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# Comparison of high-resolution HARMONIE-AROME heat-wave results to a vast observation network in Turku, Finland

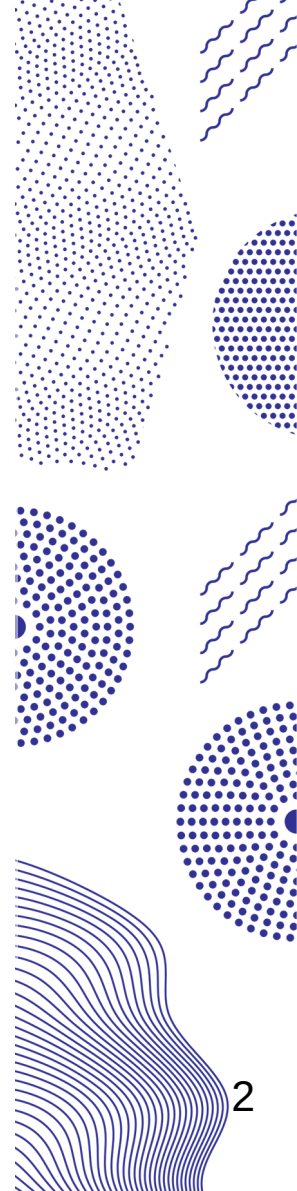
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# Content

- Setup
  - HARMONIE-AROME experiment
  - Model physiography in Turku
  - TURCLIM logger network
- Results
- Conclusions

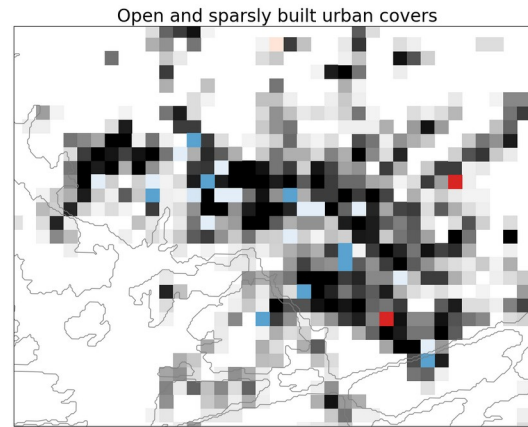
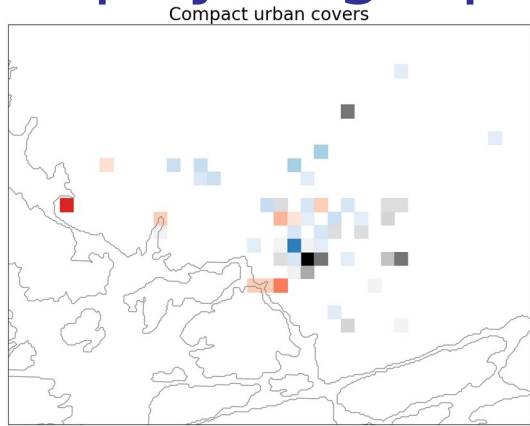


# High-resolution HARMONIE-AROME experiment

- Cy43h2.1
- 750 m spatial, 1 h temporal resolution
- Nested into operational analyses of the ECMWF
- 6-hourly forecasts
- 2018 July heatwave (25.-31.7.)
- Focus on the city of Turku

