

ACCORD

A Consortium for COnvection-scale modelling
Research and Development

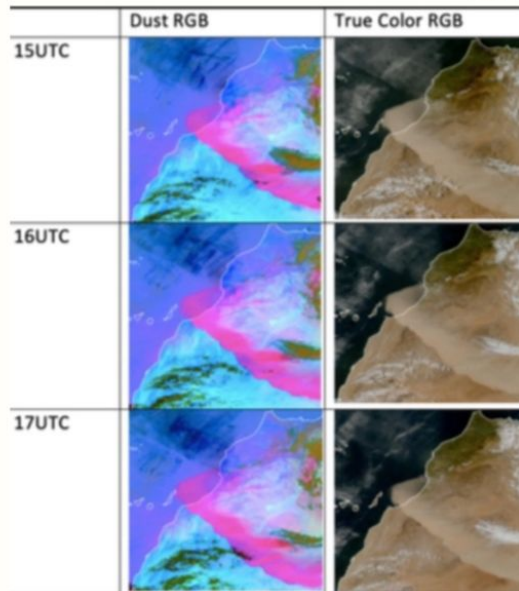
Posters Session, chaired by ...

All Staff Workshop 2026

SIMULATION OF DESERT DUST WITH THE AROME 2.5 KM MODEL



Observations



SIMULATION OF SAHARAN DUST USING THE AROME 2.5 KM MODEL

Case study: 30 March 2026

ACCORD 6th Workshop – Marrakech, April 2026

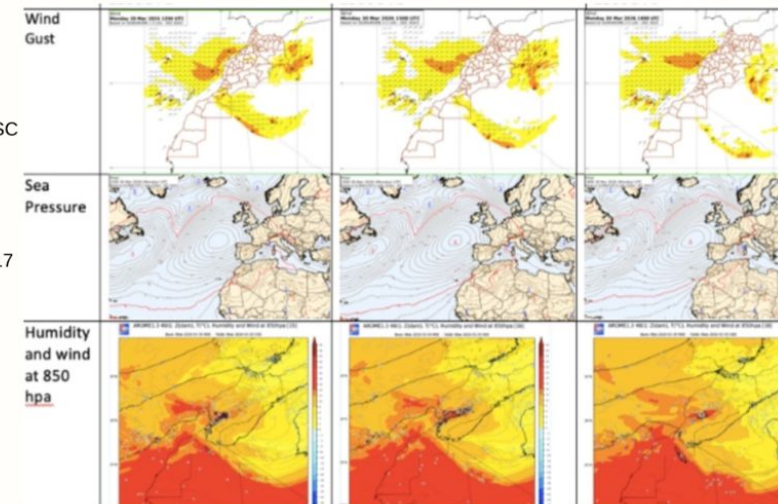


Observations

METAR/SPECI

SPECI_GMAG 301541Z 10016KT 060V120 1500 DU NSC
247 M02 Q1014 NOSIG=
SPECI GMML 301228Z 04021KT 3000 SA NSC 24/08
Q1015
NOSIG =
METAR COR GMAT 301300Z 10021KT 0600 SS FEW017
23/0
Q1013 NOSIG=

NWP dust parameters



Model Configuration

- AROME 2.5 km, 90 vertical levels
- Cycle 46t1, runs at 00 & 12 UTC

Synoptic Situation

- Strong pressure gradient (Atlantic high vs Saharan low)
- Saharan dust advected toward Morocco
- Result: strong winds, dust emission, reduced visibility

Observations

- METAR/SPECI: dust events and visibility reduction
- Satellite (True Color & Dust RGB): dense dust plume and high aerosol loading

Conclusion

AROME reproduces the timing and modestly represents the dust event structure, but without explicit dust parameterization, emission, transport, and deposition are not fully resolved.

