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**Meteorologisk
institutt** 150 år

Multiple levels of validation for downscaled ensemble results



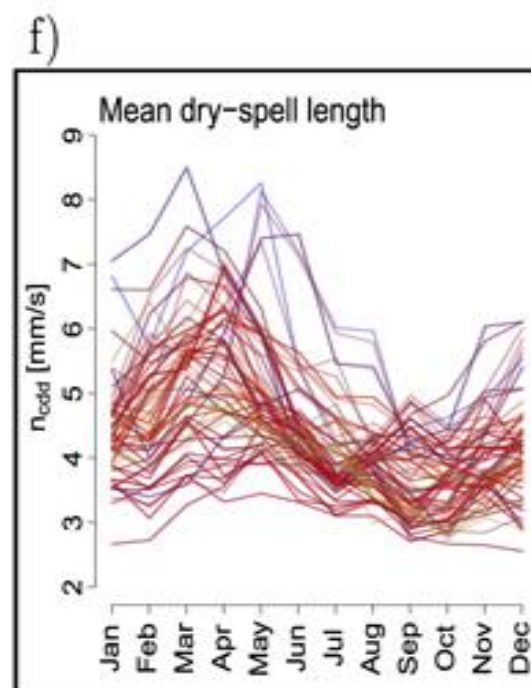