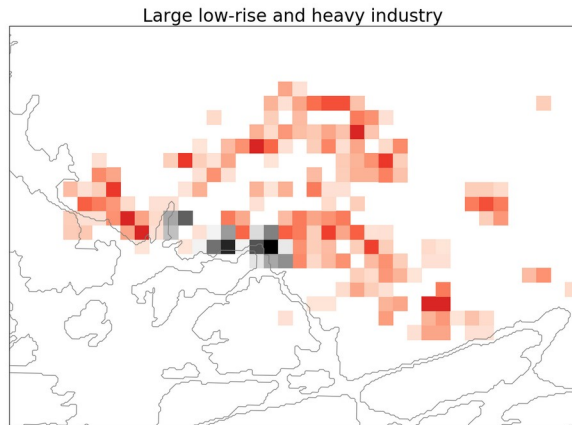


# Model physiography in Turku

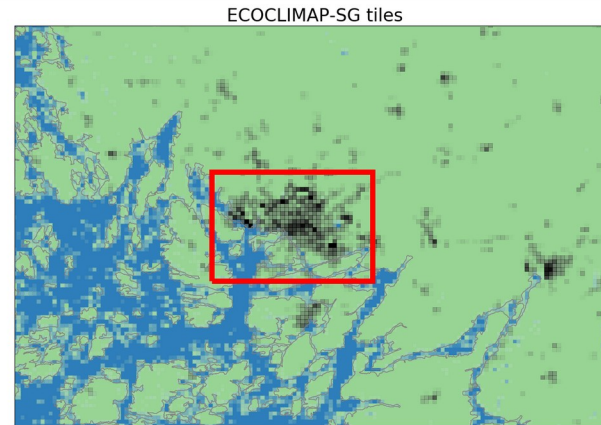


■ LCZ1: compact high-rise ■ LCZ2: compact midrise ■ LCZ3: compact low-rise

■ LCZ5: open midrise ■ LCZ6: open low-rise ■ LCZ9: sparsely built



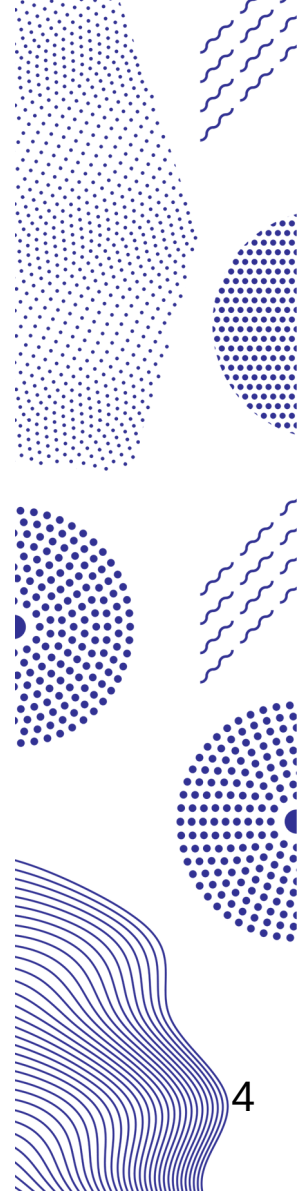
■ LCZ8: large low-rise ■ LCZ10: heavy industry