Outlook

implement an AROME-Dust scheme to enhance prediction accuracy

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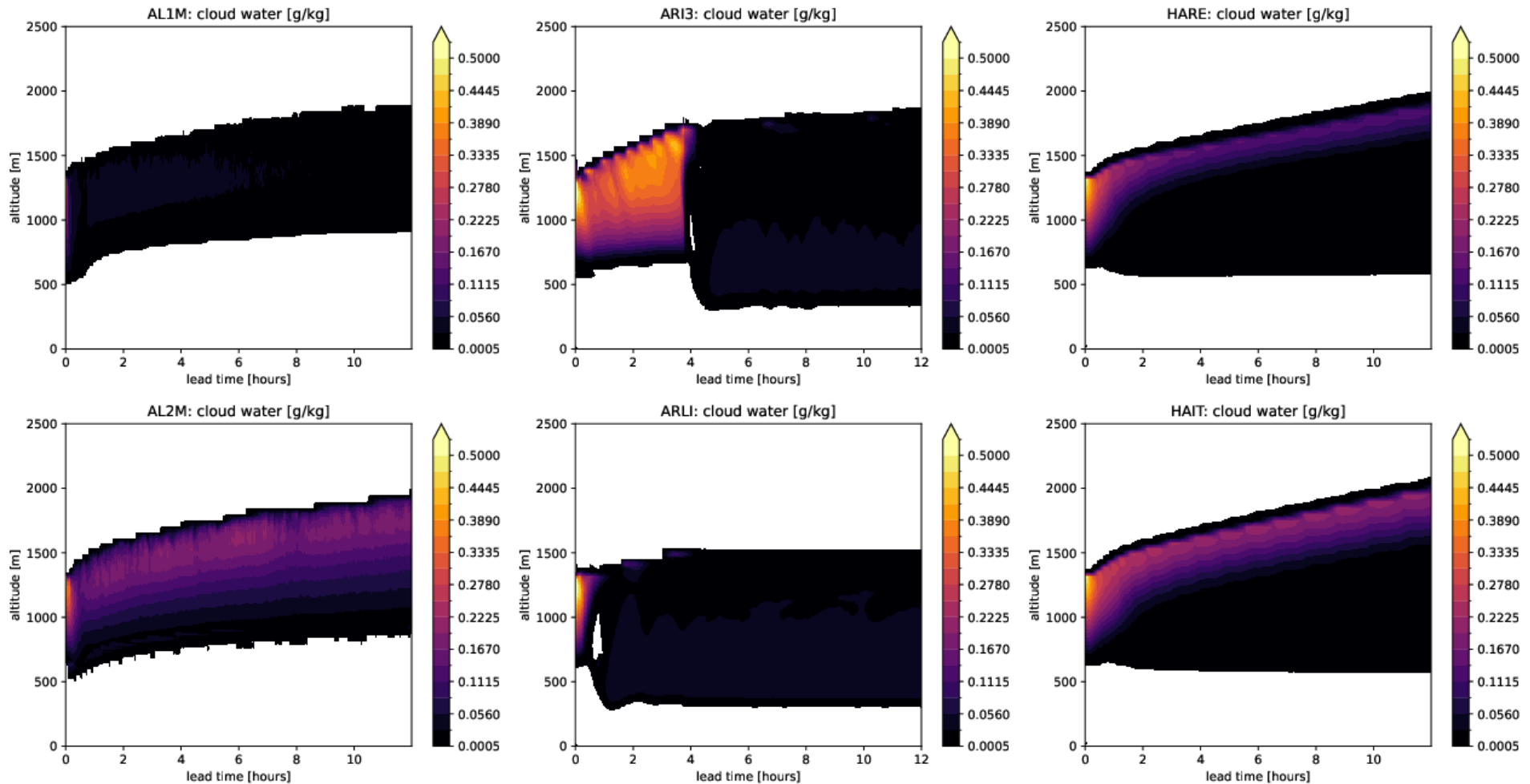
Aim

Evaluate the AROME 2.5 km model in simulating a Saharan dust outbreak over Morocco (30 March 2026).

