Road weather model for Iceland

Grant no. 1800-1086

Recent Developments and Outlook

Ólafur Rögnvaldsson – or@belgingur.is
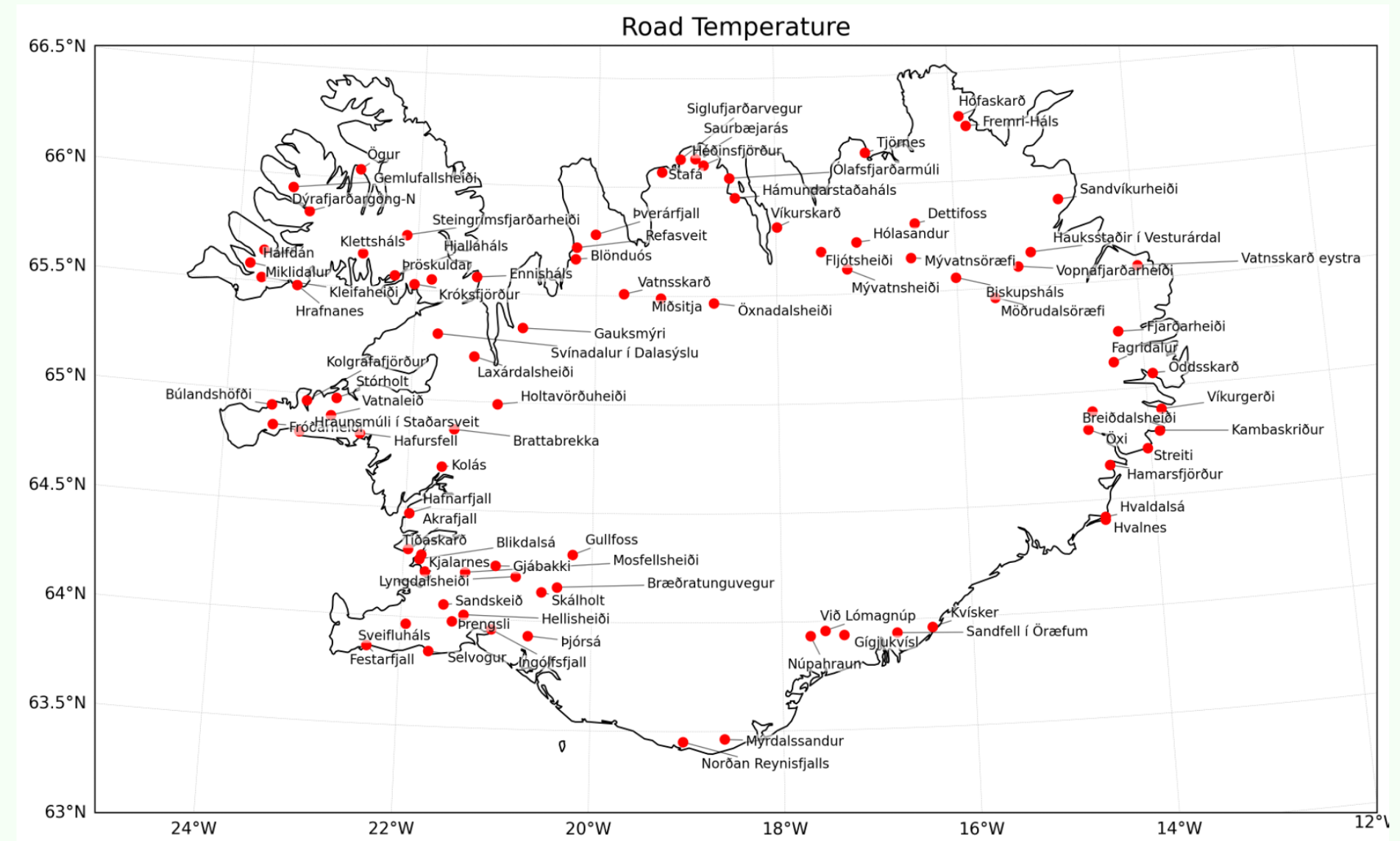
Jorge Rosas Santana

Mikołaj Okrzesa

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Outline of this talk

- *Project description*
- *Input data*
- *Methodology*
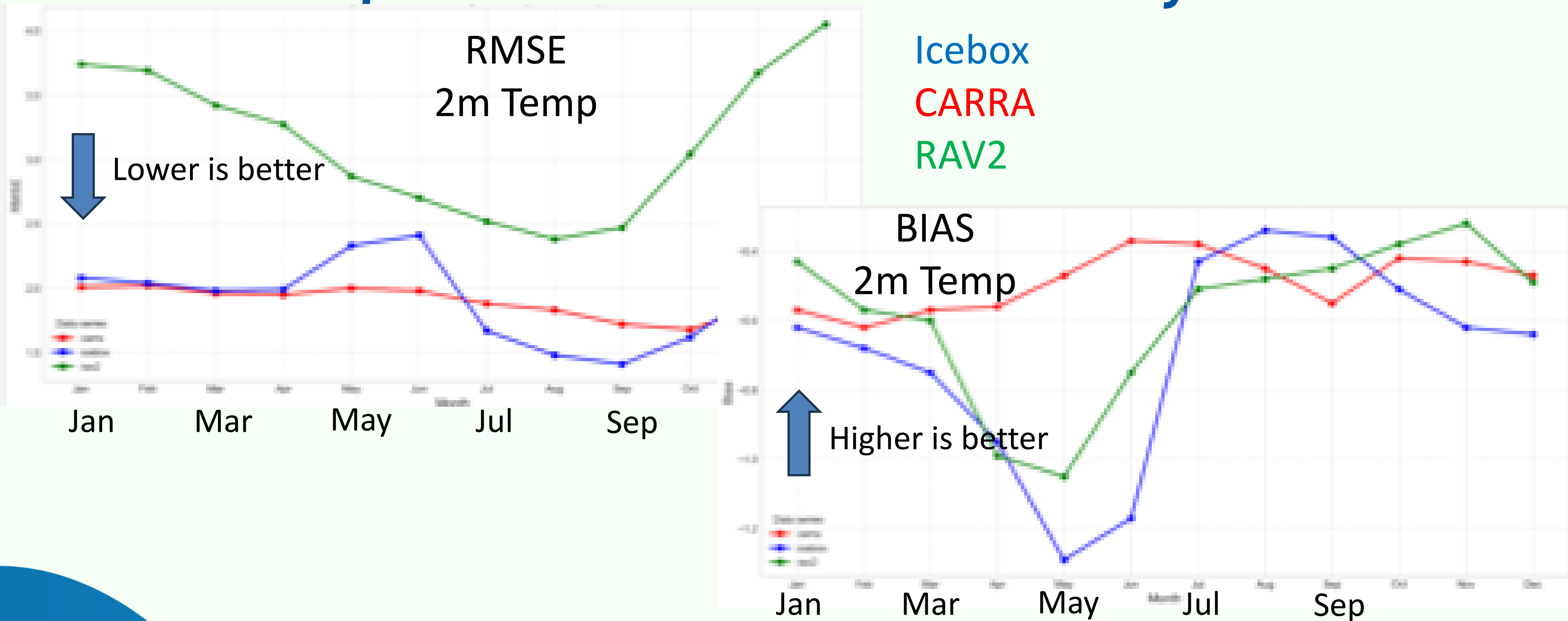- *Initial results*
- *Outlook*
- *Summary*

