

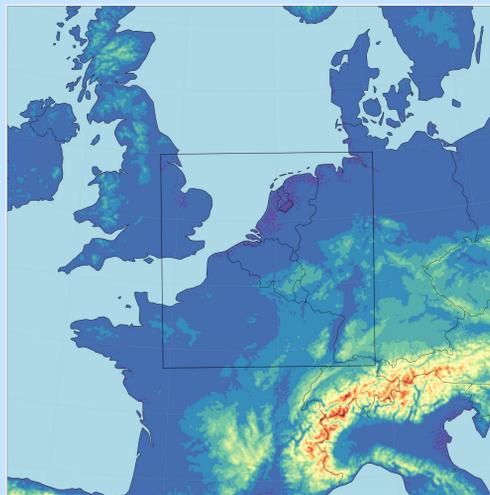
## The operational ALADIN-Belgium model

### 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

### 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 run  
 - **Alaro** (ISBA, NH, downscaling)  
 - **Arome** : with surface DA  
 • model runs use 720 cores.



## New model tunings (Alaro)

Michiel Vanginderachter

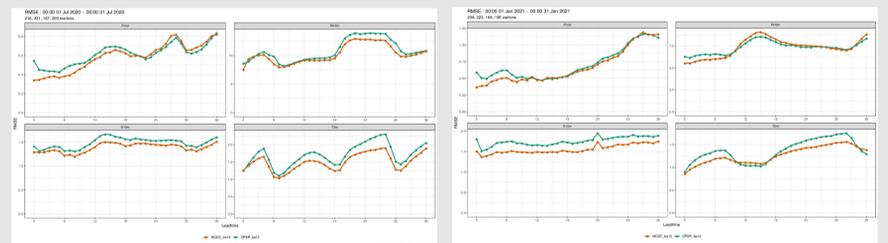
The RMI has been running a 1.3km resolution (non-hydrostatic) local version ALARO-1 since 2019. While technically the set-up worked, default tunings were used. No official RMI products were based on the forecast and it was only marginally used by forecasters.

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) became operational in December 2021.

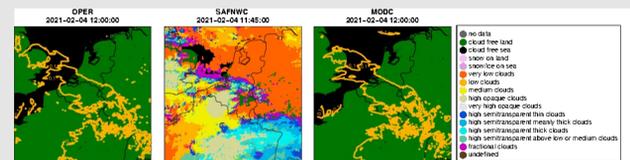
Figure 1 and 2 show the RMSE of some key variables for both configurations for summer (07/2020)

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 which gives 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.



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 and January 2021. One forecast was performed at 00 UTC every day.



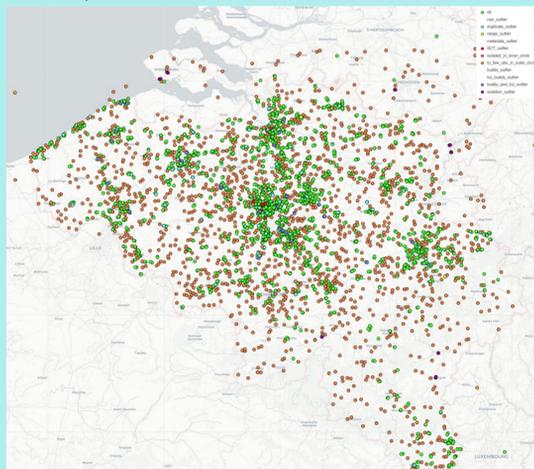
Low level cloudiness at 2021-02-04 12:00 UTC as forecasted by the OPER (left) and MODC (right) configurations. In the middle the SAFNWC Cloud Type product for comparison.

