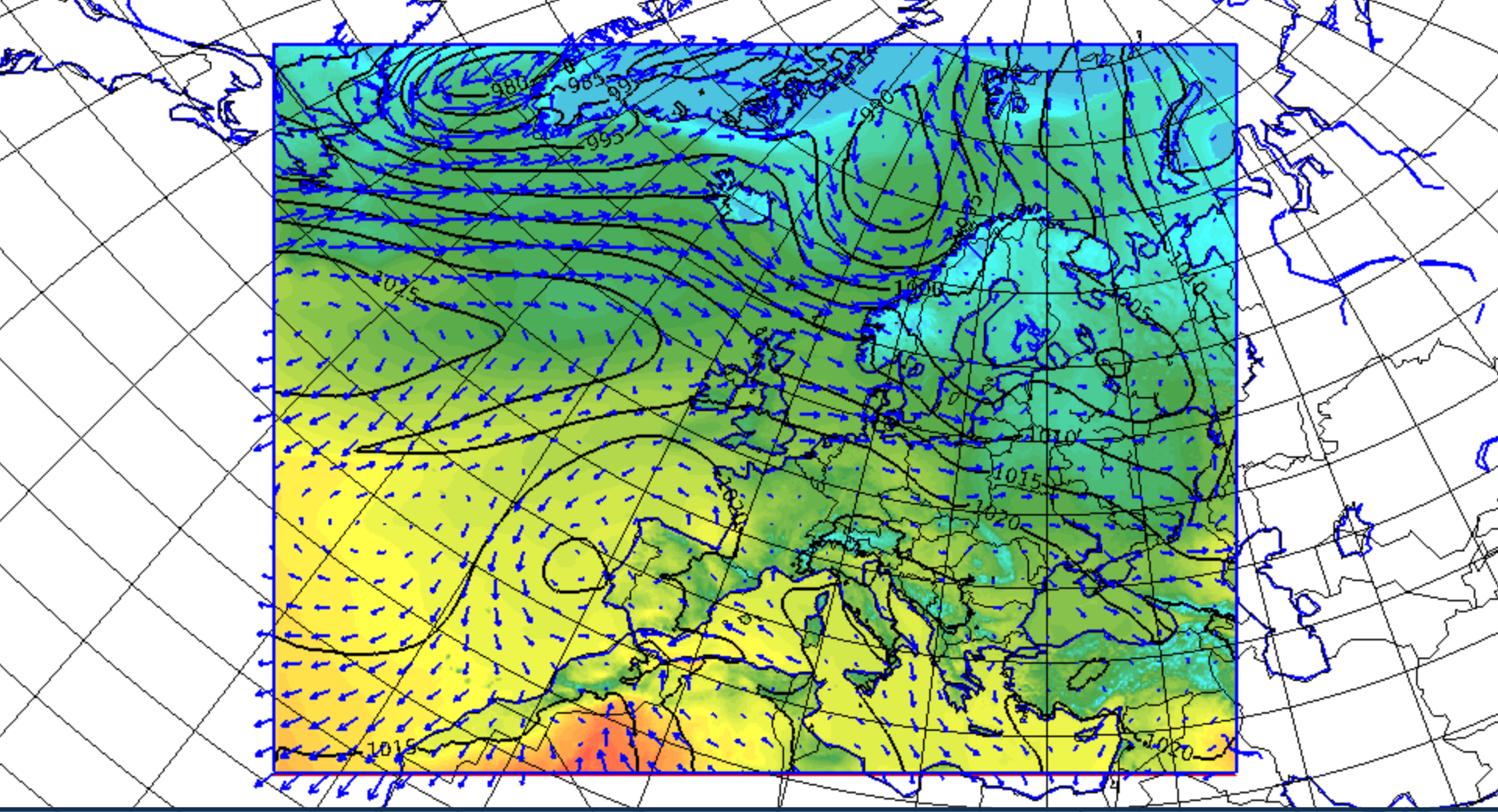


Calibrated probabilistic forecasts from GLAMEPS

Thomas Nipen (MET-Norway)

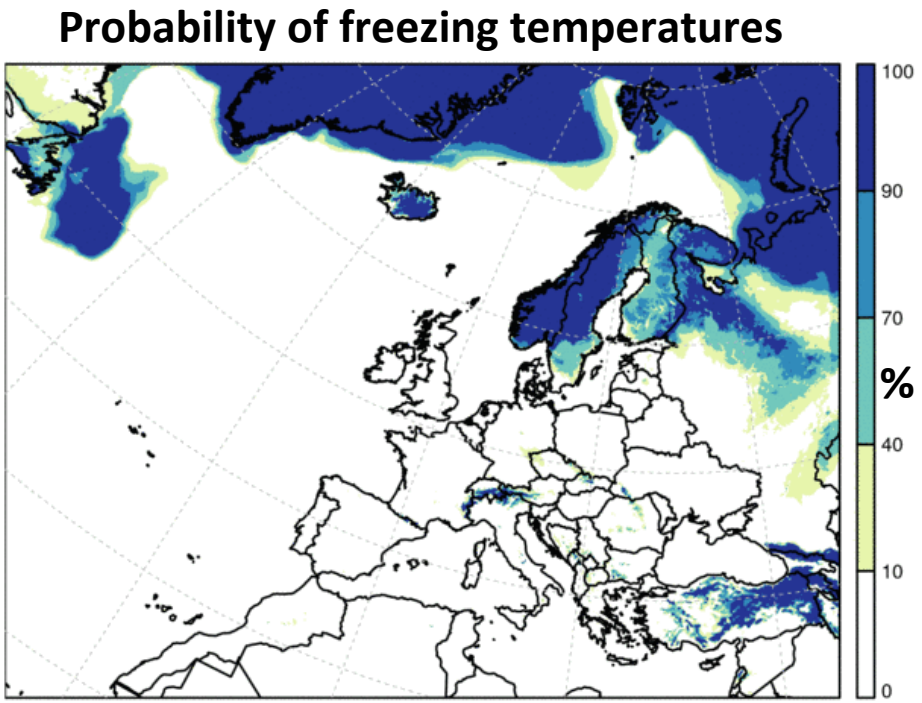
John Bjørnar Bremnes (MET-Norway) • Maurice Schmeits (KNMI)

Juha Kilpinen (FMI) • Karoliina Hamaleinen (FMI)

Background

- GLAMEPS
  - 54 members
  - 8 km grid spacing
  - Multimodel/multiphysics
  - European domain
  - 3h forecasts up to 54h

