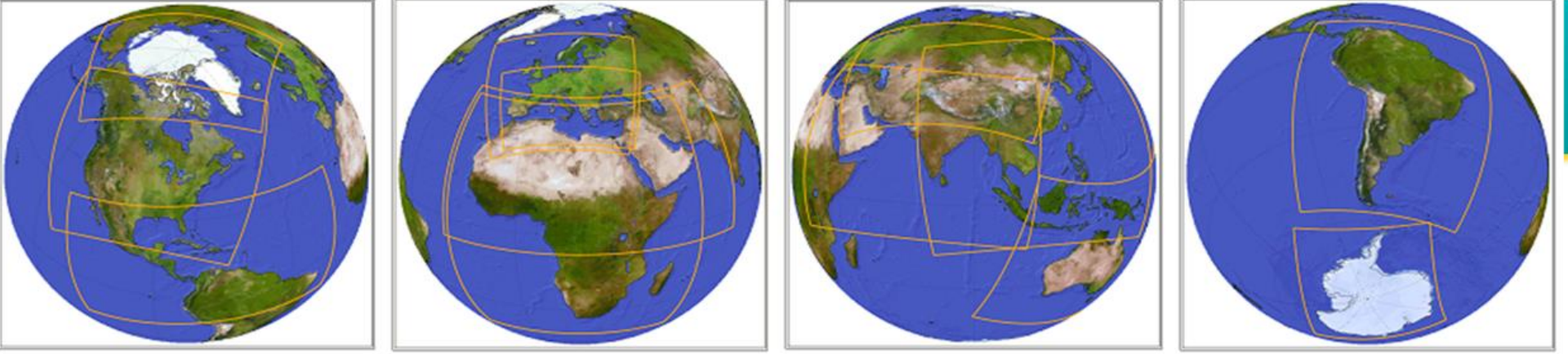

WCRP CORDEX

Coordinated Regional Climate Downscaling Experiment

Science for Society: CORDEX

Prof. Dr. Daniela Jacob // CORDEX-SAT Co-chair

01 - June - 2021 // SBSTA - Research Dialogue

GERICS Climate Service Center Germany

An institution of Helmholtz-Zentrum hereon

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CORDEX // Overview

The CORDEX vision is to advance and coordinate the science and application of regional climate downscaling through global partnerships

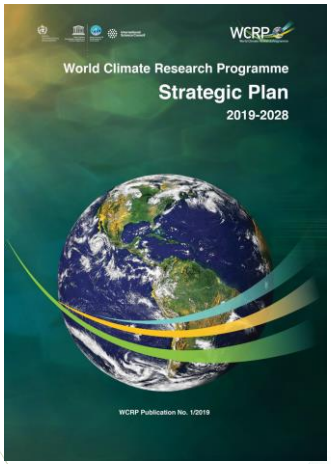
Goals:

- To better understand relevant regional/local climate phenomena, their variability and changes, through downscaling
- To evaluate and improve regional climate downscaling models and techniques
- To produce coordinated sets of regional downscaled projections worldwide
- To foster communication and knowledge exchange with users of regional climate information

CORDEX & WCRP

CORDEX directly contributes to the new WCRP strategic plan, especially Pillar 4: *"Bridging climate science and society"*

CORDEX is an instrumental part of the new WCRP Home: *Regional Information for Society (RifS)*



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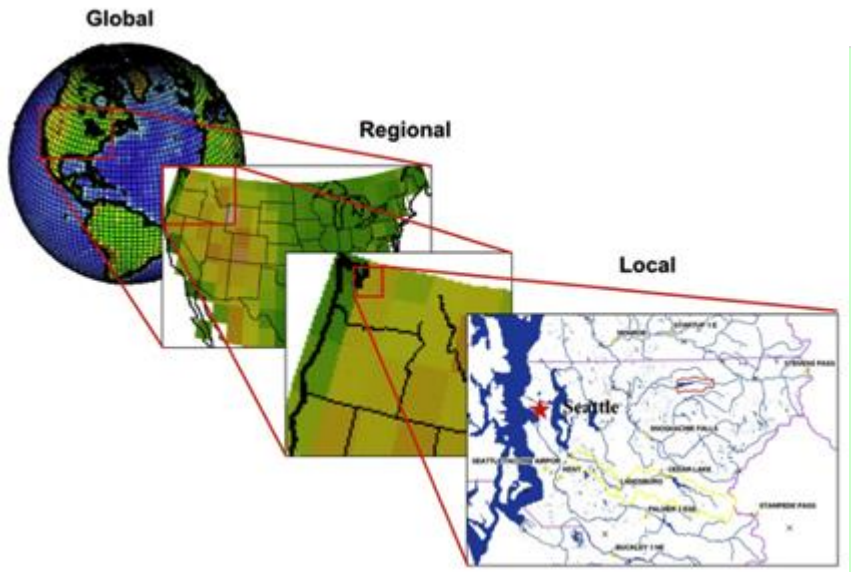
CORDEX // Activities



