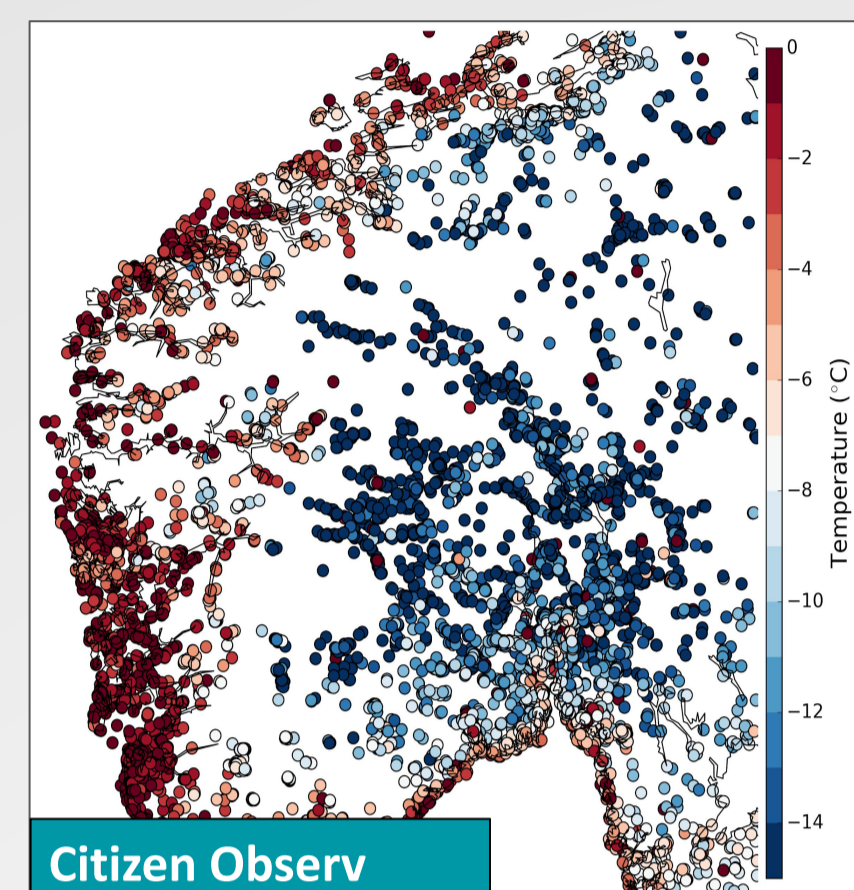
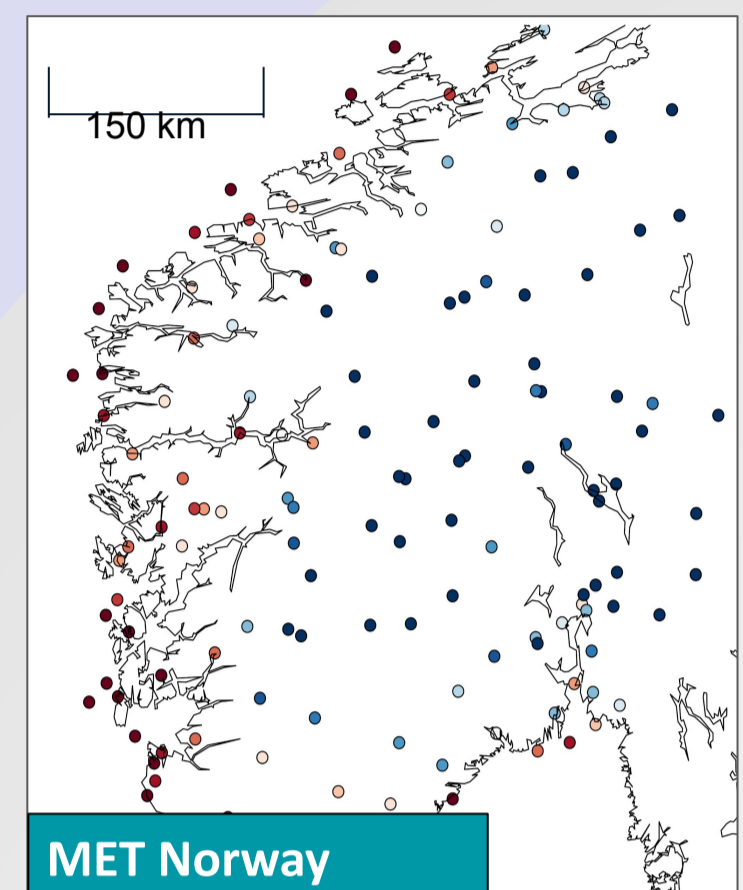