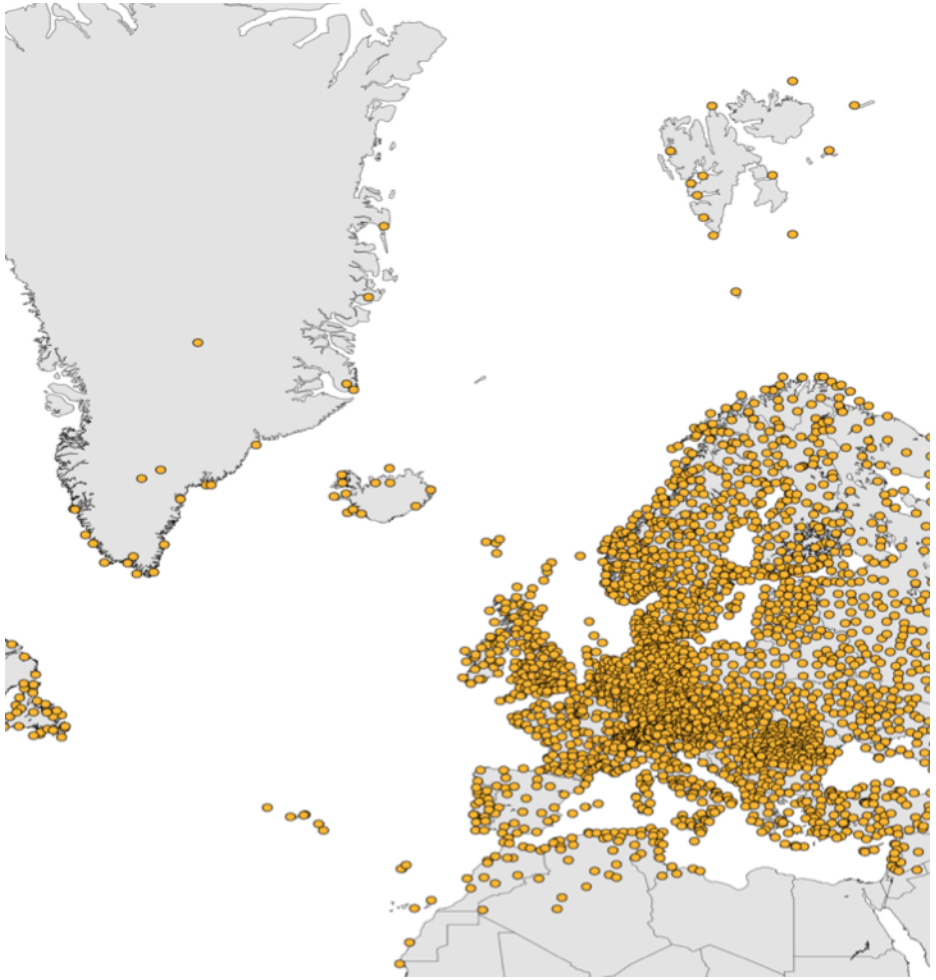
- Probabilities unreliable



Calibration approach

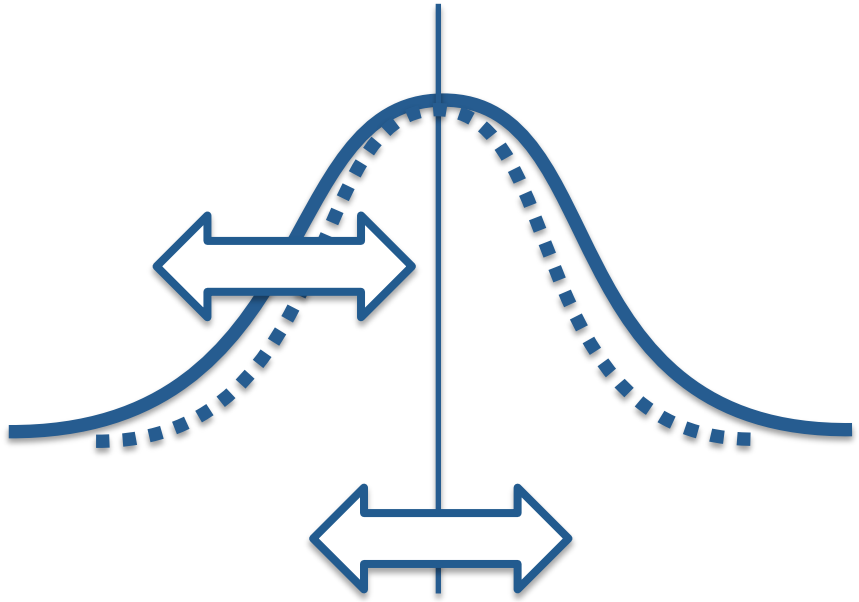
- Calibrate whole grid
- Obs from 3100 stations

Observing stations:



Calibration approach

- Calibrate whole grid
- Obs from 3100 stations
- Pick a distribution
- Fit parameters

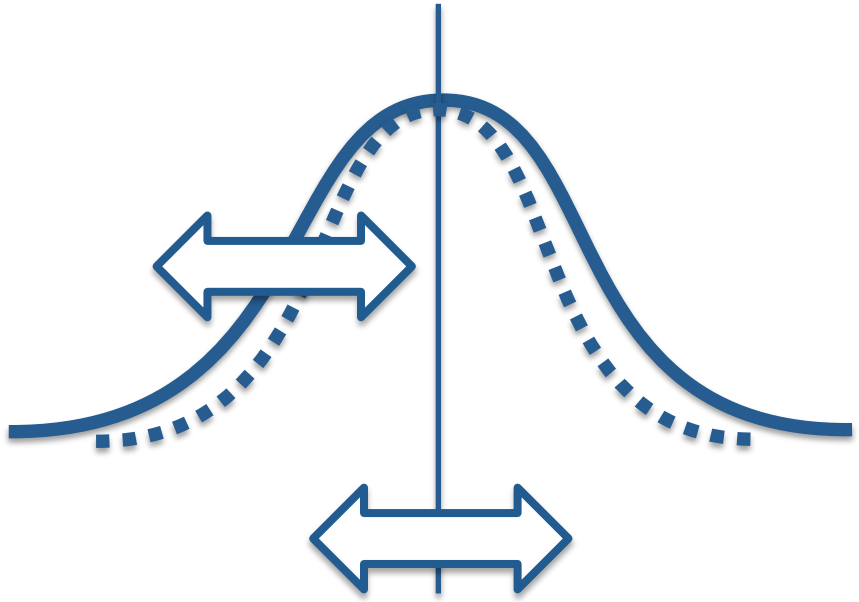


GLAMEPS predictors	Spatial variables
• Ens mean • Ens variance	• Elevation • Latitude • Longitude • Land/sea • Surface type

Calibration approach

- Calibrate whole grid
- Obs from 3100 stations
- Pick a distribution
- Fit parameters

- Update every 2 weeks
- 6 week training period
- Separate for each leadtime and initialization
- 2m temp and 10m windspeed

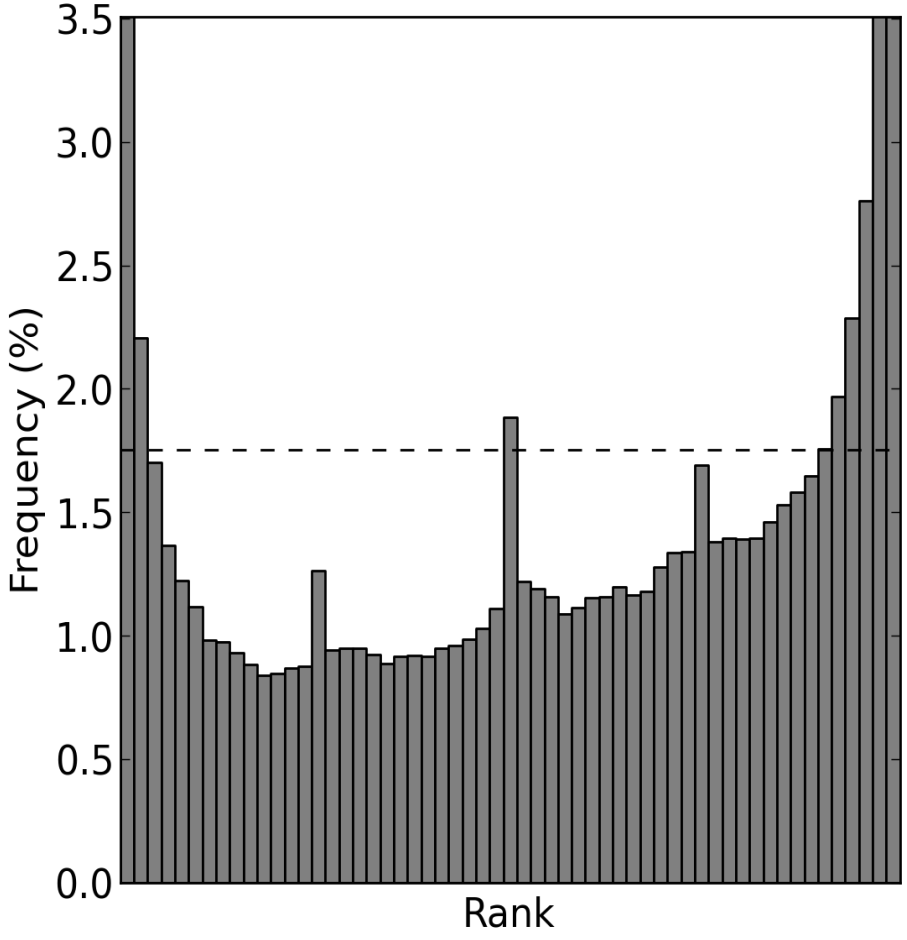


GLAMEPS predictors	Spatial variables
• Ens mean • Ens variance	• Elevation • Latitude • Longitude • Land/sea • Surface type

