

ALADIN LTM meeting
Tuesday 4 October 2016
17:50-19:30
Rome, Italy



**Document for Item 4.c in
the agenda**

Subject:	Progress and plans: status of common cycles & MF operational activities.
Summary:	Please see below, the detailed plans about the forthcoming R&D code releases in MF's GIT repository, as well as the progress and plans at MF about E-suite/operational implementations.
Action(s) required:	<ul style="list-style-type: none">• Take note of the MF E-suites: the 2016 E-suite (including the new convection scheme PCMT and SURFEX in Arpège) which is scheduled for an operational switch in the first quarter of 2017; the 2017 E-suite which should start between July and September 2017 (with a planned increase of the Arpège horizontal resolution).• Call for phasers in 2017: CY44T1 in spring, CY45 in the autumn (precise dates are pending decisions with ECMWF)• at the 6 June 2016 IFS/Arpège coordination meeting, the decision to allow FORTRAN-2003 as standard norm of the common codes was made. In future, any specific new feature coming from FORTRAN-2008 shall be discussed with all partners, before inclusion in the common coding rules.

Cycles, code releases and a few comments:

CY43T1: Deadline for code commitments in MF's GIT repository was set to Monday 18 April 2016. First libraries were created on 21 April (CY43_t1.01). Declaration in GIT was confirmed on 30 June 2016.

Content:

- System:
 - Support and debug for GRIB1 encoding in FA files (R. El Khatib)
 - Encoding with GRIB2 using the GRIB_API library in FA files (P. Marguinaud)
 - Post-processing server coupled with the forecast model (P. Marguinaud)
 - Memory and CPU optimization of the computation of filtering matrices for Full-POS Arpège (R. El Khatib)
 - Various pre-OOPS modifications in Full-POS - configuration 903 -¹ (R. El Khatib)
 - Removal of ISP (aka "movies") (R. El Khatib)
 - Open-MP compatible DDH-flexible (F. Voitus)
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- Assimilation and use of observations:
 - *"quick and dirty" fix for running APACHE & ACHMT (USE hybrid-level vertical A and B's below HOP / awaiting for a clean solution in CY44) (P. Moll)*
 - Option for anti-aliasing in the computation of σ_b (L. Berre, G. Desroziers, V. Chabot).
 - Option for the normalization of wavelet covariances (L. Berre, G. Desroziers, V. Chabot).
 - Option for taking into account the relaxation of balances in the stratosphere, when computing wavelet covariances or local σ_b 's (L. Berre, G. Desroziers, V. Chabot).
 - Restructure SUJBVARENS (computation of σ_b from the Arpège EDA) in order to make it LAM-compatible and enable objective filtering of tensor components/lengthscales (Y. Michel).
 - New code for EDA with AROME: inflation, modification to the stochastic perturbation scheme, merge of covariance matrices, etc. (Y. Michel)
 - Update of the code for the recursive filters (to make it match the development made for EnVAR with OOPS) and for the perturbation of the SST (Y. Michel).
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- ARPEGE forecast model:
 - Changes for the new convection scheme PCMT (JM Piriou)
 - Make SURFEX work for ARPEGE (F. Taillefer, Y. Bouteloup)
- AROME forecast model:
 - ORORAD impact of subgrid orography parameters on the surface radiation budget (A. Mary, Y. Seity, ZAMG/C. Wastl, Hirlam)

1 - support for interoperability in Full-POS : EC GRIB2 to FA global or LAM ; FA global to GRIB2 with EC grib_api interface (both to be still scientifically validated)
- computation of Full-POS norms out of I/Os, re-enabling Full-POS norms for EC-Full-POS
- option NFPWRITE=0/1 in NAMFPIOS to disable or not the I/Os of Full-POS, preserving the computation of the norms in the current listing
- enhancements in the flexibility of the post-processing server facility in the configuration 903
- preliminary cleaning to prepare OOPS-oriented re-factoring

