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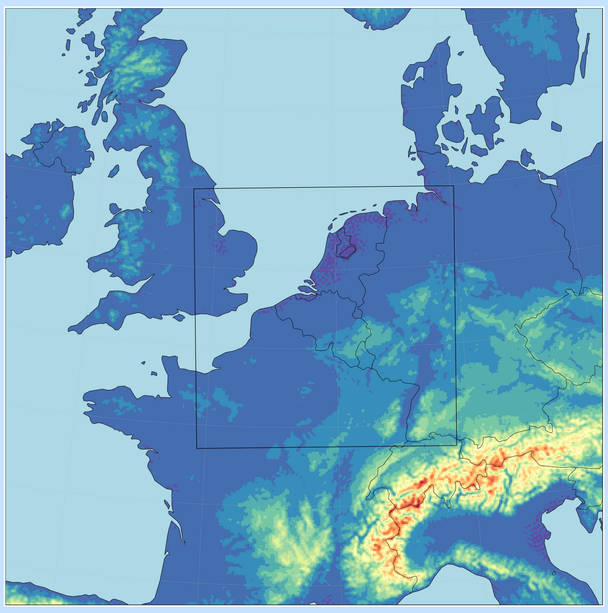
The operational ALADIN-Belgium model

1. The computer system

- SGI Rackable cluster
- 2x56 compute nodes with each 2 Xeon E5-2680V3 processors.
- 24 cores per node, 2x1344 cores in total
- model runs use 720 cores.



2. Model versions

- 4 km resolution 432x432x87L to +60h 3-hourly coupling to Arpège cy43t2 + ALARO-1
  + non-saturated downdraft
  + TOUCANS + ACRANEB2
- 1.3 km resolution 600x600x87L to +48h hourly coupling to 4km Alaro run
  - **Alaro** : ISBA, NH, downscaling
  - **Arome** : with surface DA

Data Assimilation

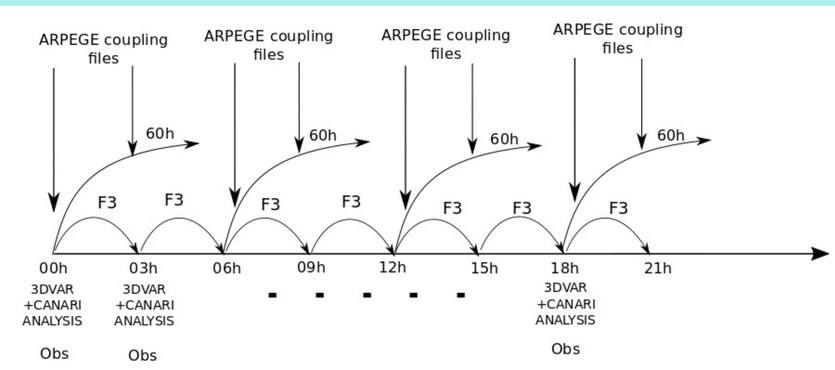
Idir Dehmous & Alex Deckmyn

In the framework of the **DASKit** project (Data Assimilation Starter's Kit) the IRM team is progressing with the implementation of data assimilation cycles for our operational Alaro and Arome models.

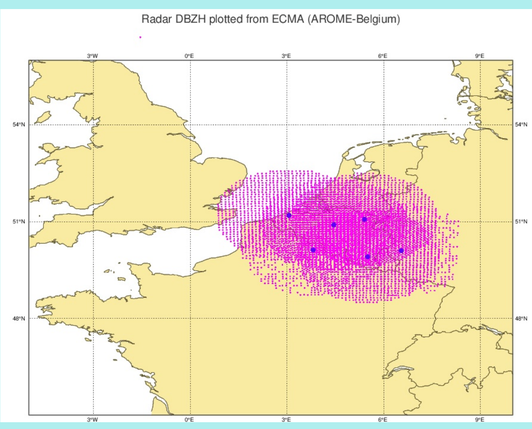
- New scripting system (*Node Runner*) based on ecflow.
- AROME with 3h surface assimilation cycle (CANARI-OImain).