Done by :MINA BOUNNIT

BOUNIT Amina

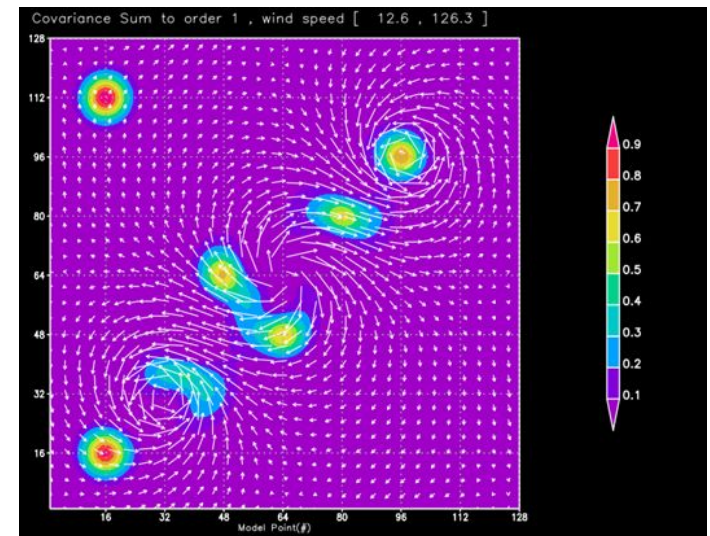
Evaluating microphysics options with the MUSC MPACE case



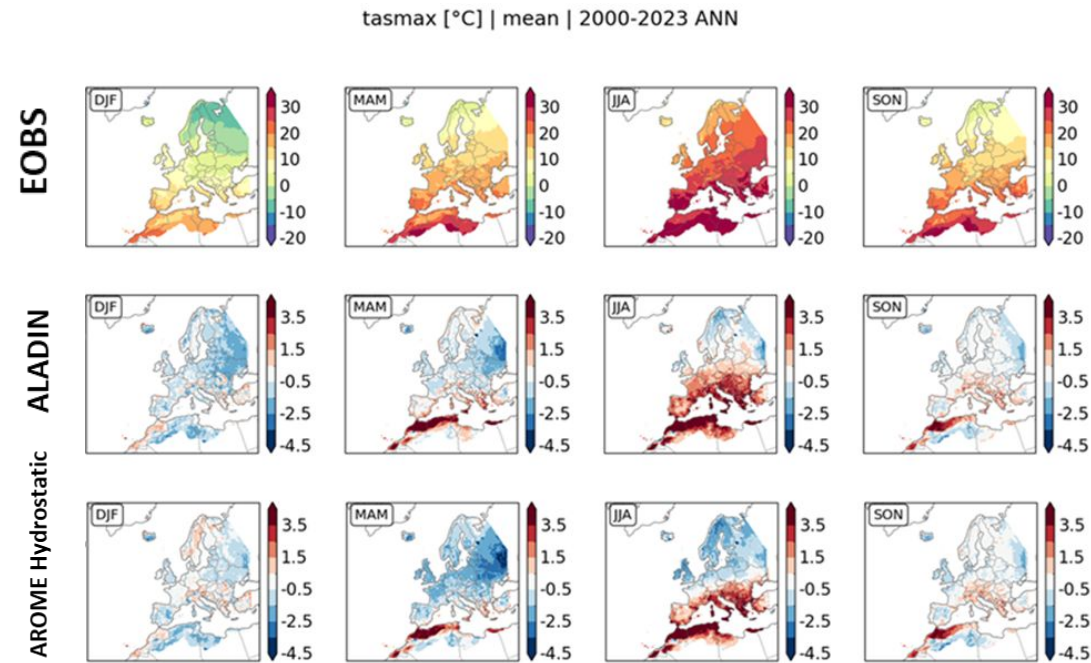
Evolution of cloud water from ALARO (1&2m), AROME-MF (ICE3 & LIMA), HARMONIE (ICE3 + OCND2 & ICE-T)

