Regional Cooperation for Limited Area Modeling in Central Europe

LACE
nwp central europe

Data assimilation and common observation pre-processing system (OPLACE) in LACE

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Outline

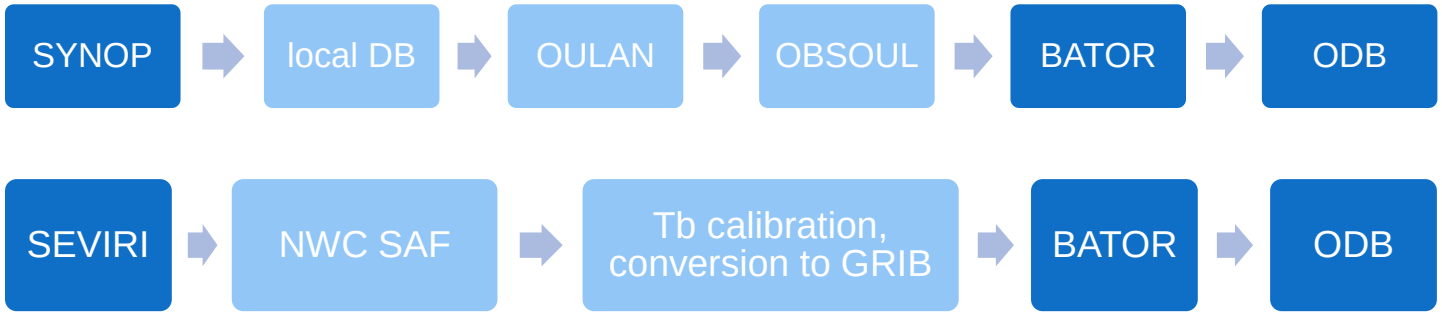
- Developments of operational DA systems in LACE
- OPLACE
- DA Networking
- Outlook

Development of operational DA systems in LACE

- Data assimilation (DA) can significantly improve weather forecast, but it is technically and manpower demanding.
- Only two Members had operational DA in 2008. LACE project (2008-2010) triggered implementations of operational DA systems at all Members, taking into account the local infrastructure & staffing and considering the opportunities for operational task sharing.
- Key ingredients of successful implementations:
  - scientific & technical support of experienced partner (OMSZ,MF)
  - operational task sharing (OPLACE)
  - close cooperation and exchange of know-how (Forum, DAWD) on various aspects (obs handing, bias correction, tuning, …)
  - exchange of the tools (observation monitoring and QC, tools for computing background error structure functions, …)
  - manpower (1-2 FTE)

The OPLACE system

- The common LACE observation pre-processing system (OPLACE) was build in order to provide observations in appropriate format for DA.
- The main aims were to support DA implementation, avoid duplication of work on observation pre-processing, share maintenance and to let people to focus on DA.
- Observation pre-processing comprises mainly decoding, conversion to the local databases, simple QC, conversions to suitable format for ODB conversion.



The OPLACE system – software & model cycles

- OPLACE was based on already existing observation processing infrastructure of OMSZ (data acquisition, databases of conventional observations from GTS and satellite data processing from EUMETCAST), where local netCDF databases are widely used.
- OPLACE uses following programs and libraries:
  - OULAN (adapted from Météo France)
  - simple tools to parse, split and merge ASCII and BUFR data
  - GRIB-API, BUFRDC libraries, (soon ecCodes)
  - EUMETSAT NWCSAF package (SEVIRI, HRW)
- OPLACE pre-processing itself takes ~3min.
- OPLACE is not (or hardly) effected by the changes of new export versions. Observations are provided in general formats suitable for direct conversion to ODB (BATOR).
- Implementation of new observations obviously requires modifications in the BATOR source-code, which are later committed to common cycles.

The current observation set and formats of OPLACE system

- 3 basic formats: ASCII-OBSOUL, BUFR, GRIB

TYPE	TEMP	SYNOP, SHIP, DRIBU	PILOT, WPROF	AMSU, MHS, IASI	AMDAR, MODES-MRAR	GEOWIND, HRW AMV	MSG-HR SEVIRI
Parameter /Channels	U,V,T,Q,Z	MSLP, T2m, RH2m, U10m	U,V	Tb amsua n15 mhs n5 iasi n500	U,V,T,(Q)	U,V	Tb n8
Incoming Format	TAC, BUFR	TAC, BUFR	BUFR	BUFR	BUFR	BUFR	HDF5
OMSZ database Format	netCDF	netCDF			netCDF		
Output OPLACE Format	ASCII (OBSOUL)	ASCII (OBSOUL)	BUFR	BUFR	ASCII (OBSOUL)	BUFR	GRIB