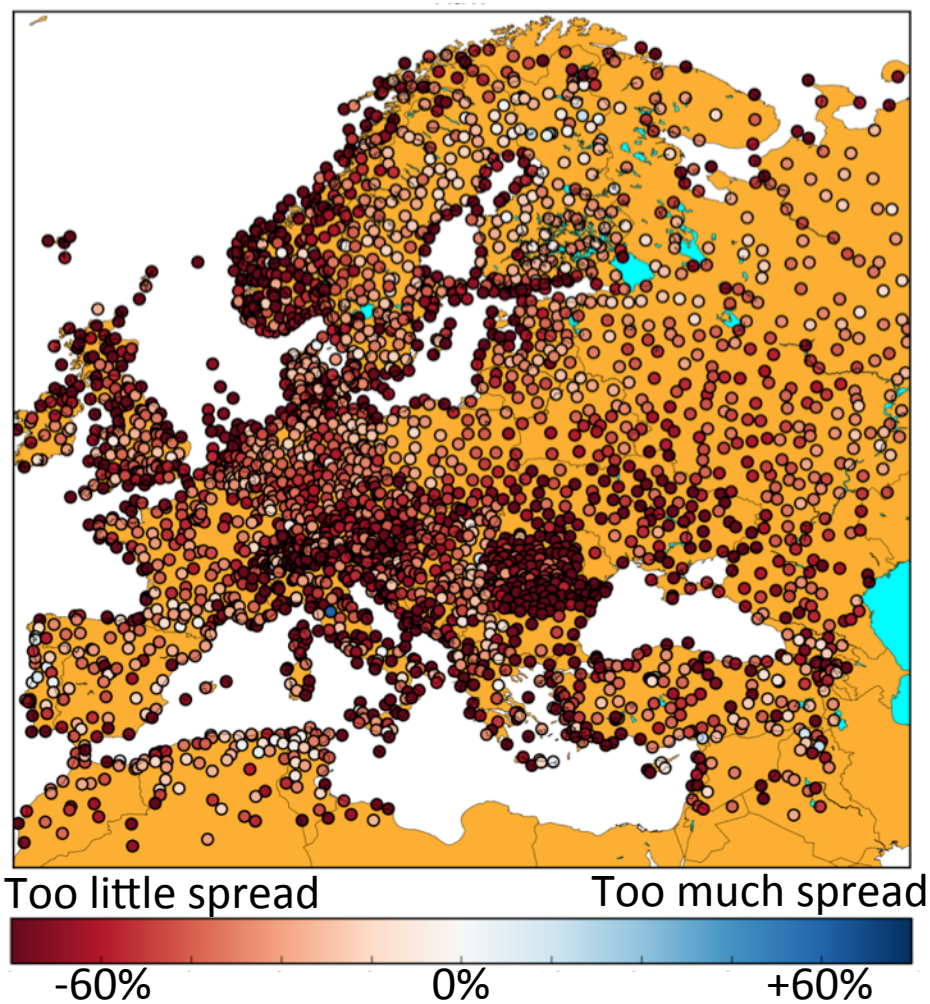
2m temperature calibration

- Raw GLAMEPS is underdispersed

Rank histogram

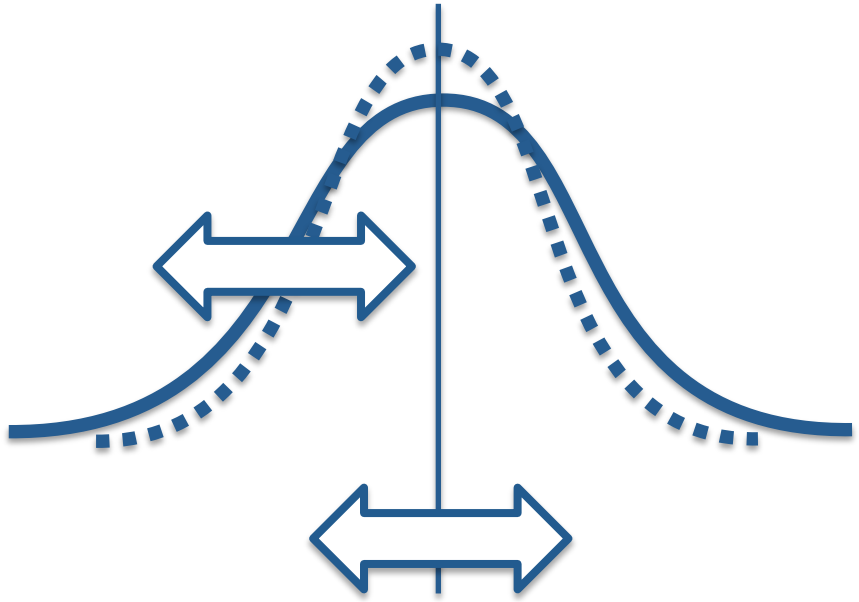


Spread/skill difference



2m temperature calibration

- Gaussian distribution



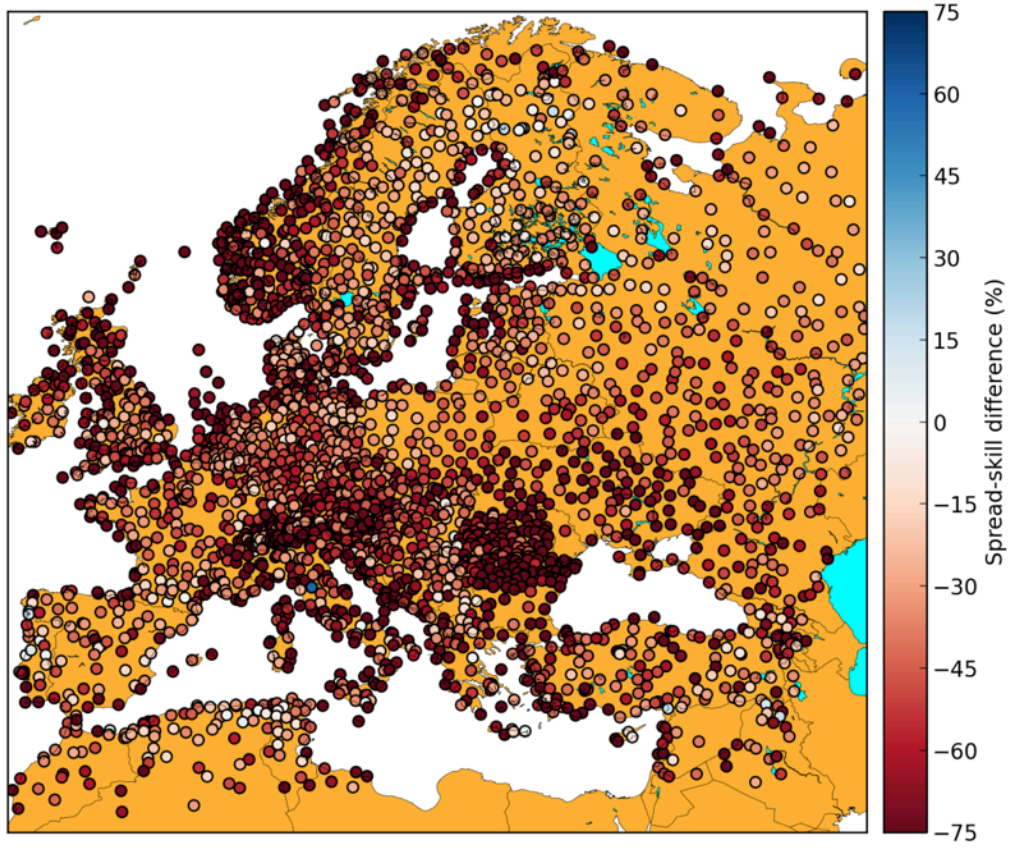
Mean	Variance
• Ens mean • Elevation	• Ens variance • Elevation

2m temperature calibration

- Improvement in spread-skill ratio (+36h)

