

IFS/Arpège Memorandum

From: Deborah Salmond (ECMWF)

To: (ECMWF) DR, RD Division & Section Heads, Anne Fouilloux, Sylvie Malardel, Tomas Wilhelmsson, Yannick Trémolet

To: (Météo-France) Arpège diffusion list, Claude Fischer, Ryad El Khatib, Guillaume Beffrey, Karim Yessad

To: (ALADIN) Piet Termonia

To: (HIRLAM) Ulf Andrae

File: R48.3/DS/1190

Subject: Minutes of the IFS/Arpège coordination meeting - Cycle 38 - held at ECMWF on 27th June 2011.

Participants:

Météo-France: Claude Fischer, Ryad El Khatib and Guillaume Beffrey

ECMWF: Jean-Noël Thépaut, Anne Fouilloux, Deborah Salmond, and Tomas Wilhelmsson

Part time: Sylvie Malardel and Yannick Trémolet

ALADIN: Piet Termonia

HIRLAM: Ulf Andrae

0. Adoption of Agenda

The agenda was adopted.

1. Approval of Minutes of Video-Conference of 4th November 2010

Approved.

2. Review of list of actions from last meeting

- 1) *ECMWF will write a short note about how to properly add new fields in the GOM arrays => can be done as a consequence of the cleaning in OBSHOR & GOM-arrays (to be finalized soon after CY37);*

*This action was to be deferred until reorganisation and cleaning of the OBSHOR part of the code was completed in CY38. **Action Open***

- 2) *GRIB_API*: ECMWF will provide a more stabilized V1.9.6 (or 1.9.7) which should contain further code adaptations in order to keep the level of vectorization obtained for NEC while improving the performances on the IBM. MF has noticed still several changes between recent versions in the GRIB reference tables (i.e., the link between GRIB numbers & identifiers on the one side, and field numbers on the other side). The reference version for GRIB_API should become stable with this respect => ECMWF will keep MF informed about the status in the new versions;

ECMWF had provided MF with the latest GRIB_API version (1.9.9). Besides the IFS/Arpège coordination, an action about the description of the humidity for Arpège restart files is ongoing (Jean Clochard and Enrico Fucile). Ryad would check if MF were satisfied with performance etc. **Action Open**

- 3) MF will prepare an updated version of the Fortran code coding guidelines (in preparation to OOPS): discussions have started at MF (Olivier, Claude, Ryad, Karim), and should be finalized soon. MF will send the outcome of these discussions to ECMWF (contact at MF remains Olivier Rivière);

Following several iterations between EC and MF and a video conf. a final version has been sent by Olivier to Mike Fisher. Mike will give this version a final check and circulate. **Action Open**

- 4) ECMWF will prepare C++ coding guidelines in preparation for OOPS; **Action Open**

- 5) Towards a network-accessible SCR?: discussions are ongoing both at MF and at ECMWF about their respective future SCR system. MF is considering GIT for its Vortex project (but not yet confirmed; an alternative could be Subversion); ECMWF is considering the pros and cons of GIT versus Perforce. MF and ECMWF will keep in touch about their plans on SCR tools and use of GIT.

No activity was planned from EC on this in the near future. **Action Closed**

- 6) OOPS-related actions: **Actions Closed**

- a. ECMWF will send MF consolidated specification documents about the obs operator code and Jb, which are essential ingredients for the 3D-VAR demonstrator targeted for summer/autumn 2011. ECMWF and MF will continue to liaise on model and script aspects, as brainstorming proceeds (animated by ECMWF). The specification documents shall be used at MF for further checks about the technical aspects, but also for evaluating the managerial issues.
- b. MF might come back to ECMWF in order to have specific discussions about management aspects (strategy, calendar, GANTT charts and the like)
- c. Further technical discussions shall be performed either by direct email exchanges between contacts (obs operator => Deborah Salmond and Patrick Moll; Jb => Mike Fisher and Thibaut Montmerle; model code => Tomas Wilhelmsson and Karim Yessad) or prepared by both sides for the next OOPS meeting. At MF: Claude remains the contact for the toy model code and C++ aspects.

d. Any more coordination to be planned about scripts and link with Olive / Vortex ?

3. Progress and Plans of ECMWF

Cycles installed at ECMWF

CY36R4 went operational on Nov 9th 2010

CY37R1:

PHYSICS

Peter Bechtold Technical changes to physics.

Richard Forbes Improvements to cloud scheme formulation and set up constants for 550nm optical depth diagnostic. (ACTIVE)

Philippe Lopez Direct 4D-Var assimilation of time-accumulated precipitation observations from the national network of ground-based radars (NEXRAD) over the USA.

Gianpaolo Balsamo and Souhail Boussetta Carbon-based land surface model extension (CTESSEL).

DATA ASSIMILATION

Yannick Tremolet Model error cycling.

Gabor Radnoti Modifications for new forecast obstat suite.

Patricia De Rosnay Separate use of SYNOP and NESDIS data in the OI and ASCAT soil moisture monitoring. (ACTIVE)

David Tan ADM-Aeolus Doppler wind lidar assimilation.

Joaquin Munoz Sabater SMOS monitoring over land and oceans.

