Summary report on DAsKIT video-conference, 19 December 2019

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The main topics of this video-conference were:

1. Status on the DAsKIT countries progress
2. Actual issues
3. Progress on actions: validation of surface DA; diagnostics on surface DA; local implementation of CY43T2; BATOR CY43T2 validation (up to end 1Q2020); AMDAR-GTS and TEMP-GTS pre-processing; 3D-Var (B-matrix computation; plans and progress); local implementation of SAPP; local implementation of OBSMON; local implementation of HARP
4. Planning of next actions & AOB

Short status per country:

ALGERIA

- <u>data acquisition:</u>
  SYNOP, TEMP, AMDAR and ASCAT (MetopA ,MetopB) from GTS (BUFR);
- <u>data pre-processing:</u>
  BUFR SYNOP (duplications and amends are tackled); TEMP (on ALADIN domain); SYNOP (automatically update on a hourly basis); AMDAR (selection of template 311010);
  Plans: pre-processing of GPS data;
- <u>monitoring tools:</u>
  OBSMON installation is on-going; MANDALAY (CY40T1) has been ported;
- <u>verification tools:</u>
  HARP not installed;
- <u>surface DA:</u>
  BATOR (CY40T1_bf07): SYNOP, TEMP, AMDAR;
  BATOR (CY43T2_bf10): on-going for SYNOP;
  AROME OI_MAIN (CY40T1_bf07) is being cycled under test mode with GTS SYNOP data (first results available);
- <u>upper-air DA:</u>
  CY43T2_bf10: compilation of screening and minimisation;
  B-matrix computed for ALADIN (6km);
  6-hour pre-operational 3D-Var for ALADIN at 00,06,12,18UTC (CY40T1_bf07); for AROME (00,12UTC); B-matrix has been computed from AEARP downscaling and a 3D-Var cycling is being implemented for AROME at CY40T1_bf07; B-matrix has been computed from AEARP downscaling and a 3D-Var cycling is being implemented for AROME at CY40T1_bf07;
  Plans: compute a new B-matrix to ALADIN (6 km);
- <u>joint surface+ upper-air DA:</u>
  building a pre-operational version of 3D-Var cycle, combined with OI_MAIN, for AROME at CY40T1;

- reported issues:
  - a segmentation fault in the forecast step with INIT_SURF file when running blendsur routine (CY40T1_bf07) has also been reported;
  - issue with AMDAR and TEMP (CY43T2_bf10);
  - MPI communication bug (Memory overflow) in Screening or Minimisation step with large amount of observations (example : SYNOP + TEMP + ASCAT), when using 1 node with several cores or multiple nodes with several cores.

BELGIUM

- data acquisition:
  SYNOP, TEMP, AMDAR from GTS (BUFR);
- data pre-processing:
  Python script that deals with duplications and amends; SAPP (ECMWF) is installed;
  Plans: configuration of SAPP to local needs;
- monitoring tools:
  OBSMON is technically working but an issue found when reading CMA/ODB files coming from ALADIN system (see 'Recommendations & actions'); MANDALAY installation (CY43T2_bf10);
- verification tools:
  HARP;
- surface DA:
  3-hour cycling of an ecflow suite for surface DA (OI_MAIN) is running in pre-operational mode for CY43T2_bf10 by switching off CANOPY;
  Plans: cycling with ALARO at 4.0 km;
- upper-air DA:
  computing B-matrix for ALARO 4.0 and 1.3 by the NMC method (period: 01.02.2019-01.08.2019);
  setup of screening namelists;
  6-hour cycling 3D-Var (some experiments with AMDAR were already done) for ALARO4.0 and ALARO1.3;
- operational systems:
  CY43T2 by dynamical adaptation (coupling with ARPEGE);
  Plans: operational surfDA (CY43T2_bf10) 1Q2020;
- reported issues:
  the explained ALARO4.0 variances show a pic at the same altitude level (200hPa) for the three control parameters (Q, T and div); more investigations must be done to know what causes this variability (~60% of the error is caused by Temperature).