MET Nordic dataset: post-processing of model output near-surface fields with unconventional observations

Cristian Lussana, Thomas N. Nipen and Ivar A. Seierstad
The Norwegian Meteorological Institute, Oslo, Norway

DATA SOURCES

Nipen, T.N., I.A. Seierstad, C. Lussana, J. Kristiansen, and Ø. Hov (2020). BAMS. <https://doi.org/10.1175/BAMS-D-18-0237.1>



- In situ hourly observations.**
- MET Norway database.
 - Citizen Observations (mostly from Netatmo stations).
 - Automatic Quality Control.



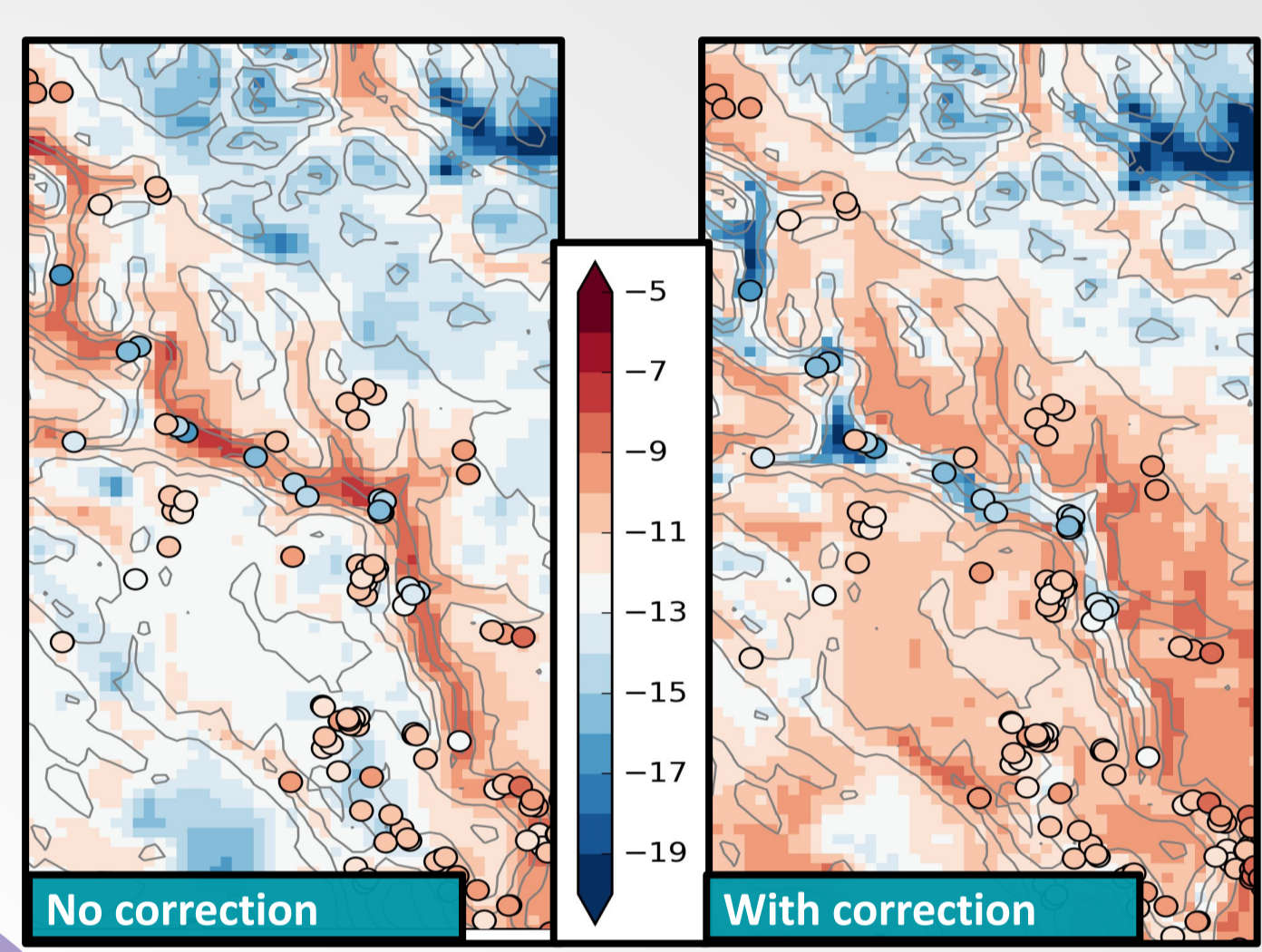
- MEPS convection-permitting ensemble.**
- 2m temperature, surface pressure, cloud cover, short- and long-wave radiation, precipitation, relative humidity, wind speed and direction.
 - Model runs every 3 hours.
 - 30 ensemble members.
 - 2.5 km grid spacing.
 - Downscaled onto 1 km grid.

