The ISIMIP bias-correction method for the PROFOUND sites

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Outline

• Introduction to bias correction
• ISIMIP bias-correction of daily mean temperature
• General bias-correction strategy in ISIMIP2b
• Special approach for forests sector
Bias correction is like cross-multiplication

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\[
\text{hist} \quad \Delta \quad \text{proj}
\]

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use knowledge of systematic errors in historical climate model output to correct future climate projections
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\[ ? \]
Bias correction is like cross-multiplication

- hist
- proj
- sim
- obs

quantile mapping etc.
Bias correction is like cross-multiplication

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Bias correction of distribution moments

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- Preservation of climate change signals
- Presumes: no change of model biases under climate change
- Equivalent: modelled trends are reliable
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ISIMIP bias-correction of daily mean temperature

- time series $T_{ymd}$ for year, month, day
  - $y \in [1979, 2013]$
  - $d \in [1, N_m]$ with $N_m = 31$ for $m = 3$
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- and of variability of daily values around monthly mean

\[ T_{ymd} \mapsto T_{ym} + C_m + B_m \left( T_{ymd} - T_{ym} \right) \]
General bias-correction strategy in ISIMIP2b

- use observational dataset EWEMBI
  - daily
  - global
  - gridded @ 0.5° latitude-longitude

- interpolate GCM data to 0.5° grid

- bias-correct individually for each grid cell and variable
Peculiarities of forests sector

• forest models designed for climate input data from point observations

• point data and grid-cell average data differ in
  • mean (site specifics)
  • variance (scale gap)
  • ...

⇒ special approach:
  • use GCM data from grid cell containing site bias
  • bias-correct using point observations
Collelongo 1996–2014 Mar

- **EWEMBI**
- **Collelongo**
Example

Collelongo 1996–2014 Mar

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- IPSL-CM5A-LR
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- IPSL-CM5A-LR+EWEMBI
- GFDL-ESM2M+EWEMBI
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The diagram shows the cumulative distribution function (eCDF) of tas [°C] for various models and scenarios over the period 1996–2014 in Collelongo.
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Collelongo 1996–2014 Mar

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  - topographic effects: rain shadow
  - surface climate conditions: temperature affected by snow-albedo effect
  - high spatiotemporal variability: variables related to clouds

- potential differences between GCM and point scale for climate change-related trends
  - hard to check but worth keeping in mind

- temporal structure of time series
  - sensitivity can be tested using synthetic time series
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