Raw

Calibrated

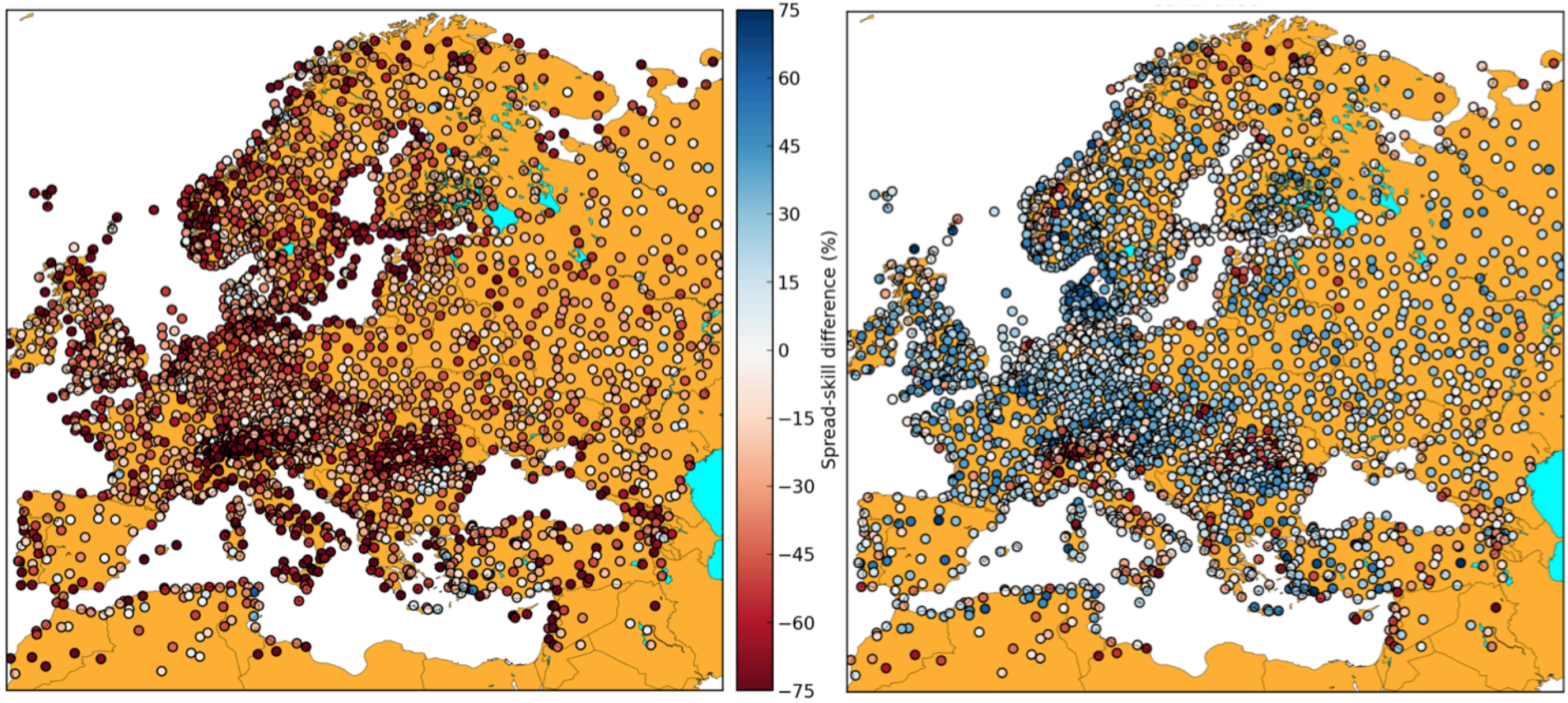


2m temperature calibration

- Improvement in spread-skill ratio (+48h)

