

Future developments of E-OBS

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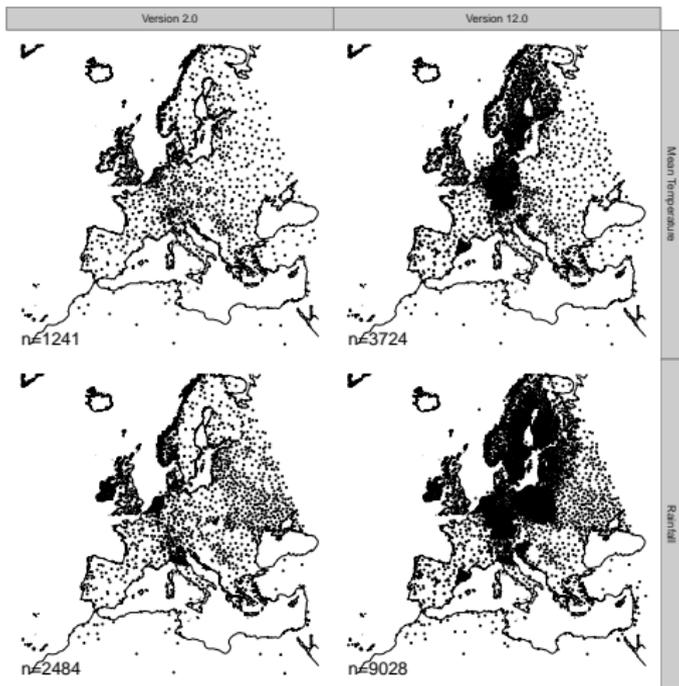
KNMI/CRU

21st November 2016

Outline

- 1 Improving the monthly spline
- 2 The Daily Ensemble Dataset

Stations in E-OBS versions



Additional Covariates in the thin-plate spline

- Currently Monthly values y are a function of three predictors (latitude, longitude and altitude)

$$y = g(lon, lat, alt) \quad (1)$$

- Generalized Additive Model (GAM) fitted to the data
- Temperature

$$y = g_1(lon, lat) + g_2(alt) + g_3(dist2coast) + g_4(TPI) \quad (2)$$

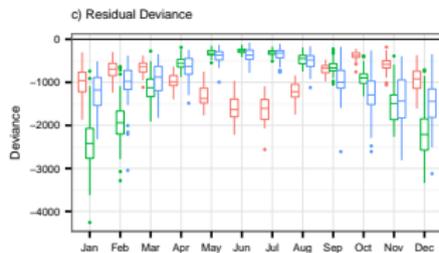
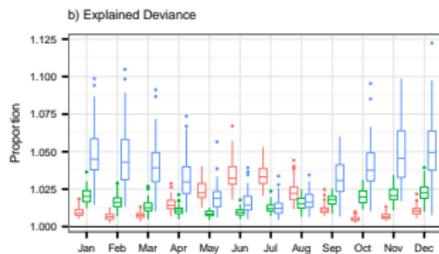
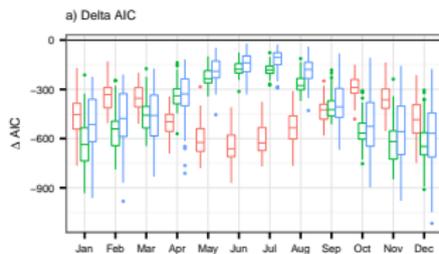
- Precipitation

$$y = g_1(lon, lat) + g_2(alt) + g_3(Qvec) + g_4(Pvec) \quad (3)$$

Features of the Generalized Additive Model

- Overfitting prevented in the model by restricting the EDF (the k -basis)
- Kriging accounts for autocorrelated residuals
- Gaussian distribution for temperature
- Tweedie distribution for rainfall
- Beta distribution for rainfall probabilities (Gamma Transform)

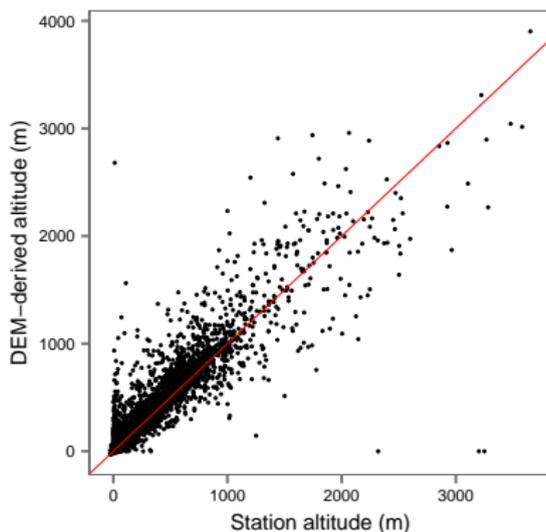
The Influence of these covariates



Resolving the box-averaging problem

- Use Lambert equal-area projection for interpolation
- Convert back to regular coordinates for box-averaging
- 0.1° master-grid $\implies 0.2^\circ$ final grid
- However, this links the output grid directly to the DEM grid