Location of weather stations observing road surface temperature

Project description

- **Test the RoadSurf model**
  - *Simulates road surface temperature and the amount of water, ice, snow, and black ice on the road*
- **Use observations and data from the downscaled weather analysis for Iceland called Icebox**
  - *Wind, air temperature, radiation fluxes, relative humidity and precipitation intensity*
- **RoadSurf was run in a set of 24 hour simulations, restarted at six hour intervals**
- **Simulated road surface temperature compared to observed one at 90 locations for the period from September 2024 through April 2025**
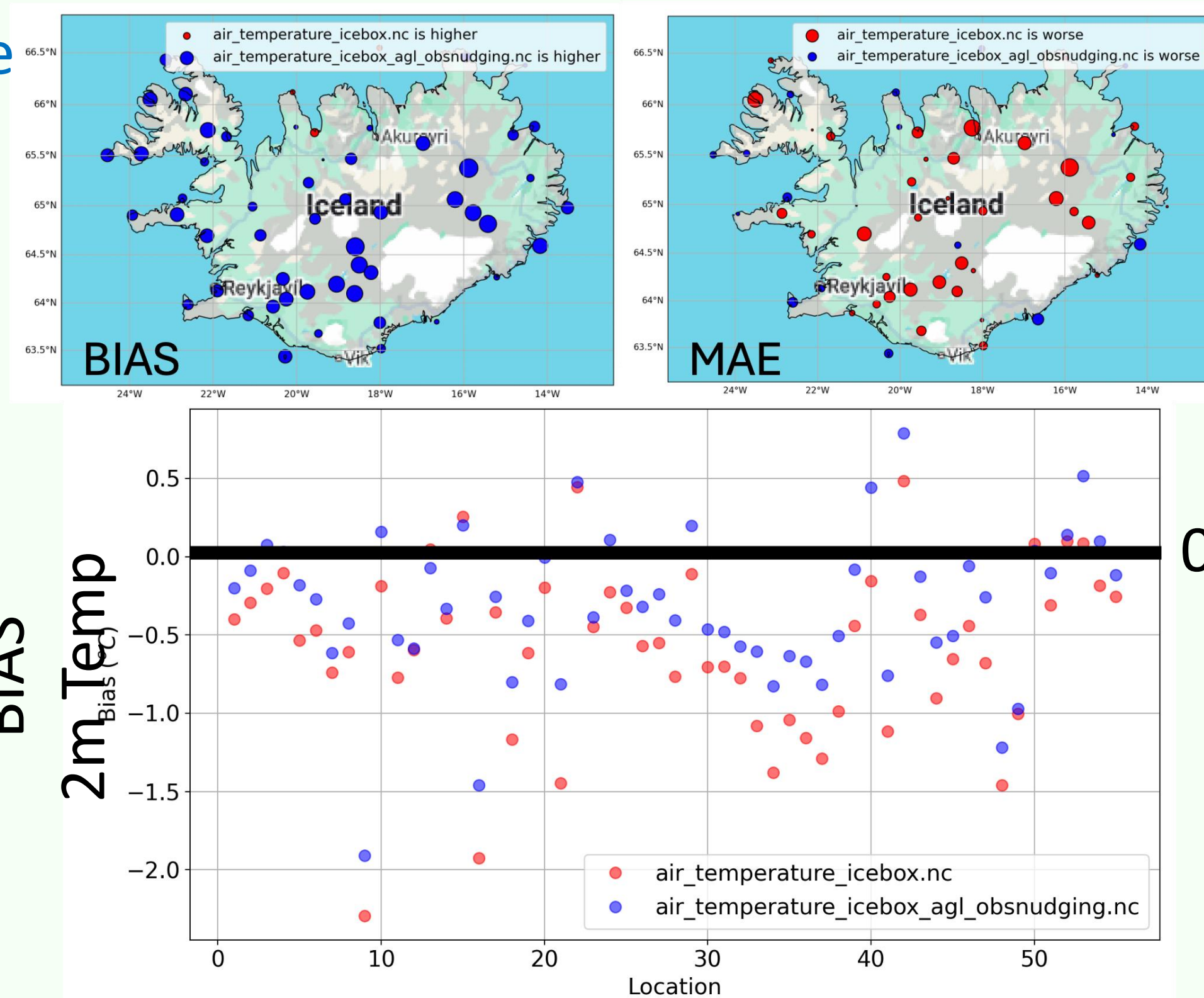
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Input data – Simulated weather analysis