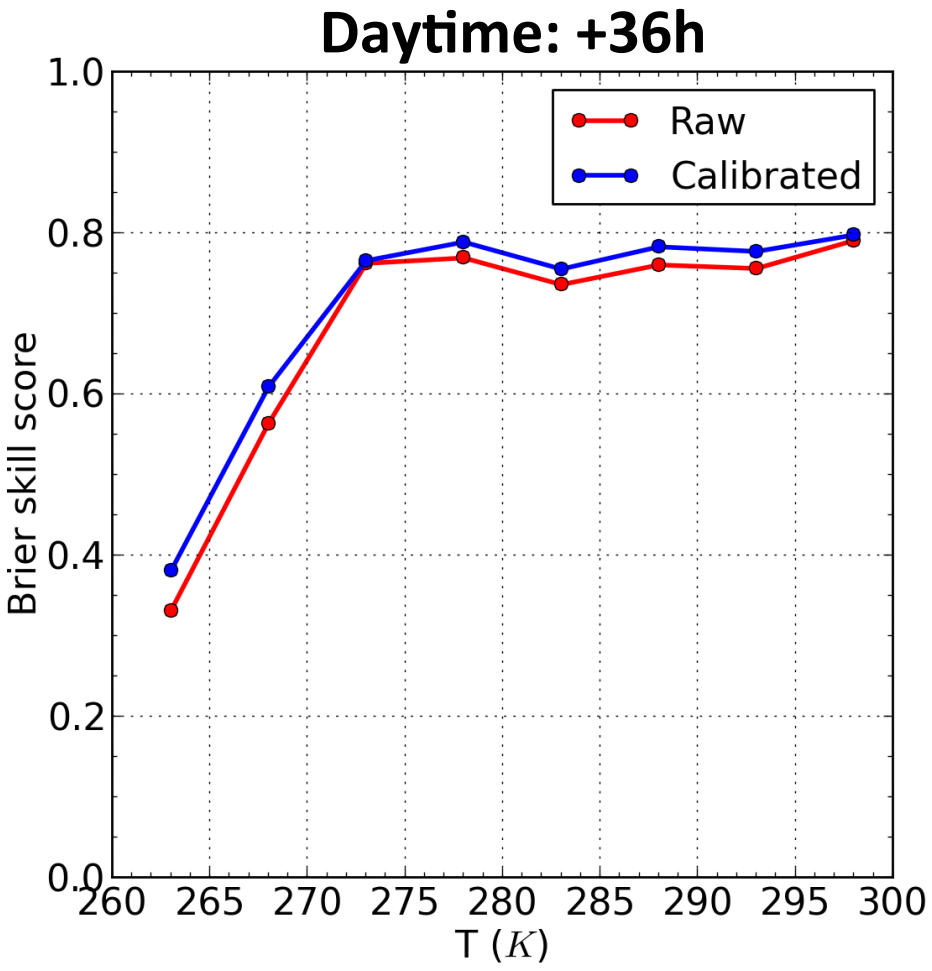
Raw

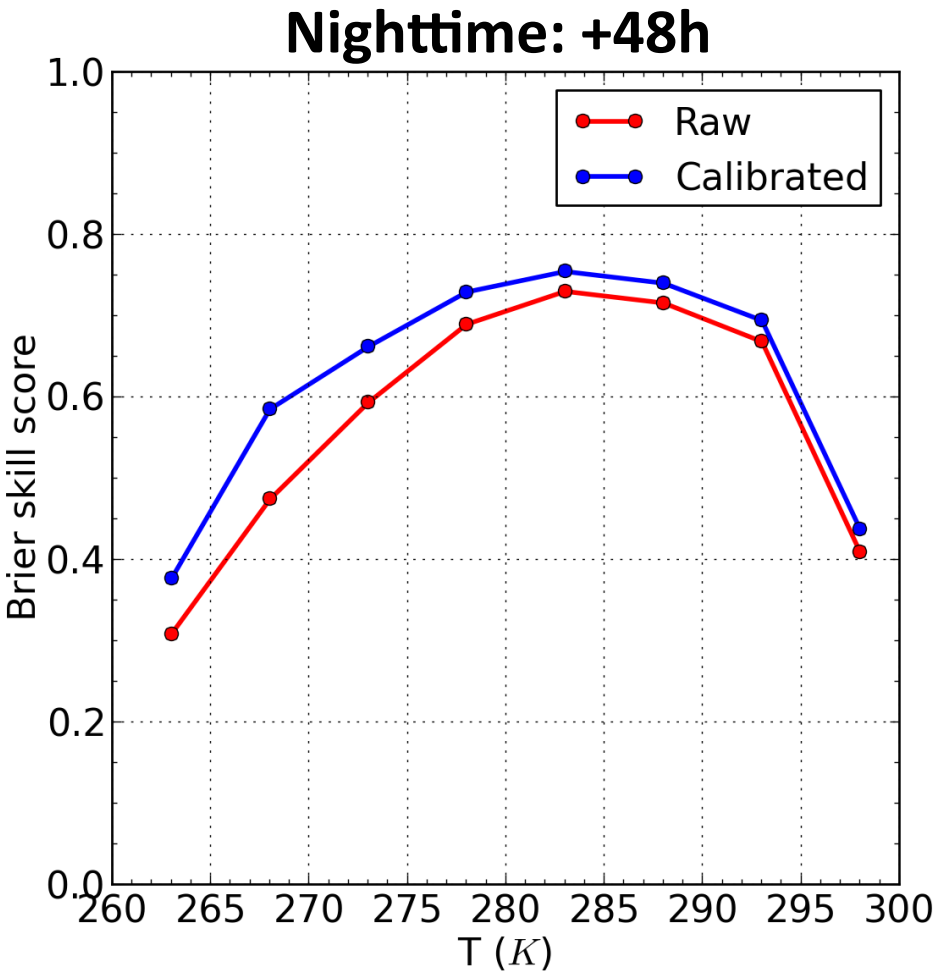
Calibrated



2m temperature calibration

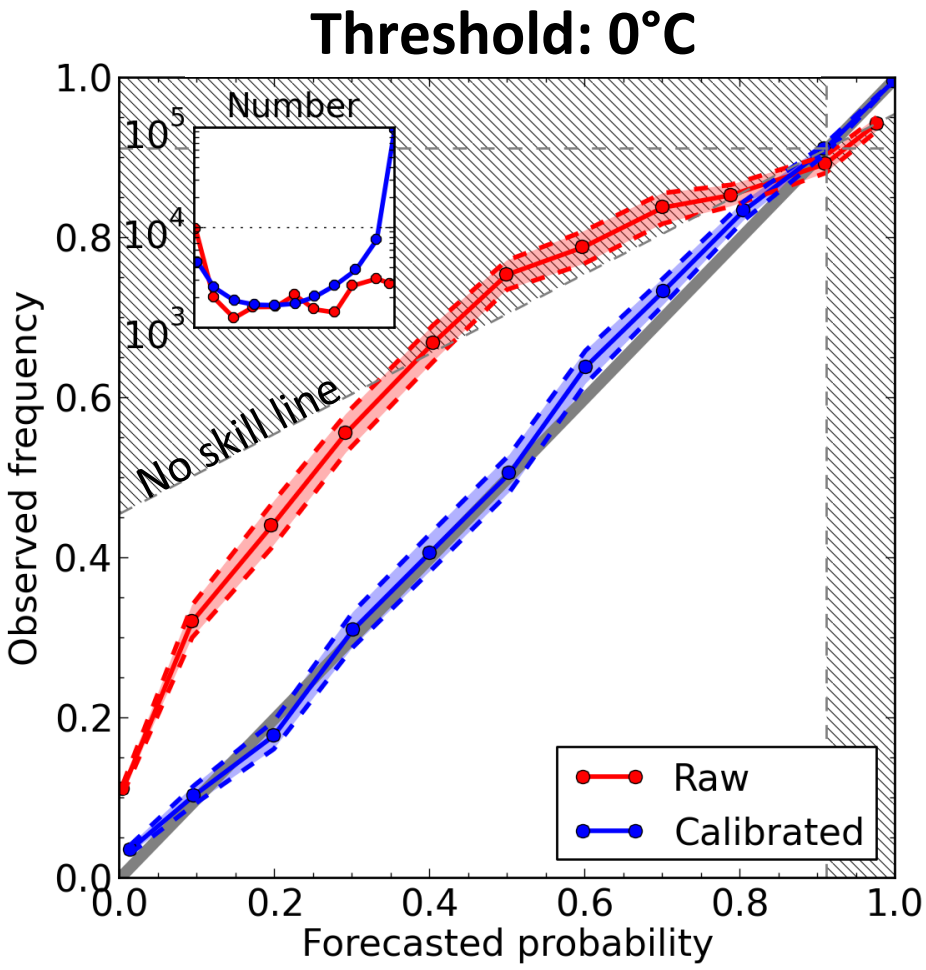
- Improvements in Brier Skill Score

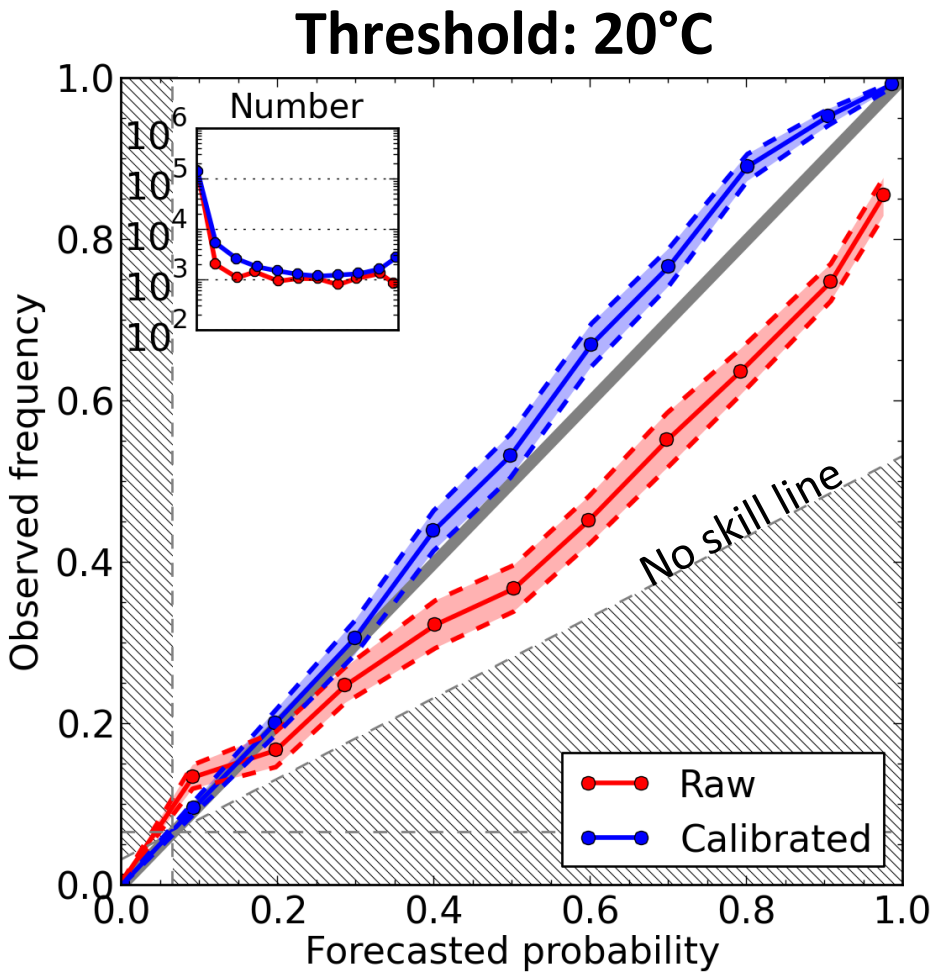