A Gaussian Approach to Flow-Dependent Correlations

- This algorithm shows how to generate anisotropic correlations for a random field on a grid with Gaussian distribution
- The local anisotropy is characterized by one or more “arbitrary” vector fields
- The properties of Gaussian integrals are used to study different ways in which these vector fields can couple to the random field
- The algorithm is based on calculations with a perturbation series whose order-zero term is a spatial homogeneous correlation function
- There is no need to specify a particular correlation function model
- Important aspects in the implementation of the algorithm like calibration and normalization are discussed
- The algorithm fits very naturally in variational DA systems widely used today in operational NWP
- It can be easily exploited in both deterministic and ensemble frameworks



Pan-European HCLIM Climate Simulations: Hydrostatic HARMONIE-AROME versus ALADIN



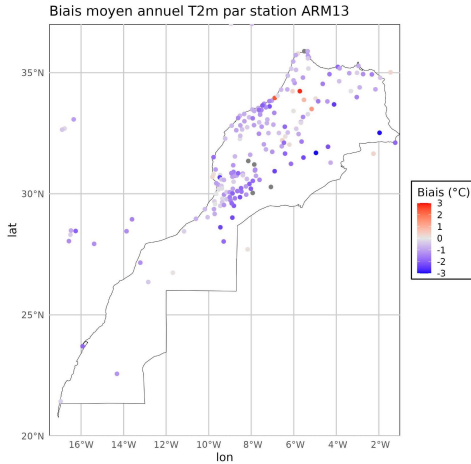
Question: Can HARMONIE-AROME in hydrostatic mode replace ALADIN for Pan-Euro downscaling?

Performed a set of 12km ERA-5 driven simulations for 2000 – 2023:

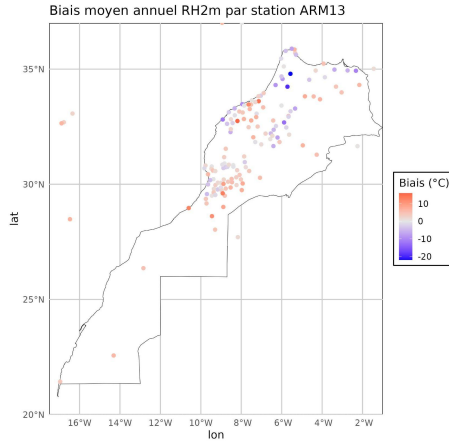
- Positive bias in HCLIM-AROME hydrostatic cloud cover which leads to a negative bias in temperature, particularly Tasmx.
- HCLIM-AROME hydrostatic overestimates precipitation, while HCLIM-ALADIN exhibits well-known drizzle problem.
- Results suggest that HCLIM-ALADIN remains the most suitable option for Pan-European downscaling at 12 km resolution, although high-res regional HCLIM-AROME hydrostatic simulations may also be feasible.
- Future research question: Can HCLIM-ALADIN precipitation bias be improved via parametrisation tuning?

Verification of the AROME 1.3 km Convective-Scale Model over Morocco Using Surface and Upper-Air Observations