RMSE
2m Temp

Lower is better

Jan   Mar   May   Jul   Sep

Icebox
CARRA
RAV2

BIAS
2m Temp

Higher is better

Jan   Mar   May   Jul   Sep

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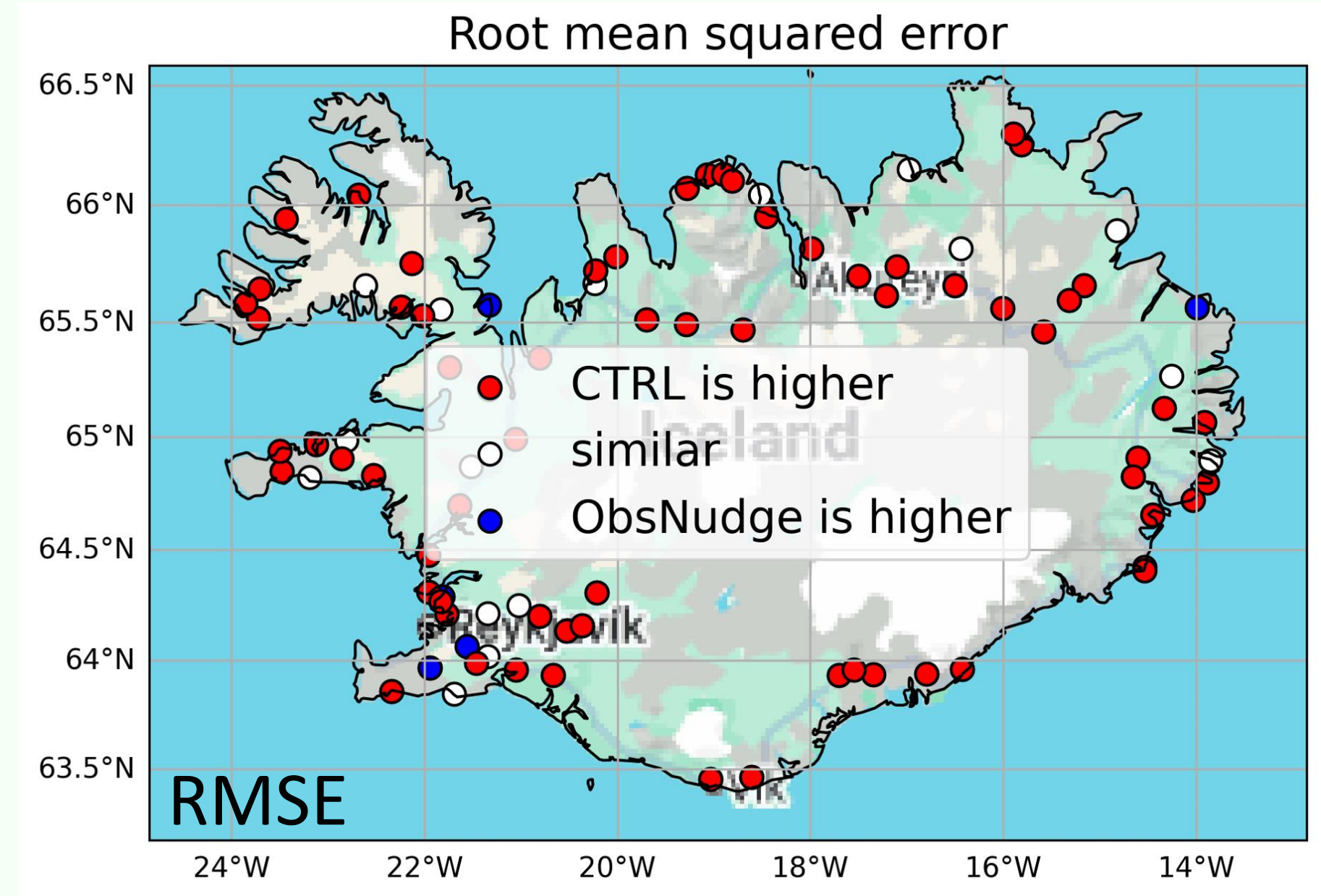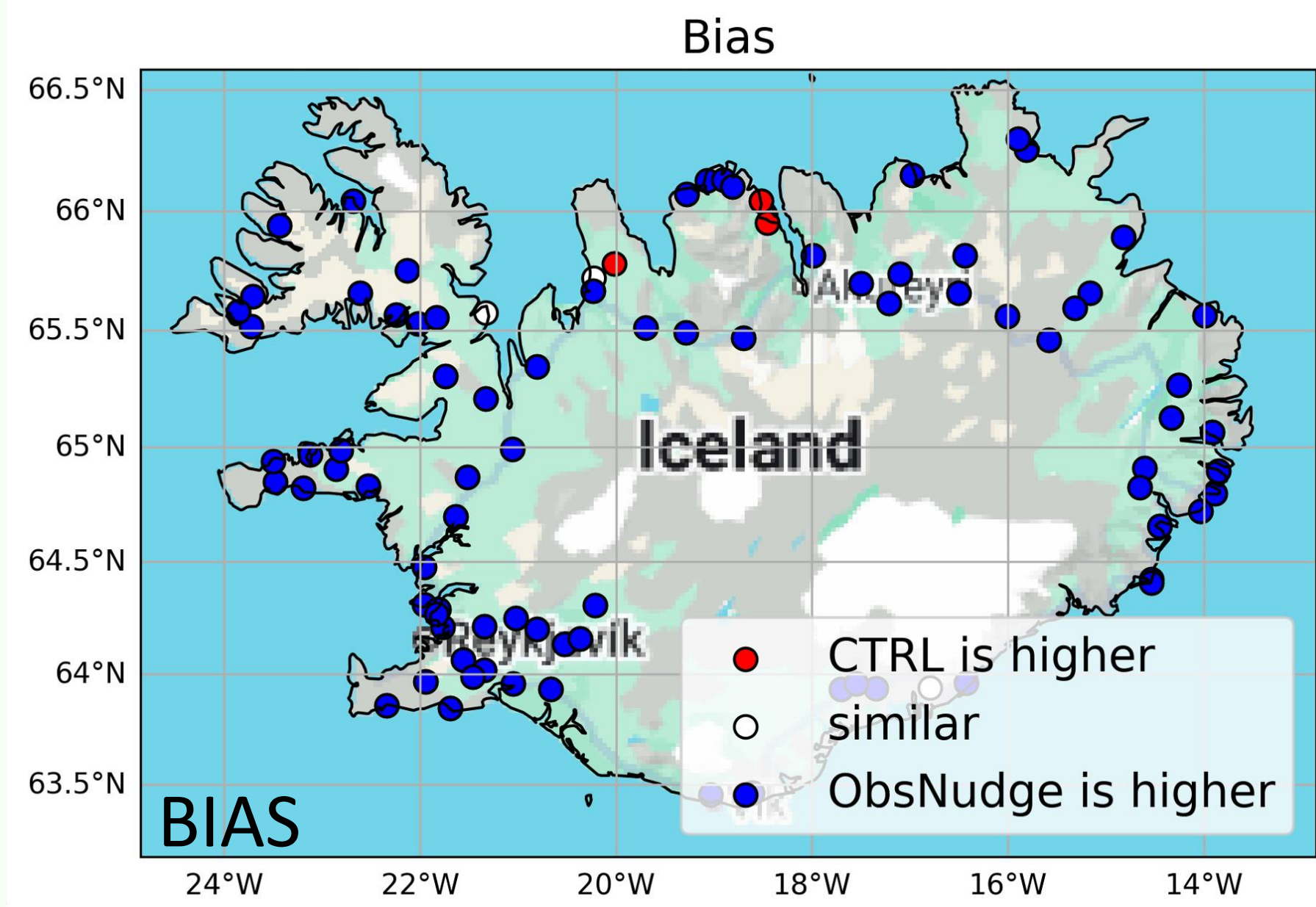# Input data – Ctrl vs. ObsNudge