SATELLITE

Alan Geer All-sky changes + "NOAA-20"/EOS-Aqua + VarBC changes. New diagnostic output for screening: Observation usage summary (ACTIVE)

Niels Bormann Reduction of AMSU-A observation errors and adjustments to MODIS AMVs. (ACTIVE)

Sean Healy GPS radio occultation - Introduction of tangent point drift and duplicate observation check. (ACTIVE)

William Bell, Anne Fouilloux, Qifeng Lu Non-linearity correction of FY-3A MWTS data.

Dingmin Li Mode Varbc.

Reima Eresmaa Cleaning of AIRS and IASI files and modified use of AIRS and IASI radiances.

WAVE MODEL

Jean Bidlot Updates to WAM. (ACTIVE)

SEASONAL

Tim Stockdale Volcanic Aerosols.

Martin Steinheimer and Glenn Shutts Updates to spectral stochastic backscatter scheme (SPBS) and cellular automaton (CA).

Frederic Vitart NEMO and mixed layer model.

MACC

Richard Englein, Antje Inness and Jean-Jacques MACC contribution.

ERA

Roger Brugge Screening suite for new observations.

OBSTAT

Mohamed Dahoui Obstat updates.

TECHNICAL

George Mozdzynski Remove obsolete radiation variables NRINT and LRADLB and improve performance of gather operations performed by gath_grid_ctl_mod.

Anne Fouilloux Removal of CO2 sink variables, update of blacklist language, ODB cleaning.

Sylvie Malardel New optional argument to SUTRANS.

Mats Hamrud More 32 bit options for MPL.

John Hague Cleaning of MPOBSEQ.

Deborah Salmond Cleaning and fixes.

CY37R2 went operational on May 18th 2011:

DATA ASSIMILATION

Carla Cardinali Fix for FSO

Patricia De Rosnay Use of new ground snow data in addition to SYNOP data

Philippe Lopez NEXRAD assimilation and window offset

Hans Hersbach Caspian Sea (ACTIVE)

SATELLITE

Rossana Dragani Ozone from SEVERI

WAVE MODEL

Jean Bidlot Fixes for WAM

EPS

Martin Leutbecher Fix for the surface and subsurface runoff in the 2nd Leg of EPS

SEASONAL

Frederic Vitart Bug fixes

OBSTAT

Mohamed Dahoui Further improvements to obstat

TECHNICAL

George Mozdzynski Bug fixes and optimisation of WAM

Paul Burton Changes for new linux cluster

Michael Rennie Fixes for Aeolus

Jan Haseler Changes for GRIB2

Mike Fisher Parameters for YOMLUN

Nils Wedi Fix for interpo

Anne Fouilloux Changes for MARS archiving

CY37R3 is planned to go operational in October 2011:

NUMERICAL ASPECTS

Sylvie Malardel New Option for Linear Advection of GFL

PHYSICS

Peter Bechtold Modifications for convection and code cleaning (ACTIVE)

Souhail Boussetta and Gianpaolo Balsamo CTESSEL: fully introduced but still passive

Richard Forbes Updates to the cloud scheme (ACTIVE)

Marta Janiskova Modifications for the linearized physics (ACTIVE)

Irina Sandu and Anton Beljaars Modifications for the surface (roughness)

Philippe Lopez Direct 4D-Var assimilation of NCEP Stage IV precipitation data over the USA (ACTIVE)

DATA ASSIMILATION

Gianpaolo Balsamo and Patricia De Rosnay Namelist control on the choice TESSEL/HTESSSEL in IFS

Patricia De Rosnay Early use of NOAA/NESDIS snow cover data at 00UTC (ACTIVE)

Patricia De Rosnay and Anne Fouilloux New report and code type for additional snow data

Gabor Radnoti Fix forecast obstat computation for all-sky micro-wave imager data

Joaquin Munoz Sabater SMOS improvements

Massimo Bonavita Bit-reproducible version of EDA post-processing and Technical improvements to EDA

Elias Holm and Agathe Untch Reading of higher vertical resolution background error and ozone chemistry files

Drasko Vasiljevic Introduction of VARBC for AIREP (ACTIVE)

Yannick Tremolet Activation of model error cycling (ACTIVE)

SATELLITE

Niels Bormann Milan Dragosavac and Tomas Wilhelmsson RTTOV-10, preparations for NPP/ATMS, geostationary (ACTIVE)

Kirsti Salonen and Niels Bormann Calculation of situation dependent observation errors for AMVs

Rossana Dragani O3 VarBC upgrade

Blazej Krzeminski Optimisation: Unformatted I/O code for the emissivity

Tony McNally Active assimilation of infrared ozone channels from HIRS/AIRS and IASI (ACTIVE)

Sean Healy Minor GPS-RO updates

Reima Eresmaa Minor modifications to usage of AIRS and IASI data and ODB cleaning for AIRS and IASI

Cristina Lupu GRIB-2 for gensatsim

Enza Di Tomaso and Niels Bormann Bug-fix in VarBC

OBSTAT

Mohamed Dahoui Updates for OBSTAT

AEOLUS

Michael Rennie and David Tan Doppler wind lidar assimilation

RE-ANALYSIS

Paul Poli VARBC for surface observations: Ps and GPS ZTD

Hans Hersbach Enable the usage of CMIP5 recommended longrange forcing in the radiation code