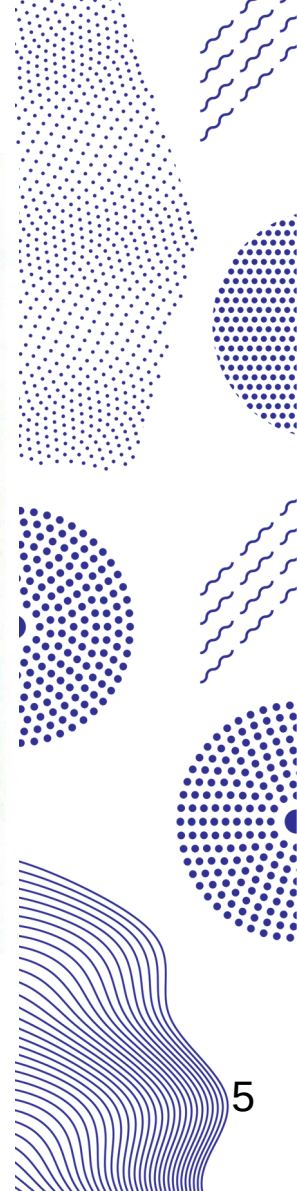
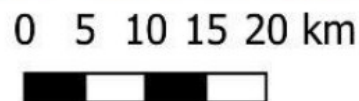
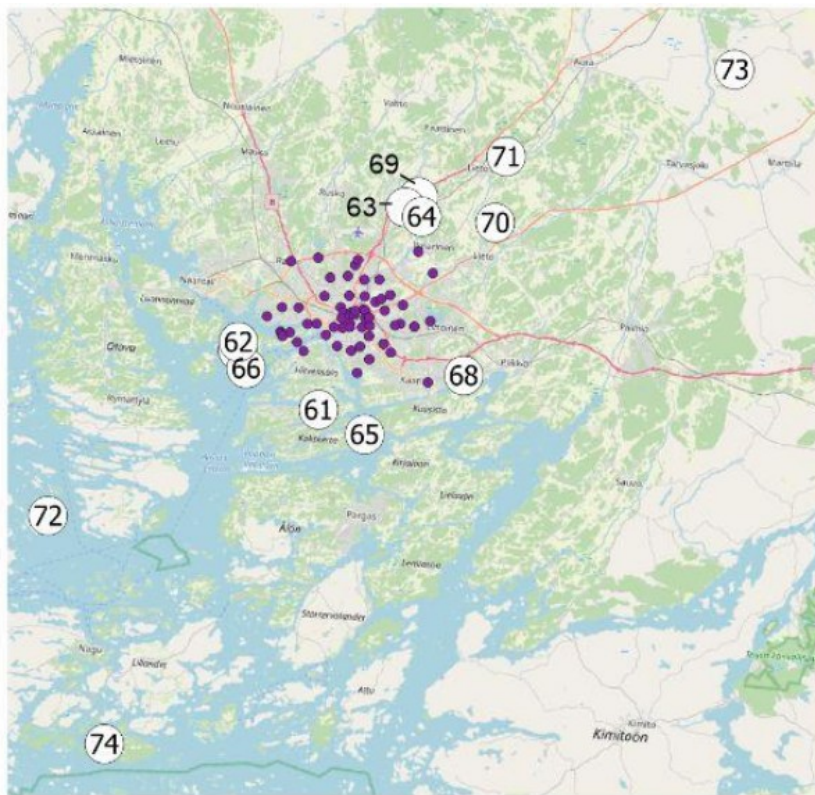
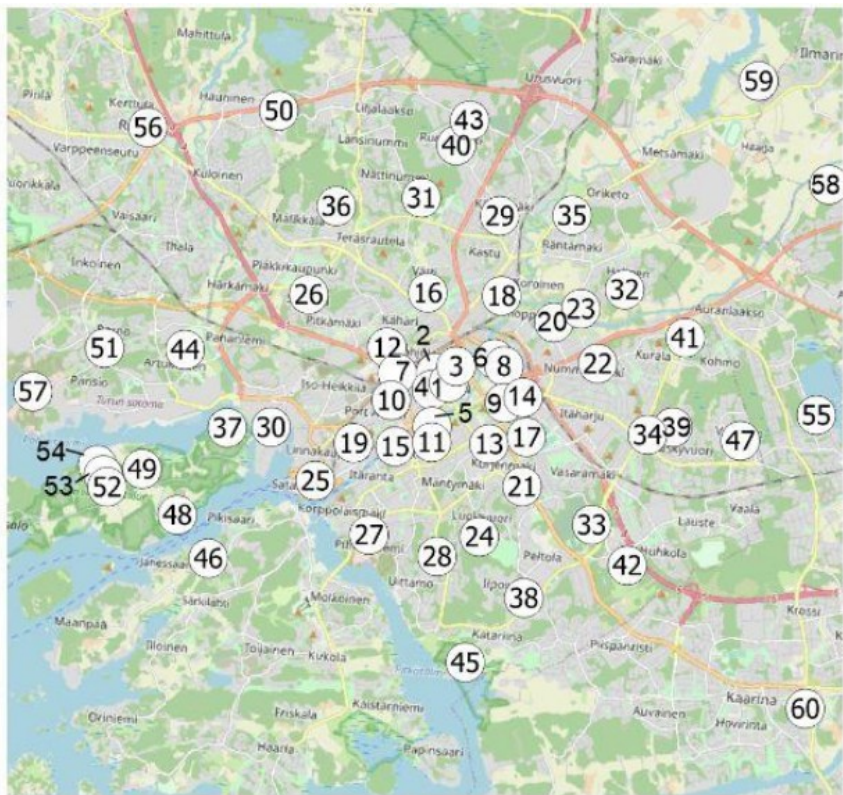
■ Sea and lakes ■ Nature ■ Town