2m temperature calibration

- Improvements in reliability

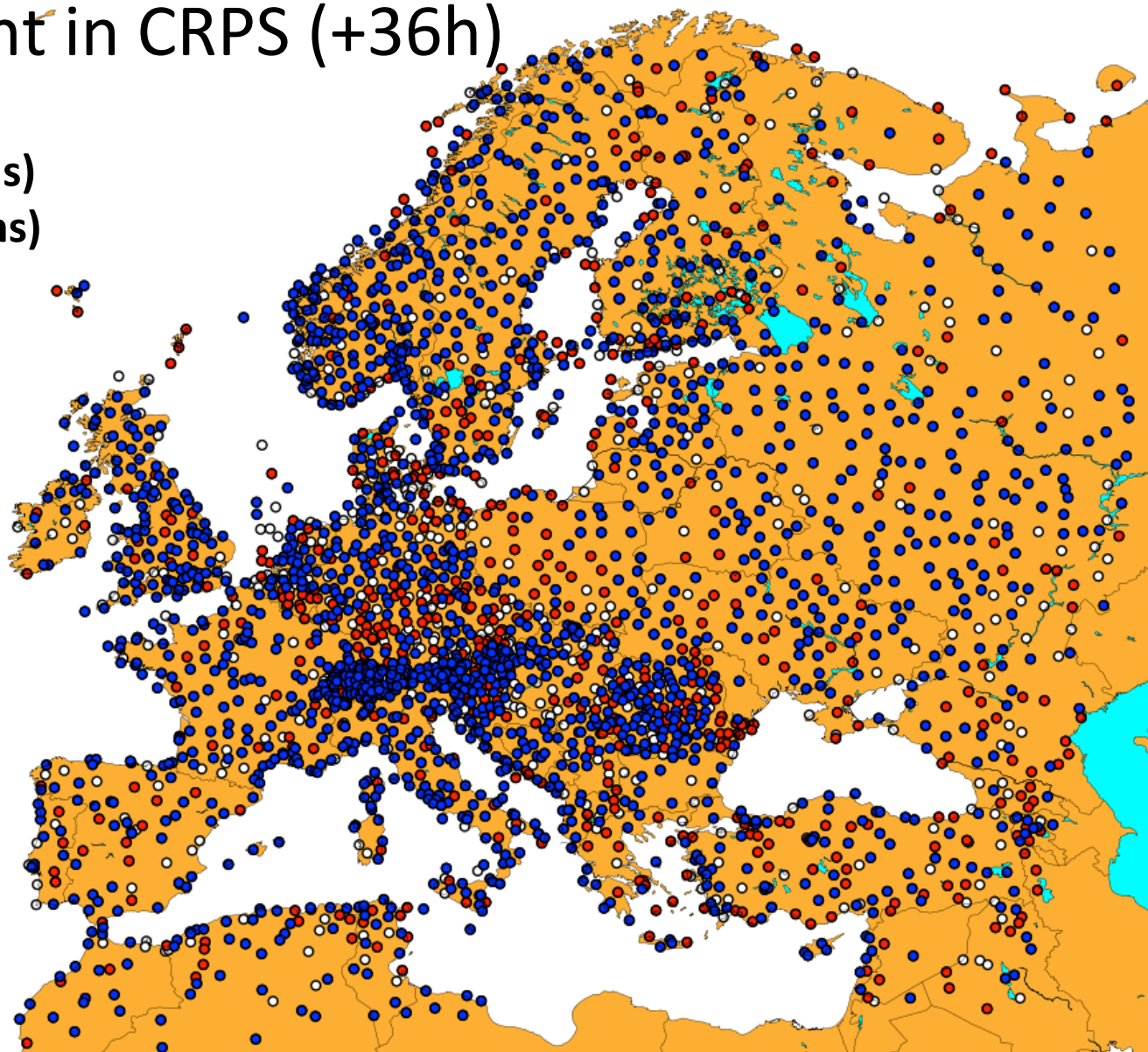




2m temperature calibration

- Improvement in CRPS (+36h)

Better (73% of stations)
Worse (27% of stations)