- Necessary updates in “mse” in order to switch Surfex V8
- Surface schemes:
 - Version 8 of SURFEX (P. Marguinaud, Y. Seity)
- ALADIN/ALARO (R. Brozkova, J. Masek, L. Gérard):
 - Radiation code ACRANE2:
 - Sunshine duration computation also for ACRANE2 (complete a missing code);
 - Fix in APL_AROME of the ACRANE2 call (to initialize a field needed by SURFEX with TEB);
 - Introduction of the exponent-random overlap in ACRANE2;
 - Improvement of the bracketing weights computations in ACRANE2 (long wave part).
 - Turbulence scheme TOUCANS:
 - New shallow convection;
 - Some cleanings.
 - Computation of T2m improved
 - Microphysics improvements (downdrafts, ...)
 - Add a new variable in Full-POS: ventilation index (tbc)
- HIRLAM (highlights)
 - Upper air assimilation:
 - Corrections to run 4DVAR in AROME (Jan Barkmeijer KNMI, Magnus Lindskog SMHI)
 - Scheme for generation of random perturbations with structure of B-matrix covariance (Jelena Bojarova, Met Norway)
 - GNSS, observation perturbation method etc.
 - Numerical aspects:
 - Application of Davies relaxation at the upper boundary LUNBC (Mariano Hortal AEMET, left over from CY41T1, code phased by Toon Moene KNMI)
 - Changes related to running with cubic grid (Mariano Hortal AEMET)
 - First order in time scheme (avoiding time extrapolations) during the first few time steps.
 - Introduce a threshold in order to limit the value of the computed 3-dimensional divergence in the model to half the inverse of the time step. This limit is chosen because it is the limit of convergence of the trajectory computation in the semi-Lagrangian method.
 - Physics aspects:
 - Optional RACMO/HARATU turbulence formulations in AROME (Wim De Rooy, KNMI)
 - Changes in coefficients and default settings for radiation (Christian Pagh Nielsen DMI, Laura Rontu FMI, Emily Gleeson Met Eirann) See note sent to MF/ECMWF
 - CA resolution dependent changes (ALARO) (Lisa Bengtsson SMHI)
 - Correction and cleaning of cloud overlap calculations (ALARO/AROME) (Lisa Bengtsson SMHI)
 - Technical aspects: cleaning, porting, fixes, ODB etc.
- Wrap-up of late changes of the ARPEGE and AROME-France operational versions of CY41T1_op1 or CY42_op1 (operational since 8 Dec, 2015) (GCO team)

Note that the reference version for validation of Arpège global configurations shall be CY41T1_op1 and/or CY42_op1.xx with xx<='09' (the latter is the CY42-phased version of the former, in rough words). For the LAM adiabatic “mitraille” tests (Aladin H/NH dynamics), the same reference applies. For the Arome-France CMC, the reference shall be CY41T1_op1 + the additional plug-in and testing of SURFEX Version 8. A complete overhaul of the “mitraille” test of Arome-France has been implemented in GIT as well (new Ecoclimap files matching Surfex/V8, new PGD and test coupling files, updates for ORORAD).

CY43T2: this is a short-term update cycle, for fixes and code finalization on top of CY43T1. It will contain only bugfixes and updates found during the build of the Arpège and Arome E-suite configurations (CY42_op1) and any potential fix for Harmonie or Alaro. The cycle will not become a new scientific version (with respect to T1). Deadline for contributions was Tuesday 27 September; declaration target is 20 October. If successful, CY43T2 would become the reference version at MF for (1) validation of the assimilation instead of T1 and for (2) building CY44. The reference validation version will be CY42_op1 at MF.

Expected content:

- Fixes and code finalization from the Arpège and Arome E-suite versions CY42_op1
- Code updates for Full-POS (halo management, conf 903), Arpège optimization and Arpège single-precision forecasts
- Potential fixes for Harmonie and Alaro

CY44: mid-November 2016 until end of February 2017.