TEMPERATURE

Ref: Lussana, C, Seierstad, IA, Nipen, TN, Cantarello, L. (2019) QJRMS. <https://doi.org/10.1002/qj.3646>

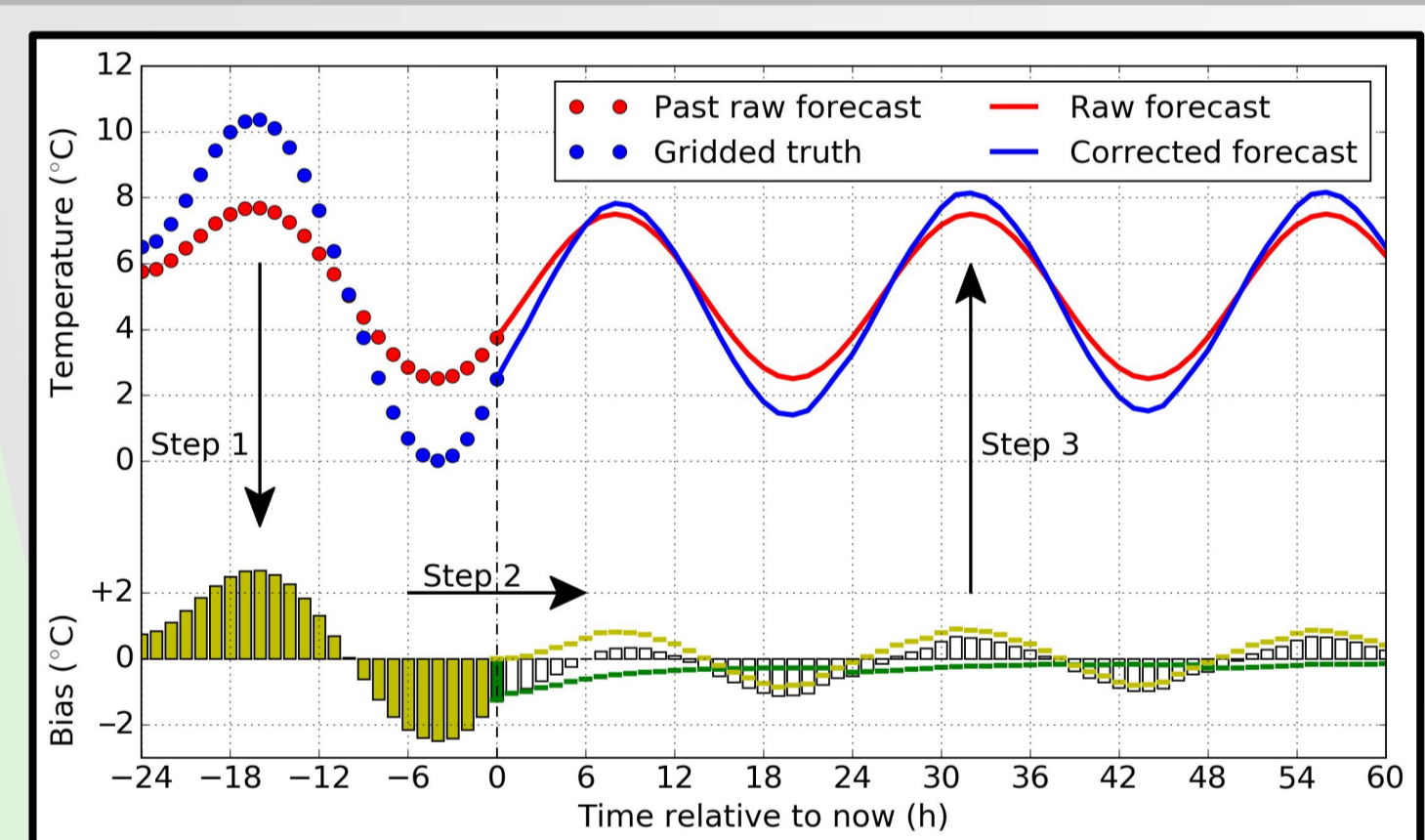
Ensemble Statistical Interpolation EnSI.