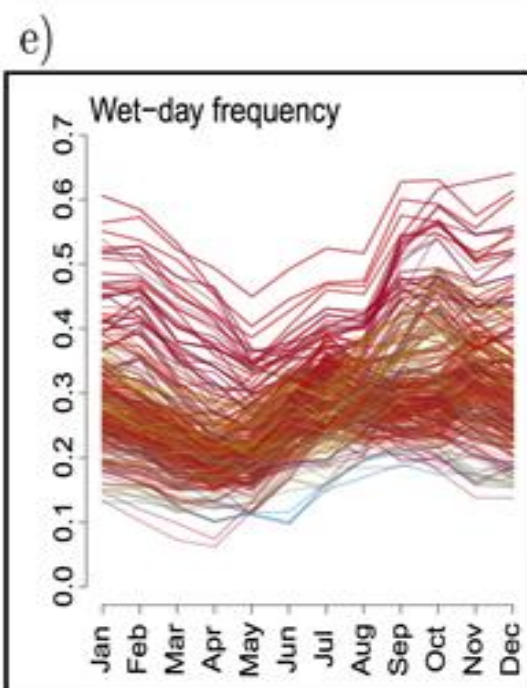
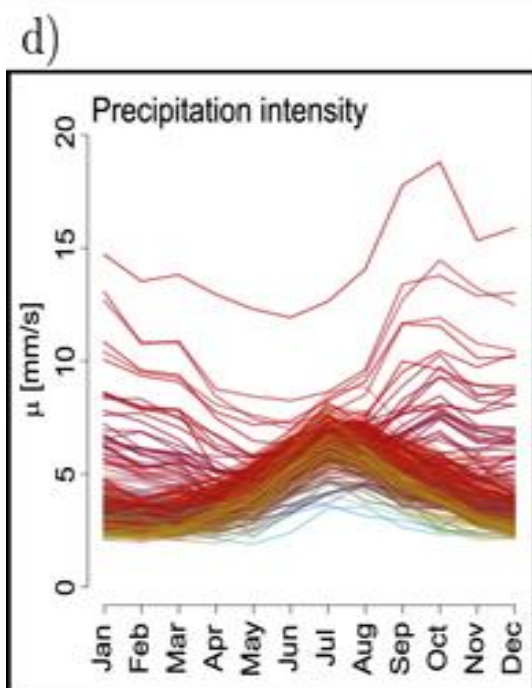
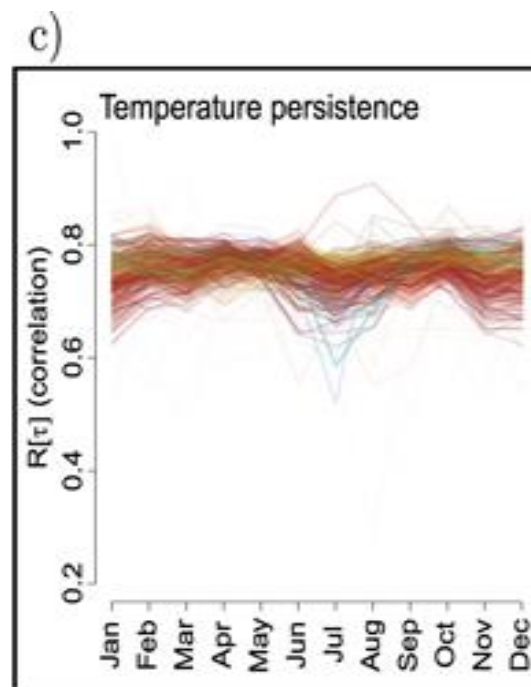
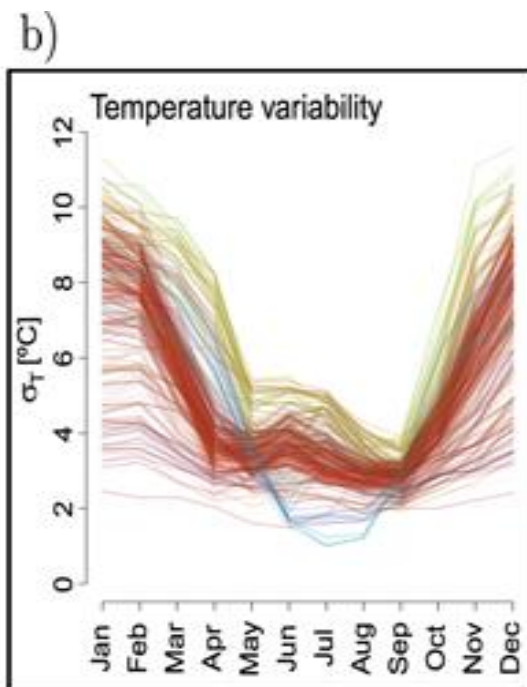
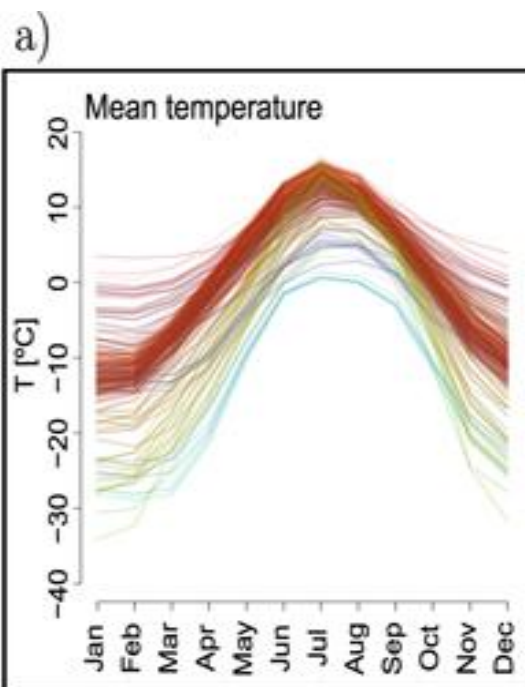
Why multiple levels?