CORDEX White Paper

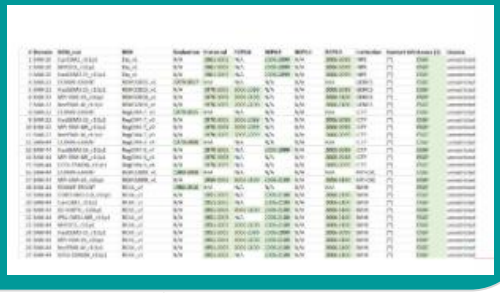
- Higher resolution, domain size, inform risks/VIA
- RESMs, human dimension: increased complexity
- Data/infrastructure

WCRP CORDEX
FLAGSHIP PILOT STUDIES

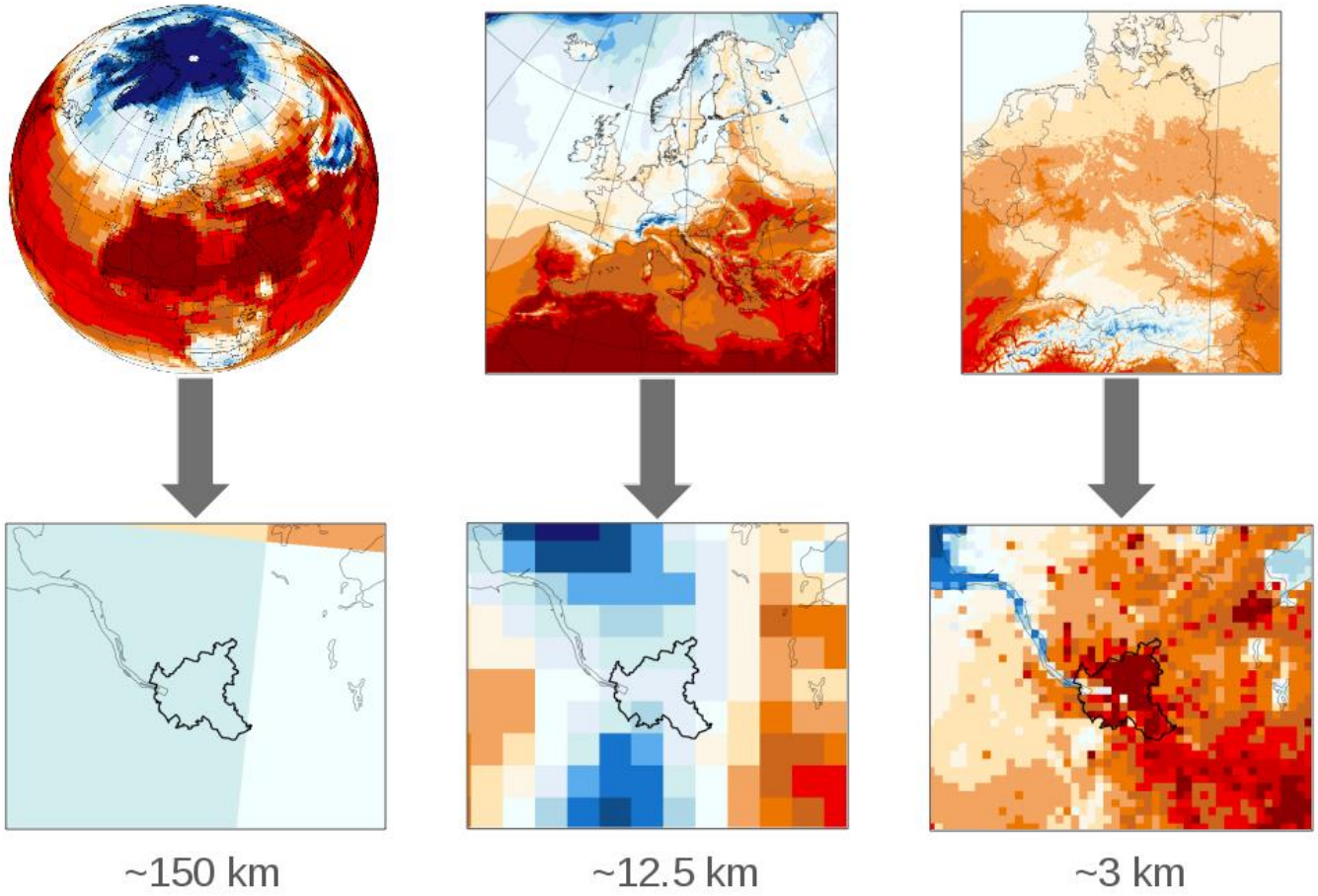
Flagship Pilot Studies

- Regional-to-local extremes
- Third pole region
- Convection permitting
- Land use change
- Urban areas

CMIP6 Downscaling protocol



Moving to higher resolutions