Icebox - ObsNudge

Icebox - CTRL

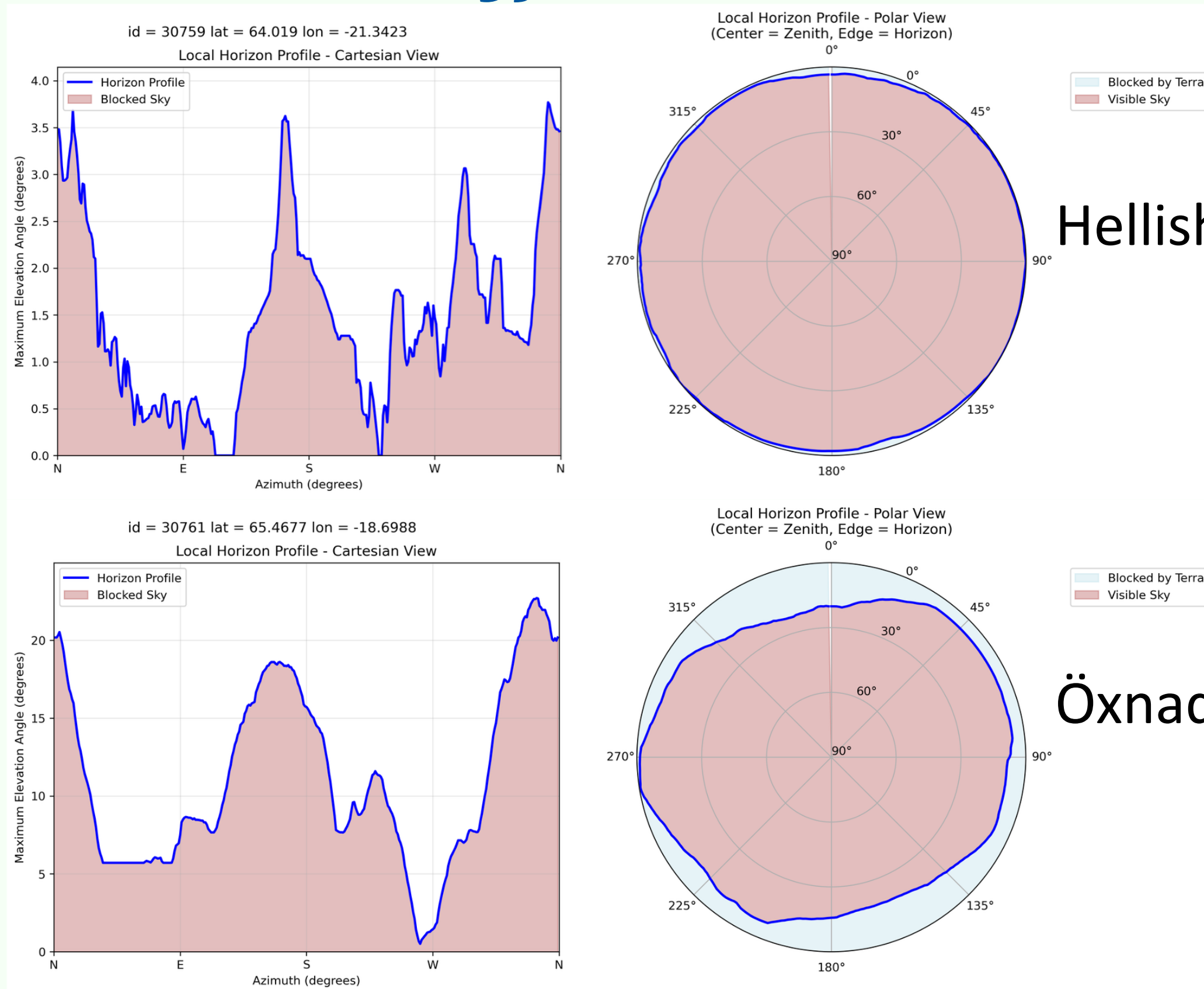# Input: ObsNudge vs. CTRL

Sneak peek: ObsNudge gives better
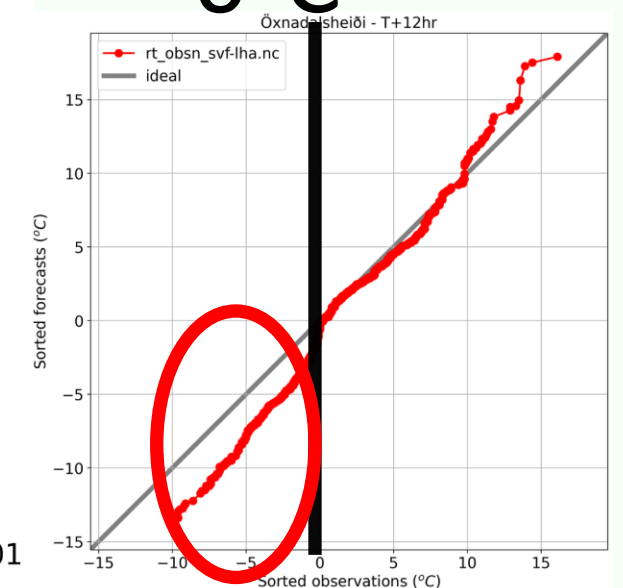results than CTRL

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Methodology – Spin up