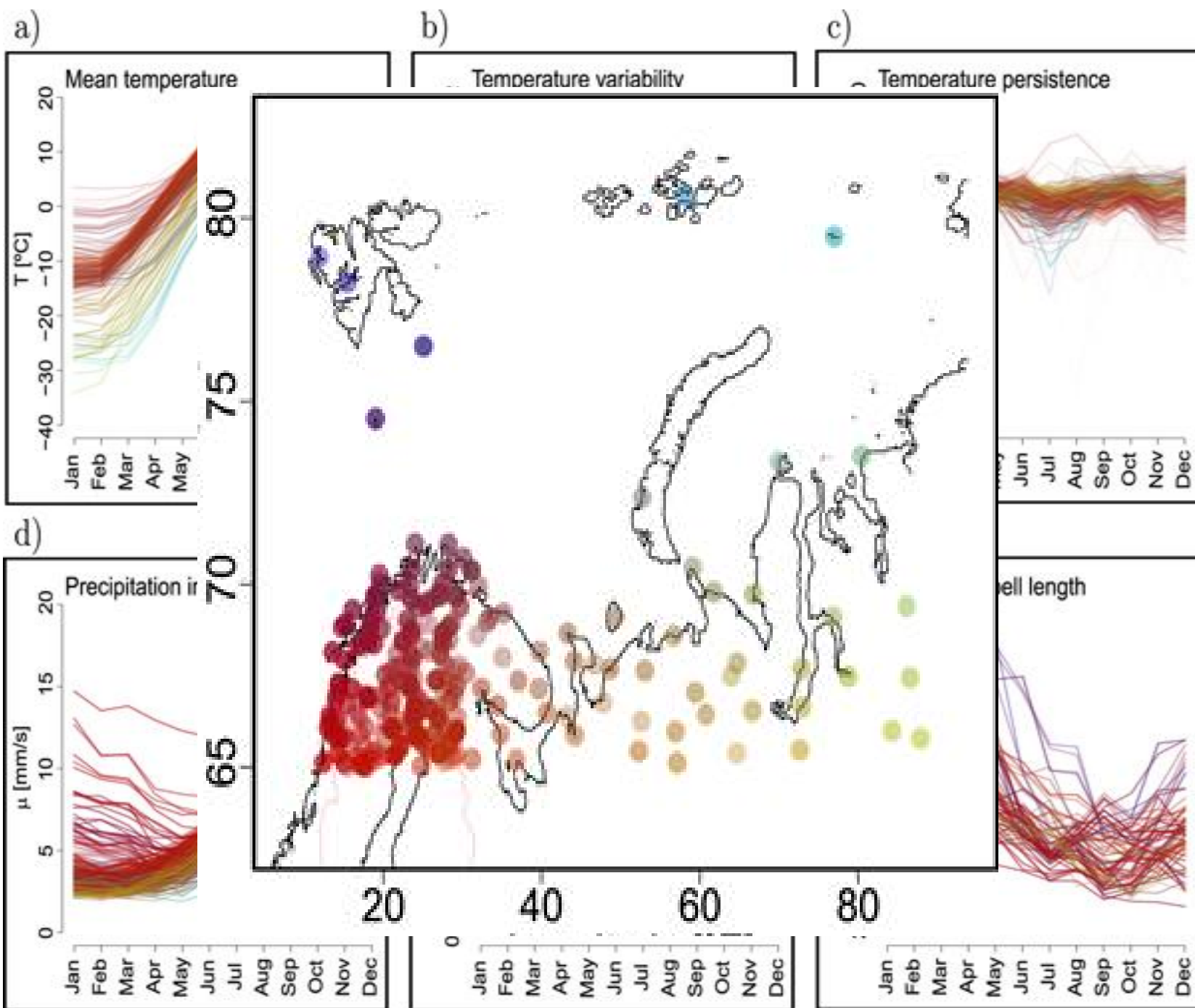
Levels

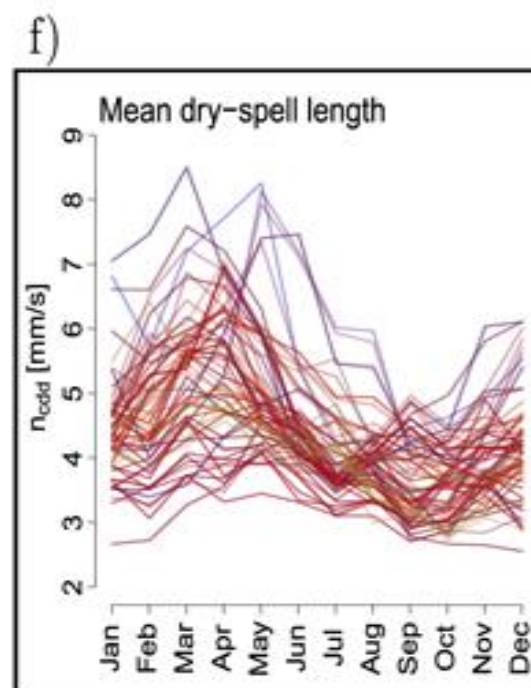
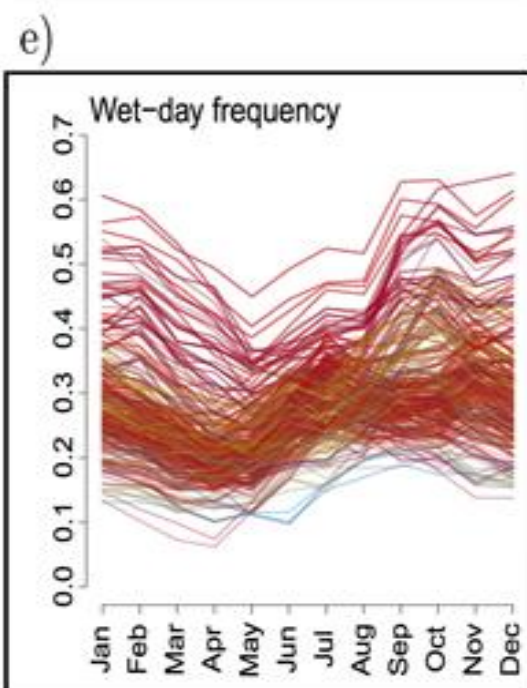
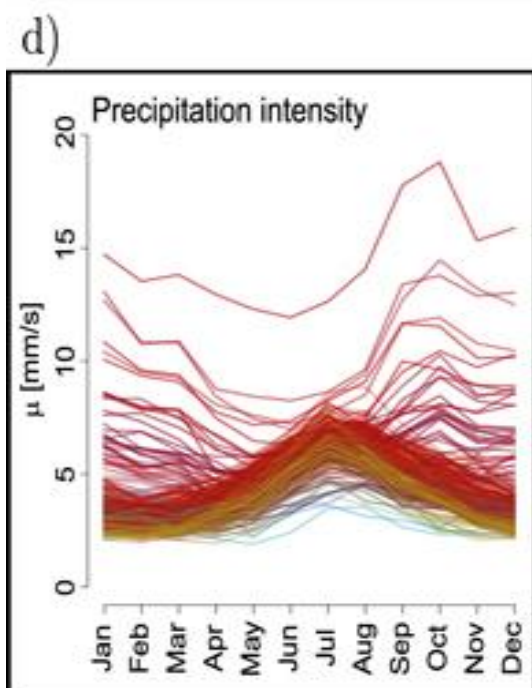
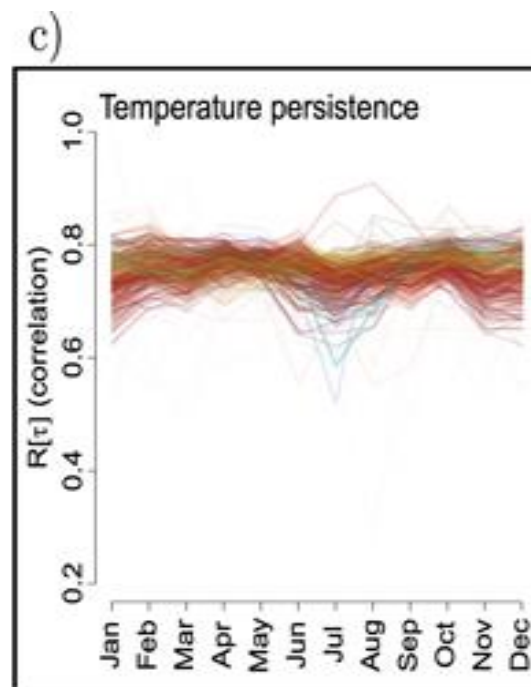