SEASONAL

Frederic Vitart Fix for creation post-processed products for the monthly forecasts

WAVES

Jean Bidlot External currents in IFS and minor fixes in WAM

Saleh Abdalla Changes for preprocessing of wave data

Giovanna De Chiara Changes to the Oceansat-2 Scatterometer data processing

EPS

Martin Leutbecher Conserving interpolation of accumulated fields at resolution changes in EPS and bugfixes and Enable use of grib1 initial condition perturbations in experiments that use grib2 for model levels

CLEANING and pre-OOPS

George Mozdzynski New derived types, Fixes for GSTATS and Replace assignment statements by files

Mike Fisher Removal of YOMDIM from pp_obs routines, Convert YOMTAG and YOMMPI variables to parameters, Cleaning of YOMLUN and Encapsulation of JB

Deborah Salmond Remove coding norm violations and Make constants in YOMCOCTP PARAMETERS

Tomas Wilhelmsson Preparation for OOPS

John Hague Observation Interpolation Encapsulation, MPI tracing, YOMGLOBS into a derived type, Encapsulation of GOM arrays - for OOPS, JIO Monitoring

John Hague and Mats Hamrud Setup MKGLOBSTAB for OOPS

Richard Engelin Cleaning of MACC

Jean-Jacques Morcrette Comments for RRTM and SRTM modules

Anne Fouilloux and Alan Geer, Cristina Lupu, Niels Bormann ODB cleaning for mars archiving: radiances (including allsky) and satob

Anne Fouilloux ODB cleaning (mainly for reo3, conventional and gpsro)

Alan Geer Safer blacklist, VarBC controls: tidying and Observation usage summary now threadsafe

CY38R1 is planned to go operational in Early 2012:

Vertical resolution change from 91 to 137 levels

Plans

- Ensemble data assimilation methods (EDA, EKF)
- Weak constraint, long window 4D-Var (originally 24 hour)
- Enhanced cloud analysis
- Numerical experimentation into the “grey zone”
 - Fast Legendre transforms at T3999
 - Physics-dynamics coupling for NH
- Improved physical parameterizations
 - Stable boundary layer
- IFS maintenance and optimisation (cycles, code, scripts, observation handling)
- Object Oriented Prediction System
 - Modularity, flexibility for new algorithmic developments

HPC Plans

There is a delay in Phase2 installation at ECMWF – so the new IBM Power7 clusters will not be ready until March 2012 at the earliest. However, the change to vertical resolution does not depend on having the Phase-2 system. The contract for the Phase2 IBM system will terminate in mid 2014, so the next HPCF procurement was expected to be in 2012.

Plans for the SL dynamics at ECMWF

Sylvie Malardel presented her work on improvements to the semi-Lagrangian scheme in the IFS. The specific problem under investigation was for the case of a badly resolved convective plume had been solved. The modifications had been transferred to the AROME code (Didier Ricard at MF). Evaluation of real cases at mesoscale had started. The first test did not solve the ‘firework’ case but some impact was seen. 2D and 3D: dry and moist test cases were being set up. Work was starting soon on a 3D ‘non-interpolating’ SL scheme. Sylvie also mentions that one may need to work on a parametrization of sub-grid downdrafts.

There was a discussion on reorganisation of the GFL attributes – to keep the number of GFL attributes under control and remove any duplication. Also a streamlining of the setup for the MF and EC physics was being planned. The work was targeted for CY39. Karim has written a proposal for this work. Sylvie and Karim were still waiting for feedback from the physics teams. Claude and Piet pointed out that an overhaul of the physics/dynamics interface might be quite ambitious, and Claude insisted that this work be planned in a staged approach. Jean-Noël mentioned that it would anyhow be beneficial with respect to our efforts to make the code clearer and easier to maintain. Claude agreed to set up a forum to discuss the work which could be agreed at the next tele-conf – with a view to starting the work early in 2012. ACTION Claude

Also Sylvie and Karim would slightly re-work the document to have a more step-wise approach and provide a start-up for the forum discussions. ACTION Sylvie and Karim

4. Progress and Plans of Météo-France

Cycles installed at Météo-France:

CY37: The decision was to build this cycle from end-August through mid-October; the pre-cycle has been sent back to Reading on October 26th. The official release was declared at ECMWF on November 24th.

- Catch-up of some late E-suite changes in Arpège and Arome
- Blending FA file optimization (J. Mašek)
- IFS contribution CY36R4 (August sending)

CY37T1: Intend to declare this cycle by June 30, 2011.