Only observations for spin up

Observations blended with simulated data

Only simulated input

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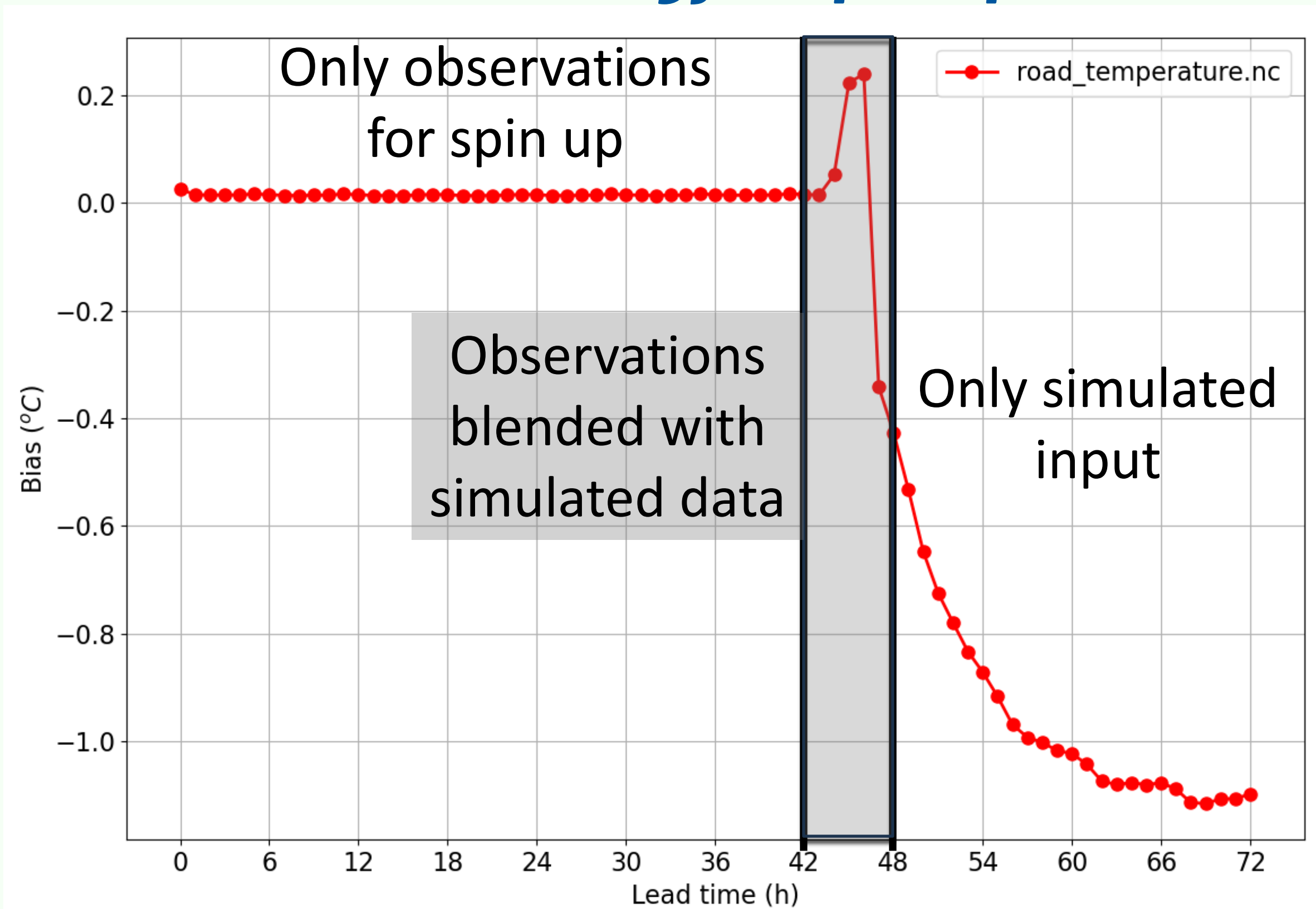
Methodology – Shadow effect
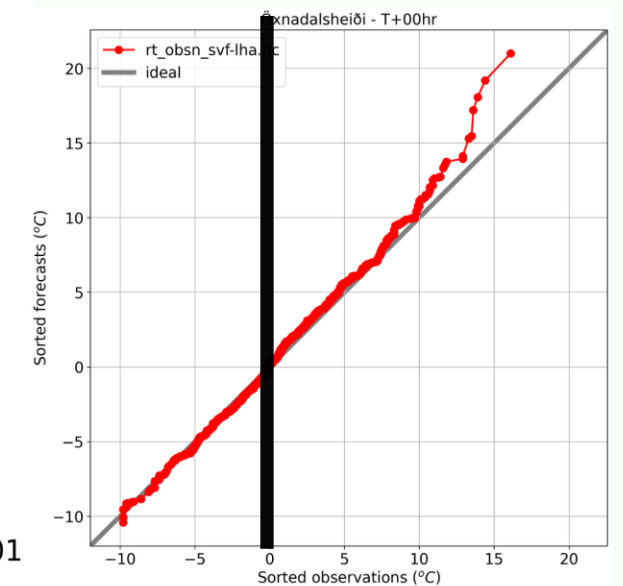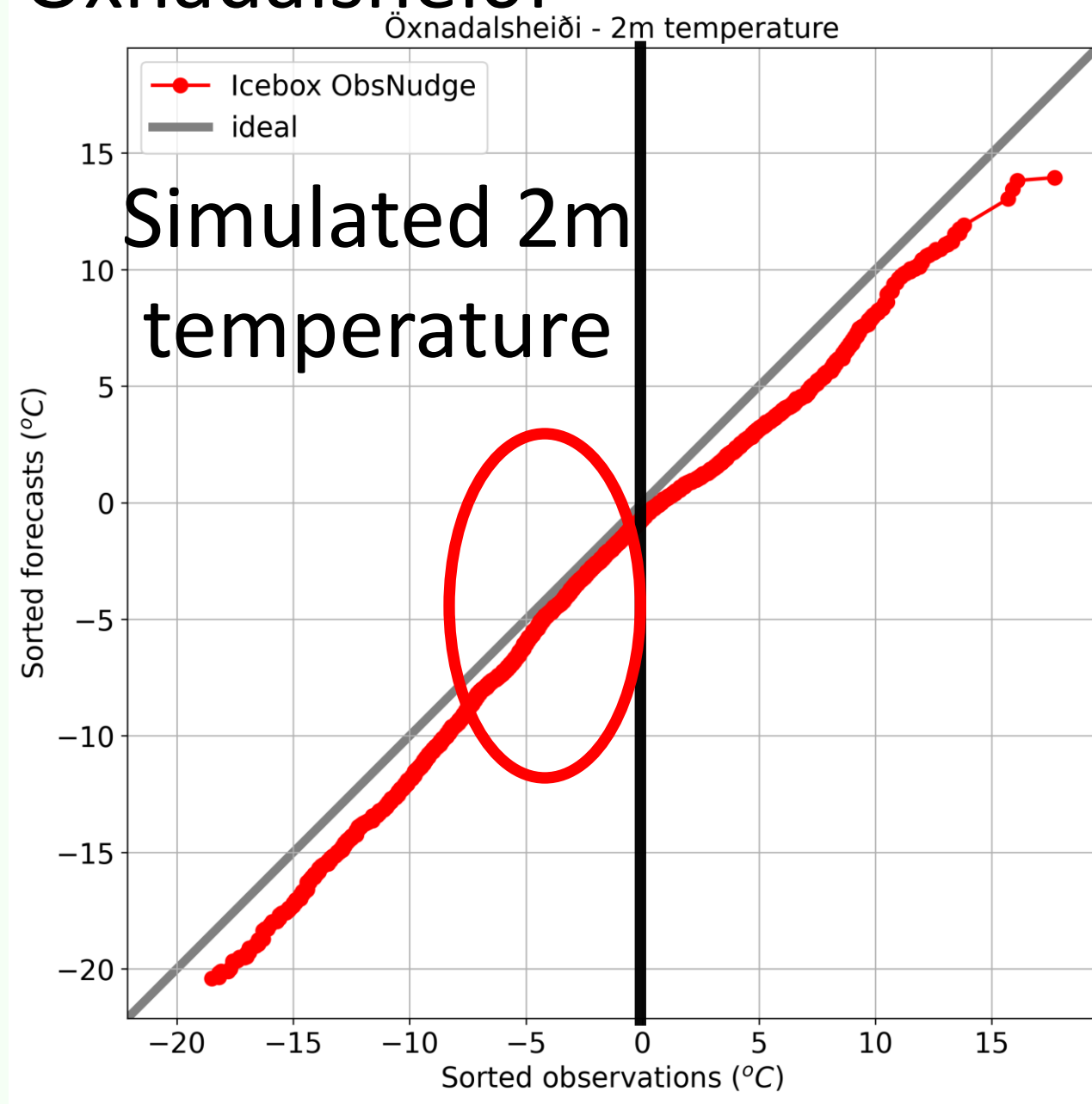