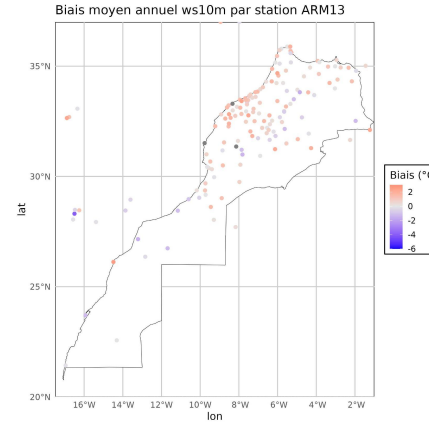
Surface results



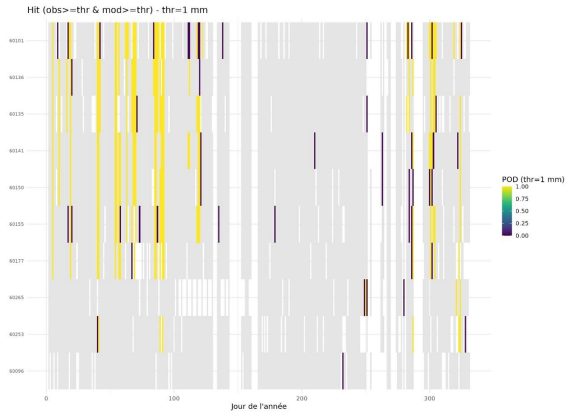
average annual bias for temperature at 2m



average annual bias for Relative Humidity at 2m



average annual bias for Wind at 10m

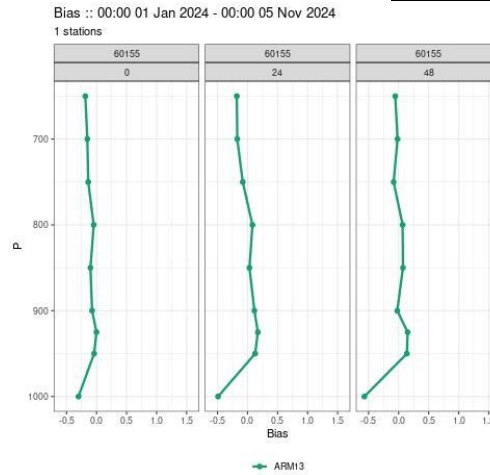


POD Heat Map of precipitation

Main Findings:

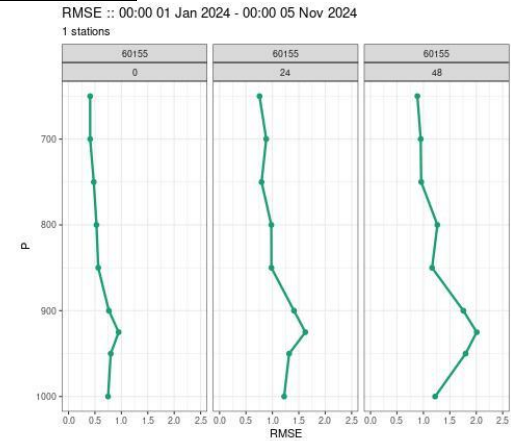
AROME 1.3km provides a good representation of the atmospheric structure, but most of the errors are concentrated in the lower troposphere, especially for humidity and near-surface variables