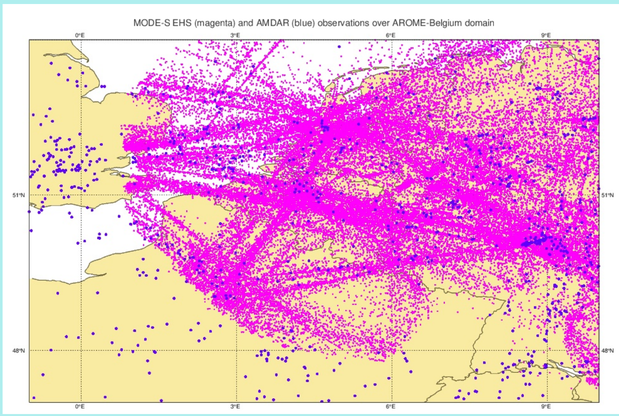
Current developments:

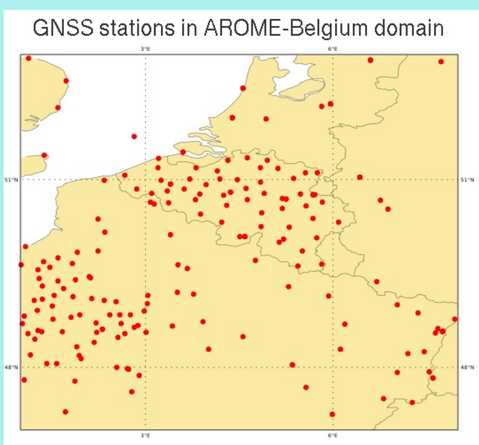
- 3D-Var cycles for all operational models (1.3km and 4km). Currently aiming at 3h assimilation cycle with, e.g.



Observation type	Source	Status
SYNOP	GTS	Assimilated
TEMP	GTS	Assimilated
AMDAR	GTS	Assimilated
GNSS	GTS	Monitored & tested
MODE-S	KNMI	Monitored & tested
RADAR (BDZH)	RMI	tested







Next steps:

- B-matrix from EDA
- Further validation of Mode-S & Radar

New Alaro tuning

Michiel Van Ginderachter

The RMI has been running a 1.3km resolution (non-hydrostatic) local version (OPER) (based on cy43t2) of ALARO-1 since 2019.
While technically the set-up works, default tunings were used and a thorough verification had never been performed. As a consequence, up until now no official RMI products are based on the forecast and it is only marginally used by forecasters.

After a Flatrate-stay in Prague, optimal tunings (both for dynamics and physics) were provided by our colleagues from CHMI together with some improvements in the Total Turbulent Energy solver and roughness length climatology. This new configuration (MODC) has been running once every day since September 2021. In addition a rerun of the July 2020 was done to provide some summer statistics.

Figure 1 and 2 show the RMSE of some key variables for both configurations for summer (07/2020) and winter (01/2021) respectively. RMSE is improved for all variables except RH2m (in summer), while the new tunings also drastically improve the cold bias in winter and warm bias in summer (not shown). Improvement in T2m bias is probably linked to the TTE-solver improvements which give improvements in low level cloudiness, which was previously often underestimated. An example can be seen in Figure 3. Improvements in 10m wind speed on the other hand can be linked to the improvements in roughness length.

Feedback from forecasters has been mainly positive, which is why some tests are now being performed with some of the new tunings and the TTE-solver improvement applied to the operational 4km configuration.

The MODC 1.3 km is planned to go in go in operational production by the end of April.