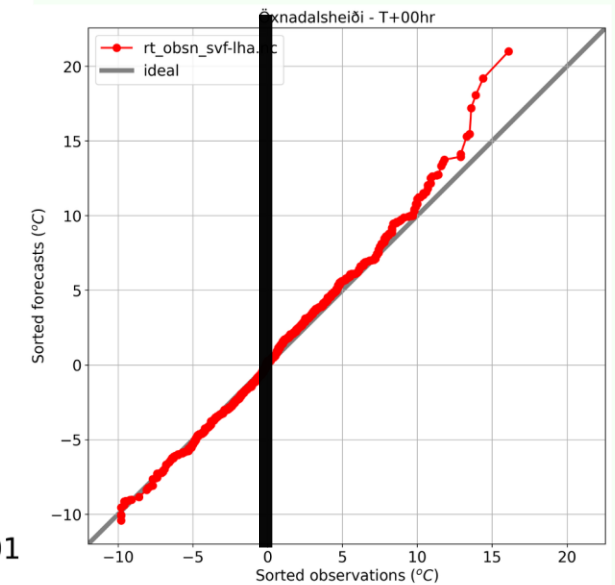Hellisheiði

Öxnadalsheiði
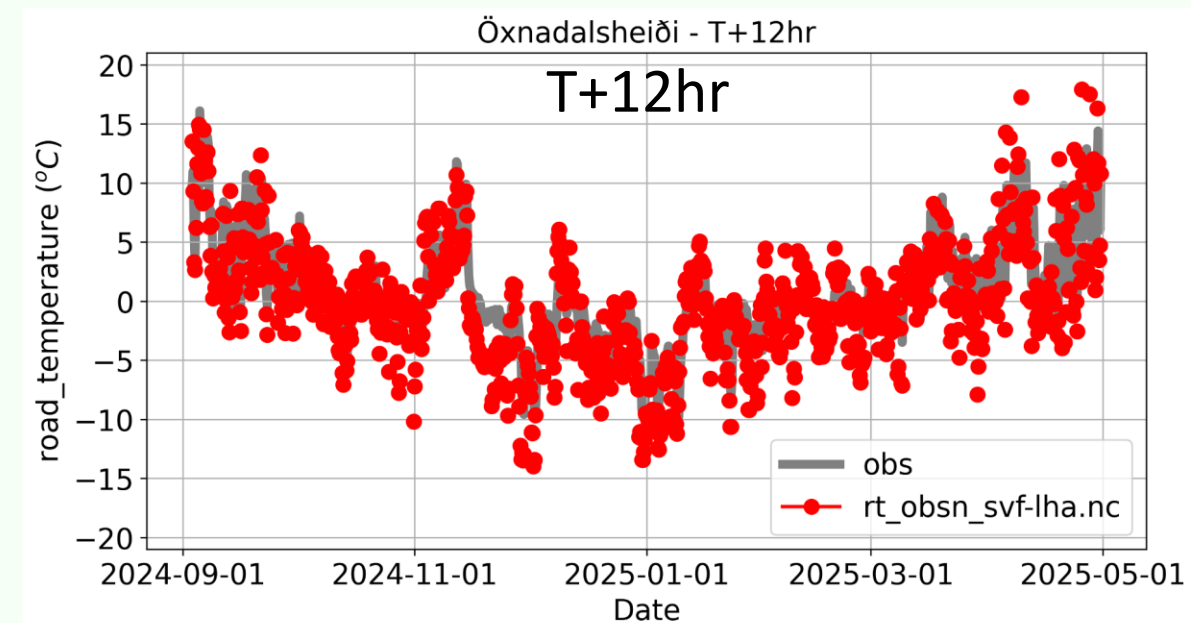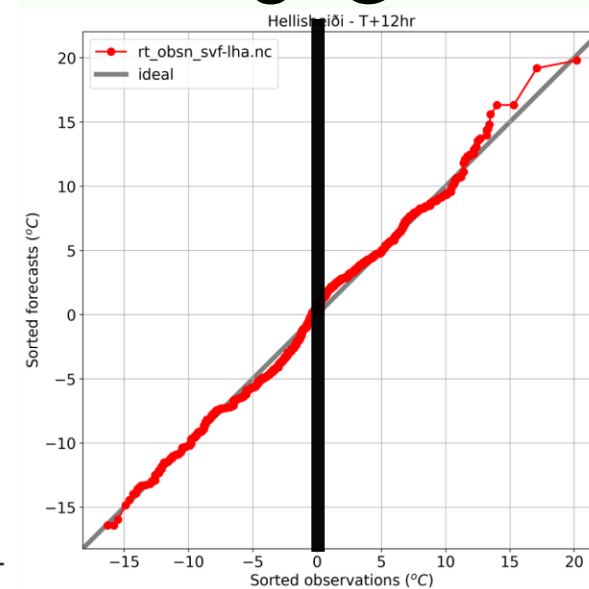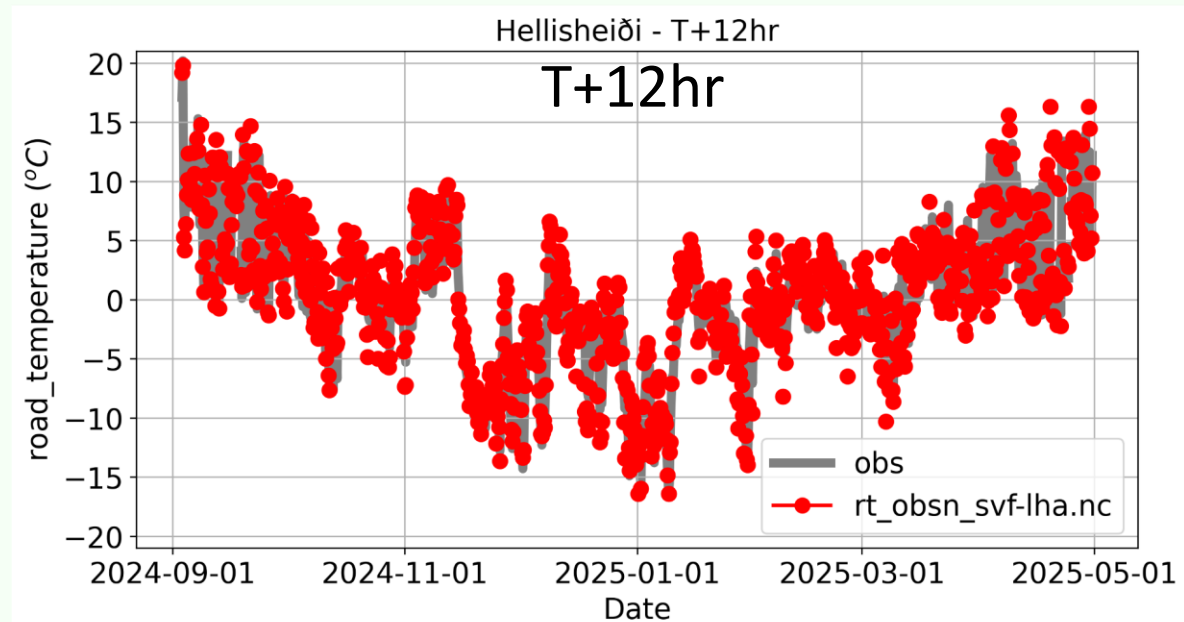