A tool for "Improving bias-corrected Climate Change scenarios with local OBServational data" (ICC-OBS)

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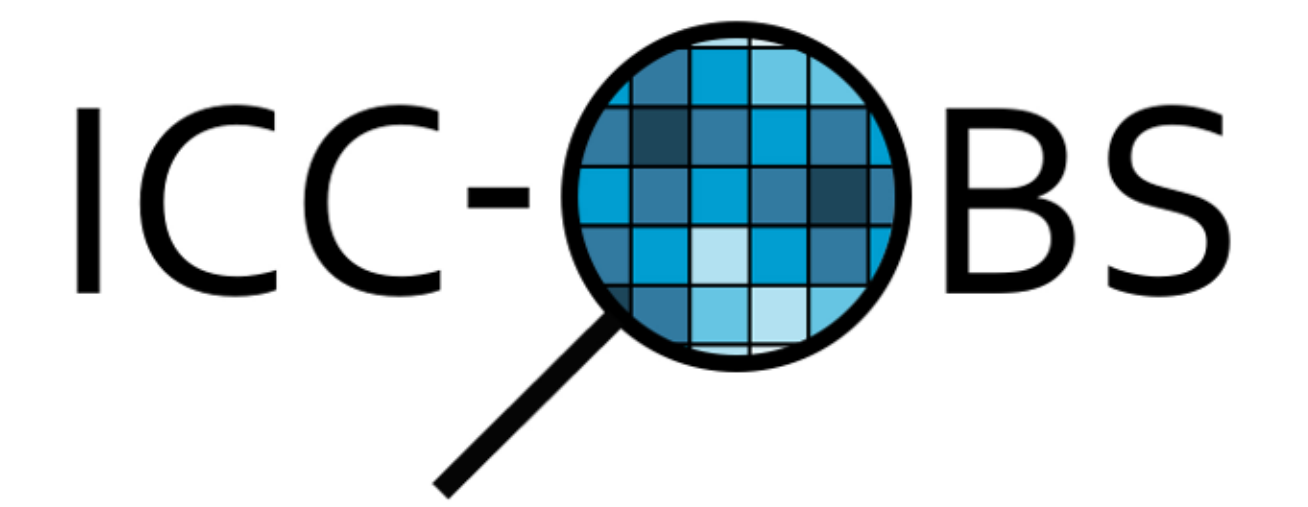
Objectives

There is an increasing interest and need by decision makers for bias corrected climate model scenarios on a local scale. The motivation for developing the **ICC-OBS** Tool is based on the fact that:

- Observational data serves as the ground truth for bias correction
- On a local scale freely available gridded observations often do not represent spatial variability, especially in mountainous areas
- General access to local measurements is difficult or expensive
- Local station data has the potential to improve the bias correction of climate model data
- ICC-OBS gives the possibility to easily integrate station data into the bias correction process without giving it away

Data Sources

Regional climate model scenarios from EURO-CORDEX[1] and MED-CORDEX[2] experiments are the basis for bias correction. Observational data for the Western Balkan Region was merged from different data sources:

- ERA5[3]
- SARAH-2[4]
- E-OBS[5]
- CHIRPS[6]
- CarpatClim[7][8]
- DanubeClim[7][9]