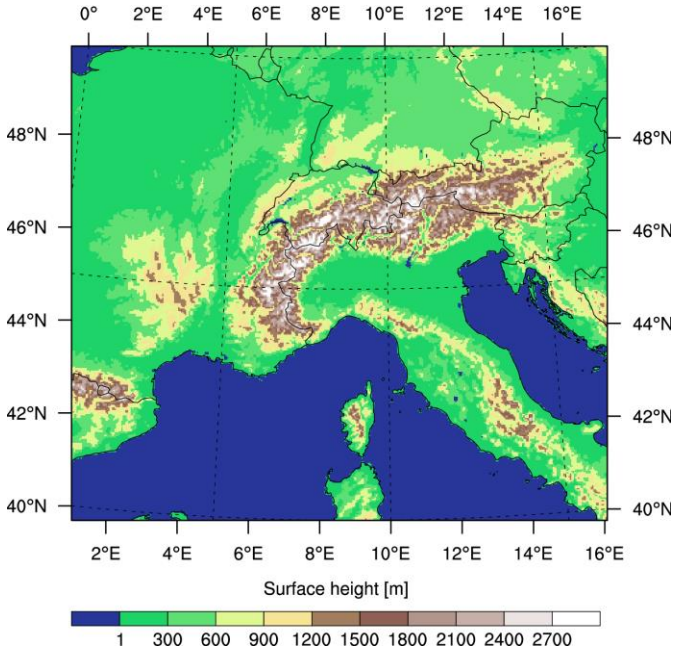
Grid Representation of near surface Temperature (2.7.1995) *(Note: colour scales differ)*

Applied cases // high-resolution (3km)

CORDEX-Flagship Pilot Study

Convection over Europe and the Mediterranean

Model domain

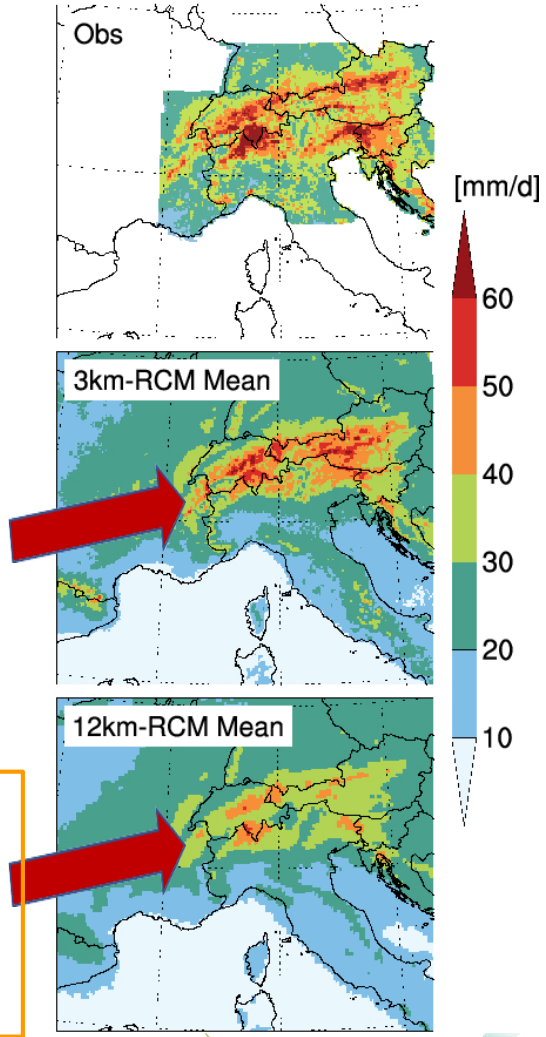


23-member ensemble

- Reduces biases & uncertainty ranges;
- Improves diurnal cycles;
- Mitigates the “drizzle” problem;
- Captures heavy precipitation