The OPLACE system - outlook

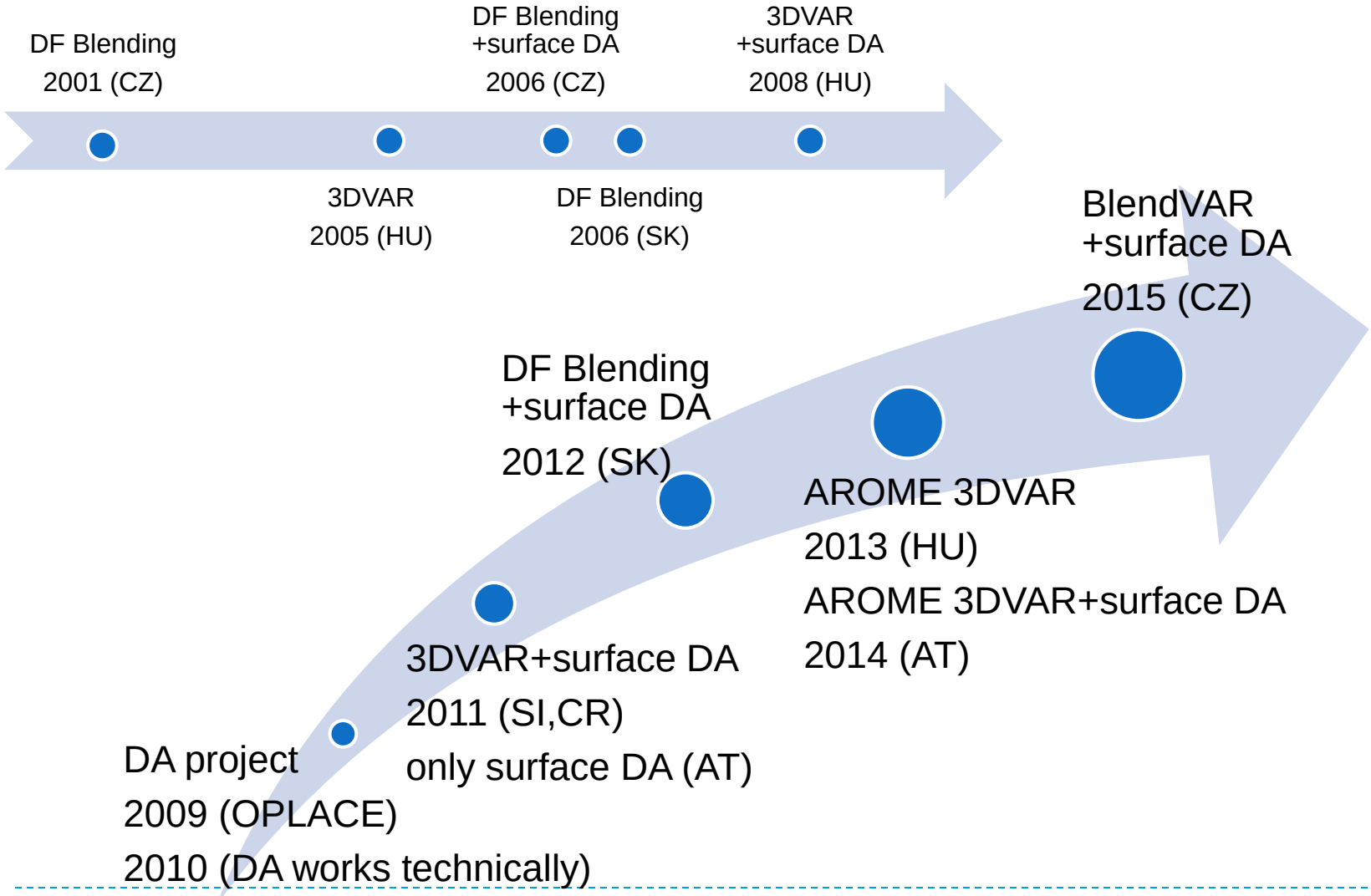
- Considerable progress has been made during last years to simplify observation pre-processing and ongoing TAC2BUFR migration for conventional observation (SYNOP & TEMP) will further simplify it.