- Bayesian interpolation, LETKF analysis step.
 - Background: MEPS.
 - Observation: in-situ
- Output: Gridded Analysis**
- 30-member ensemble more accurate and precise than MEPS.
 - 1 km grid.
 - Available every hour.



Example. 2m temperature ensemble mean for an hour in a narrow valley.
Left. MEPS (shaded) and observations (dots)
Right. Gridded truth (shaded) and observations (dots)

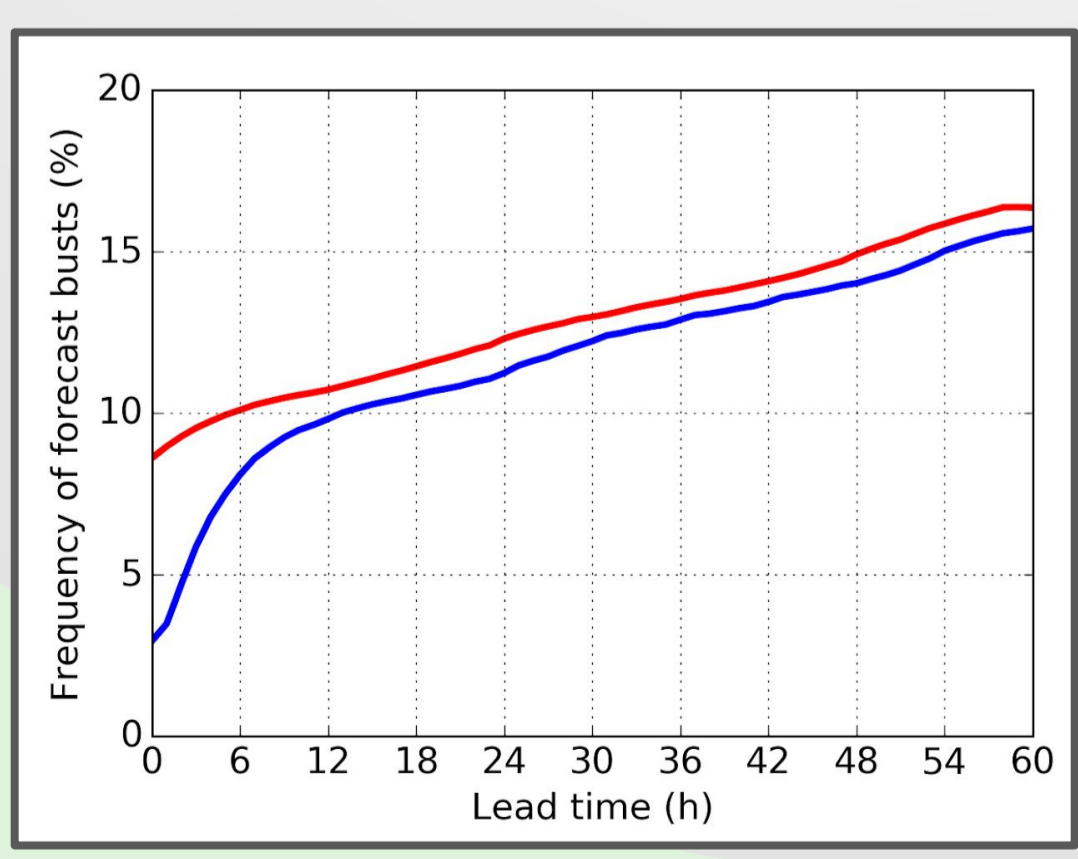
Yr.no
xgeo.no



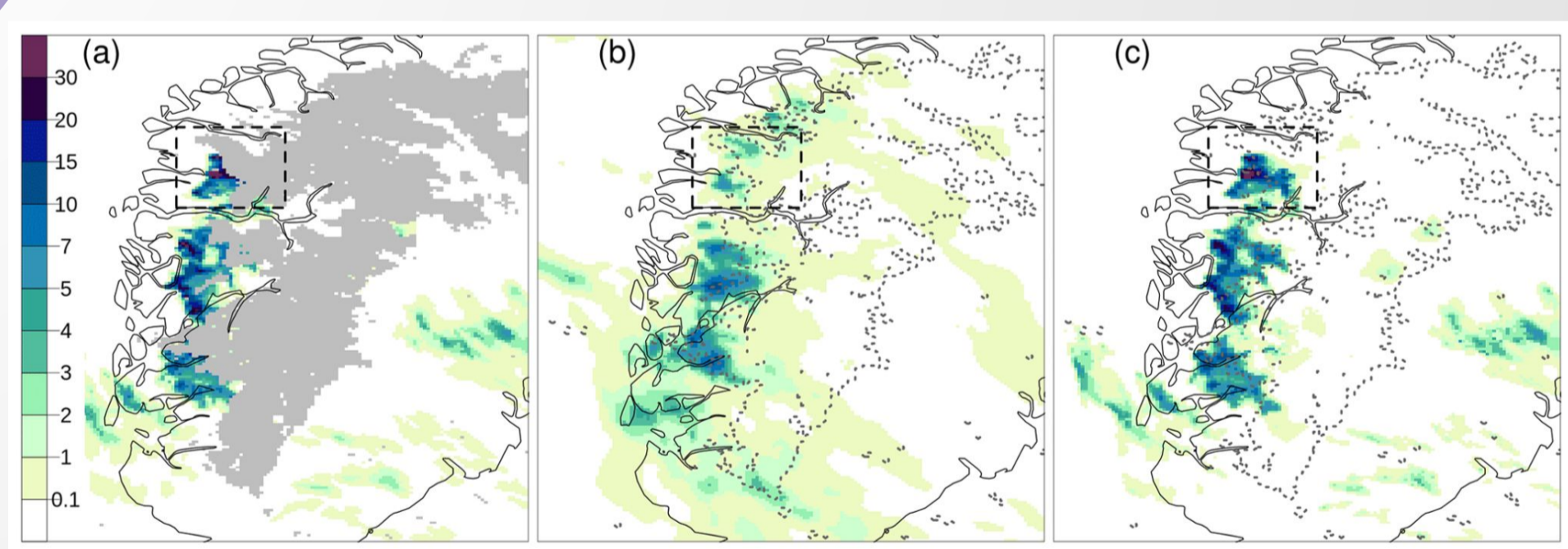
Use temperature analysis to bias-correct forecasts

- Gridpoint by gridpoint correction
- Seamless transition from gridded analysis to gridded forecast
- Diurnally varying bias based on last 24 hours

Decrease in >3 °C observations-forecasts deviations:
Red: without citizen data **Blue: with citizen data**



USE CASE: AUTOMATIC WEATHER FORECASTS



Example. Hourly precipitation 30 July 2019, 15:00 UTC (mm h⁻¹), over South Norway. Observations (a) Grid points without observations are in gray. Background ensemble mean (b). Analysis expected value (c).