Altitude results



ARM13

Verification for T



ARM13

Verification for T

Pseudo Global Warming approach in HCLIM and Tactus

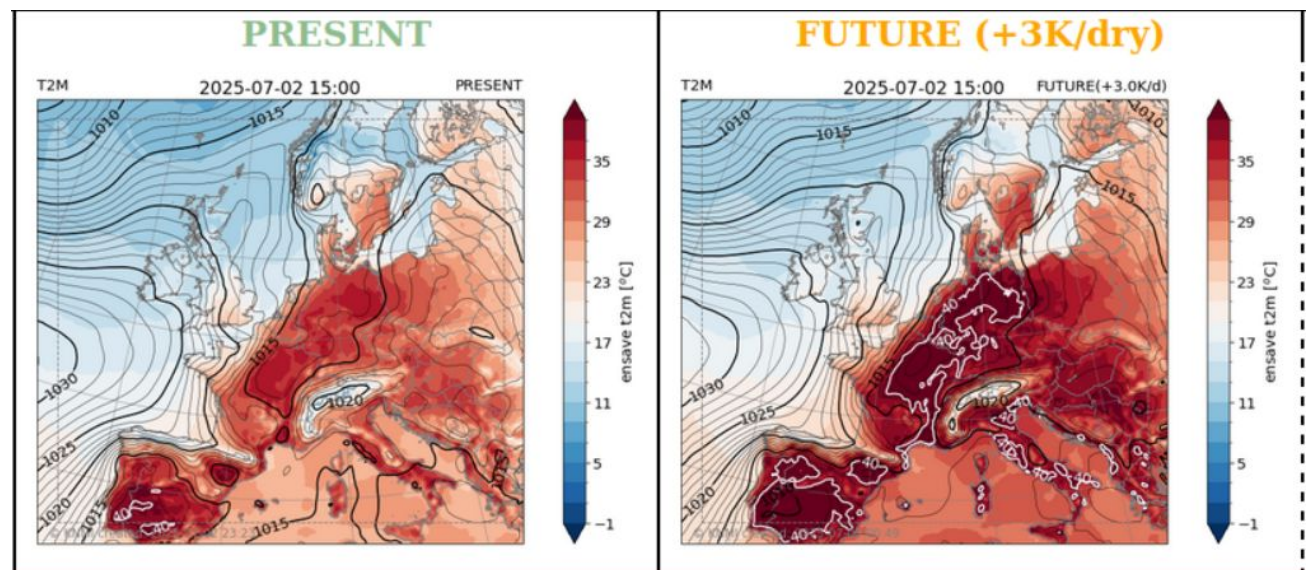
- > To what level will temperatures rise during future heatwaves?
- > How intense will heavy precipitation be in 50 years?

Pseudo global warming:

- Past weather events are re-simulated under future climate conditions

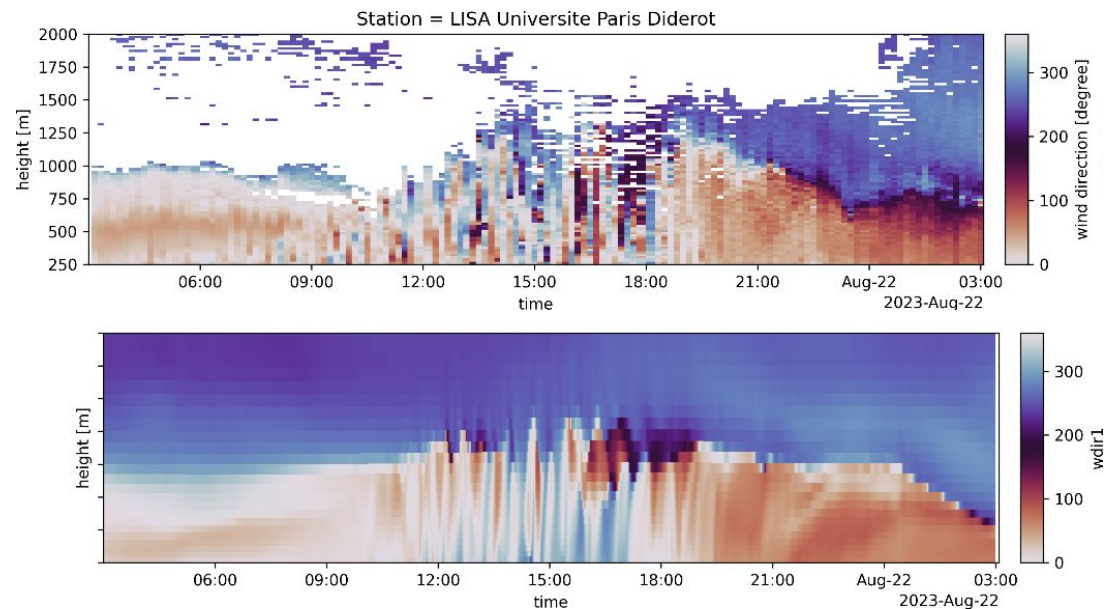
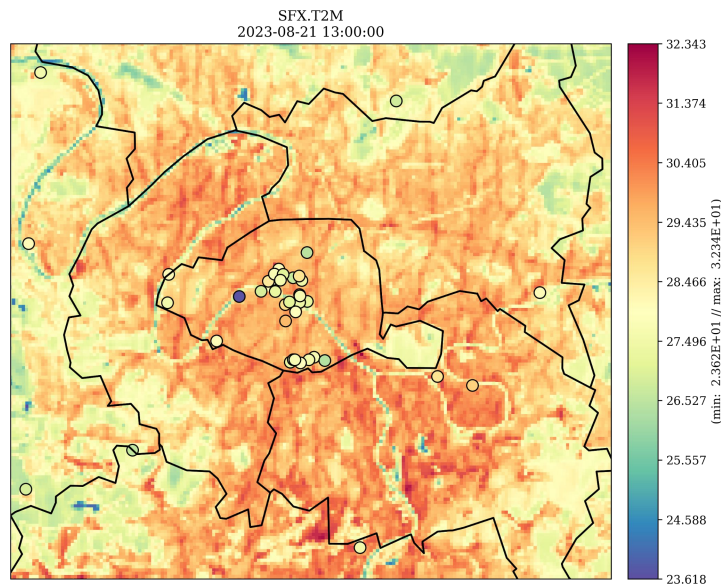
At KNMI:

- implementation in GL
- HCLIM and Tactus
- available to the community (soon)

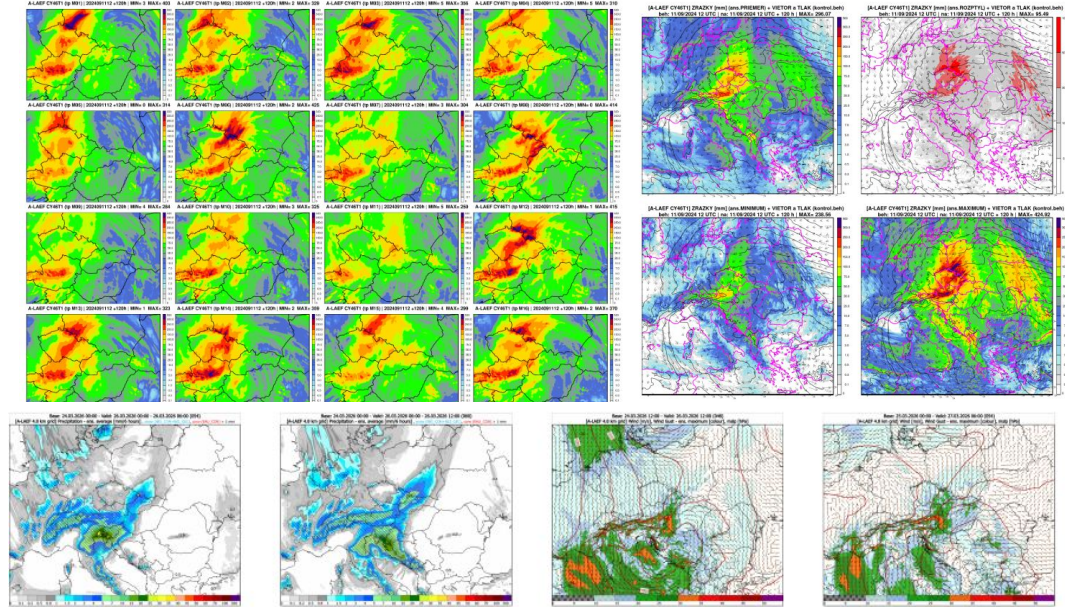
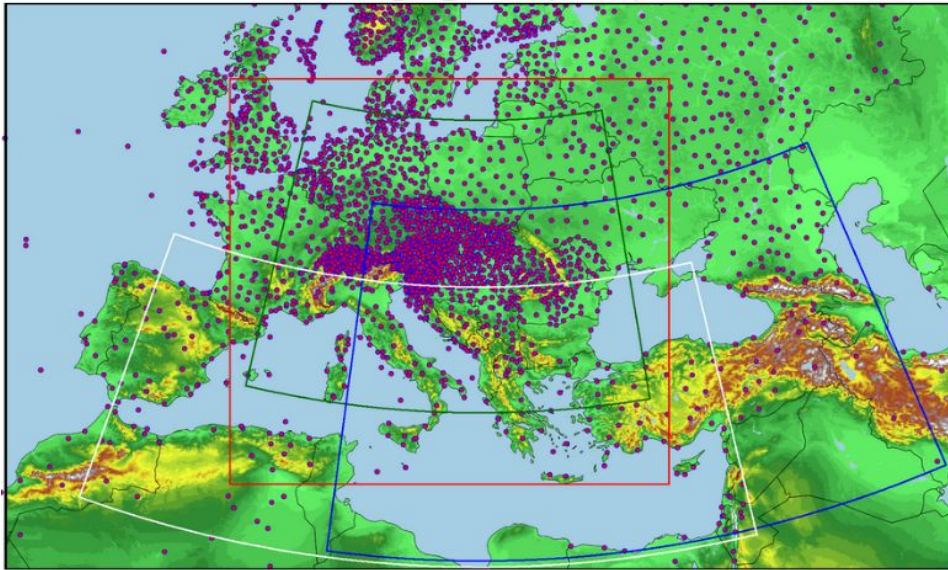