- OPLACE is a good example how to work together in an effective way and save manpower.
- The structure of OPLACE may change in the future when COPE becomes mature (less softwares and formats).
- But the basic aims to create common and centralized observation provision will be preserved (especially for high resolution national data).
- Cooperation in this area with other non-LACE countries already started and is expected to enlarge in the future.

LACE DA Networking

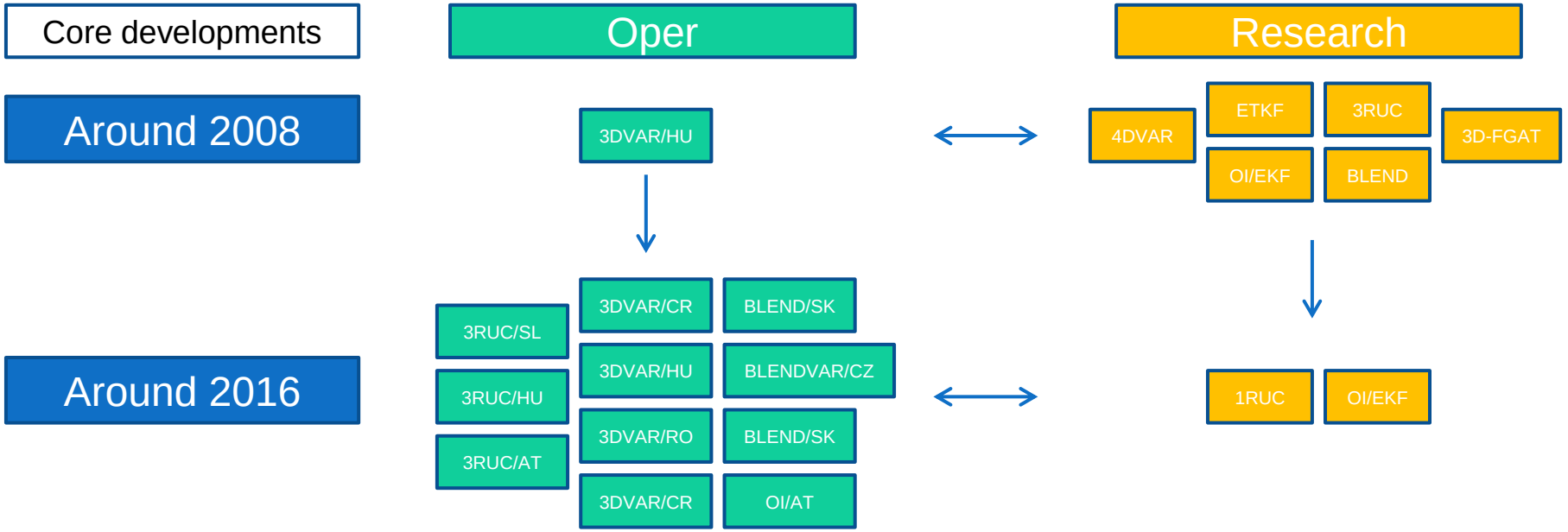
- LACE Data Assimilation Working Days (DAWD) are organized yearly in Autumn for 2,5 days.
- Program consists of status presentations of local DA systems and research activities, discussions on issues, coordination and planning, but so far almost zero practical exercises or code developments.
- Non-LACE DA colleagues are also invited. In previous years colleagues were also participating from HIRLAM (Norway, Sweden, Netherlands), ALADIN (Tunisia, Portugal, Belgium) and remotely from MF.
- Another valuable floor for spreading information, direct interaction and sharing tools is LACE Forum (www.rclace.eu/forum).

Operational LACE data assimilation milestones



Operational LACE data assimilation systems

- 11 operational DA systems
- Mostly 6 hours assimilation cycle used, but there are 3 hourly cycled and 1 pre-operational hourly cycled system as well.
- During last years the efforts of the LACE DA colleagues are moved towards maintenances, validations and operations from research activities.



General outlook

- LACE DA group is large and due to cooperation major goals can be achieved (see DA project 2008-2010 and outcomes).
- However there are some challenges and open questions:
  - Where's the balance between operation and research?
  - How can we further reduce work on maintenance and operation?
  - What are the goals we want to achieve (identify new targets)?
  - What is feasible and affordable at every Member?
- There are still opportunities for more effective work:
  - to increase the level of cooperation inside and outside LACE,
  - support cooperation with other areas (e.g. DA & EPS),
  - to consider common scripting and validation systems to reduce technical part of the DA works,
  - to apply common international projects which supports the research oriented activities.