BULGARIA

- data acquisition:
  SYNOP, TEMP from GTS (BUFR), local SYNOP (coverted to BUFR);
- data pre-processing:
  new tools to split compressed BUFR file into single BUFR file have been developed in-doors using eccodes; duplications are then removed using the same tools;
- monitoring tools:
  OBSMON, MANDALAY ported locally;
- verification tools:
  HARP ported and some tests just started; local surface verification tool;
- surface DA:

BATOR (CY43T2_bf10): AMDAR tests in beaufix;
OI_MAIN (CY40T1_bf07) for AROME-BG was ported from beaufix (Météo-France HPC platform) and cycle for 2 weeks with BUFR data and ODB validation; a newcomer has arrived and efforts are being put onto its training;
on-going work to port surfDA for AROME-BG to CY43T2_bf10;

- operational systems:
  CY43T2 by dynamical adaptation is running in operational suite since November 2019 (created a new PGD file for SURFEX 8 of ecoclimap 8): ALADIN (105/5km/72h) and AROME(60L/2.5km/36h);
  Plans: 2 daily runs at (00UTC and 12UTC; so far they had shifted model runs); new machine in 2020;

MOROCCO

- data acquisition:
  SYNOP, TEMP and AMDAR from GTS (BUFR); local SYNOP; local GPS, ATOVS (BUFR);
- monitoring tools:
  OBSMON installation: on-going in the local machine;
- verification tools:
  HARP not yet;
- surface DA:
  bator (CY40T1) handling: SYNOP, TEMP and AMDAR from GTS (BUFR) in beaufix; local SYNOP; GPS (BUFR); surface DA runs to AROME-MOROCCO in beaufix; waiting the new local machine to port and cycle it;
- upper-air DA:
  3-hour cycling 3D-Var for AROME-MOROCCO has been cycled in beaufix (CY40T1_bf07); B-matrix diagnostics have been done, comparing the downscaling with the ensemble method;
- joint surface+upper-air DA:
  Plans: acquisition of a new HPC is planned for 2019, where surface DA should be validated and the full AROME-MOROCCO settings is supposed to be ported.
- operational systems:
  a new HPC platform has been acquired to which porting of CY40T1_bf07 (benchmark and upper-air DA) systems will be done together with those of CY41T1; compilation of CY43T1_bf10 has started.

POLAND

- data acquisition:
  OPLACE data is used;
  conversion of local SYNOP to BUFR;
- monitoring tools:
  OBSMON installed and tested with DAsKIT WD data (see reported issues);
- verification tools:
  HARP-v2 runs for DA cycle;
- surface DA:
  6-hour cycling of a surface DA based on CANARI (not SURFEX) for ALARO (CY40T1_bf07 and CY43T2_bf10) 4 km; 66-hour forecasts. RMSE scores for one week period (2019060400-2019061100) after a 3 week cycling was validated (more local data was introduced);

- operational systems:
  ALARO CY43T2_bf10;
  AROME CY40T1_bf07 (to change early autumn);
- reported issues:
  OBSMON: problems when testing local data with graphical/shiny part of OBSMON; the implementation of the conversion tool (from the local experiment's output data to shiny recognised format) is missing.

PORTUGAL

- data acquisition:
  SYNOP, TEMP, AMDAR from GTS (BUFR);
  Plans: OIFS radar data;
- data pre-processing:
  local handling of duplications and amends (FORTRAN): SYNOP; following local implementation of SAPP (SYNOP WMO BUFR data);
- monitoring tools:
  home-made (metview plotting for SYNOP); local OBSMON_V3.3.2 (shiny part) and MANDALAY (CY40T1_bf07) implementation is on-going;
- verification tools:
  local (home-made IPRODS-IVERIF) surface verification tool;
  Plans: HARP implementation;
- surface DA:
  BATOR (CY38, CY40T1_bf07): SYNOP, TEMP; BATOR (CY43T2_bf10); ported to ECMWF;
  3-hour cycling of a standalone surface DA scheme (OI_MAIN, CY40T1_bf07, 60-levels) ; setting an experiment for validation of 48-hour forecasts of AROME-PT2 (CY40T1_bf07, 60/46-levels) initialised by surface DA using as reference the same AROME-PT2 model configuration, initialised by dynamical adaptation for the two periods: WINTER: 10dez2018-10fev2019 (cold and rainy period); SUMMER: 01ago2018-09set2018 (extreme temperatures); preliminary validation revealed LNOTS and CANOPY scheme should be switch off for Mainland domain (AROME-PT2), but not for the Atlantic Islands (AROME_MAD and AROME_AZO);
- joint surface+ upper-air DA:
  B-matrix computed computed by AEARP downscaling and tested in beaufix for AROME-PT2 OI_MAIN+3D-Var, with AROME DA VarBC (CY40T1); 20-day validation on beaufix platforms of combined AROME_PT2 OI_MAIN+3D-Var (CY42T2) has revealed a slightly improving using conventional + OIFS HDF5 volumetric data, in particular for larger amounts of 24-hour accumulated precipitation (Skill Scores and Probability of Detection), keeping the False Alarm Rates;
  Plans: porting the beaufix experiment to the ECMWF machines;
- operational systems:
  AROME-PT2 (CY38);
  implementation of AROME-PT2 (CY40T1_bf07) and start of its validation;
  Plans: move to ECMWF computing platforms;
- reported issues:
  installing BATOR CY43T2_bf_09 installation in the local machine (IBM-p7) since the native compiler does not supports FORTRAN2008 features; installation in the local machine (IBM_p7) with gcc since it was not possible to install gcc compiler with older software on the machine which does have maintenance support.