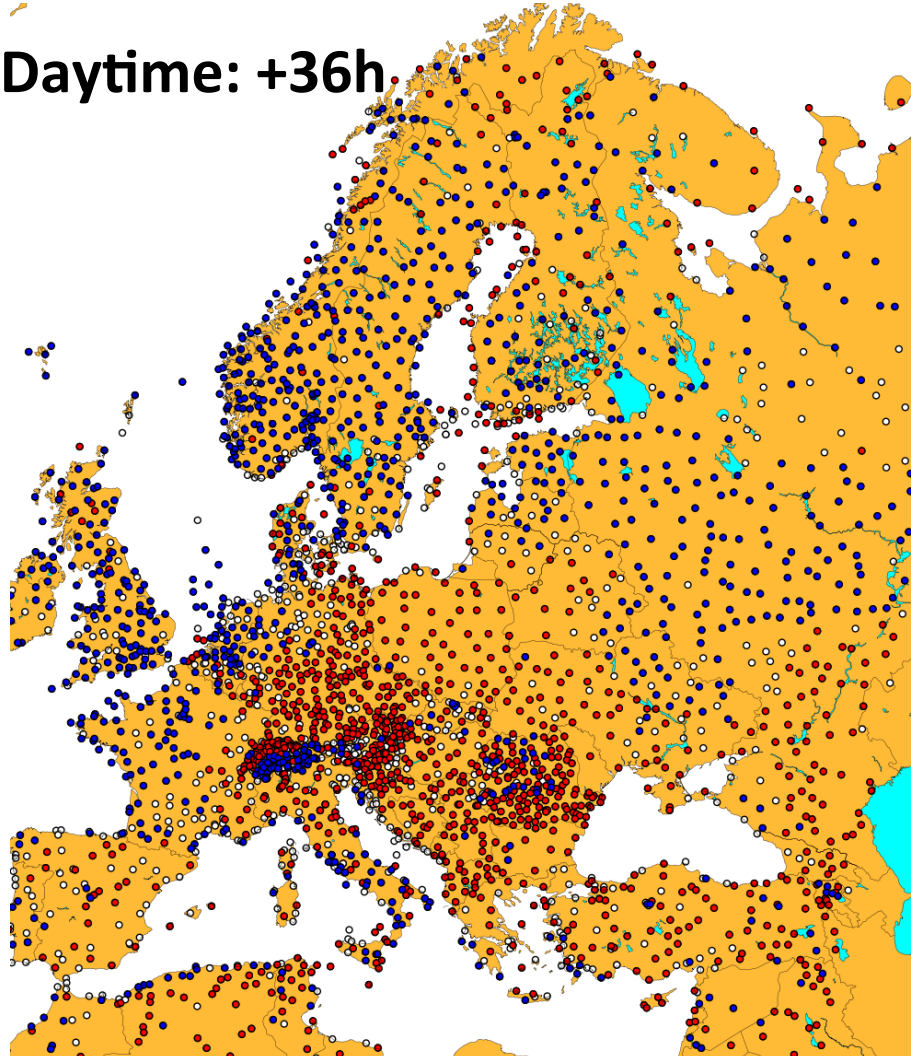


2m temperature calibration

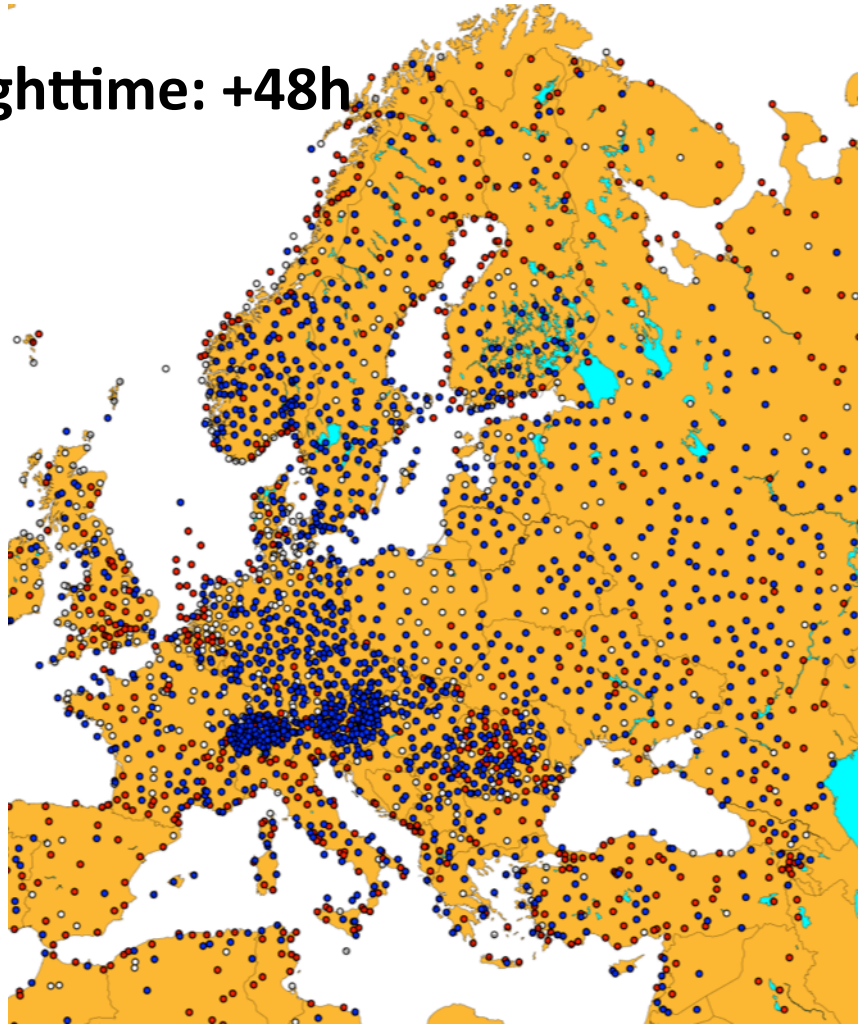
- Improvement in RMSE

Better
Worse

Daytime: +36h

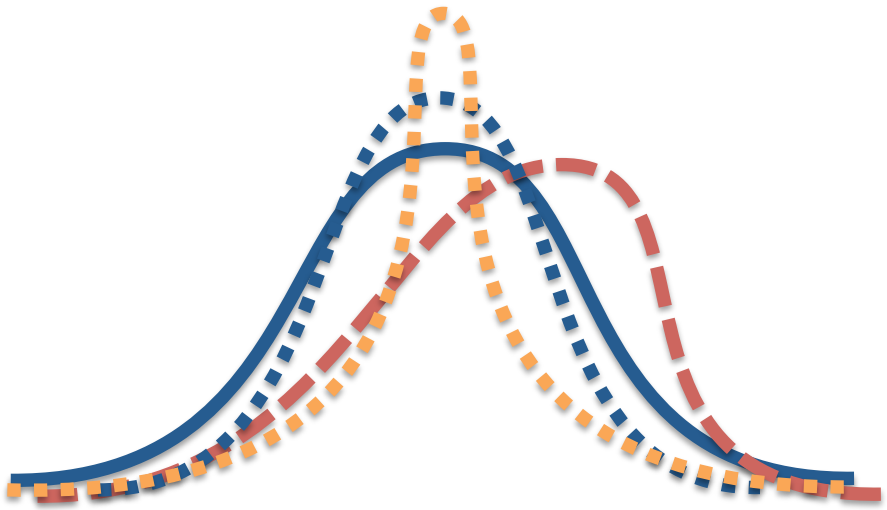


Nighttime: +48h



10m wind speed calibration

- Box-Cox t-distribution

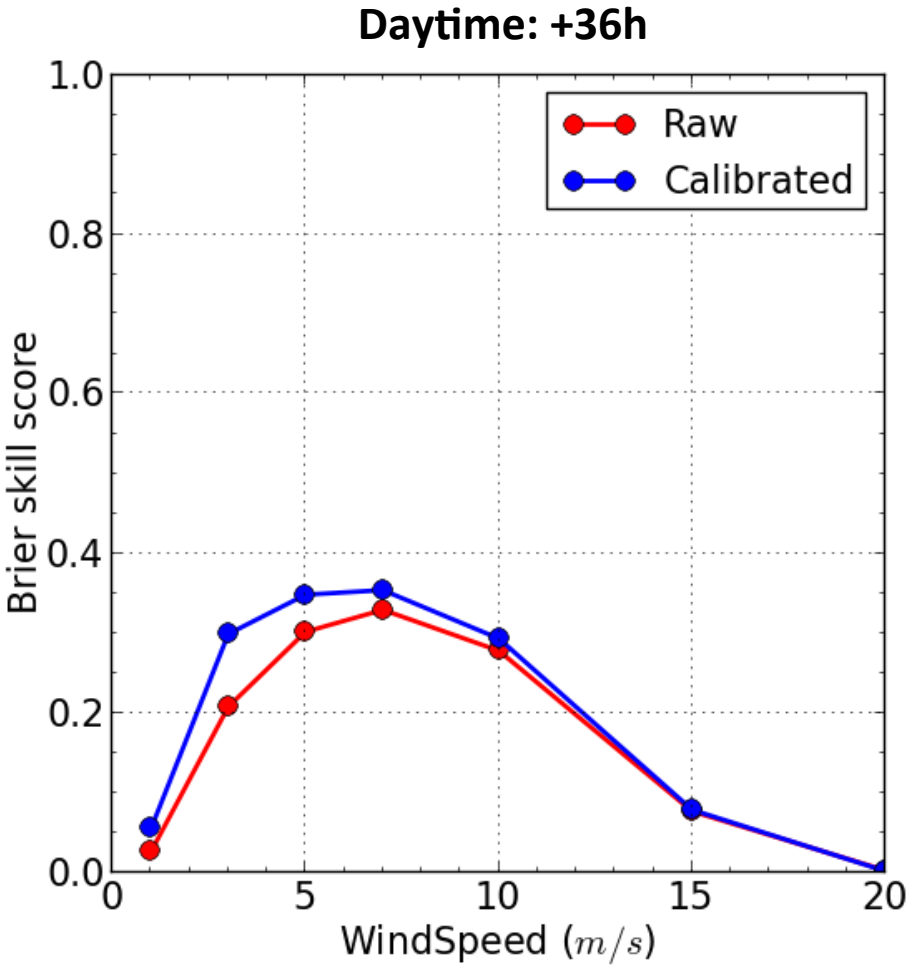


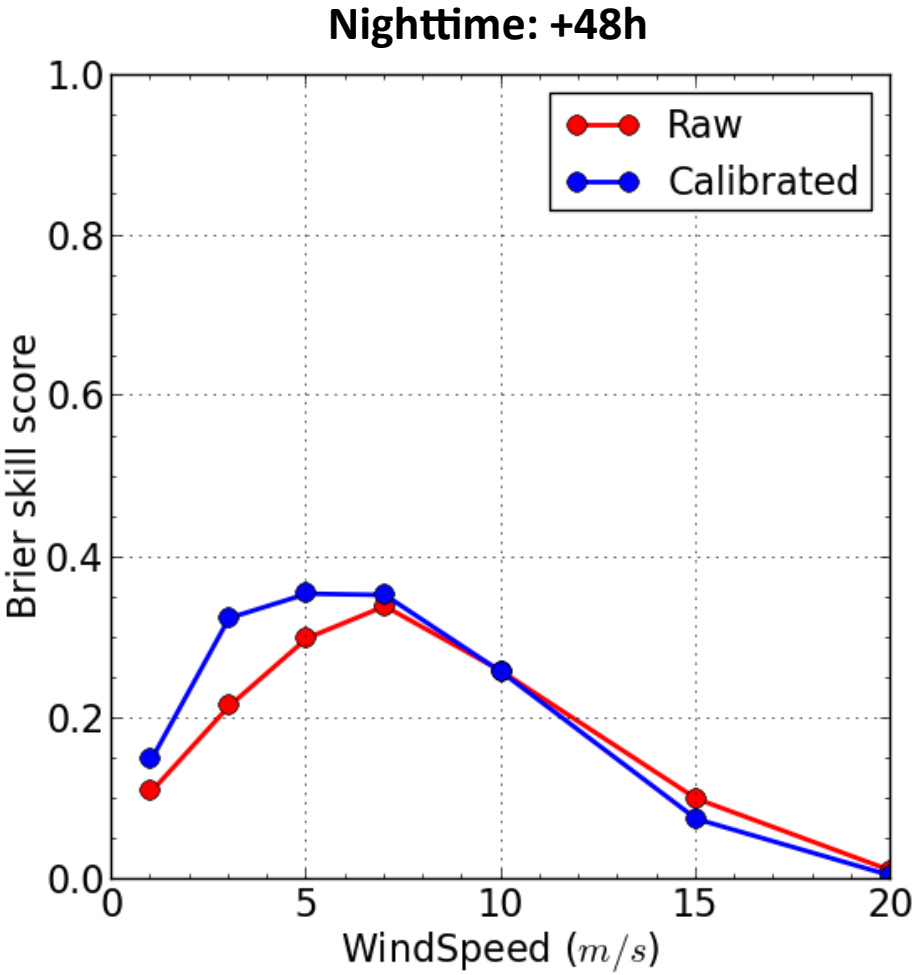
Mean	Variance
• Ens mean • Elevation	• Ens variance • Elevation