Clear improvement in heavy precipitation (P99)

More realistic representation of precipitation with convection-permitting models compared to coarser counterparts



Ban et al. 2021
https://link.springer.com/article/10.1007%2Fs00382-021-05657-4

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Applied cases // Cities

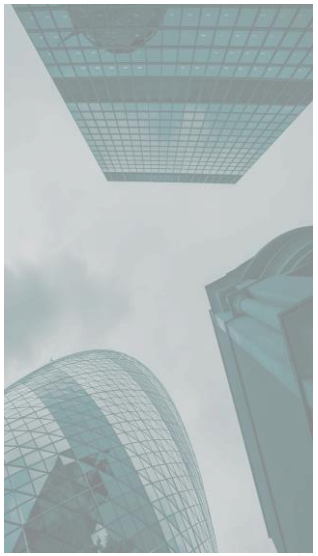
URBan environments and Regional Climate Change (URB-RCC)

CORDEX Flagship Pilot Study *(new! Started 01.05.21)*

Main goal:
to understand the effect of urban areas on the regional climate, as well as the impact of regional climate change on cities, with the help of coordinated experiments with urbanized RCMs.

Objectives:

- Investigating interactions of urban environment with local-to-regional climate for (mega)cities based on coordinated ensemble using urbanized RCMs in CORDEX experiments
- Understanding and assessing urban climate change impacts, across local-to-regional scales, providing the urban climate change science to underpin climate services for cities
- Assessing options for urban parameterization (UP) schemes in high-res RCM simulations for further use in CORDEX



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CORDEX data availability

- Open access
- Standardized, quality controlled
- Observational basis for verification
- Community effort
- Inventory of GCM/RCMs on www.cordex.org

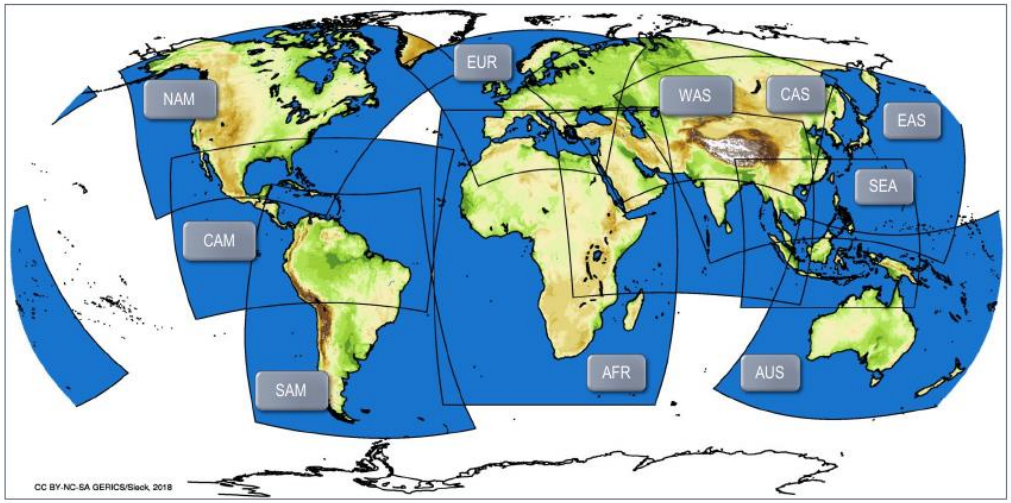
CORDEX model output data is available online via:

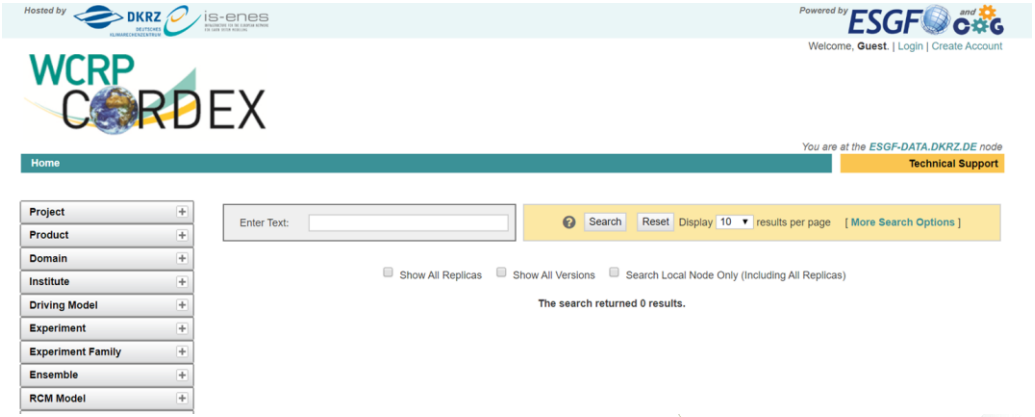
- Earth System Grid Federation
- Copernicus Climate Data Store

ESGF

Climate Data Store (CDS)
Climate data at your fingertips

CORDEX-CORE Regions/Domains





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CORDEX and NAPs

CORDEX can provide robust information to inform applications & decision making

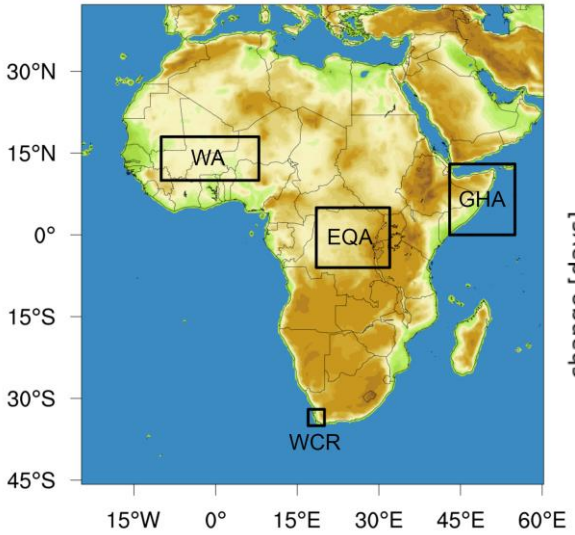
CORDEX products can inform NAPs

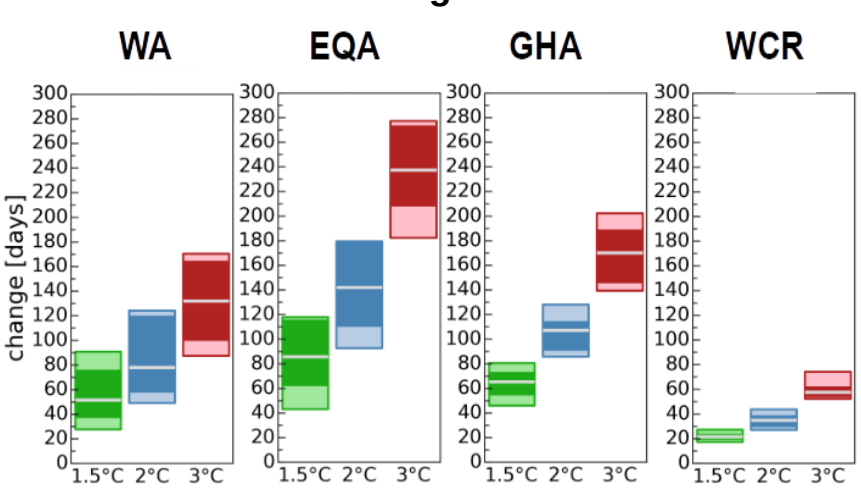
CORDEX-CORE

Covers all land regions around the world
25x25km grid size
RCP2.6 & RCP8.5
1970-2100

➔ Particularly interesting for developing nations

Example of analysis CORDEX climate data in Africa





The colours of the boxes: 1.5°C (green), 2°C (blue), 3°C (red) global warming scenario.
Ensemble minimum/maximum (light colour), 17th and 83th percentile (dark colour) and median (grey) as field means for focus regions d) West Africa, e) Equatorial Africa, f) Greater Horn of Africa, g) Western Cape Region.

WCRP CORDEX

Weber et al., 2018, https://doi.org/10.1002/2017EF000714

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