FMI

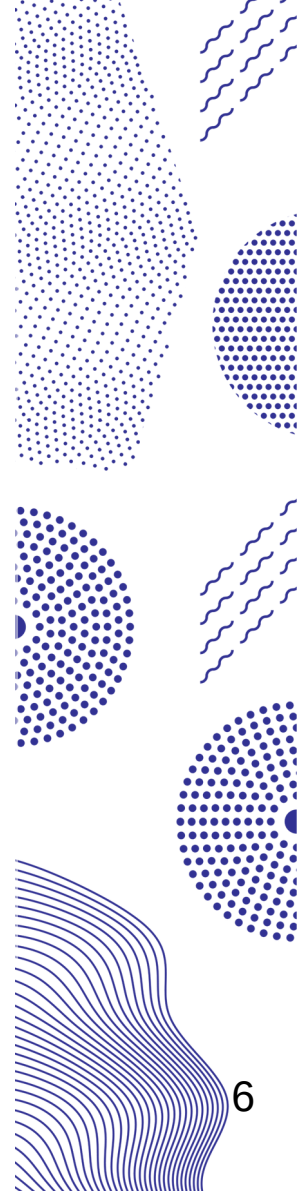


# TURCLIM weather data logger network



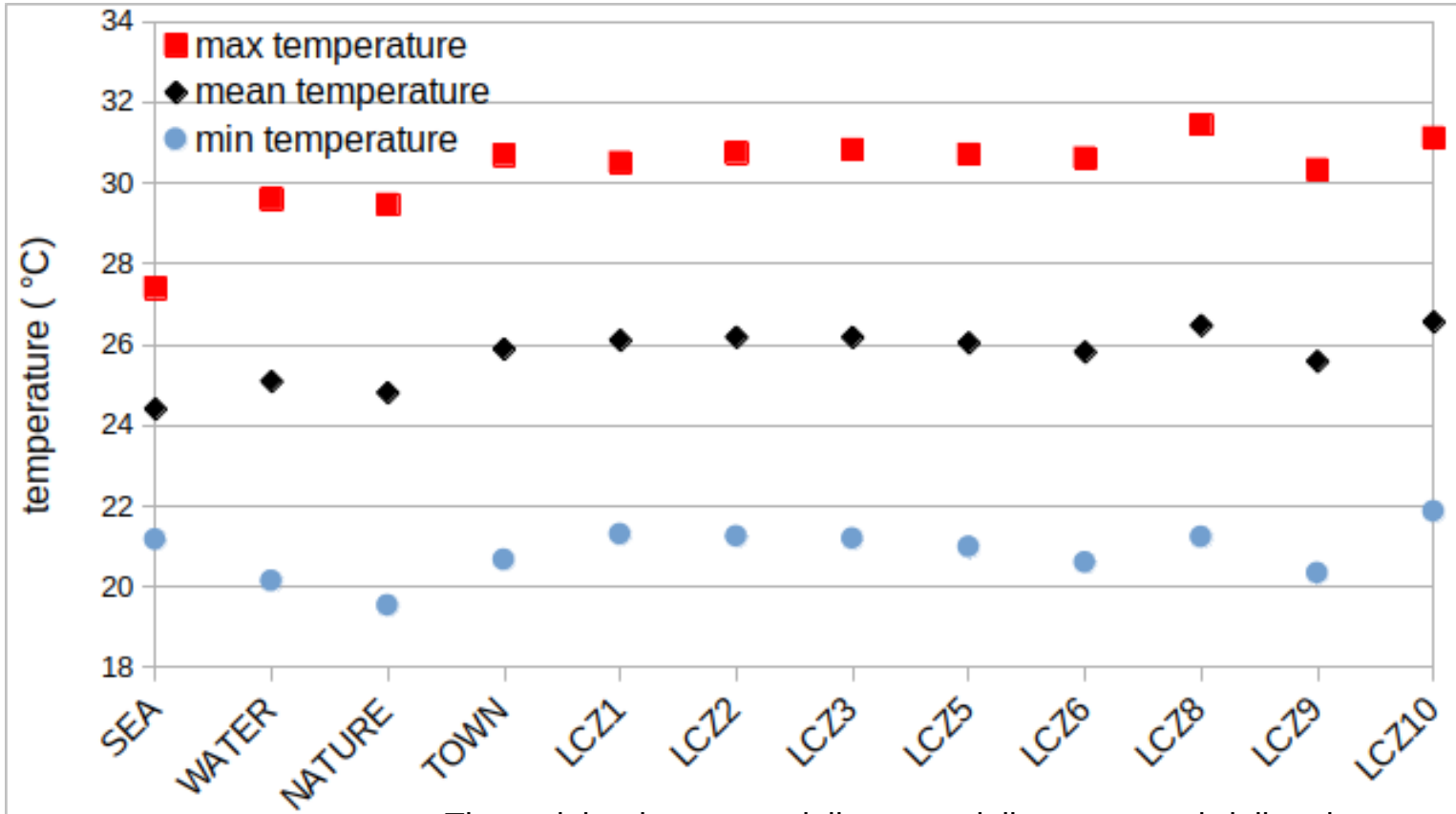
# Content

- Setup
- Results
  - Temperatures in different physiography
  - Diurnal cycles of modelled and observed temperatures
  - Site-specific differences
- Conclusions