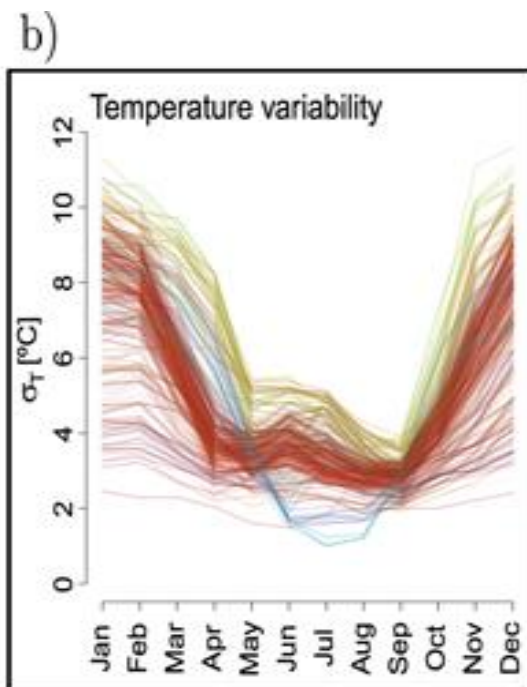
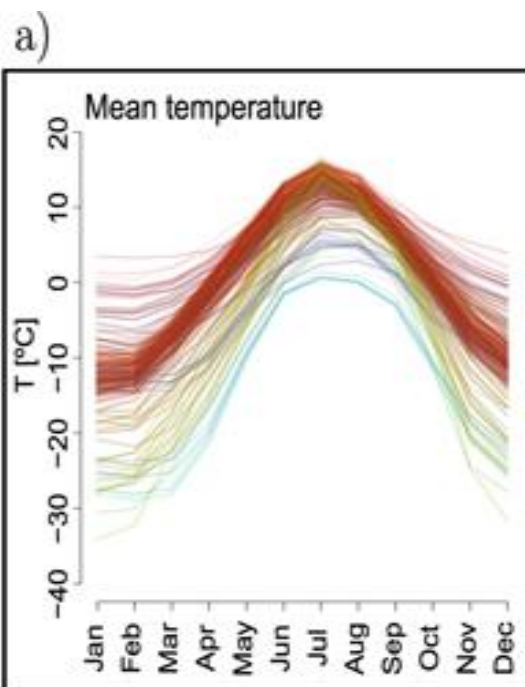
- 1. Sensitivity tests**
- 2. GCM representation**
- 3. Downscaling skill**
- 4. Ensemble representation**