HIGH-RESOLUTION NWP FORCING FOR URBAN-SCALE HEAT AND AIR-QUALITY SIMULATION

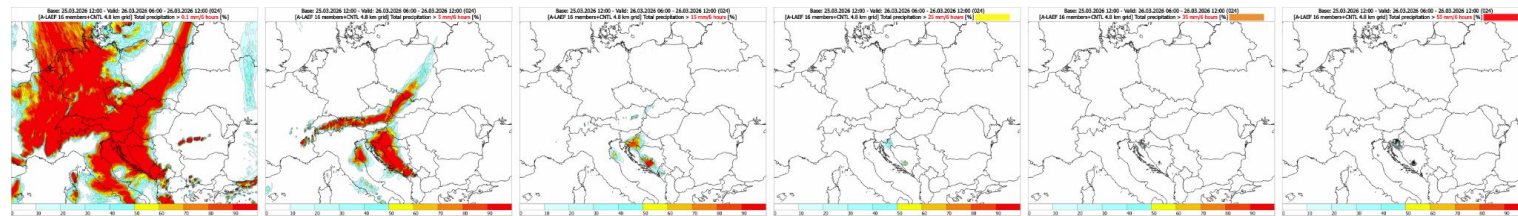
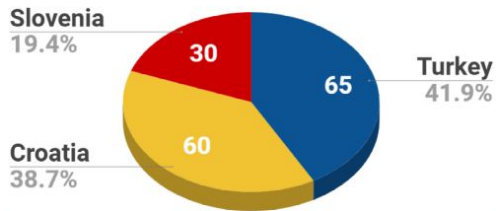
- NWP models → force downstream urban-scale models (**UrbanAIR**)
- **Higher resolution** → added value for **LES forcing**.
- **Ongoing** investigation: surface spin-up + OpenStreetMap in UrbanAIR Tactus
- **Opportunity:** observational data + LES for turbulence parameterization
 - Length scales
 - Horizontal shear production
 - other..



A-LAEF - an ensemble system using ALARO CSC overview



SBUs [millions] for A-LAEF TC2 operations in 2024



The operational domain (top left) run on ECMWF HPC as TC2 using national SBUs from several countries (bottom left), the upgrade tested on storm Boris from September 2024 (top right) and the current operational performance for a storm in Croatia from March 2026 (bottom right).