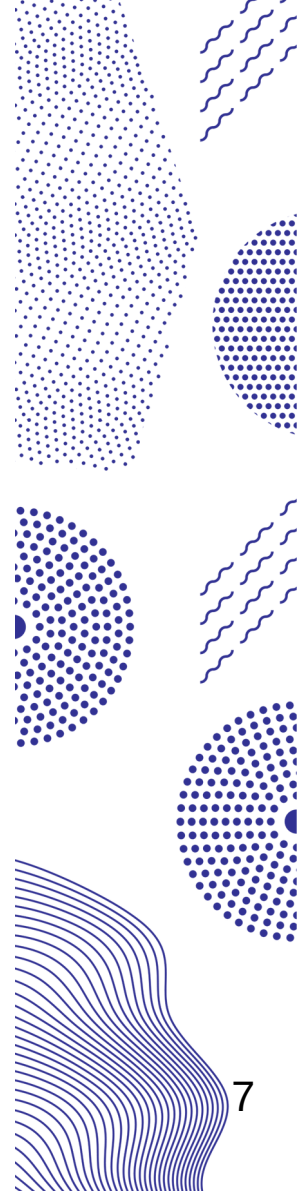




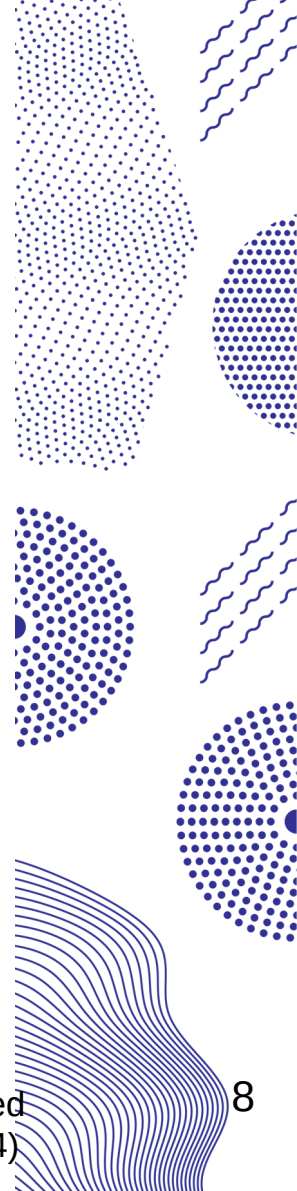
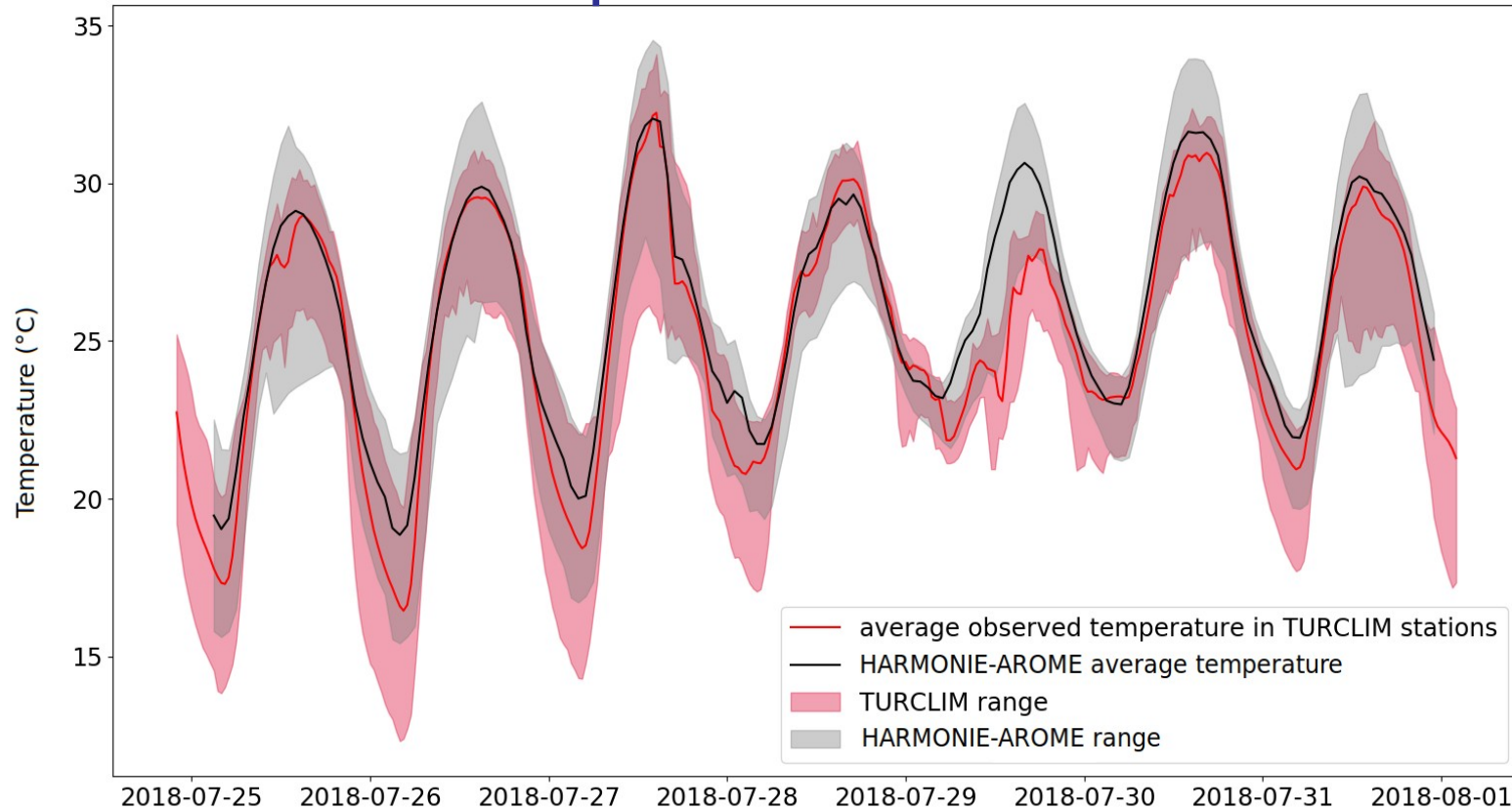
# Temperature in different land-use areas