1. Sensitivity to different factors in observations

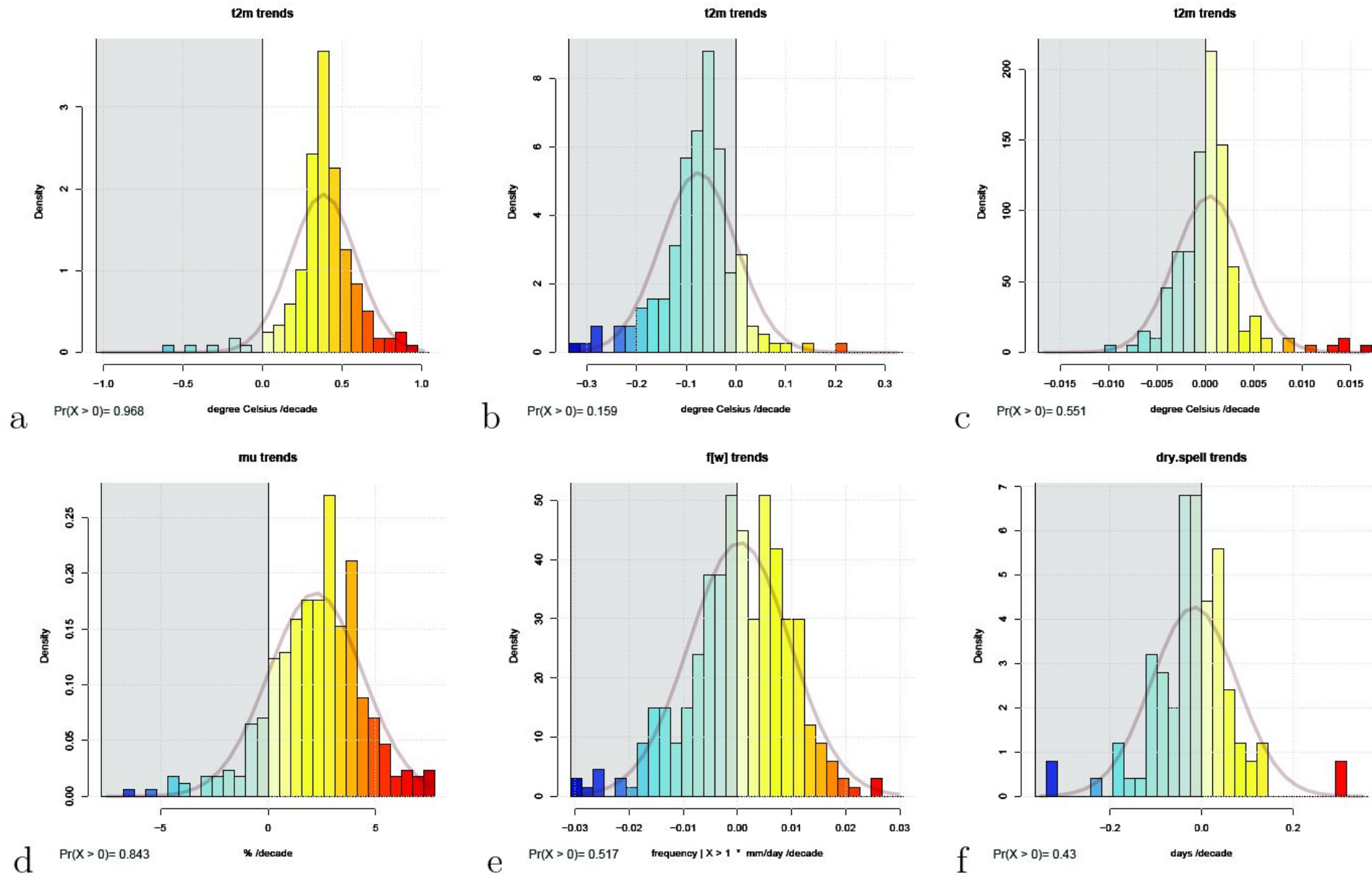
- Past warming
- Seasonal variations
- Geography







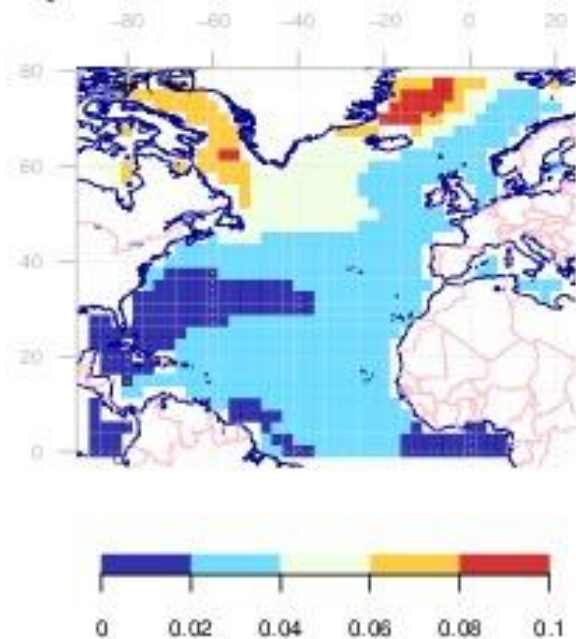
Past trends: an indication of sensitivity



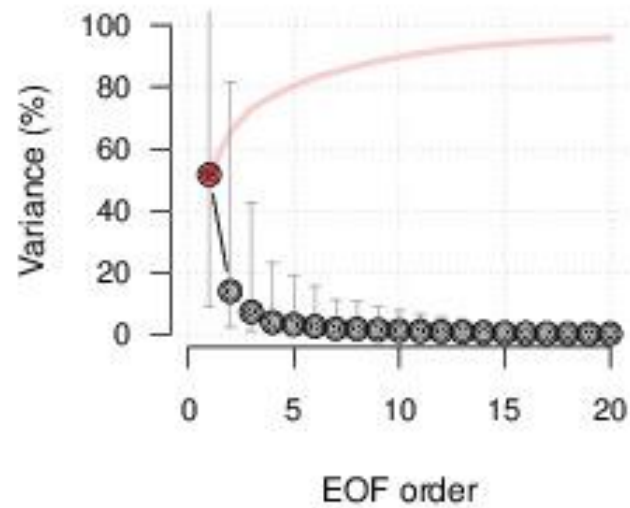
2. Are the GCMs able to reproduce the observed spatio-temporal structures?