TUNISIA

- data pre-processing:
  OPLACE; local SYNOP; TEMP and WIND PROFILER;
- monitoring tools:
  OBSMON and MANDALAY implemented on the local machine;
- verification tools:
  HARP not installed;
- surface DA:
  BATOR has been locally implemented on CY40T1_bf07 and should now be tested with OPLACE databases; surface DA (OI_MAIN) has been implemented in beaufix but not yet on the local machine;
  Plan: move to CY43T2_bf10;
- upper-air DA:
  6-hour DA cycling (ALADIN, AROME);
- joint surface+ upper-air DA:
  B-matrix has been computed by the ensemble method and tested in beaufix for AROME;
  Plans: to implement a joint surface + 3D-Var DA, with a Jk component on the new HPC platform by end of 2019; installing CY34T2 (AROME, BATOR).

TURKEY

- data acquisition:
  SYNOP and AMDAR from GTS (BUFR), local SYNOP (conversion to BUFR); non-conventional observations are using AMSUA, AMSUB-MHS (NOAA18-19 & METOP1-2, SEVIRI (METEOSAT11) and AMV (METEOSAT);
- data pre-processing:
  using eccodes following DAsKIT examples;
  Plans: SAPP will be implemented during 2019 in pre-operational mode; test of new observations;
- monitoring tools:
  OBSMON has been installed and tested with provided observations; a python script has been created to visualize MANDALAY output;
- verification tools:
  Plan: HARP implementation;
- surface DA:
  BATOR (CY43T2_bf10) has been installed; BATOR (CY43T2_bf10) and CANARI tested successfully with local SYNOP (t2, rh2); diagnostics done for one SYNOP station;
  Plans: set-up of a surface DA (OI_MAIN) cycling to AROME-Turkey;
- joint surface + upper-air DA:
  B-matrix has been calculated from AEARP at CY43T2 by the ensemble method;
  Plans: set-up of a joint surface (OI_MAIN) + 3D-Var DA to AROME-Turkey;
- operational systems:
  CY43T2_bf10 is operational since September 2019 for AROME (72L, 1.7km and 48-h lead time);
  CY40T1_bf07 is operational for ALARO (60L, 4.5km and 72-h lead time);
  6-hour DA is being cycled for ALARO CY40T1 in test mode (at 00, 06, 12, 18UTC network times), at 4.5km, 60 levels and with LBC from ARPEGE; as conventional observations are using SYNOP GTS&local; TEMP local and AMDAR GTS; CANARI is used for surface DA and 3D-Var for the upper-air with 24-hour varBC. The model is integrated up to 48 hours;

- reported issues:
  crash during 001, probably due to blendea step (CY43T2_bf10);

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Main conclusions:

1. during last quarter of 2019, main concern of DAsKIT countries was still the local implementation of CY43T2 and in sequence the porting of their DA systems to this cycle (Algeria, Bulgaria, Poland, Portugal, Tunisia, Turkey). Tunisia and Morocco have now new HPC computing platforms. Portugal has declared the obsolescence of its actual HPC platform to install CY43T2 which will frozen the actual maintenance from January 2020 on and the plans to move its NWP systems to ECMWF. Bulgaria will keep a slow progress on DA due to lack of computing power on the actual local machine and plans the acquisition of a new HPC platform for 2020;

