The CORDEX-CORE initiative

High resolution regional climate information for the world

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Background

With the growing demand for high-resolution information about regional climate change and its impact all over the world, the WCRP CORDEX supported the CORDEX-COmmon Regional Experiment (CORE) Framework. CORDEX-CORE aims at contributing to the next IPCC report with a homogeneous dataset of high-resolution regional climate information and providing this information for all major inhabited areas of the world.

The main ideas of the CORDEX CORE framework are:

- to provide an ensemble of high-resolution (~25 km) regional climate change information.
- to provide a basis for an assessment of future extreme events for all major inhabited regions of the world.
- to use the ensemble for further analysis such as climate change impacts on the different global warming levels, e.g. +1.5 °C or +2.0 °C.

Setup www.cordex.org/experiment-guidelines/cordex-core/

RCMs currently contributing to the CORDEX CORE framework to simulate at least nine domains (Figure 1) with horizontal resolution of 0.22° (about 25 km):

- REMO model (contribution by GERICS)
- RegCM model (coordinated by ICTP, Italy)

Experiments: evaluation, historical, rcp2.6 & rcp8.5

Forcings: ERA-Interim re-analysis, three GCMs representing the range of low, medium, and high climate sensitivity:

- NorESM (backup: GFDL-ESM)
- HadGEM (backup: MIROC5)
- MPI-ESM (backup: EC-Earth)

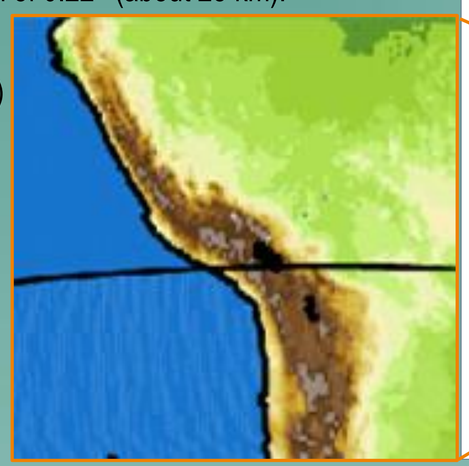


Figure 1b: Orographically structured area at CORDEX-CORE resolution of 0.22°.

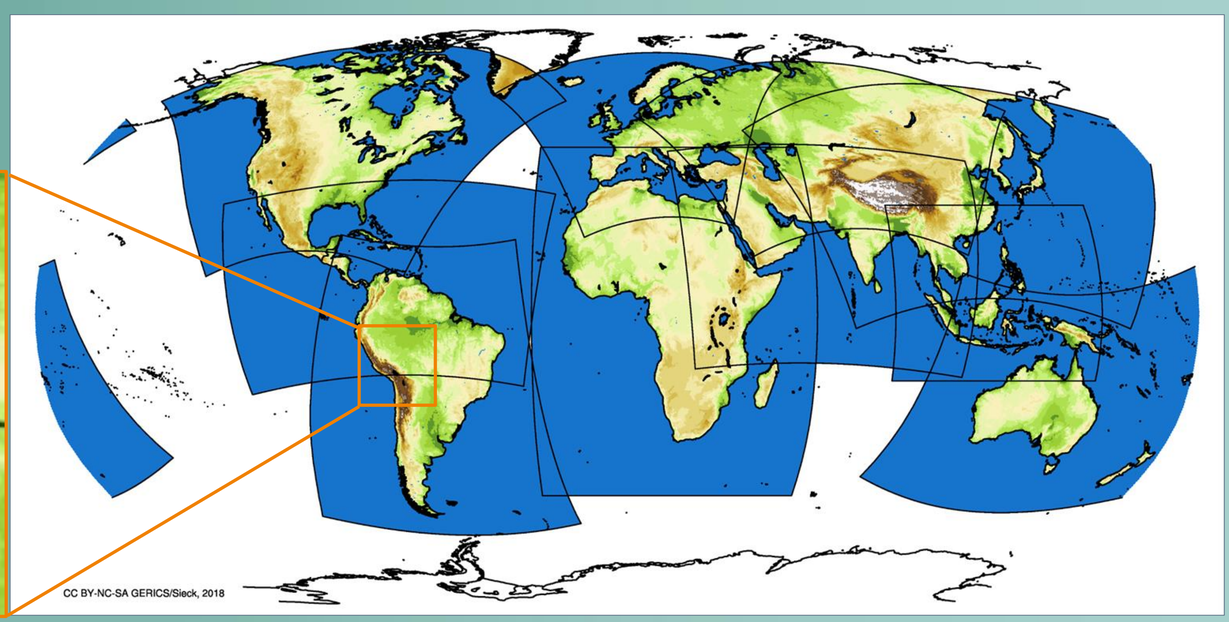


Figure 1a: CORDEX-CORE model domains used in the simulations. From top-left to bottom right: North America (**NAM**), Central America (**CAM**), South America (**SAM**), Europe (**EUR**), Africa (**AFR**), South Asia (**WAS**), East Asia (**EAS**), Southeast Asia (**SEA**), and Australasia (**AUS**).

Preliminary Results

- In order to evaluate the RCM model performance, the model biases compared to the observational datasets are analyzed for the 1971 to 2005 period.