## CS-MASK project

Thomas Vergauwen, Steven Caluwaerts, Daan Degrauwe, Rafiq Hamdi

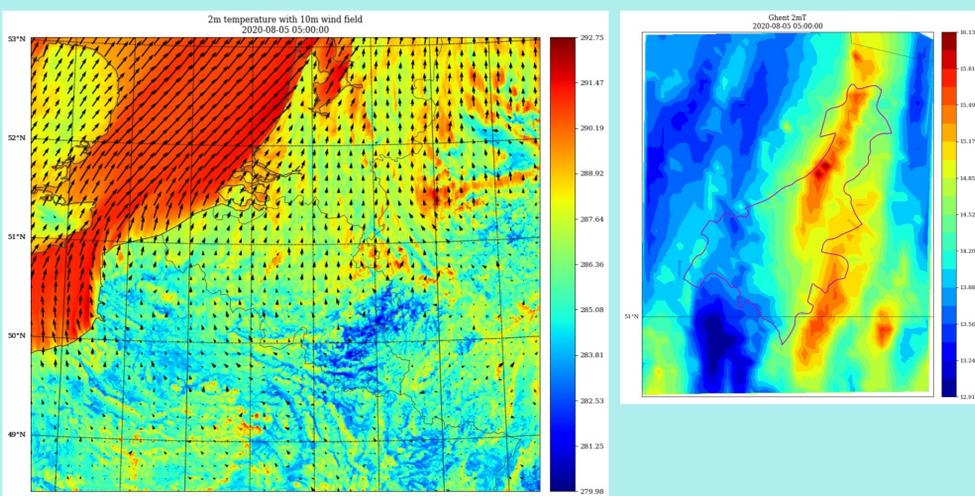
The CS-MASK project (**Crowd Sourced data for atmospheric Modelling At Sub-Kilometer scale**) aims at very high resolution forecasts. The CS data is used primarily for validation of the hectometric model run, not for assimilation. Different phases are distinguished.

1) Development of a quality control (QC) procedure for the existing CS datasets (WOW, VLINDER, ...).



2) AROME runs at 700 m resolution. A first test was recently performed as a pilot project on **LUMI**. August 2020 was selected as a case study to evaluate the added value of hectometric runs. Thanks to the significant fraction of urban observations in the CS data, this project provides a unique opportunity to experiment with the TEB (Town Energy Balance) scheme that is used within SURFEX to model the urban-atmosphere interactions.

3) Finally, UHI maps at different resolutions will be produced for Belgian cities for the August 2020 heatwave.

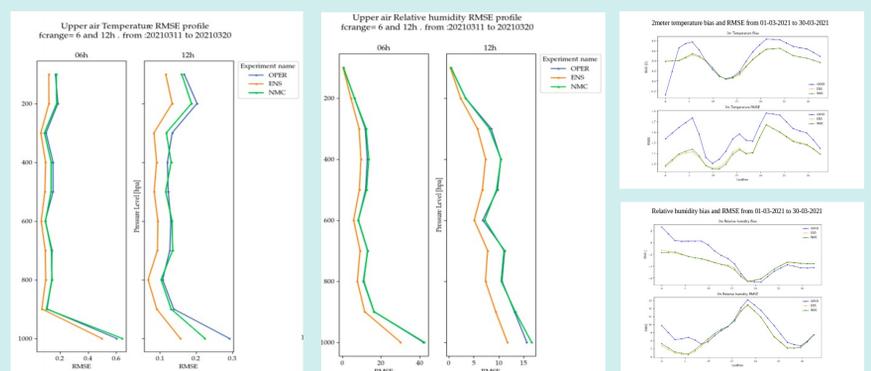


First results of a 700m resolution AROME run performed on **LUMI**. On the right a focus on the urban region of Ghent.

## Data assimilation progress at RMI

Idir Dehmous

- Surface DA (CANARI OImain) is used operationally for Arome.
- 3D-var developments:
  - data sources: TEMP, AMDAR, GNSS (ZTD)
  - Comparison of B-matrix obtained via NMC method and from an Ensemble of 4 perturbed Arpege members.



- Impact of DFI

- **Node Runner** (portable ecFlow-based script set)