All data was regridded to a common regular lat-lon grid with a horizontal resolution of 0.1°using the "patch" algorithm provided by the Earth System Modelling Framework (ESMF). For all variables except precipitation a simple height correction is applied. For the purpose of testing the tool we got station data from 11 stations in Bosnia and Herzegovina.
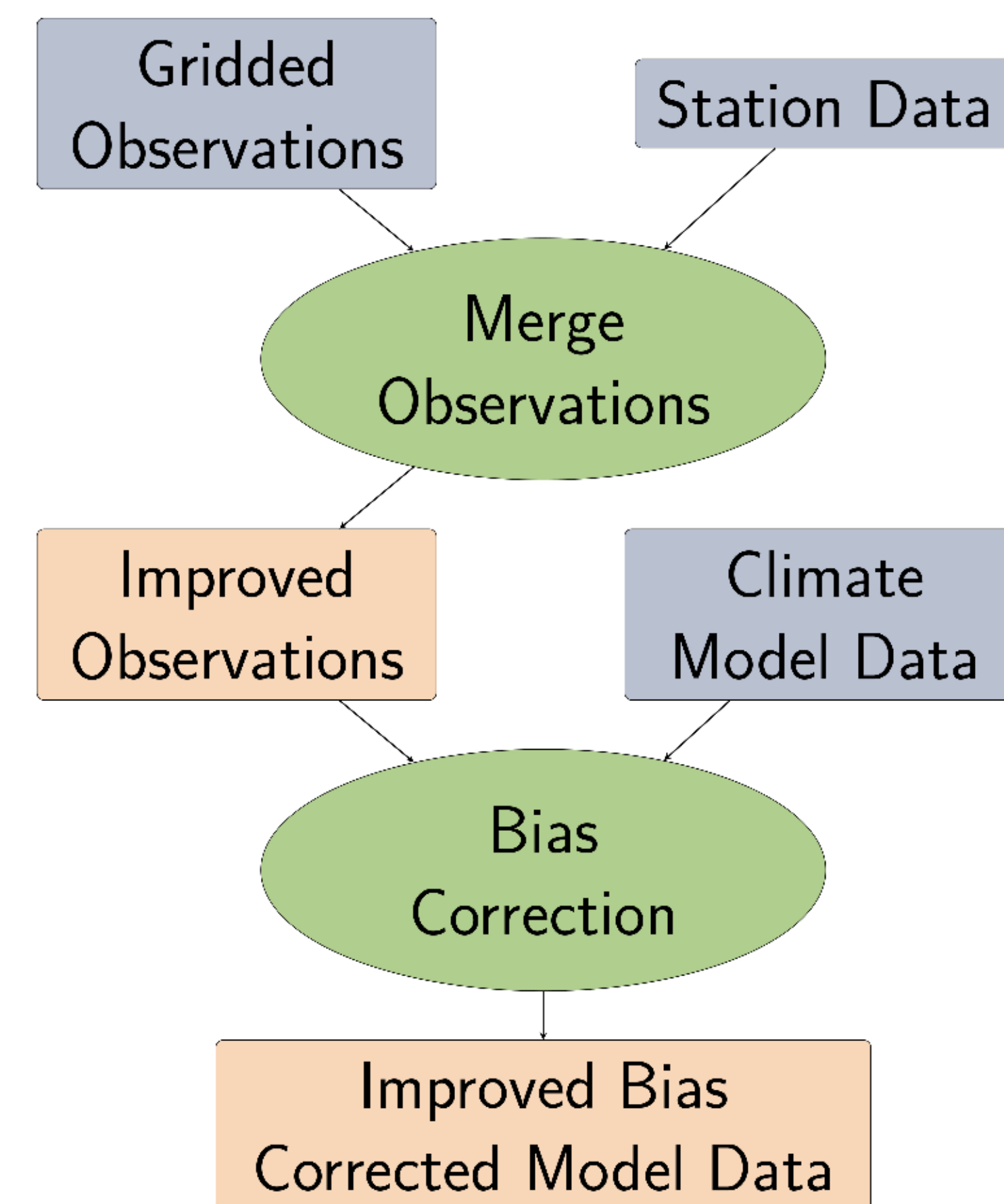

Figure 1: Workflow of the ICC-OBS Tool.

Methods

To merge gridded observations with station data, the following steps are necessary:

❶ Remove dependency on elevation from observations
❷ Interpolate gridded residuals to station locations with nearest neighbour interpolation
❸ Interpolate differences of station- and gridded residuals back to the grid (IDW or kriging)
❹ Add interpolated differences to gridded residuals

Scaled Distribution Mapping[10] is implemented in the tool as the method for bias correction.

Availability

The ICC-OBS Tool as well as all gridded data needed as input is **freely available** via the Climate Change Center Austria (CCCA) Data Server:
https://data.ccca.ac.at/group/climaproof
Additionally, an ensemble of 43 bias corrected climate model scenarios (RCP 2.6, 4.5 and 8.5) for six meteorological variables using only the freely available gridded observations is provided.