- Common EOFs
- Compare simulated and observed trends

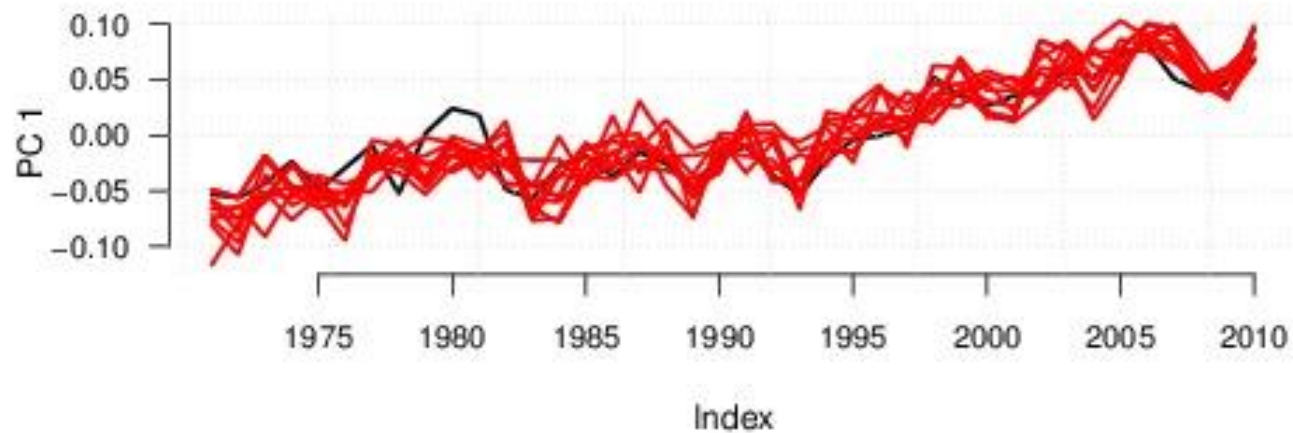
1 years



First 20 leading EOFs: 95.8 % of variance



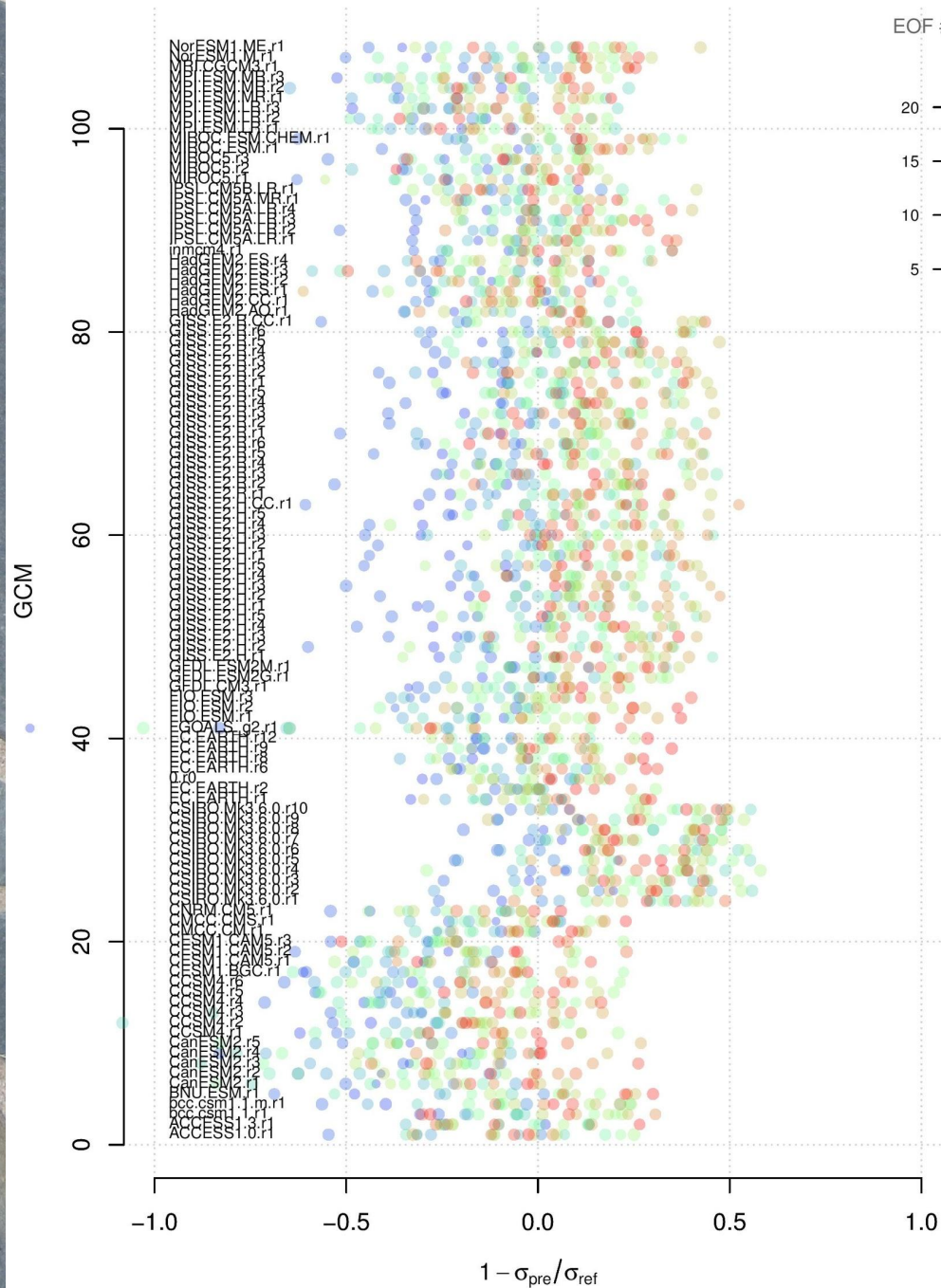
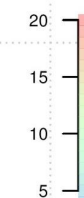
Leading PC#1 of Monthly Mean Air Temperature at sigma level 0.995 – Explained variance = 51.71%