The weighted average daily max., daily mean, and daily min. temperatures for each tile type and for urban covers. The weighted average temperatures are calculated from daily temperatures of the one week period 25.-31.7.2018 using grid cell tile/cover percentages as weights. (Suomi et al. 2024)

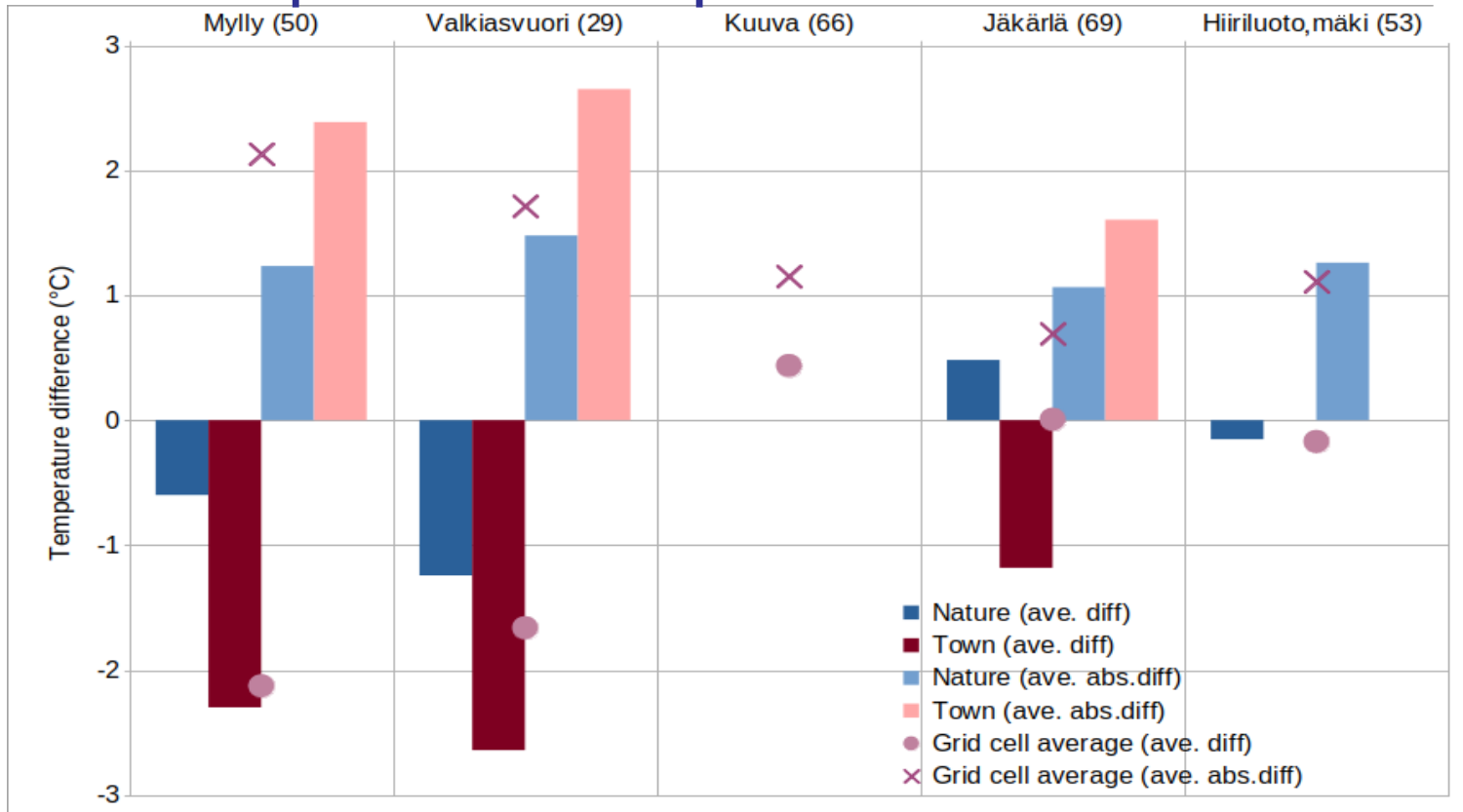


# Diurnal ranges of observed and modelled temperatures

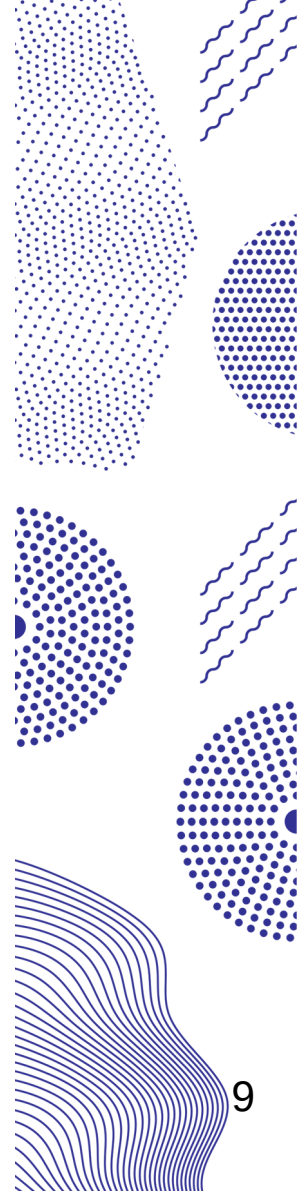




# Site-specific temperature differences



Average differences (obs. - mod.) and average absolute differences between