References & Acknowledgements

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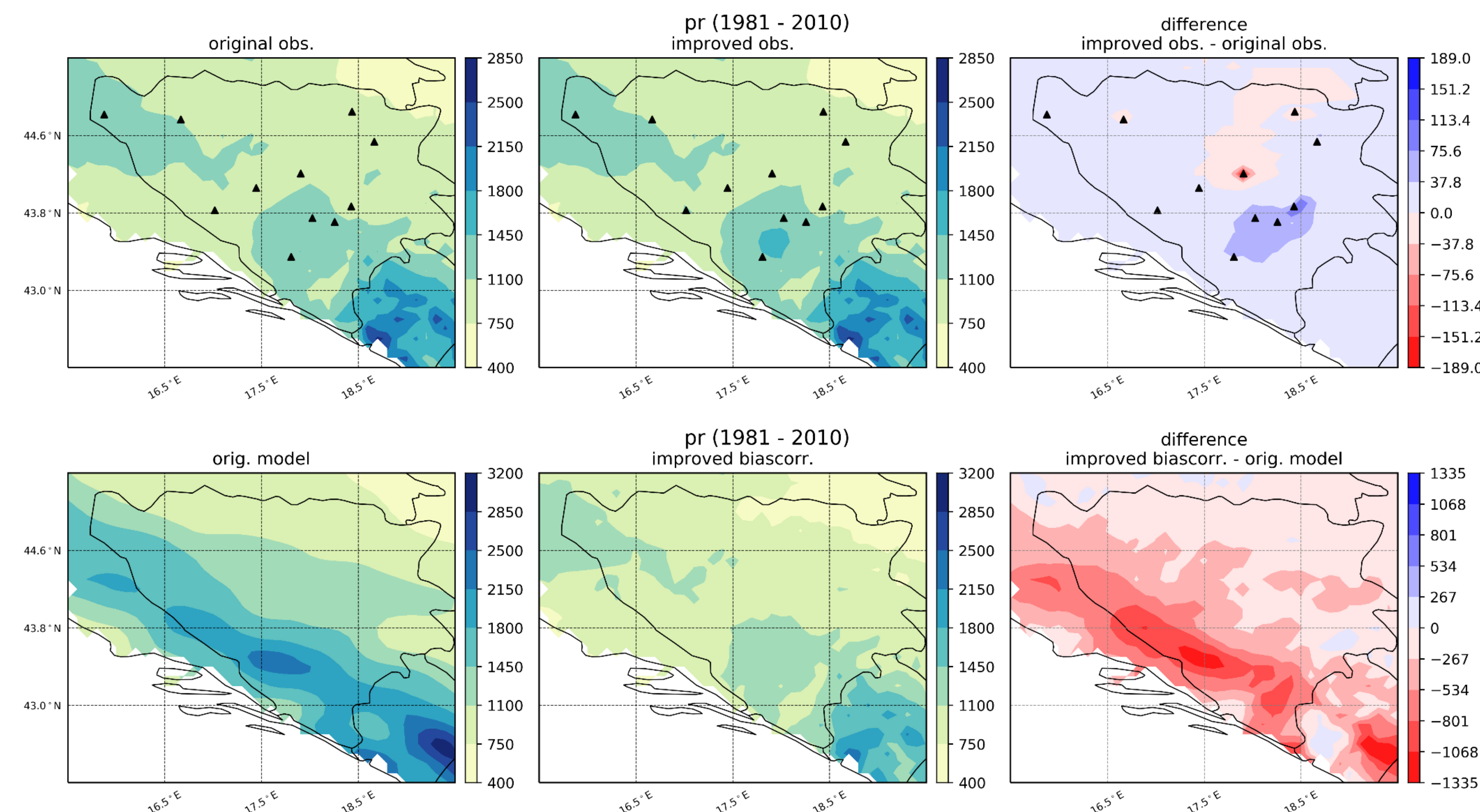
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Figure 2: Mean yearly precipitation sum for Bosnia and Herzegovina (1981-2010); top: comparison of original gridded and merged observations (including station data); bottom: Comparison of original and bias corrected climate model data