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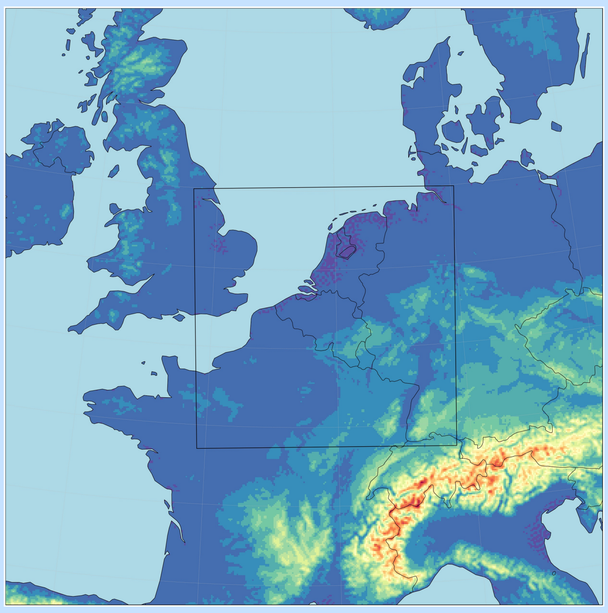
The operational ALADIN-Belgium model

1. The old 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.

3. HPC issues

- The SGI is now 8 years old and showing it.
- Problems with support

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 to explore the use of non-traditional observations for hectometric NWP models. In total a collection of 4000 crowd-sourced automatic weather stations (AWS) in combination with synoptic observations is created for a test period. These observations will be used for model verification and exploring new verification techniques dedicated to hectometric NWP.

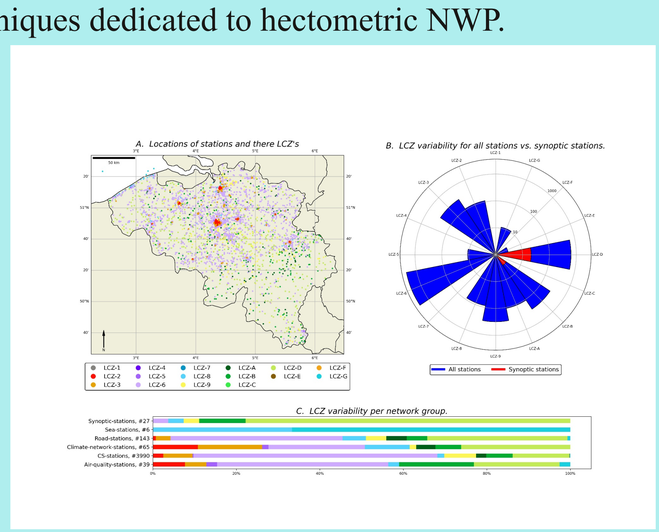
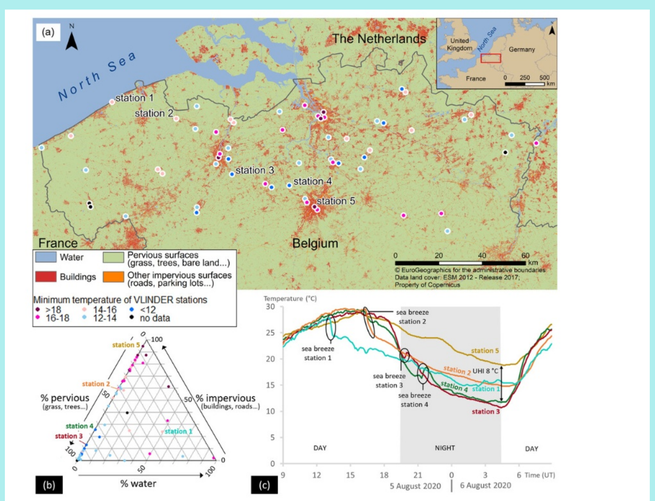
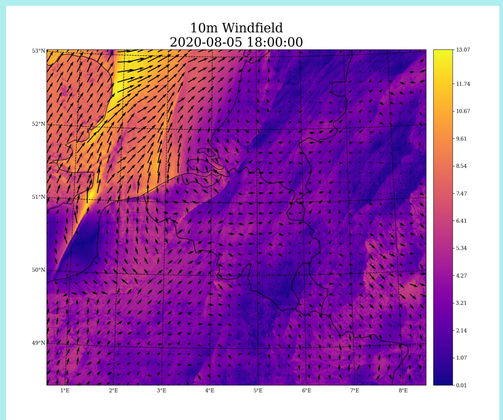


Figure 1 represents the variability and diversity of the local land cover at the observation site using *local climate zones* (LCZ). From figure 1B it is clear that there is very little land cover variability for synoptic observations (red), while land cover variability is restored by combining traditional and non-traditional observations (blue). This creates opportunities for *specific verification techniques* on land cover. Figure 1C indicates that each group of non-traditional stations (networks), grouped by application, has its own variability-fingerprint.

In the context of CS-MASK, AROME runs at 700m resolution are performed on LUMI and ATOS. 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. Figure 2C represents the passing of a sea breeze using non-traditional observations reaching up to Brussels (roughly 100 km inland). Figure 3 is the 10m wind (vector) field from the 700m AROME model during this sea breeze event. Can you spot the passing seabreeze front?





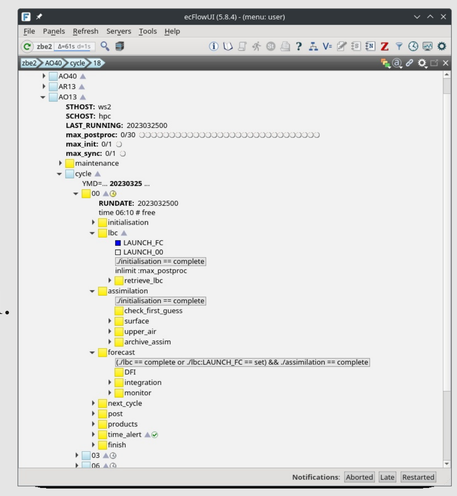
Porting operational runs to ATOS

Due to the very old age and many technical problems, the HPC at RMI can no longer be considered suitable for operational forecasts. Therefore RMI has requested to move the operational forecasts as a Time Critical facility on the new ATOS infrastructure of ECMWF in Bologna.

1. Scripting

The three suites are implemented using the **NodeRunner** script system developed at RMI.

2. Model setup



AO40

- Alaro cy43t2
- 4 runs per day to +60h
- Downscaling
- Hourly Arpège LBC's.
- Now using the same re-tuned version of cy43t2 as used for the 1.3km alaro model.

AO13

- Alaro cy43t2
- 4 runs per day to +48h
- Surface DA (3h cycle)
- Hourly LBC's from HRES.

AR13

- Arome cy43t2
- 4 runs per day to +48h
- Surface DA (3h cycle)
- Hourly LBC's from HRES

To work with BUFR-SYNOP data available at ECMWF, the cy43t2 code for BATOR was adapted with some code from Harmonie

Adaption of ACCORD codes to GPU's

Daan Degrauwe & Denis Haumont

- Collaboration with other ACCORD partners in DE_330 project
- ACRANEB2 radiation scheme and spectral transforms have been ported to GPU's in standalone-mode
- Main challenge is to increase the flexibility of the code such that some parts can run on GPU's while other parts remain on CPU
- Concrete target during the first phase of DE_330: have an ALARO configuration with ACRANEB2 radiation and spectral transforms running on AMD GPU's on the LUMI HPC. LUMI is, thanks to the inclusion of GPU's, currently the most powerful HPC in Europe.

Picture of LUMI supercomputer