DEM vs. station altitude



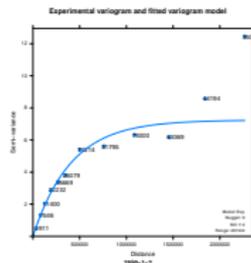
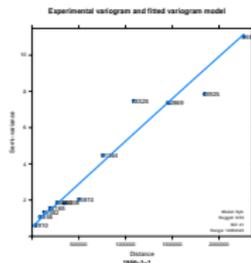
- This will become more important when attempting to increase the grid-spacing (resolution)

The Daily Ensemble Dataset

The Variogram

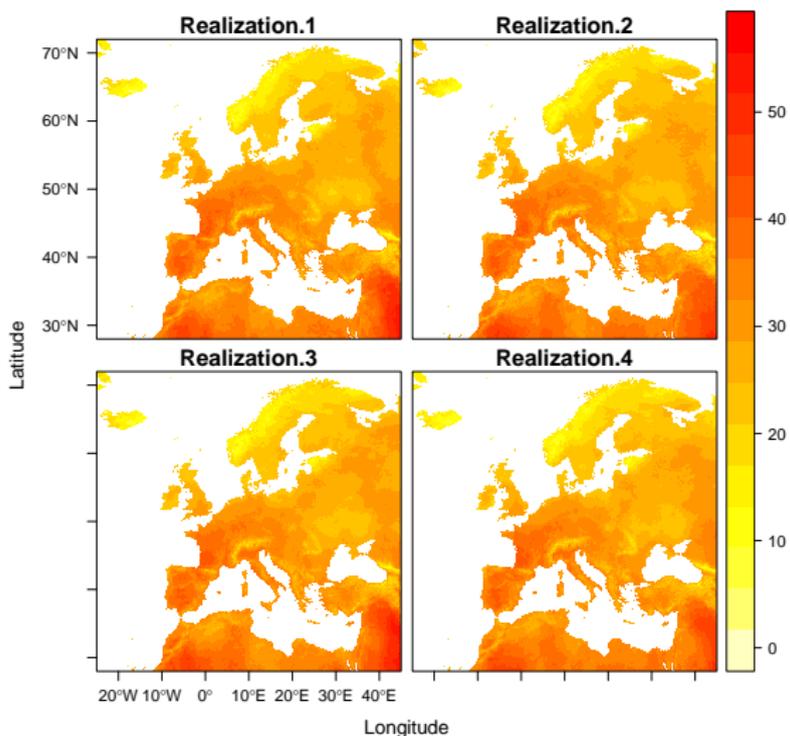
- Currently one variogram used for the whole period
- But the empirical variogram varies significantly
- The new method uses **daily** variograms