Diagnostics: common EOFs air

JJA

EOF #



NorESM

MPI-ESM

MIROC5

IPSL-CM5

HadGEM2

GISS-E2

GFDL

FIO-ESM

EC-EARTH

CSIRO

CSIRO

CCSM4

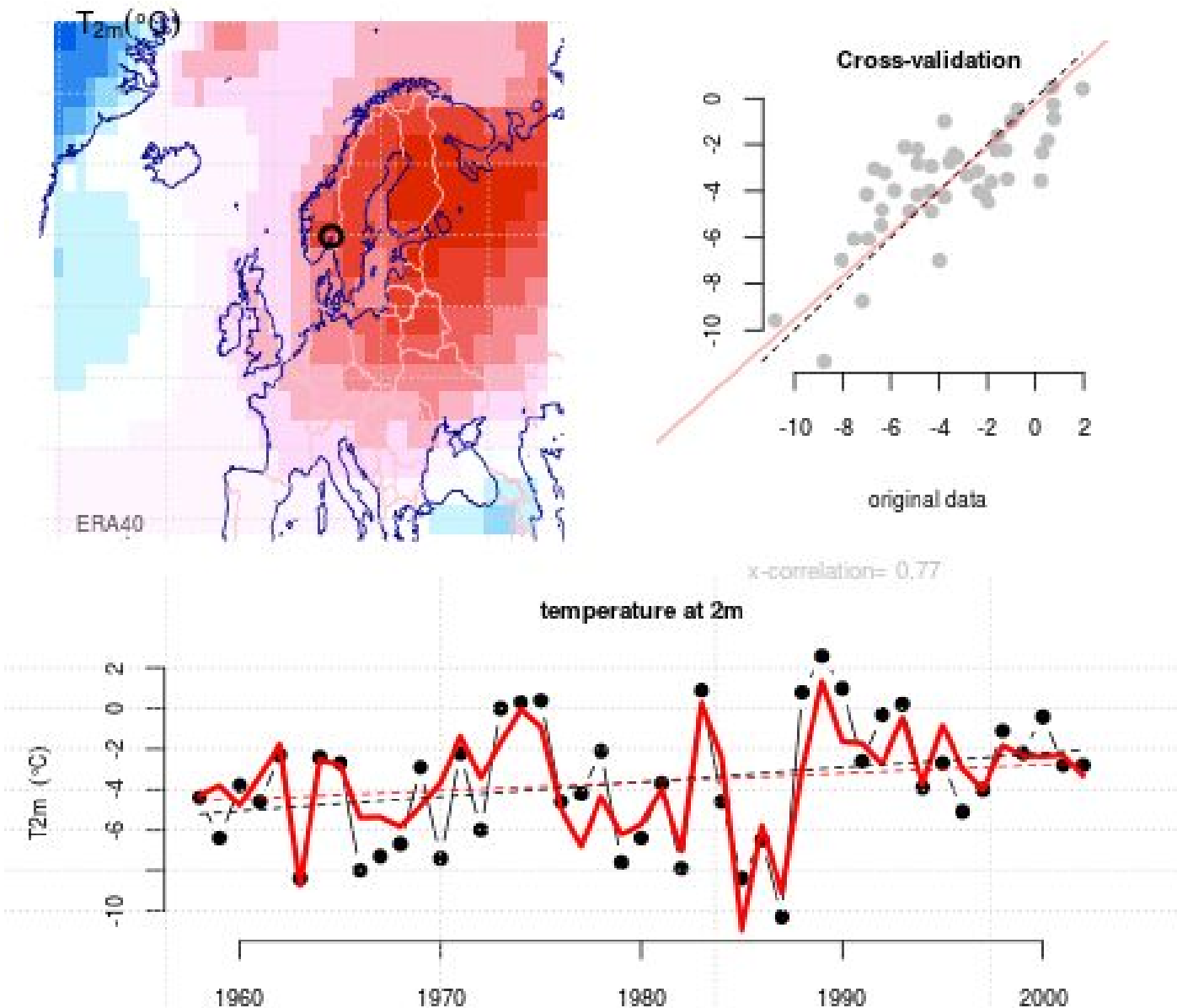
CanESM

ACCESS

3. How well does downscaling capture local change?

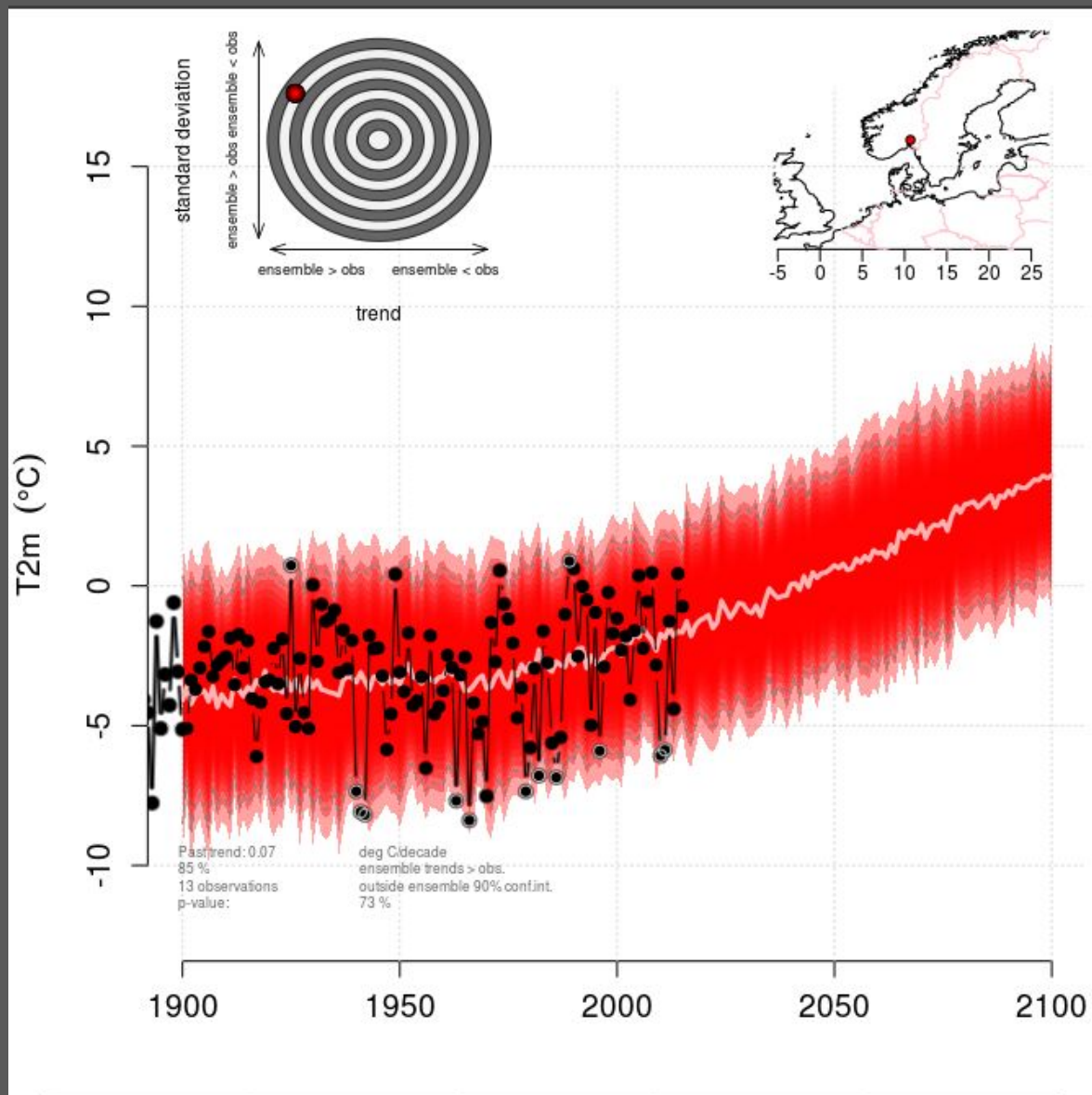
- Cross-validation
- Residuals

Cross-validation



4. How well do downscaled ensembles describe variability?

- Interannual variations
- Past trends (esd diagnose?)



Summary

- Downscaling needs to be evaluated on several levels.

Thank you for your attention!



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