the town (TEB), nature (ISBA), and grid cell averages of the modelled and observed temperatures of selected stations: Mylly (urban), Valkiasvuori and Jäkärä (semi-urban), Hiiriluoto mäki (rural), Kuuva (sea). (Suomi et al. 2024)



# Physiography at Mylly and Jäkärälä sites



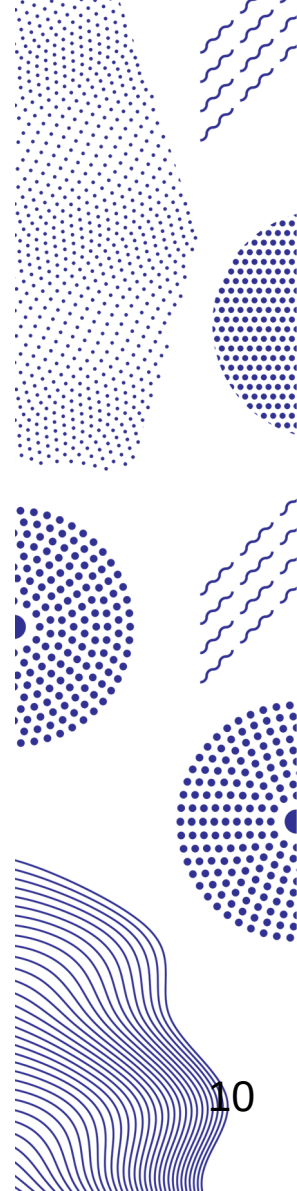
Mylly

Jäkärälä



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Mylly: Located at a small green area. Model: 100% LCZ8: 'large low-rise'.  
Jäkärälä: Suburban area. Model: 93.3 % 'sparsely built', 6.7 % 'winter C3 crops'