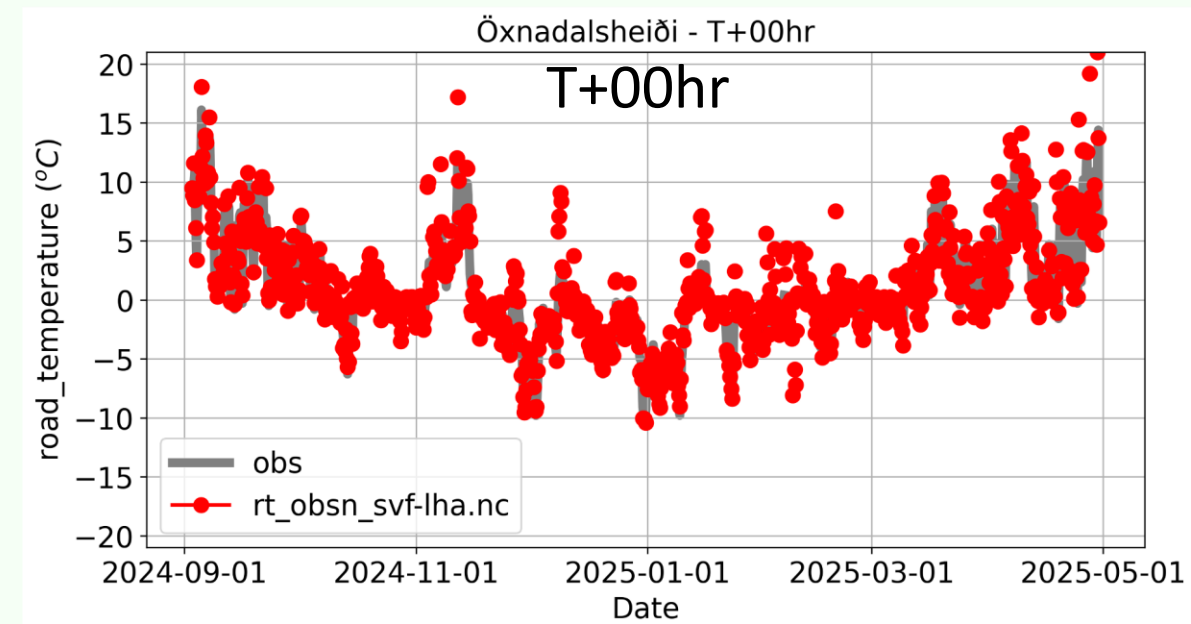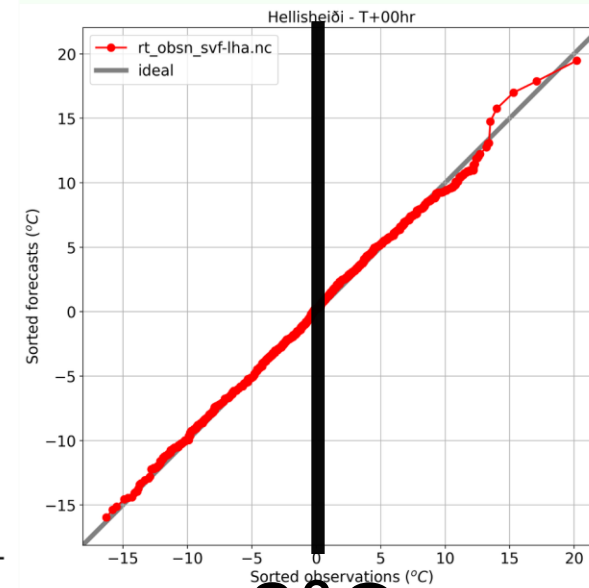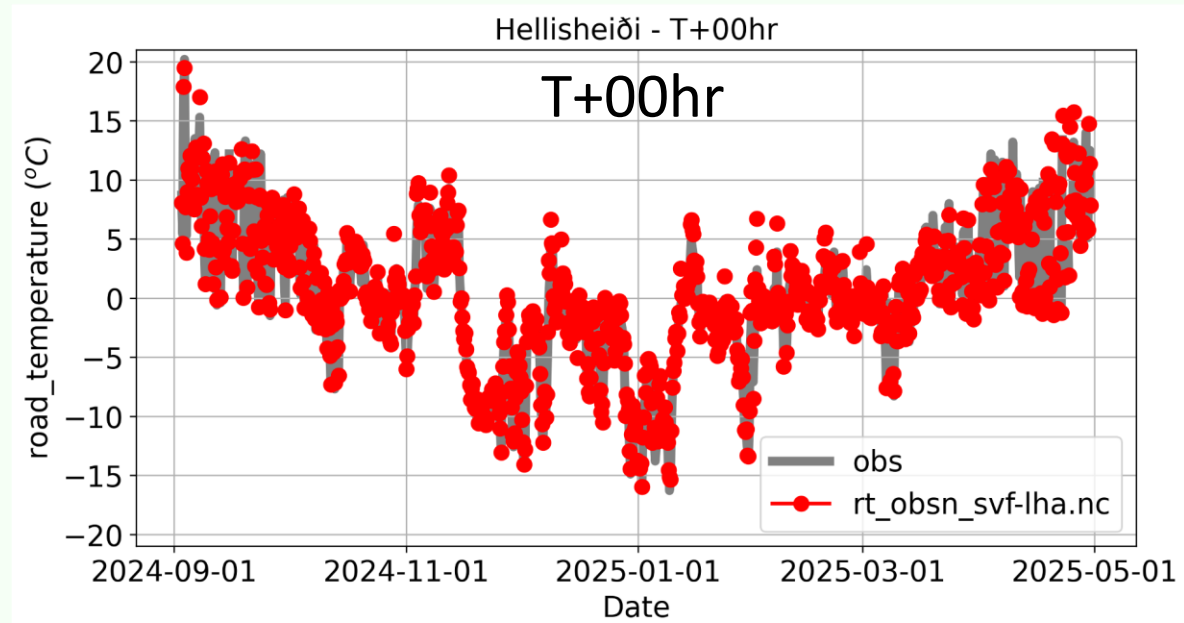
Simulated road surface temperature