Skewness	Kurtosis
• Ens mean	• Fixed

10m wind speed calibration

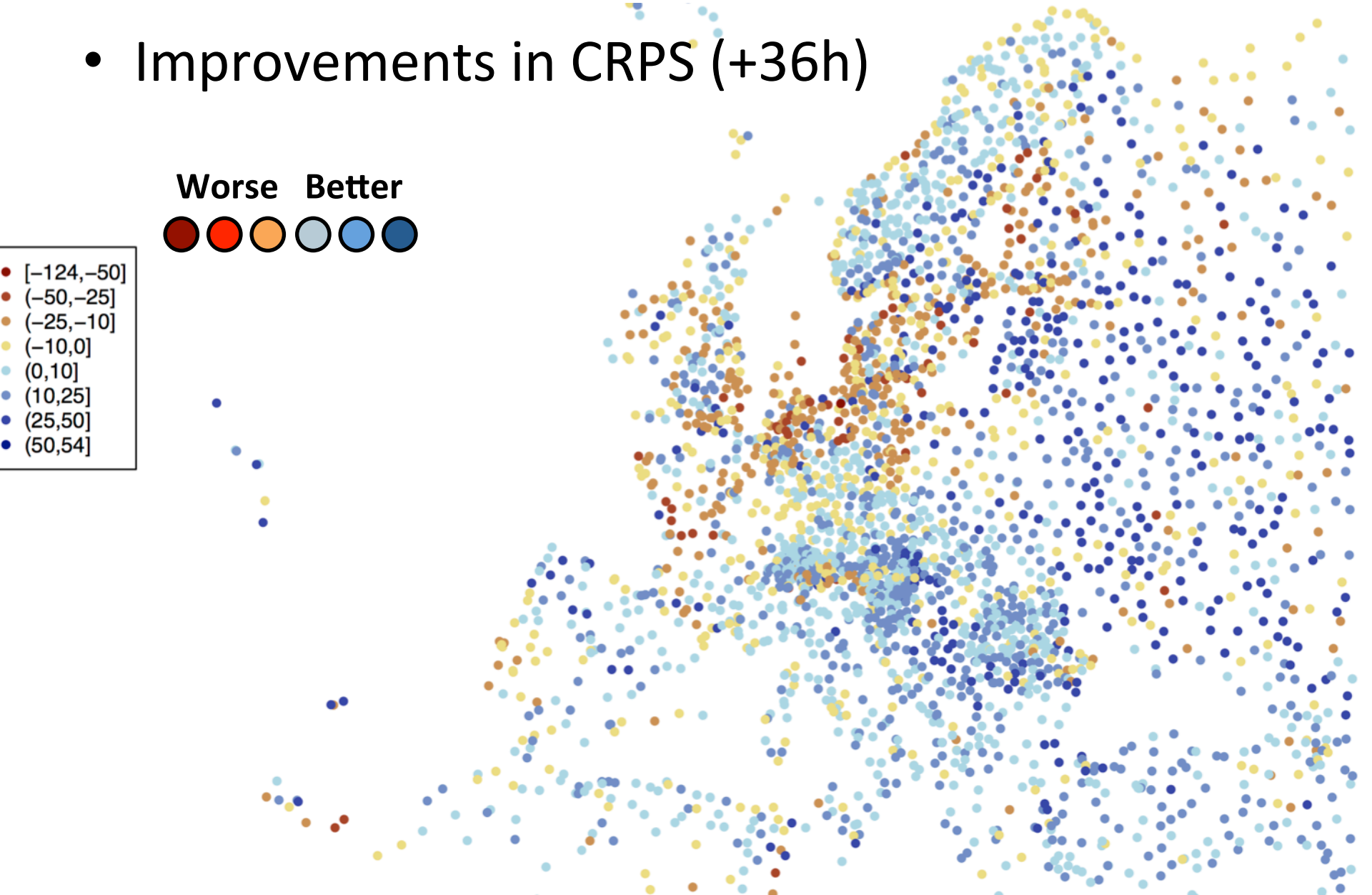
- Improvements in Brier Skill Score





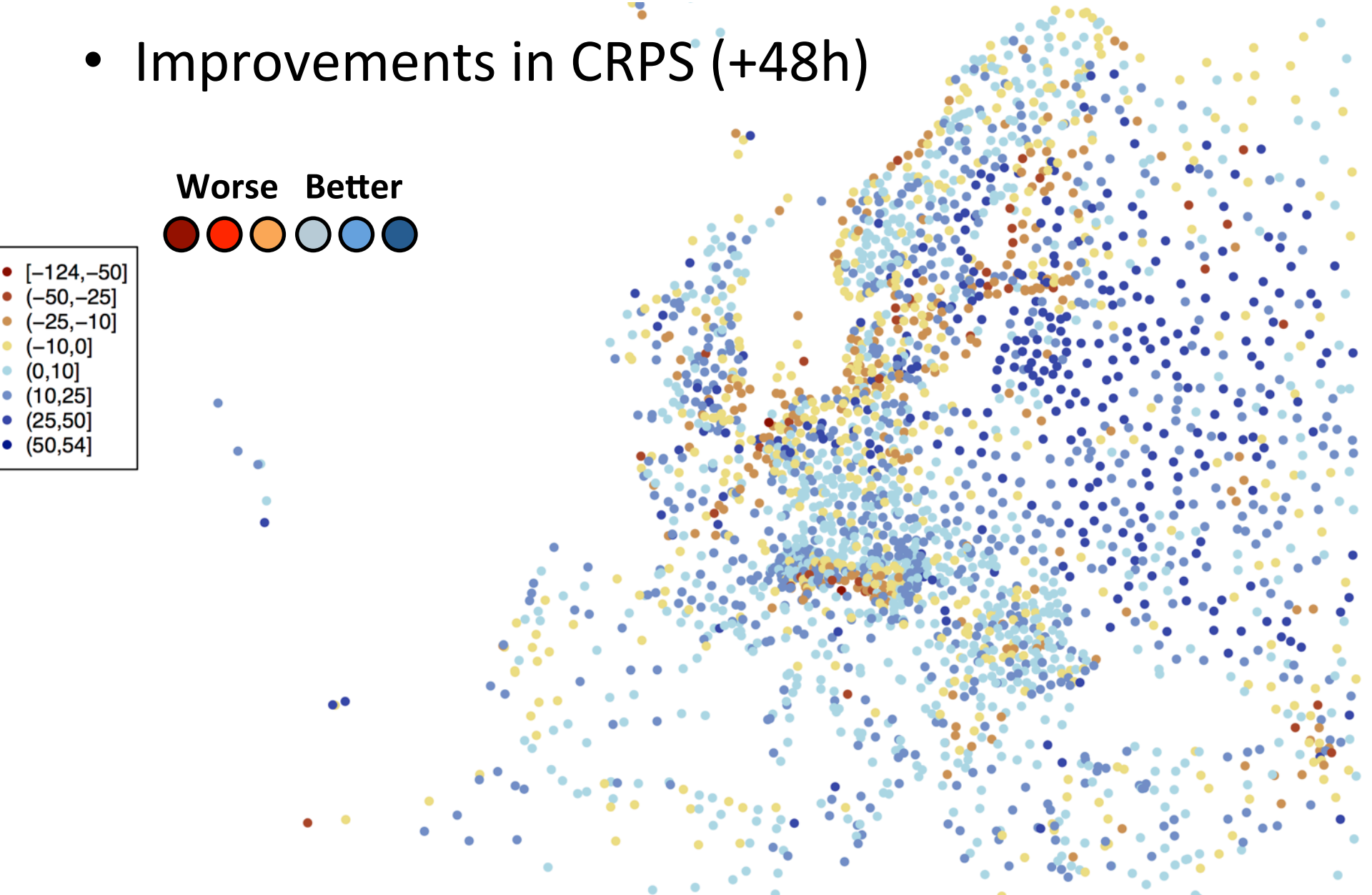
10m wind speed calibration

- Improvements in CRPS (+36h)



10m wind speed calibration

- Improvements in CRPS (+48h)



Conclusions

- Gridded calibration of 2m-temperature and 10m-wind speed
- Improvements to Brier skill scores and reliability

- Future work:
  - Use further spatial parameters
    - Land/sea mask
    - Coast proximity
    - Model climatology
    - Regional biases
  - More advanced models for skewness & kurtosis