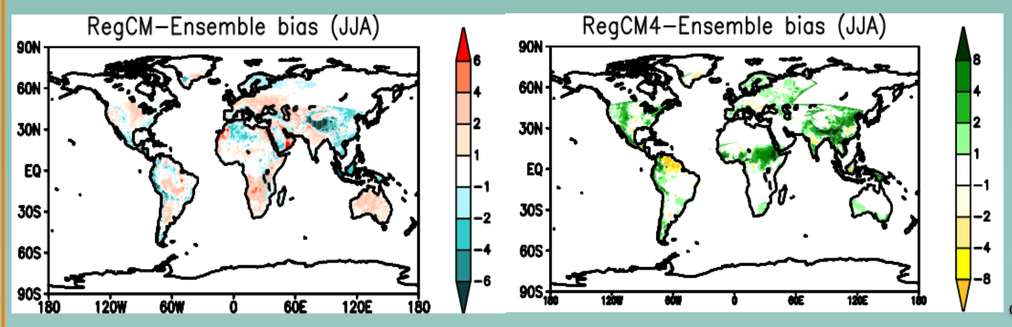


Figure 2: The mean austral summer temperature and precipitation biases of the ensemble of RegCM simulations driven by the GCMs compared to observational datasets during the historical period from 1971 to 2005.

- Figure 2 depicts the regions where the RegCM model have low or high biases of the temperature and precipitation during summer. The biases were comparable to the simulations from previous studies.
- Another way of estimating the biases is using the IPCC SREX regions. As an example, Figure 3 identifies the regions where the REMO model has the highest warm or cold biases (e.g. in West Asia [19] or Tibetan Plateau [21]) from the REMO-NORESM simulations).

- Currently, the new CORDEX-CORE simulations are further analyzed to determine the mean signal, variability, extremes and hazards in different scenarios of climate change.

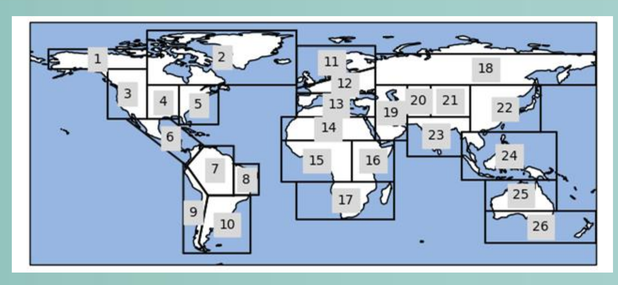
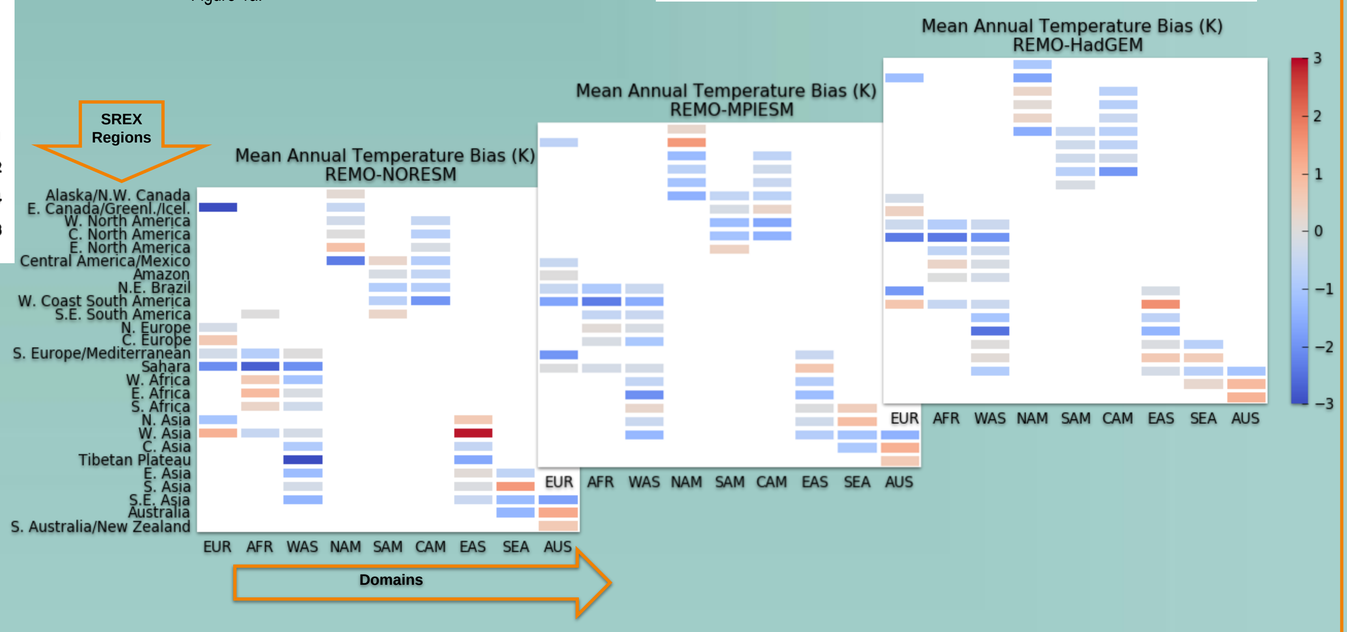


Figure 3: The mean annual temperature biases of the REMO simulations driven by the 3 GCMs (below) compared to CRU during the historical period from 1971 to 2005. The regions of analysis (y-axis) were taken from the IPCC SREX regions (right). The nine CORDEX-CORE domains (x-axis) are from Figure 1a.



Outlook

- Refinement of common output and analysis strategies. CORDEX-CORE data will be released by the end of Summer 2019.
- Foster interaction with the Vulnerability Impact Adaptation and Climate Services (VIACS) communities to enable a broad application of the CORDEX-CORE simulations (e.g., via the CMIP6-endorsed VIACS Advisory Board)

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