Working Area Data Assimilation

Work Plan

Prepared by:	Area Leader Máté Mile
Period:	2014
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1Introduction and background

In 2014 the DA tasks will have the same allocated budget as it was in 2013, therefore the coordinated stays are going to follow the financial frame of the last year plan. However thanks to Alena Trojakova's(DM) idea the support of the OPLACE stay is out of the research DA budget which can help to do a bit more, but of course this commonly interested OPLACE task will be kept in 2014 as well. There will be minor changes in the division of LACE DA budget also because more shorter stay are planned instead of less longer ones. This will let us to do more progress on several topics, but also can induce some risks. Beside of this, the manpower of the member countries is hoped to be more or less at the same level to keep the balance between the stays and local development issues.

2Goals

The maintenance of the OPLACE system is financed from Common technical budget and not from R&D budget, but it has also high priority to keep the OPLACE system in an up-to-date level, therefore the goal remains the same to allocate efforts to this action.

Also we are standing for that goal to introduce operational DA system at every LACE center, although it is hard to realize till we are working with different circumstances, configurations and cycles. The main LACE stays in 2014 are hopefully going to provide more useful input for these efforts through development of surface assimilation and better representation of background error statistics. More communications might also help to speed up these processes.

The goal to assimilate RADAR observations in our DA systems are wished to turn into the home stretch for the operational RADAR assimilation locally. The corrected and verified LACE RADAR data collection would providing high temporal and spatial coverage over LACE area of interest which is going to extensively investigated in 2014 with AROME and ALARO DA systems. A task will be opened to evaluate the spatially varying background error variances in higher resolution models to approach towards the flow-dependent representation of background error statistics. The surface assimilation part of DA actions is planned to support from budget focusing on EKF assimilation, because the recently used canari configuration has less and less future perspective. Another very important goal is to start coordinated work and build alternative surface assimilation system based on EKF.

3 Main R&D activities

Action/Subject: **Maintenance and Development of OPLACE system**

Description and objectives: The OPLACE system recently contains 6 main observation types and e.g. just conventional data takes approximately 500 thousands reports per month. We are planning to make dedicated maintenance as usual for upgrade of OPLACE and implement new observations in 2014. The exact actions of this maintenance are taken into account at the beginning of 2014. This task is operating in the collaboration of DM and Hungarian DA team.

Proposed contributors, Estimated efforts: A. Trojakova (Cz), M. Mile, G. Boloni (Hu), 1 months (0.5 month local work at OMSZ and 0.5 month stay of A. Trojakova at OMSZ)

Planned timeframe: whole year

Planned deliverables: reliable operation of OPLACE at OMSZ

Action/Subject: **Towards operational implementation of full (upper air and surface) DA system**

Description and objectives: The optimal settings of this implementation of the full DA system have been sought at LACE centers. In CZ a good combination has to be found with the operational initialization technique (blending). It means more observations in the experimental 3DVAR and tuning the representation of B matrix are planned. In SK and RO newer model cycle is going to be applied and tested and later on surface assimilation will be reassessed.

Proposed contributors, Estimated efforts: 1 person per countries (CZ, SK, RO), 5 months

Planned timeframe: whole year

Planned deliverables: operational implementation (Cz, Sk, Ro)

Action/Subject: **Assimilation of Radiance observations (IASI, ATOVS, SEVIRI) in DA system**

Description and objectives: The assimilation of radiance observations is a crucial part of DA activities. In 2014 it is planned to make some revision of radiance observation in the context of high-resolution modeling. To use more observations the tuning of thinning distances, examination of not used channels and its blacklisting should be investigated. The impact and the availability of radiance data have to be evaluated in Rapid Update Cycle approach as well.

Proposed contributors, Estimated efforts: P. Benacek, A. Trojakova(Cz), F. Meier(At) M. Mile (Hu), B. Strajnar(Sl), A. Stanesic(Hr), M. Pietrisi(Ro), 6 months

Planned timeframe: whole year

Planned deliverables: scientific reports

Action/Subject: **Investigation of spatially varying flow-dependent background error variance**

Description and objectives: The use of spatially varying background error variance was tested by Strajnar (2008) and was shown a positive impact against climatological variances. An investigation is reopened to assess the so called grid-point sigmaB maps in AROME and ALADIN model as well. At first on the AROME side technical validation and correction of the method is needed where distorted increments were found concerning humidity model variable. After this, the main interest is about to produce grid-point maps from limited-area ensemble system instead of global system in order to has enough variability over Central Europe.

Proposed contributors, Estimated efforts: A. Trojakova(Cz), A. Buchanek(Cz), F. Meier(At) 4 months (1 months - LACE supported stay of A. Buchanek)

Planned timeframe: whole year

Planned deliverables: scientific reports

Action/Subject: **Implementation of RADAR reflectivity and radial wind**

Description and objectives: In 2013 the LACE RADAR data from 5(at least) LACE countries (CZ, HR, SL, SK, HU) was technically corrected and validated which open the road to the scientific validation of these observations. In 2014 we would like to focus on the impact of RADAR observations and extensively testing through impact studies and case studies. The reflectivity and Doppler wind should be tested together and separately and its contribution to the analysis and forecast impact. Followed by the Hungarian experiments the question of low level reflectivity blacklisting should be answered too.

