Fourier geometry is presently coded deeply inside the Fortran 90 structures (SPECTRAL_FIELDS, CONTROL_VECTORS) and this presumably will remain to be the case for even more OO code (with Fortran 2003). Early exchange of code and anticipated coding of LAM aspects inside new structures might be best to avoid huge phasing and recoding efforts later on.
- MF stresses also that the new coding should not endanger the modularity of the IFS system in terms of compilation and library handling. It is necessary to preserve some compartmentalized scopes of modules, compilation dependencies, library linking etc ...

Actions for the near future:

- ** ECMWF to send MF any new information on the OO-recoding project: dates of informal seminar, planning memo, any specific technical memo, ...
- ** MF to send Mike's first internal memo to a list of restricted Aladin and Hirlam contacts
- ** MF to keep the survey action on availability of F2003 compilers in the Ald/Hir community

** Specifications for recoding inside POS shall be produced by MF for after CY36. Contact at ECMWF is Nils Wedi*

Karim Yessad shall produce the doc and send it to Nils. Karim mentions that he probably will only touch the code not used by the APACHE configuration. Karim also shall send to Deborah the list and the source code of the routines which he will merge for CY36.

NB from after-meeting discussions: Karim mentions that the merged source code should not enter an official ECMWF cycle before CY36, as this would otherwise create a situation of "double-phasing" which often leads to bugs at the time of merging between MF and EC.

The concerned code would be below the calls of CALL_SL and below the calls of LACDYN (+TL,AD). Karim will try to send the new version for examination at ECMWF around mid-December.

** JNT shall check whether EC use L_USE_CONGRAD for the computation of singular vectors in the EPS*

yes, ECMWF computes its singular vectors with CONGRAD. MF has indicated to Aladin and Hirlam contacts running or interested by this configuration for the LAMs that they should consider CONGRAD as well (instead of the old Lanczos code which seems robust in terms of maintenance but which presumably will be less and less optimized for scalability). Action closed.

** The old bias correction code shall be kept inside the IFS at least until CY37. MF (for internal, Aladin and Hirlam usage) and EC will check who's still using it, and make an update on its usage at the next coordination meeting*

The old bias correction is not used anymore at MF; MF will re-contact Aladin and Hirlam partners to warn them on the future pruning of this code out of the IFS (action Deborah ; exact scheduling to be decided?).

Vocabulary: specific actions of code cleaning, pruning, will be known as "gardening" in the future.

3. Status and progress of operations

3.1. ECMWF:

CY35R1 has become operational on October 1st:

- * usage of OSTIA SST (no more NESDIS data)
- * new trajectory interpolation technique
- * corrected VarBC coefficients for IASI short wave channels
- * several changes in the physics: fix for improving the forecast of ice cover, ...
- * monitoring of ENVISAT/MERIS

CY35R2 will go into E-suite very soon:

- * TL/AD physics: modified code for long wave radiation scheme (removal of the neural network code)
- * further modifications in the snow scheme
- * modifications in the chemistry model
- * modifications for the assimilation of JASON-2 data in the wave model
- * clipping of humidity and cloud water variables at the first time step of the EPS forecasts => this consists in bounding the perturbations to physically realistic values (avoid unphysical values)
- * Assimilation in the IFS:
 - changes in the bias correction for surface pressure from radiosondes
 - active assimilation of IASI humidity channels
 - consistent Sigma_O's for IASI and AIRS humidity channels
 - direct 4D-VAR assimilation for rainy microwave radiances (instead of 1D-VAR+4D-VAR)
 - activation of RTTOV-9 with new cloud detection

3.2. MF:

CY35T1 should be finalized by next week. The most prominent new code feature is a reorganization of the dataflow in the SL code (impacts both global and LAM). Other changes mostly concern the LAM models (LAM wavelets, new brand of Méso-NH and SURFEX for Arôme, upgraded ALARO physics).

MF will produce a CY35T2 in January/February in order to collect all remaining code contributions before the "frozen" period of mid-February/mid-April when its technical staff will become busy with porting to the NEC SX-9.

E-suite progress: the "physics E-suite" prepared in summer will still be tested until January. The changes concern mostly the Arpège and Aladin-France physics (TKE scheme, shallow convection, ...), an Optimal Interpolation analysis scheme for the surface fields in Aladin-France (CANARI), increased assimilation of IASI and AIRS channels.

4. AOB:

MF is curious on some updated information about the global NH tests with the IFS => Nils Wedi shall prepare some summary of the progress for the next phone call.

EC is curious to get info on performance issues of Arpège on the SX-9 => MF shall give news at the next phone call

EC has problems with the code for analyzing humidity (new humidity variables in the control), after changes made by MF for CY34/35. Deborah and Elias Holm shall contact Loik Berre to sort out the question.

5. Next meetings:

next phone call is confirmed on March 26th 2009¹

next coord meeting is kept for June 25th 2009 in Reading. The list of the MF delegation will depend on the progress and needs coming from the "OO" recoding project.

APPENDIX:

Updated list of actions:

* MF will do performance checks of RTTOV9 on the NEC vector computer (Vincent Guidard) and send their results to EC (Deborah)

* Actions for the near future concerning the "Object-Oriented" recoding project of the IFS (will be called "OO" for short):

** ECMWF to send MF any new information on the OO-recoding project: dates of informal seminar, planning memo, any specific technical memo, ...

** MF to send Mike's first internal memo to a list of restricted Aladin and Hirlam contacts

** MF to keep the survey action on availability of F2003 compilers in the Ald/Hir community

* Specifications for recoding inside POS shall be produced by MF for after CY36 (Karim²). Contact at ECMWF is Nils Wedi

¹This date has been moved after the phone call to Tuesday, March 24th, 1pm Reading/14h Toulouse

²Karim may send the doc by about mid February 2009

* The old bias correction is not used anymore at MF; MF will re-contact Aladin and Hirlam partners to warn them on the future pruning of this code out of the IFS (action Deborah ; exact scheduling to be decided?).

* MF is curious on some updated information about the global NH tests with the IFS => Nils Wedi shall prepare some summary of the progress for the next phone call³.

* EC is curious to get info on performance issues of Arpège on the SX-9 => MF shall give news at the next phone call

* EC has problems with the code for analyzing humidity (new humidity variables in the control), after changes made by MF for CY34/35. Deborah and Elias Holm shall contact Loik Berre to sort out the question.

³Karim intends to send information on his Arpège NH TL538 experimentation as soon as ready