Ensemble Statistical Interpolation with Gaussian anamorphosis EnSI-GAP.

- Bayesian interpolation, LETKF analysis step
 - Anamorphosis transforms Gamma to standard Gaussian
 - Background: MEPS.
 - Observation: in-situ and radar
- Output: Gridded Analysis**
- 30-member ensemble
 - 1 km grid.
 - Available every hour.



Lussana, C., Nipen, T. N., Seierstad, I. A., and Elo, C. A. (2021) NPG. <https://doi.org/10.5194/npg-28-61-2021>

PRECIPITATION

Want to know more about the accuracy of precision of citizen observations of hourly precipitation?
Lussana, C., Baietti, E., Bäserud, L., Nipen, T. N., and Seierstad, I. A. (2023) <https://doi.org/10.5194/asr-20-35-2023>



<http://thredds.met.no/thredds/catalog/metpplatest/catalog.html>

Data quality control is crucial for the effective use of unconventional observations

Alerskans, E., C. Lussana, T. N. Nipen, and I. A. Seierstad, (2022) <https://doi.org/10.1175/JTECH-D-21-0184.1>
Bäserud, L., Lussana, C., Nipen, T. N., Seierstad, I. A., Oram, L., and Aspelien, T. (2020) Adv. Sci. Res., <https://doi.org/10.5194/asr-17-153-2020>