- Assimilation systems:
 - model error representation in ensemble assimilation, using innovation-based inflation of forecast perturbations (L. Berre & G. Desroziers).
 - Corrections in OI_main (Surfex related surface analysis tool) and CANARI (F. Taillefer)
- Observations:
 - filling of some additional ODB columns, introduced by ECMWF or to our request since the previous common cycle 36 with ECMWF, for SATOB and SCATT data (C. Payan)

- update of the Aeolus decoding part, as much as possible (C. Payan)
 - Consideration (as much as possible) of new data from the OSCAT scatterometer onboard the Indian satellite OceanSat2. Impact in BATOR and possibly in ARPEGE (C. Payan)
- Arpège/Aladin upper-air physics:
 - 3D aspects for the transport of dust (M. Mokhtari and Y. Bouteloup): dry sedimentation, wet deposition, coupling with convection and radiation
 - modset for MUSC and for running EDKF in Arpège (Y. Bouteloup)
 - catch-up from CY36T1_op2 E-suite: microphysics/convection ordering, condensation/evaporation and negative temperature, modulation of convective entrainment and modulation of moisture convergence (F. Bouyssel)
- Arpège simplified physics (O. Rivière):
 - Improvements for stratiform precipitations; TL/AD of convection; various cleanings for readability of the code and protection of impossible combinations of options
 - Introduction of the following processes in the microphysics: auto-conversion, collection, evaporation. Note: the melting of ice/snow precipitations around 0 deg. Celsius has not been introduced (this code produces modified numerical results with the non-linear physics on NEC, which was found problematic given the late introduction of the whole modset in CY37T1 => postponed).
- Arome and Aladin surface scheme: version 6+optimization of SURFEX:
 - Open-MP adaptations and other I/O optimizations
 - *Scientific content (for remainder): improvements for the dust model (Mohamed Mokhtari) => for Surfex V7 but the atmospheric contribution enters CY37T1 (APLPAR)*
- Dynamics and time step related code (tendencies etc ...) – Filip Vana -:
 - new options for phys-dyn coupling:
 - L[x]LAG=4,
 - LPHYLIN attribute for GFL fields,
 - Extra and separate diffusion of physical tendencies.
 - 3D turbulence dataflow in dynamics (“2D+1D”):
 - LHORTURB attribute of GFL fields,
 - 3D shear term preparation in NH dynamics,
 - Laplacian operator applied to appropriate GMV fields, and physics:
 - computation of horizontal exchange coefficients,
 - extension of TKE equation by horizontal terms.
 - updated automatic setup of NPROMA for LAM domains
 - slight update of SLHD triggering based on divergence
 - Promoting consistent set-up of SLHD w/r to spectral diffusion setup when LECMWF=.T. (in coordination with Nils Wedi, ECMWF)
- Bugfix in DFI2 in order to properly run DFI (removal of a conversion $T < - > T_v$): this fix has a major impact in dynamical adaptation mode, where it corrects a strong positive bias of temperature in the low levels (correlated with the field of specific water content Q_v)
- DFI for gridpoint fields (L. Auger)
- various code cleanings and algorithmic developments (K. Yessad):

- code cleaning: re-arrange some of the LBC code in a more OOPS-oriented manner; removal of useless dummy arguments (FMR15); introduction of new structures in the dynamics, with some collateral, modifications in the physics-dynamics interface; introduce a new key in the surface dataflow (SURFACE_FIELDS_MIX) to say if fields are active, and use this key in MODULE_OBB1_MIX in order not to interpolate not allocated surface fields in the observation interpolator; reduce excessive modularisation at various places; remove variable LPC_OLD; remove information about modifications done before 01/01/2001; remove obsolete (unused) decks; some cosmetic cleanings
- Fullpos: introduce multi-linear horizontal interpolations, introduce the mapping factor in the spectral filtering
- Alaro physics (Filip Vana as code contributor to the cycle):
 - updated TOUCANS code (Ivan Bastak-Duran)
 - code updates in link with the introduction of 3D turbulence as a 2D+1D algorithm (see item on dynamics above)
 - code for Cellular Automaton (Lisa Bengtsson & Filip Vana for optimization aspects)
 - fixes in convection/microphysics (Radmila Brozkova)
- Hirlam/Harmonie (Toon Moene):
 - Optimization features by S. Saarinen (incl. “samio”)
 - Surfex/Alaro
 - EDMFM code updates (W. De Rooy)
 - Miscellaneous Harmonie adaptations: LAM fix for Jc-DFI (evjcdfi.F90)
- DDH diagnostics (F. Voitus):
 - Dynamics terms added: Semi-implicit, Semi-Lagrangian transport, horizontal diffusion, valid for all models - ARPEGE/ALADIN/AROME –
 - Flexible 2D fields: for surface fields
- Adaptation of configuration 901 (conversion IFS to Arpège historical files) to GRIB2 upper-air input fields (Mate Mile & Jean-Marc Audoin)
- Optimisation of the Open-MP parallelisation in the spectral dynamics of Aladin/Arome (the existing Open-MP directives have been moved to a higher level in the code, in order to reduce the overhead of the Open-MP start-up, and to have Open-MP applied to the non-hydrostatic dynamics as well as to the hydrostatic ones) – Ryad El Khatib & Fabrice Voitus –
- Some minor contributions w/r to GMAP’s work for RAPS and benchmarking (REK)
- Climate group contribution (A. Alias):
 - Changes in radiation schemes; relaxation of mesospheric specific humidity; linear Ozone added; changes in nudging scheme

CY37T2: To be decided yet (July/August ?); this cycle would be devoted to catch up with the SURFEX official release V7. Otherwise, only technical bugfixes can be accepted (no operational input, no R&D input). The phasing and validation work is planned to be very short.