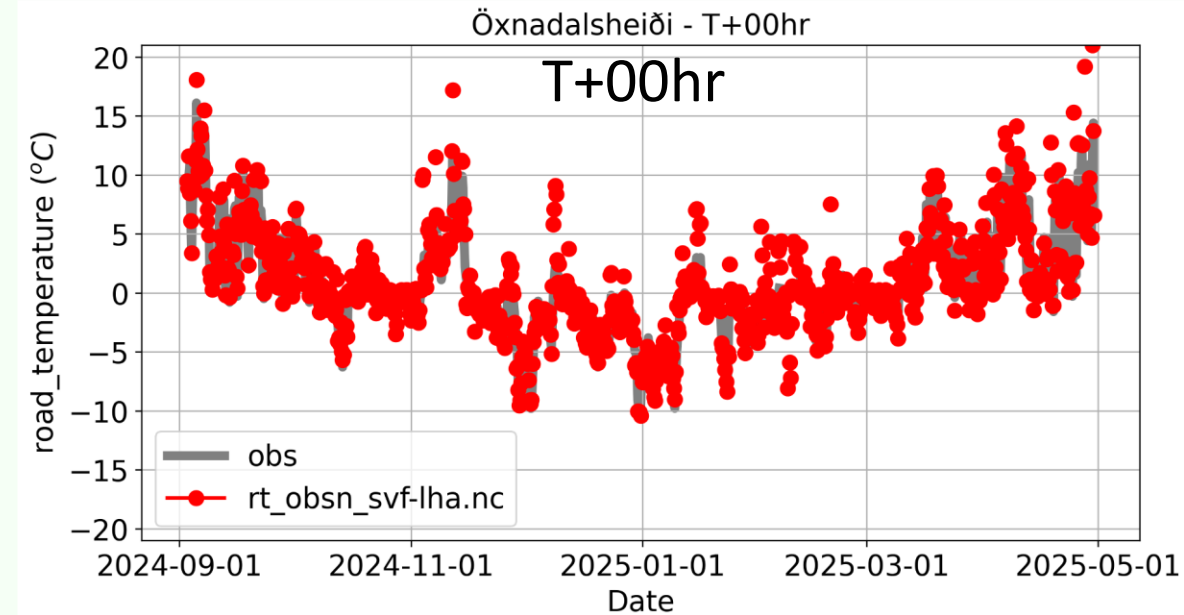Öxnadalsheiði

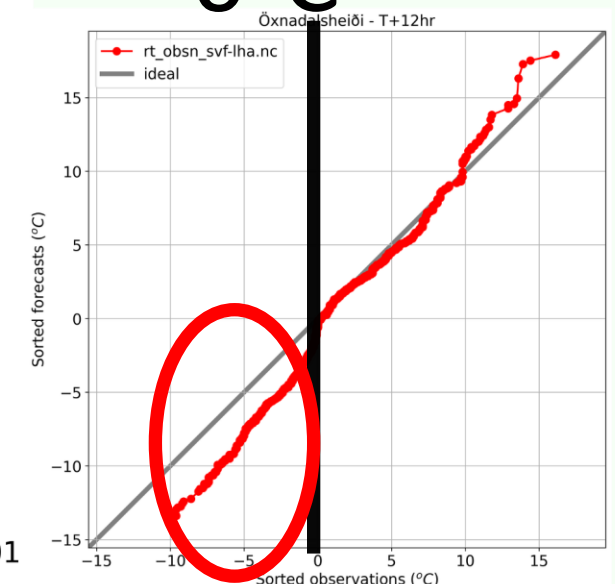Simulated 2m temperature
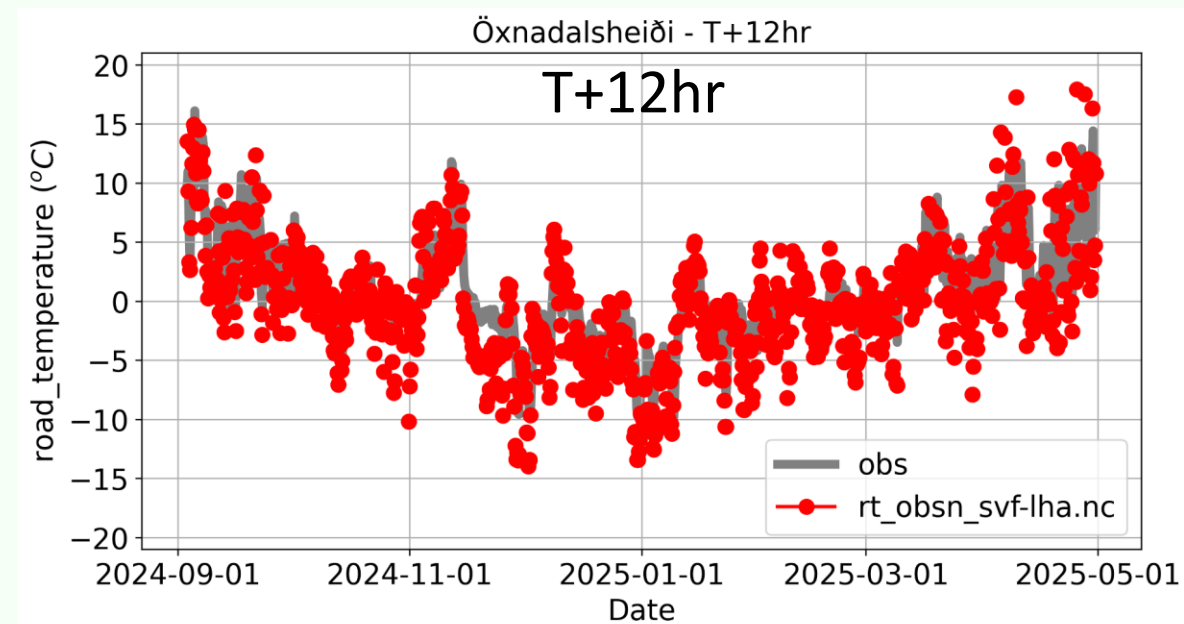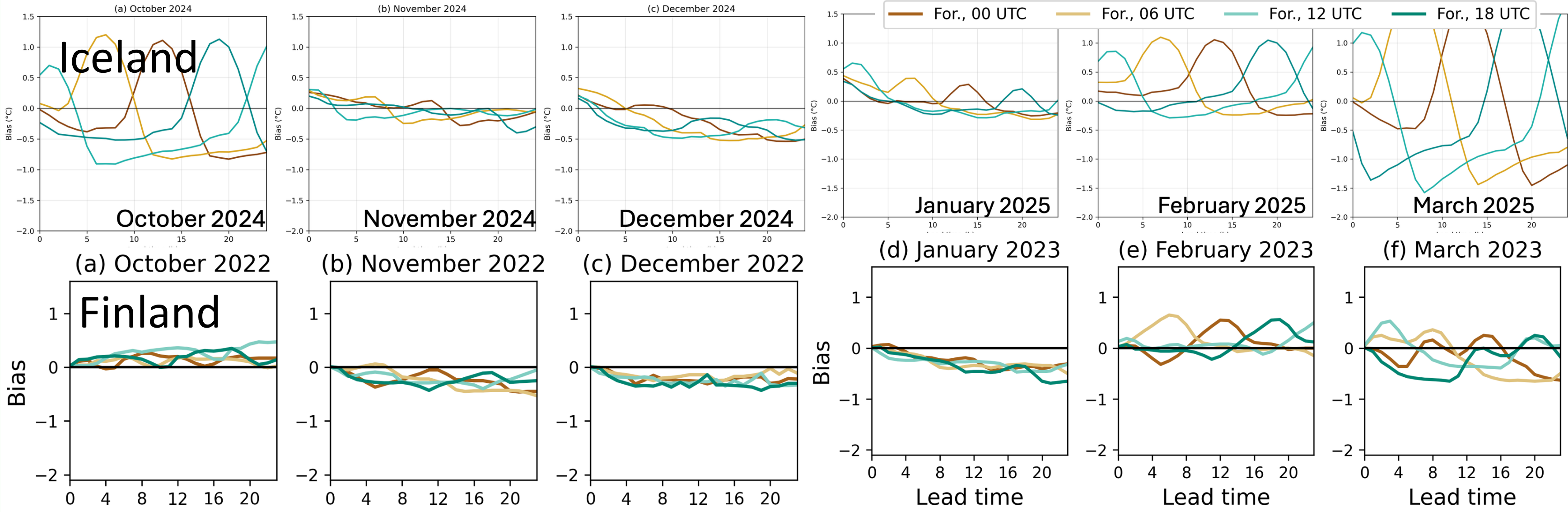
0°C

Results

T+00hr

T+12hr

0°C

0°C

Simulated road surface temperature

Results – All stations

BIAS

Results – All stations
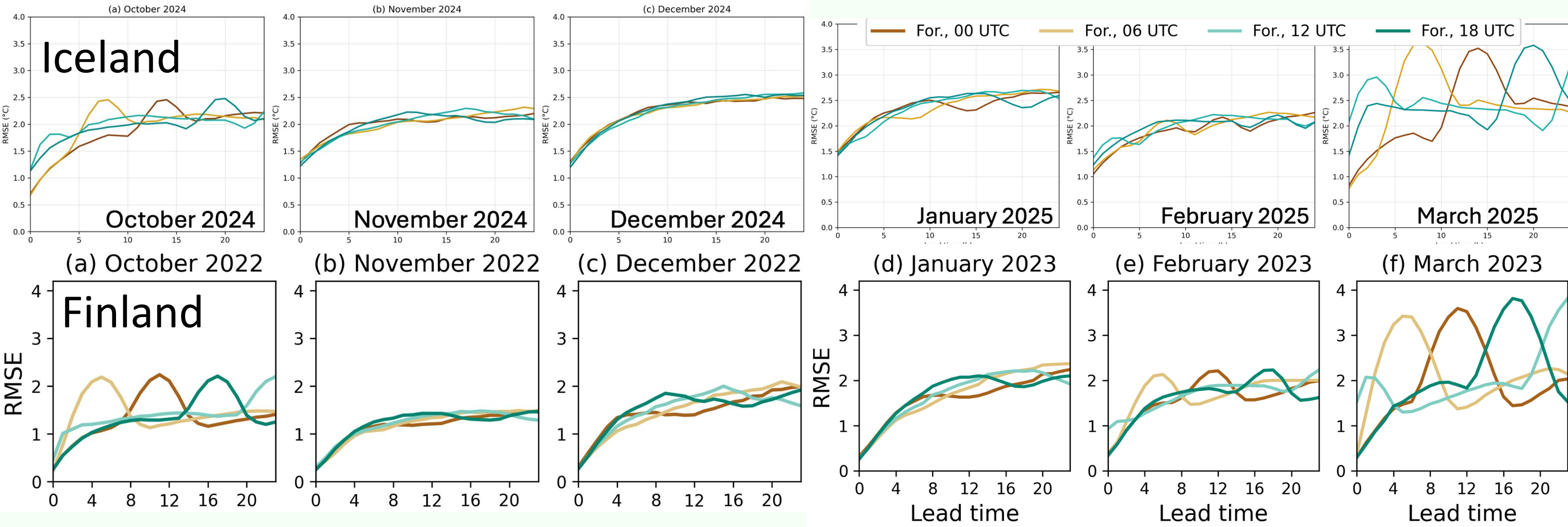
RMSE

Outlook

- **Further testing and tuning of the RoadSurf model**
  - *how can we reduce the observed cold bias in "RoadSurf seen at some locations?*
  - *can we reduce (or preferably eliminate) the large intra-day oscillations in the model bias in late fall/early spring conditions?*
    - *modify the heat capacity of the ground in the model?*
  - *extend the observational forcing further into the forecast*
  - *use fish-eye photographs to improve information on the topographical shadow effect for each station*

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Outlook

- *Location based post-processing/corrections of the RoadSurf forecasts*
  - *how this will be done depends primarily on available observations*
- *Integrate the RoadSurf model with Belgingur's WOD forecast framework*
  - *force RoadSurf with a range of weather forecasts (e.g. UWC-DINI, UWC-IG, and WOD)*

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Summary

- *The RoadSurf model has been installed and tested using various sources of atmospheric forcing data*
- *RoadSurf was run in a set of 24 hour simulations, restarted at six hour intervals*
- *Simulated road surface temperature compared to observed one at 90 locations for the period from September 2024 through April 2025*
- *Initial results compare favourably to observations*
- *Further tuning of the model is however needed*

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