Proposed contributors, Estimated efforts: T. Kovacic (Hr), A. Stanesic(Hr), F. Meier(At), A. Trojakova(Cz), M. Nestiak(Sk), M. Mile(Hu), 9 months (1 months- LACE supported stay of ? at OMSZ)

Planned timeframe: whole year

Planned deliverables: Scientific reports

Action/Subject: **Implementation of ground-based GPS data assimilation**

Description and objectives: Thanks to the EUMETNET EGVAP programme, the amount of GPS observation over Central Europe has been growing in the last few years. After the GPS tests of 2013 it is planned to continue and extend the investigation and/or examine the emerging problems. With cycle 38 the VARBC computation for GPS observations is

available, therefore it is planned to use this method during studies. More actions of this task are taken into account at the beginning of 2014. This action is also joint to a GPS COST action (COST-ES1206).

Proposed contributors, Estimated efforts: X. Yan(At), M. Mile(Hu) 3 months (1 month LACE supported stay for ? in Budapest)

Planned timeframe: whole year

Planned deliverables: Scientific reports

Action/Subject: The evolution of Dispersion Spectra in Blending Cycle

Description and objectives: As the 3DVAR, DFI Blending and its combination are going to further investigated in 2014, the evolution of error dispersion spectra is planned to keep on. Regarding every 3DVAR experiments in CZ, increasing of variance in large scale was observed which would be interesting to examine and/or understand it further as well.

Proposed contributors, Estimated efforts: A. Bucanek(Cz), 5 months

Planned timeframe: whole year

Planned deliverables: scientific report

Action/Subject: Surface Assimilation using Extended Kalman-Filter

Description and objectives: In 2014 this task is going to continued and supported because the commonly used Canari configuration has less and less perspective in the future. The aim of this task is to produce a framework for surface assimilation which at first similar to the recently used Canari method i.e. can assimilate conventional observations to screen level increments. When we have such existing Extended Kalman-Filter based surface assimilation for ALADIN and AROME model and it has reasonable skill for the forecasts as well, we can step towards the assimilation of non-conventional observations. EKF has the opportunity to do that against the Canari method. The already ongoing efforts of assimilation of ASCAT soil moisture (Austrian activity) and LANDSAF products (Slovenian activity) are wished to continue in 2014.

Proposed contributors, Estimated efforts: S. Schneider(At), J. Cedilnik(Sl), 3 months, (1 month LACE supported stay for ? in Budapest)

Planned timeframe: whole year

Planned deliverables: scientific report

Action/Subject: Assimilation of Mode-S data

Description and objectives: A comparison with radiosonde and AMDAR observations showed a good quality of Mode-S MRAR aircraft observations. This and the encouraging data assimilation results of these observations induce continuation of this task for 2014.

Proposed contributors, Estimated efforts: B.Strajnar(Sl), 2months

Planned timeframe: whole year

Planned deliverables: scientific report

4Summary of resources

Subject	Manpower	LACE	Other (Hirlam)
OPLACE maintenance	1	1	
Local operational DA	5	5	
Radiance Assimilation	6	6	
RADAR Assimilation	9	9	
SigmaB Maps	4	4	
GPS Assimilation	3	3	
Evolution of Dispersion Spectra	5	5	
Surface Assimilation	3	3	
Mode-S Assimilation	2	2	
Total:	**38**	**38**	

5Meetings and events

1)24st ALADIN Workshop and & HIRLAM All Staff Meeting 2014, 7-11 April, 2014, Bucharest, Romania (participation of Mate Mile).

2)36th EWGLAM & 21th SRNWP joined meetings (participation of Mate Mile).

3)7 participants at DA Working Days 2014

LACE supported stays in 2013

1)Antonin Buchanek CHMI (SigmaB Maps) – 1 month , 2014

2)? (RADAR Assimilation) – 1 month in Budapest (OMSZ), 2014

3)? (EKF Assimilation) – 1 month in Budapest (OMSZ), 2014

4)? (GPS assimilation) – 1 or 0.5 month, 2014 (support instead of OPLACE stay, exact money not decided yet, but I've foreseen 1 month in the budget)

6Risk and constrain

In every year we have several risks started with the lack of manpower as usual. Now we are planning to organize more and a bit shorter stays of supported DA activities which times might be insufficient to get clear conclusions. That's a risk, but we hope to cover more issues and can support more area with this organization. Another serious risk is about the data policy of OPLACE data. Hopefully the LACE Council can recognize the importance of the extension of OPLACE with more observations (especially or at first national SYNOP data) and can give a clear road to the data spreading for assimilation purposes.