Daily Variograms for TX Jan 1950

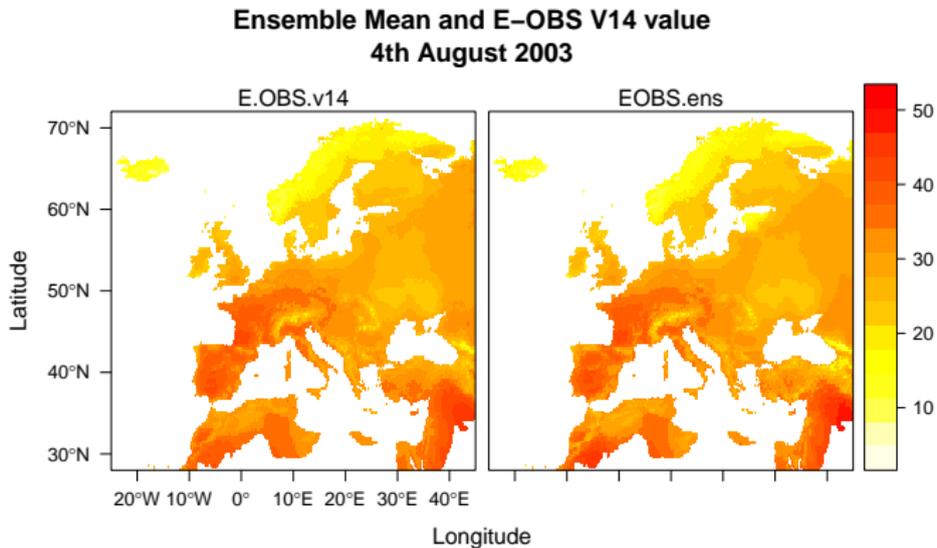


The daily Ensemble

Maximum Daily Temperature
4th August 2003

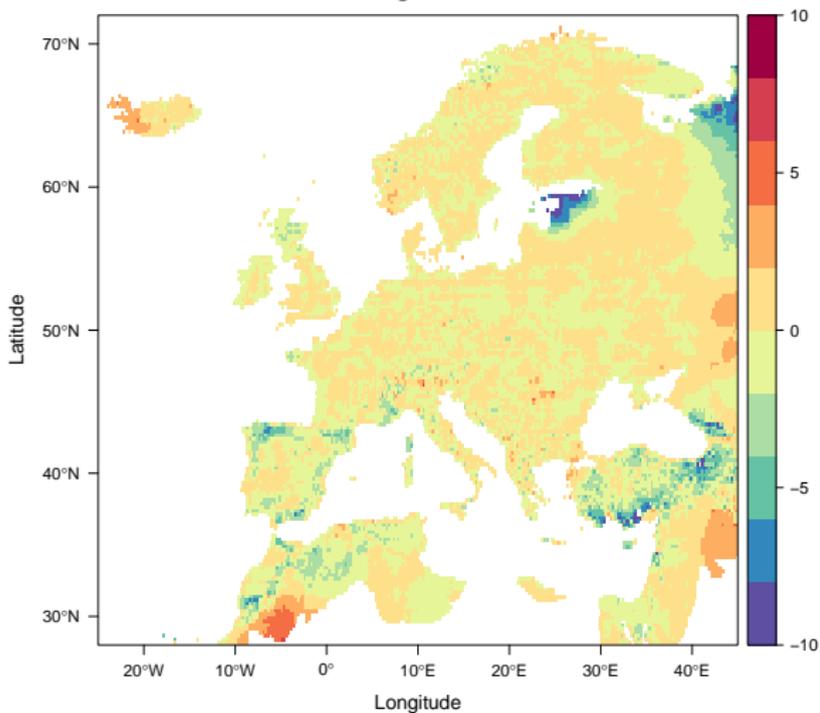


Comparison of E-OBS versions

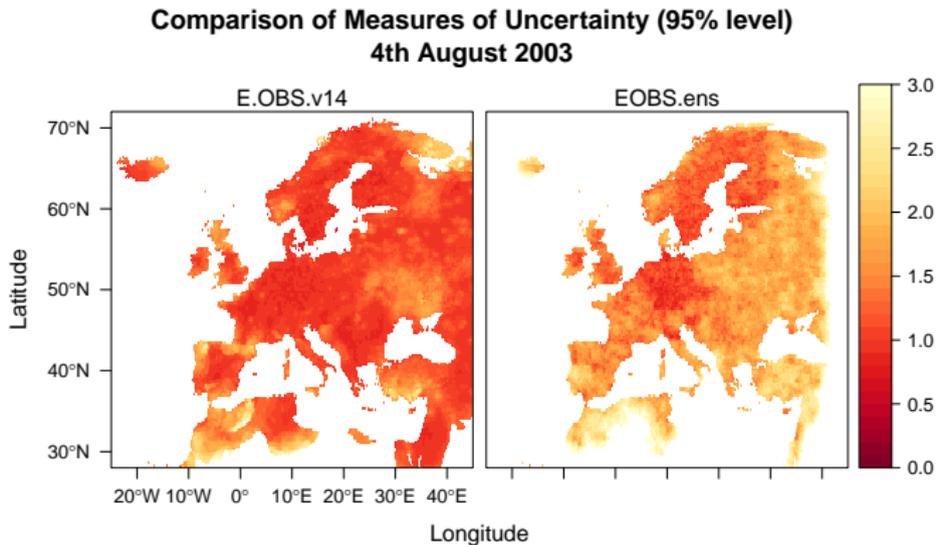


Comparison of E-OBS versions

**Difference (E-OBS ens minus E-OBS v14)
4th August 2003**



Comparison of Uncertainty Measures



Outstanding Operational Questions

- How do we disseminate a dataset 100x the current size?
- The output grid is now linked to the DEM, i.e different origin and spacing than in the current E-OBS version
- The update frequency will likely need to be adapted