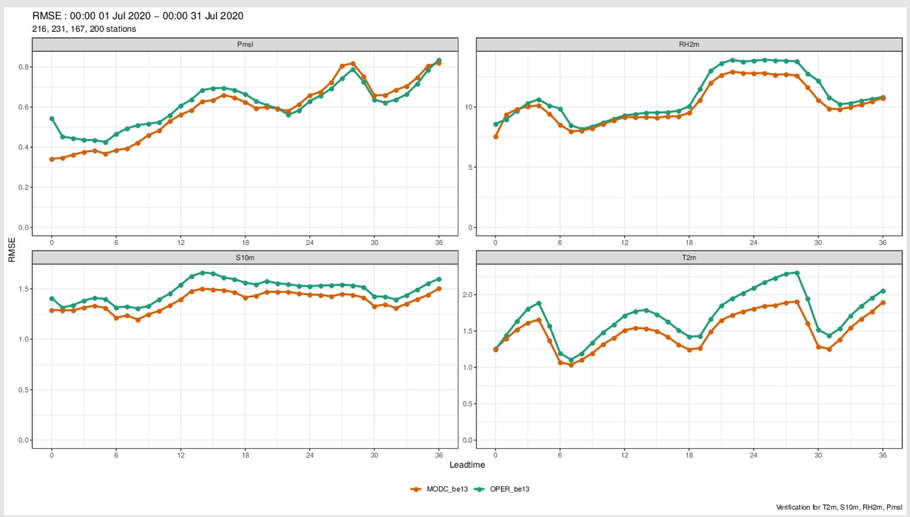


Fig. 1: RMSE for mean sea level pressure (Pmsl), 2-meter relative humidity (RH2m), 10-m wind speed (S10m) and 2-meter temperature (T2m) for July 2020. One forecast was performed at 00 UTC every day. OPER indicates the currently operational configuration with default tunings, while MODC indicated the new configuration with new tunings and improved TTE-solver and surface roughness length.

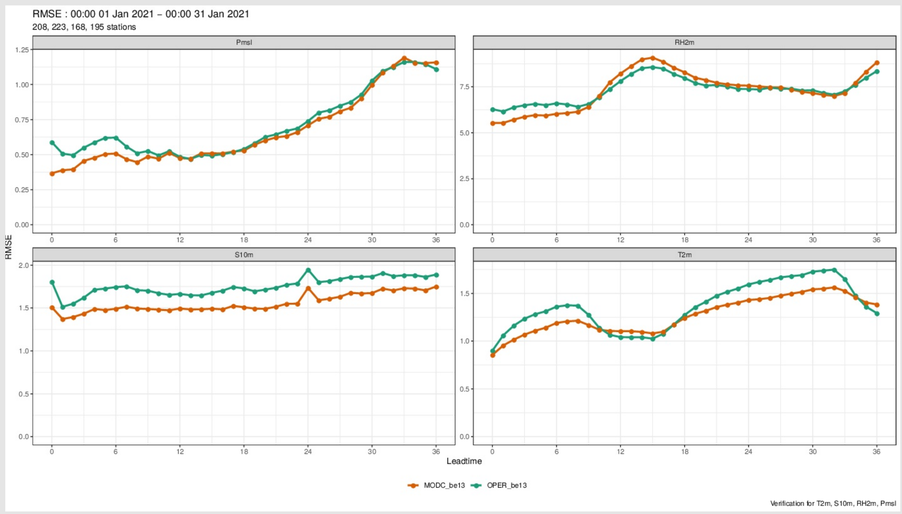


Fig. 2: RMSE for mean sea level pressure (Pmsl), 2-meter relative humidity (RH2m), 10-m wind speed (S10m) and 2-meter temperature (T2m) for January 2021. One forecast was performed at 00 UTC every day. OPER indicates the currently operational configuration with default tunings, while MODC indicated the new configuration with new tunings and improved TTE-solver and surface roughness length.

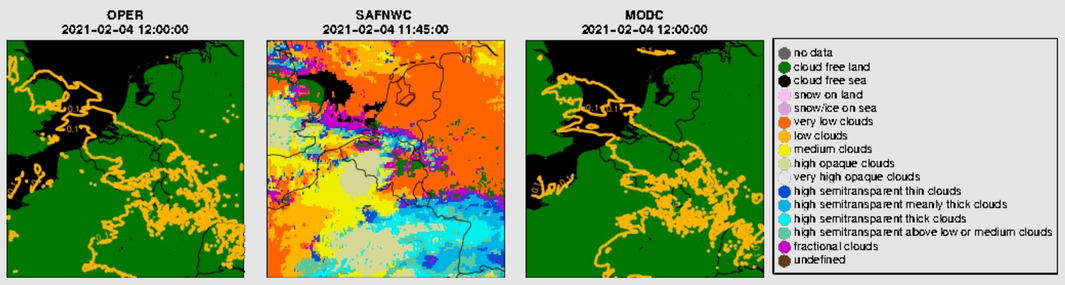


Fig. 3: Low level cloudiness at 2021-02-04 12:00 UTC as forecasted by the OPER (left) and MODC (right) configurations. In the middle the SAFNWC Cloud Type product for comparison.