- SURFEX official release V7 & plug-ins in “mse” interface

- Last catch-ups of Olivier Rivière's work on Arpège simplified physics: melting process of ice/snow precipitations
- Code inclusion in official libraries for the computation of LAM B-matrices: update of FEMARS code in the IFS, reference version of FESTAT main & ancillary code (new project "fst" or in "uti")

Note: if no CY37T2 is done, then Surfex V7 would be introduced only in early 2012 (CY38T1). The other contributions could enter CY38.

CY38: This cycle is scheduled for over September/October 2011. The first elements of IFS Fortran code cleaning in the OOPS spirit will enter this cycle.

- Encapsulation of LBC coupling code (K. Yessad)
- Some cleaning in MF's physics routines to prune coding norm violations (M. Jerczynski & Y. Bouteloup)
- IFS cycle CY37R3 (June sending)

Claude mentioned two compiler problems which are subject to investigations by the NEC support: one for F90/C++ interoperability (see in item 7 – ODB2 and COPE), one for the variational code (a workaround has been agreed between Deborah and Stéphane).

Known developments, but not yet confirmed source code contributions:

- An overhaul of the physics/dynamics interface (CPTEND_FLEX) in collaboration with the Aladin/ALARO partners
- Use of a surface emissivity map from the SAF-Land and an inversion method for Ts, in order to assimilate more MSG/SEVIRI radiances over land. Extension towards assimilating IR channels, in addition to the water vapour ones (S. Guedj)
- Interoperability: code for the adapter software (I-SRNWP) – D. Degrauwe, O. Spaniel, J.-M. Audoin
- Code for generating frame-formatted lateral boundary conditions from the IFS, and alternative bi-periodization method – L. Auger (+ G. Kerdraon for some specific harmonization work)
- Hirlam/Harmonie :
 - Implementation of code in order to run Harmonie physics on a different grid than the dynamics (inspired from the IFS development) (M. Hortal and A. Fitch)
 - Implementation of the variable map factor formulation for the LAM models, in the LAM Semi-Implicit code (based on an approximated development and inspired from the global solution already present in IFS/Arpège) (M. Hortal)
 - Boyd-solution for LAM coupling
 - Vertical coordinate system in dynamics based on height (J. Simarro, AEMET)
 - LAM code adaptations for switching off E-zone gridpoint calculations; optional key LNOEXTZ (by Mariano Hortal) => the change consists of modifications both in Full-Pos (= gridpoint coupling data) and the

forecast model (insert bi-periodization inside the LAM spectral transforms)

- SST/LST and snow analysis (M. Homleid)
- Handle nearly constant fields in grib (FA) packing (U. Andrae)

Plans for 1st semester of 2011:

- “winter E-suite” (start in January 2011):
 - CY36T1_op2
 - Assimilation (4D-VAR Arpège):
 - New RT-coefficients for IASI & AIRS
 - Computation of relative humidity made consistent between monitoring and assimilation for SYNOP
 - Monitoring and assimilation of RARS/ATOVS over Pacific and Asia, EARS-La Réunion, & Miami, SSMI-S of F-18
 - Monitoring (and possibly assimilation) of GPS R.O. from the Terrasar-X, SAC-C et C/NOFS satellites, to anticipate the future removal of COSMIC data. These GPS RO data have negligible biases and serve as anchor data for the VarBC bias correction of satellite radiances.
 - Arpège/4D-VAR simplified physics: new tuning of critical relative humidity in the Smith scheme (TL/AD code)
 - New computation of orography for the 4D-VAR low resolution grids: orography is directly computed from the 2°30' input dataset rather than interpolated from high resolution.
 - Arpège ensemble data assimilation (AERP):
 - All ingredients from the Arpège deterministic E-suite
 - Time step decreased from 1350 s to 1080 s with intermittent call of radiation calculations (instead of every time step)
 - Arpège physics and surface treatment:
 - Removal of the relaxation towards climatology in the CANARI surface OI scheme for deep layer temperature, total water content, water content of the snow pack over continents
 - Changes in the deep convection scheme in order to increase the activity of convective precipitations in given circumstances (more convective parameterized precipitation w/r to the resolved one). This change prevents the development of unrealistic shallow vortices.
 - removal of the calls to radiation on the first and last time steps,
 - take into account TKE at t+dt (instead of t-dt) when computing wind gust diagnostics
 - proper phase changes and budgets in falling precipitations (rain and snow; especially account again for re-freezing processes of rain)

- Aladin-France: switch to SURFEX (based on Arome-FR version: ISBA3L, ...) & ECOCLIMAP. TEB and CANOPY are however *not* used. New orography computed from GTOPO30 using the prepPGD program; envelope orography is abandoned. The change to SURFEX will also be applied to the Aladin-La Réunion and Aladin-Outre Mer model versions. Aladin-France 3D-VAR includes all the ingredients from the Arpège assimilation part. Additionally, correction of a bug with DFI when LSPRT=.TRUE. (i.e. when Tv is the spectral variable). This is the last modification of Aladin-France in an E-suite. Aladin-Réunion is to become the reference Aladin.
- Arome-France:
 - All ingredients from the Arpège assimilation part
 - Removal of the call to radiation at the first and last time step
 - Add an additional contribution to turbulence in the adjustment process, representing sub-grid variability of clouds: the sub-grid departure w/r to saturation is based on a statistical formula, but in very stable conditions almost no fractions of clouds were generated. In nature however, various sources of turbulence remain (ducted gravity waves, density currents) which can lead to saturation locally. Thus, a climatological source of turbulence is added as input to the PDF. This helps generating clouds when $RH \sim < 100\%$.
 - Revised low level drag: limit the orographic roughness length to a maximal value.
 - Diagnose hail (computed from the vertically integrated content of graupel in the previous one hour)
 - Correction of a bug which lead to a constant surface temperature in the FA files (the one in the LFI-surface file was correct). This fix has an impact on fields computed by Full-Pos.
 - Correction of a bug when specific humidity is grid point (concerns assimilation)
- PEARP:
 - Re-tuning of the amplitudes of initial perturbations
 - Restore the use of AEARP perturbations at low levels