2. however, there is a wide effort onto the implementation (including its validation) of the DAsKIT set for surface DA in almost all the countries (Algeria, Belgium, Bulgaria, Morocco, Portugal, Tunisia, Turkey, except Poland which runs a CANARI solution for ALARO);

3. countries continue to show and discuss the first diagnostics and forecast scores on the surface DA, namely: Algeria, Belgium, Poland, Portugal and Turkey;

4. and 1 out of 8 countries (Belgium) plan to move the DAsKIT set into operations (with AROME physics).

5. The second main concern of DAsKIT countries is the handling of locally available data. Main observation types are: SYNOP, TEMP and AMDAR under BUFR format from GTS or local networks;

6. so far countries created pre-processing tools based on eccodes (ECMWF) to handle BUFR data, as it is the example of the recent tool built by Bulgaria to split a compressed BUFR file into single files, removing duplications from amends.

6. MANDALAY (CY40T1 or CY43T2) has been implemented and tested with demo data in almost all countries (still on-going for Portugal) and no issues have been reported so far;

7. OBSMON has been implemented and tested in almost all the countries with demo data (still on-going for Algeria and Portugal), but none has started to use it on a regular basis, thought Belgium has tested it with locally produced data and faced some issues (see Recommendations & actions);

8. HARP has not been implemented in most of the countries;

9. Issues have been reported in configuration 001 when blendsea (in CY40T1) is added to the workflow; and with BATOR pre-processing (CY43T2). These topics will be the focus of priority actions during 1Q2020 together with the main general goal of having BATOR running in all countries at CY43T2 by end 1Q2020;

10. besides it was discussed the possibility to analyse local CMA/ODB data with OBSMON and to ingest BUFR data produced by SAPP with BATOR export version. These two topics have to be investigated more deeply, so some action (with less priority) will be kept alive too in order to support all the DAsKIT countries;

11. next DAsKIT video-conference will take place in March 2020 and a doodle to establish the appropriate dates will be set in advance.

Recommendations & actions:

1. all countries are invited to document their issues in the LACE forum, on the page dedicated to DAsKIT issues http://www.rclace.eu/forum/viewtopic.php?f=21&t=580;

2. countries have been strongly encouraged to progress on the validation of their surface DA cycling so that main issues may be found and solved in an optimum way and main conclusions may be commonly achieved/discussed;

3. main goal for 1Q2020 is the porting of BATOR to CY43T2 in all the countries;

4. besides, attention should simultaneously be paid by all countries on the local usage of blendsea (in their CY40 or CY43 implementations). In particular, Turkey has to check if blendsea issues in CY43T2 concern sea or land-sea points or then land points. If land points are on the origin of the problems then, blendsea routine may have a bug (found previously in CY42, but not in CY40) and in this case the problem should be replicated in beaufix so that French team may give support to some action. At the same time, Algeria was asked to repeat and clearly document its blendsea problem in CY40T1: if a similar problem is encountered, then the same methodology to find a solution will be attempt;

5. Algeria also reported a problem with BATOR pre-processing of AMDAR and TEMP data. In this case, it was advised to visit the testing exercise done by CHMI at beaufix: /home/gmap/mrpe/trojakova/cy43t2/sample_alaro/scr_3dvar_bufr; and if the problem persists, to write back to the DA coordinator or to post the problem at the LACE Forum, under: http://www.rclace.eu/forum/viewtopic.php?f=21&t=580;

6. Algeria is also invited to reproduce his segmentation issue on beaufix (or to provide the problematic data - observations, guess, …);

7. concerning the issue reported by Belgium on OBSMON (not possible to analyse locally produced CMA/ODB data with OBSMOB), it was decided that Belgium will contact Roger Randriamampianina to get a clarification, keeping the DA coordinator in touch.

8. No action was set on the compatibility of SAPP (ECMWF) BUFR data with BATOR export version but it was mentioned that status in April 2018 was to keep ECMWF BUFR format reading in a different branch from the main. Therefore DAsKIT should keep some attention on this;

9. finally, Bulgaria kindly offer to make available its data handling BUFR tool for DAsKIT countries in case they show interest on it.