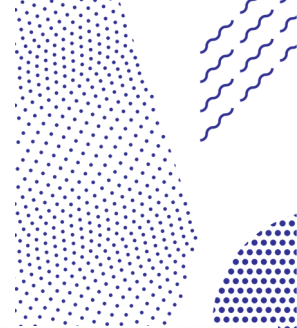


Mylly



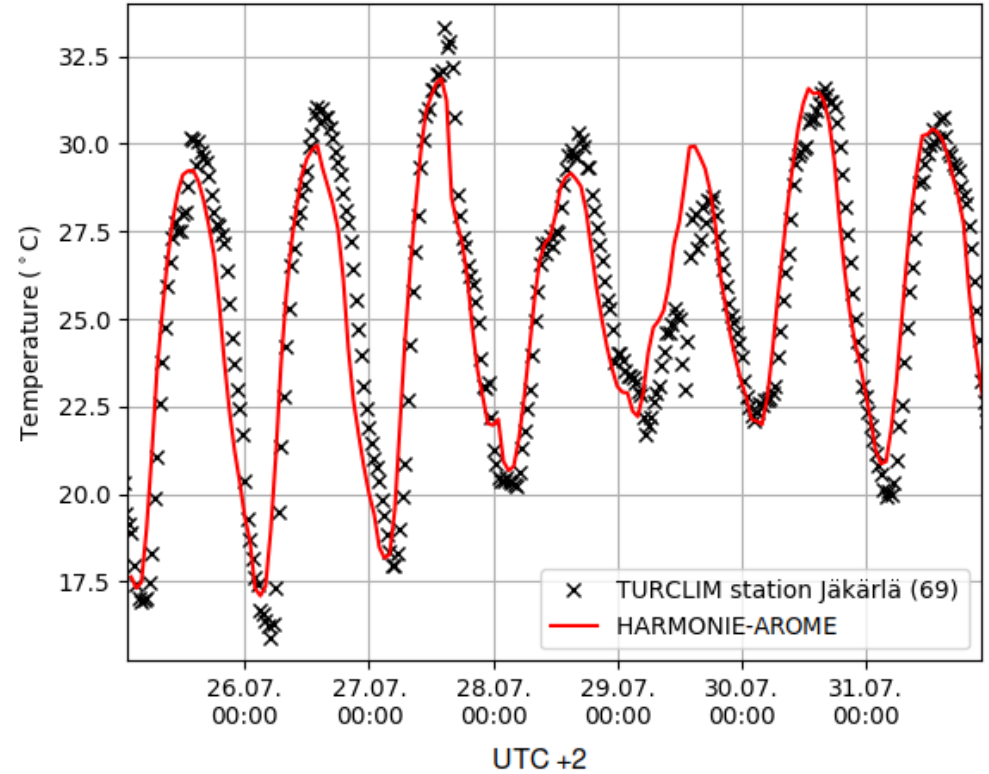
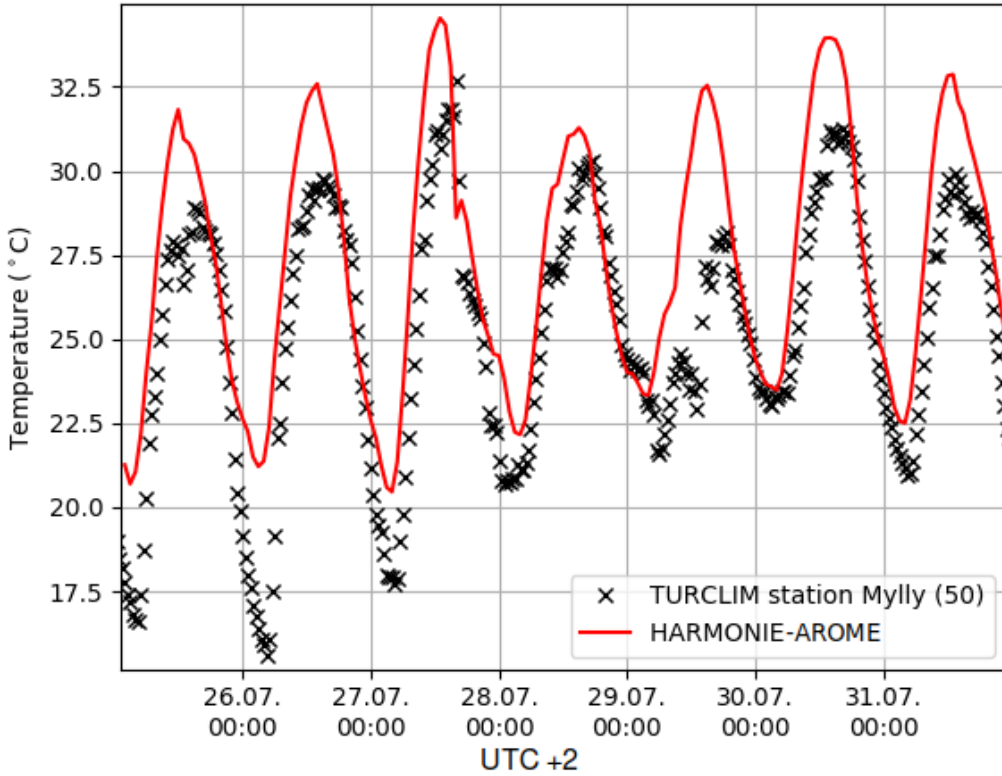
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Jäkärä





# Temperature variation at Mylly and Jäkärä sites



Modelled temperatures at 'Mylly' site are warmer than the observed throughout the period, while at 'Jäkärä' site the modelled temperatures correspond to the observed temperatures more clearly. (Suomi et al. 2024)

# Conclusions

- HARMONIE-AROME performs well at 750 m resolution and captures the daily variation during a heat-wave in Turku
- Night-time temperatures are too warm in the model
- The performance of the model is greatly affected by the accuracy of the physiographic description

## Reference:

J. Suomi, O. Saranko, A.-I. Partanen, C. Fortelius, C. Gonzales-Inca, J. Käyhkö, 2024. *Evaluation of surface air temperature in the HARMONIE-AROME weather model during a heatwave in the coastal city of Turku, Finland*. Urban Climate, Volume 53, 101811, <https://doi.org/10.1016/j.uclim.2024.101811>.

Thank you for listening!