This E-suite is scheduled for a switch to operations in September 2011. Claude presented an overview about the main scientific changes in this suite (satellite observations and modified triggering of sub-grid precipitations). The slides can be obtained from him.

Plans for 2nd semester of 2011:

- Next E-suite (start in Nov/Dec 2011): very preliminary list !
 - CY37T1
 - Assimilation (4D-VAR Arpège & AEARP):
 - Observations: revisited strategy for GPS ZTD blacklisting (allow more data to be assimilated); retuned σ 's (after a re-evaluation of the diagnostics following Desroziers et al., 2005)

- Inflation factor to take into account model error, applied as a renormalization of the perturbations of the ensemble members (and impact on the derived σ_b 's for 4D-VAR)
 - Arpège/4D-VAR simplified physics: either a new convection scheme, or a modified turbulence; additional microphysical processes (if tested and validated enough by the time of the E-suite)
 - Arpège/Aladin-France physics and surface treatment:
 - Aladin-France + Surfex + new surface assimilation code "OI_main" to follow the surface assimilation method of Arome-France
 - ISP modelled satellite imagery
 - Arome-France:
 - At least, impact due to the changes in the Arpège assimilation
- The start of this E-suite might be impacted by the status and schedule of VORTEX, which will also require manpower on the side of MF's Operations.

Plans for 2012:

- implement the daily σ_b 's of AEARP/Arpège in the Arome 3D-VAR
- assess the impact in AEARP (Arpège ensemble assimilation) of daily cross-correlation structure functions in wavelet space (H. Varella, L. Berre, G. Desroziers)
- evaluate the potential benefit of half-hourly timeslots in 4D-VAR (keeping a 6 hour window) => this may provide a better computational balance
- evaluate modified versions of the SL advection scheme in Arome (liaison between Sylvie Malardel, ECMWF, Didier Ricard, CNRM/GMME and Ludovic Auger)
- evaluate the new convection scheme "PCMT" in Arpège (Jean-Marcel Piriou)
- evaluate the impact of a higher resolution input orography (GTOPO30) in Arome-France; assess carefully the model's behaviour especially over steep slopes
- observations:
 - evaluate an increased density of observations in the LAMs
 - cloud-affected IR radiances (Nadia Fourrié & Pauline Martinet)
 - start the evaluation of polarimetric radar data in Arome (in R&D mode only)
 - more geostationary satellite data
 - finalize the revisited blacklisting strategy for GPS ZTD in all models
- implement VORTEX in MF's OLIVE (R&D scripting system) and Operations
- test new scenarios for the operational production of MF's NWP system (especially for the R00 network); implement 8 Arome runs per day

HPC aspects at MF:

Here is the current schedule of the HPC procurement, and related actions at MF:

- procedure of call for tender: September 2011 – April/May 2012 => issue the call for tender, contacts with vendors, receipt of offers and evaluation (confidential)
- analysis of final offers and decision-making (confidential): spring-summer 2012
- official decision made public: October 2012
- installation of test computer end of 2012 in Météo-France's building
- installation of HPC solution in September 2013. A major difficulty of this procurement is that the computer is to be installed in a new building away from MF's site, and shared by other users. This building is planned to be delivered during spring 2013 at the earliest.
- main porting of MF's applications to the new HPC: fall 2013
- Validation of operational environment after porting of applications: Autumn/Winter 2013-2014 (February as optimal target if no delay in previous steps ?)
- Switch-off present operational HPC (NEC SX9): spring 2014, probably involving negotiations with NEC

5. Timing of CY39

This was expected to be in Autumn of 2012.

6. Cleaning of IFS for CY38

Deborah presented the various types of cleaning work that had been done for CY38.

- The number of violations had reduced from 5565 in CY36 to 4606 in CY37 to 3518 in CY37R3. This was mostly from the removal of unused declarations (CCPT(04)) and including of USE with ONLY for modules (NORM(09))
- Another possible set of cleanings for CY38 that could be done on the MF side were removal of the 469 violations in phys_dmn.
- The norm checker (and norm violation counts) should now be modified to reflect the new coding norms.