Provisional input:

- Code re-factoring for OOPS:
 - final phase 2 re-factoring of observation operator codes (EC)
 - finalize the adaptation of Arpège options to the re-factored observation operator codes of phase 2: APACHE, ACHMTTL/AD (MF/ OBS team)
 - New version of trajectory code for OOPS-IFS VAR (Y. Trémolet, O. Marsden)
 - pass by arguments MODEL variables and parameters. Remove global variables and pass all fields and parameters as arguments via Fortran structures. This re-factoring also applies to relevant LAM codes and variables – (O. Marsden, A. Mary)
 - updated GMV/GFL structures in order to match requirements for the OOPS INCREMENT object ? (T. Wilhelmsson, M. Hamrud)
 - further reorganization, encapsulation and passing-by-arguments of the LBC code for LAMs (B. Bochenek, A. Mary, K. Yessad)
 - other re-factoring aspects: ...
- Pruning of obsolete options in the dynamics (K. Yessad):
 - The old code for the sponge
 - LRNHC1+LSLINLC1
 - LRETCFOU+LWRTCFOU (specific handling of radiation coefficients for the simplified radiation scheme of Arpège 4D-VAR)
 - The NH code for GEO-GW (coded in 2007, never used nor fully validated)

- Note: in this process, some specific Aladin/LAM code will be removed
- Scientific inputs from CY43T1/T2 and CY43R1/R2/R3.

CY44T1: April-June 2017 (the provisional start of build was set to 18 April)

Provisional input:

- Tbd ...

CY45: autumn 2017, precise timing and content yet open to discussion with ECMWF. This cycle might still contain late stages of the FORTRAN re-factoring of the IFS for OOPS.

Progress and plans of E-suites/O-suites:

Progress and plans for MF's NWP suites in 2016:

The next forthcoming important scientific targets concern the implementation of new applications:

- **Arome-Nowcasting (“Arome-PI”)**: operational since 8 December 2015;
- **Arome-airport** application (for SESAR production). The operational implementation is to be discussed between Research, Production and IT Depts;
- **Arome EPS (“PEARO”)**: porting to operational environment was completed in summer 2016, and operational declaration is expected for the end of 2016;
- **Arome Overseas**: five domains in dynamical adaptation from the IFS (except La Réunion – 3D-VAR and Arpège coupling). In operations since 11 February 2016.

The following main items have entered the MF E-suite of the 2nd semester of 2016:

- **CY42_op1**
- Arpège/Aladin physics:
 - new convection scheme “PCMT” in Arpège
 - SURFEX in Arpège
- Arome physics: modified cloud optical properties, changed threshold value for liquid->rain auto-conversion rate
- Improvements in the assimilation of satellite radiance: MWHS2 on FY3-C (Chinese satellite), GMI on GPM-Core (US satellite)
- Arome-Overseas: activated the 1D ocean mixing model CMO

HPC aspects at MF:

Here is the current status of the porting to BULL and the upgrades of MF's HPC configuration:

- The first Phase 2 BULL Cluster (new “prolix”) was declared operational in the beginning of July 2016.
- The second Phase 2 cluster (new “beaufix”) was open to the users access and test period in mid-September 2016, and shall become fully validated in October 2016.

Plans for MF's NWP suites in 2017:

- Arpège:
 - higher horizontal resolution (5km over Western Europe),
 - improvements in the assimilation of observations : AMDAR-hum, VarBC/aircraft, hyperspectral sounders inter-channel error correlations, additional GSP-RO, additional microwave radiances, etc.
- PEARP (global EPS): 4 runs/day, surface perturbations
- Arome-France:
 - progress on forecasting low level clouds and fog,
 - reduce spin-up for dynamical adaptation models (with an application for the Overseas Arome models),

- test new microphysics scheme LIMA in R&D mode,
- diagnose visibility and cloud bottom height,
- assimilate more X-band radar, assimilate OPERA-type data (Belgium, Netherlands, etc.)
- PEARO (convection-permitting EPS): 4 runs/day, increase ensemble size ?