Work had been done based on Karim's V6 and V7 cleaning documents

- New derived types: SL_STRUCT and YOMGEM (Appx J)
- Removal of unused variables in modules (Appx G)
- Move 600000 lines of data set-up (Appx N)
- IFS source reduced from 1600000 to 1000000 lines ☺
- Put comments in radiation modules (Appx A)
- Removal of useless routines (Appx K)
- Removal of 'ARGUMENT not USED' (Appx L)
- Removal of useless intermediate routines (Appx D)

Pre-OOPS cleaning work:

- New Derived Types
 - Model Fields e.g. TYPE_YOMGFL
 - TYPE_GOMALL (GOMS+GLOB)

- JB_STRUCT
- Change from pass by Module to pass by Argument list
 - GOMS/GLOB
 - Remove YOMDIM from PP routines
- Introduce PARAMETER for Constants
 - YOMLUN, YOMTAG, YOMMPI and YOMCOCTP

The merge for CY38 is expected to require significant work as for 37R3 about 2500 files had been changed and for 37T1 about 2900. However, there had already been useful iterations between Stéphane Martinez and Deborah to at least make sure that CY37R3 did not have any compilation problems on the MF computers. At MF, Karim wil also perform a number of pre-phasing actions. Liaison will be kept between Deborah, Karim and Stéphane.

7. ODB, Bufr2ODB, COPE

Anne presented the recent improvements to ODB. There had been significant cleaning work - which now meant that ODB's were suitable for archiving in MARS.

Conventional data had been reorganised,

Useless columns had been removed,

ECMA and CCMA now use the same schema file - which means that the size of the ECMA was reduced and the last trajectory can be run on a different number of MPI tasks.

There would be less ODB cleaning from now on

An ODB norm checker would come for CY38R1 - and would be sent to MF

Now columns have to be approved by ODB governance group

There is an ODB tutorial available which could go on the AIADIN website. Also a link to the ODB online documentation for the current ODB and ODB-2 - this would have to be in the password-protected part because of licensing issues. Anne would check if this would be OK.

ACTION Anne

The ODB-2 is written in C++. Anne has provided a test version so this can be tested against the NEC compiler at MF (given during her last visit at Meteo-France).

The COPE project was described. Work had started on analysis of preparation jobs e.g. prejobs and Bufr2odb. A formal document will be sent to MF - which will be relayed to HIRLAM and ALADIN. Bufr2odb tests had been carried out with the new ODB2 library using I/O method-6. Peter Towers was working currently on optimisation of ODB and would look later at optimisation of ODB2. In the framework of COPE, Bufr2odb will convert data as soon as it is received; it will be tested first with aircraft data. An ODB-2 to ODB-1 converter has been made which will be useful for HIRLAM. Tomas Kral is working on removing the screening from IFS - he has started coding from scratch in C++ - AIREPS would be done by September 2011 and

will be reviewed by Baudouin. All that did not need knowledge of model would be removed from IFS.

MF informed EC that they have identified a bug in the NEC Fortran compiler. This was related to the new ISO-C binding to pass derived types from Fortran to C. NEC had accepted that this was a defect in their compiler and would provide a fix. However the fix would not enable a C++ STRUCT to be passed to Fortran - this may cause a problem for the ODB-2.

ODB contacts are:

MF: Dominique Puech

ALADIN: Alena Trojakova

HIRLAM: Roger Randriamampianina

Actions around COPE & ODB:

- There is an ODB tutorial available which could go on the ALADIN website. Also a link to the ODB online documentation for the current ODB and ODB-2 – this would have to be in the password-protected part because of licensing issues. Anne would check if this would be OK. Anne
- A formal document about COPE will be sent to MF – which will be relayed to HIRLAM and ALADIN. Anne (?)
- ECMWF to send test ODB-2 code to MF for testing compilation against NEC/SX9. Anne and MF.
- MF to send info about compiler restrictions on C++/F90 interoperability to ECMWF (STRUCT format and link with ODB-2). Claude.

8. Benchmarking and Optimisation at MF

Ryad gave an update on the benchmarking activities at MF in preparation for their forthcoming HPC procurement. The benchmark had been passed to the computer vendors and the end of May 2011. This consisted of 3 test cases:

- AROME
- ARPEGE
- 4D-Var (screening and minimisation)

These were provided in 3 different resolutions:

- Low resolution test
- Current operational resolution
- 2013 resolution: T1198 L105 C=2.2 – T479 for minimisation and 5 times more observations as in operations presently

Other benchmarks were a test from Mercator, MPI tests and Fortran 2003 test from RAPS. The benchmark was based on CY36T1 and had been tested on NEC and IBM and at low resolution on the Intel cluster. The main optimisation put into the benchmark was to enable the use of I/O only processors.

9. OOPS status

Yannick gave an update on the status of the OOPS project. The C++ part was now frozen – and had been sent out for a technical review on 13th June 2011. The reviewers are Baudoin Raoult (ECMWF), Michael Wong (IBM), Jesus Montero Garrido (HIRLAM), Pascal Lamboley and Claude Fischer (MF). The results of the technical reviewers would be received on 4th July followed by detailed discussions in the week 11th-15th July 2011.

The OOPS code now can run 3D-Var and 4D-Var: Strong and Weak Constraints with both L95 and QG models. The QG model was now written in Fortran with a Fortran interface layer called by the C++ and is a prototype of the way the IFS will plug into OOPS.

The ‘OOPS code’ that will become OOPS-IFS code is the OOPS C++ and Fortran interface layer tested by calling the Fortran QG toy model. It is confusing to call this the ‘OOPS-Toy code’ so it will be in future called just the ‘OOPS code’.

The Fortran interface routines were the starting point of the IFS-OOPS. So far testing has been done for setup and reading in of Model Fields, Observation Operator (including Interpolation to Observation Points) and calculation of departures. Work was focussed on what was necessary for the 3D-Var prototype – and so the IFS model would not be included for this.

The integration of OOPS-IFS to make a 3D-Var will start after the results of technical review had been consolidated into the OOPS C++ code.

Claude had already received the OOPS code for review and had spent some time with Pascal Lamboley looking at the OOPS code. They had noted with some concern the use of all the different types of C++ Pointers (auto, scoped, shared) – some of which were only available in the Boost library. He thought that this could impact the portability of the code and also make it more difficult to understand. Yannick said that he expected this aspect would be fully investigated in the review.

Claude pointed out that all researchers in data-assimilation would need to be able to understand the C++ layer and feel comfortable with making modifications in this area. Yannick said that following the technical review there would be a scientific review which would look in to these matters.

Yannick again reminded the group of the reason why the OOPS project was started was that the current IFS made it almost impossible to do the Long-Window 4D-Var called by the ECMWF Strategy for the coming years – and he strongly considered OOPS was a necessary step towards this.

Jean-Noël asked if MF would be able to commit to review the 3D-Var prototype when it was completed. Claude said that MF would do their best to do this, taking into account the tense calendar issues (phasing of CY38, various missions and conferences in the autumn). Claude remains MF's contact person for the OOPS aspects, including reviewing.

Ulf Andrae suggested the Nils Gustafsson would be very suitable for the scientific review and also for the review of the 3D-Var from the LAM side.

10. AOB

FLUBS

Jean-Noël asked if it would be possible for MF to provide a FLUB for each of their releases more similar to that provided for EC.

- Name of contributor
- Brief description of contribution (including whether the meteorological results would be expected to change)
- List of files changed

This would help EC to identify any changes which came in un-noticed at the joint-cycle and which currently only came to light after much testing.

MODULES in IFS

There was a discussion on the positioning of Fortran MODULES in the IFS source.

It was thought that it could be best to keep the current position in ifs/module (arp/module) – except for new modules whose use was limited to a particular project – these could be located in this directory. However, this needed to be discussed further at the next Technical Video-conf.

HIRLAM

Ulf brought the groups attention to the work by Mariano Hortal on a new height based coordinated system for the LAM. Ulf proposed that the LAM consortia could also in future list their foreseen scientific changes, due to enter the common cycles. This was accepted by EC and MF.

Video-Conferences

The group agreed the Technical Video-Conferences had proved to be very useful and had helped very much in the CY38 cleaning work to be well coordinated from both sides.

Next Technical Video-Conference

There are several documents on technical issues written by Karim which are to be discussed fully between EC and MF:

1. Proposal for cleanings in Arpège/IFS in 2011-2012, June 20th 2011, Version 7b (and follow-up email from Karim describing his proposed work for CY37R1/CY37T2, 23rd June 2011)
2. OOPS: Action Cleaning, June 27th 2011, Version V2
3. Status of different Interpolators coded in Arpege/IFS CY37: towards unification and externalisation
4. GFL and physics-dynamics interface setup: some proposals, May 18th 2011, Version 1.

It was proposed that a series of technical video-conferences should be organised to discuss documents 1-3 – starting with the first in week 19-23 September. Also there would be a technical visio-conf on 13th July 2011 for the wrap-up of OOPS code technical review. The GFL document is to be discussed in another forum – see section 3 of these minutes.

11. Date and Place of Next Meeting

Next video conference: November 24th 2011: 1.30pm GMT (14:30 MEST)

Next Technical video conf: July 13th 2011: 2.30pm GMT (15:30 MEST)

Next Coordination Meeting in Toulouse: June 2012

12. List of Actions

- 1) *ECMWF will write a short note about how to add new fields in the GOM arrays); This action was to be deferred until reorganisation and cleaning of the OBSHOR part of the code was completed in CY38.*
- 2) *GRIB_API: Ryad would check if MF were satisfied with performance.*
- 3) *Mike Fisher will give a final check and circulate the final version of the coding rules received from MF.*
- 4) *ECMWF will prepare C++ coding guidelines for OOPS.*
- 5) *Claude to set up a tele-conf to discuss the work on GFL – with a view to starting the work early in 2012.*
- 6) *Sylvie and Karim would slightly re-work the GFL document to have a more step-wise approach and provide a start-up for the forum discussions (and to help with the interaction with other work going on in the physics/dynamics interface).*
- 7) *Actions around COPE & ODB:*
 - a. *There is an ODB tutorial available which could go on the AIADIN website. Also a link to the ODB online documentation for the current*

ODB and ODB-2 – this would have to be in the password-protected part because of licensing issues. Anne would check if this would be OK. Anne

- b. EC will send a formal document about COPE will be sent to MF – which will be relayed to HIRLAM and ALADIN.*
- c. MF will try to install and test the new ODB-2 software with the NEC C++ compiler.*
- d. MF to send info about compiler restrictions on C++/F90 interoperability to ECMWF (STRUCT format and link with ODB-2). Claude.*