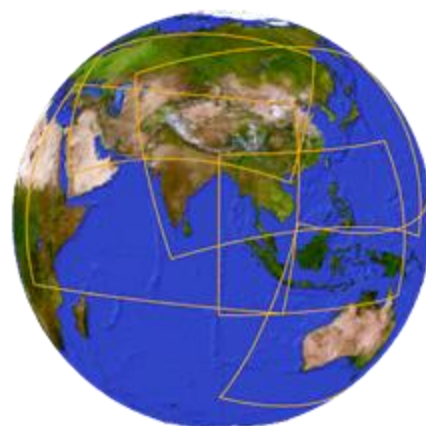
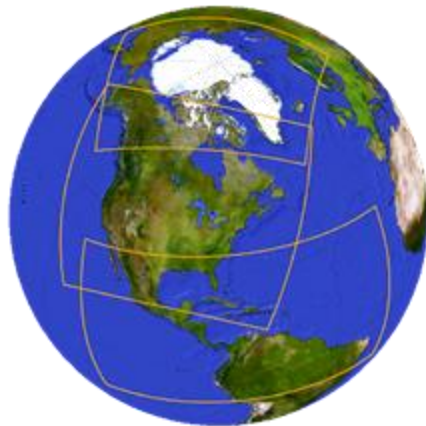
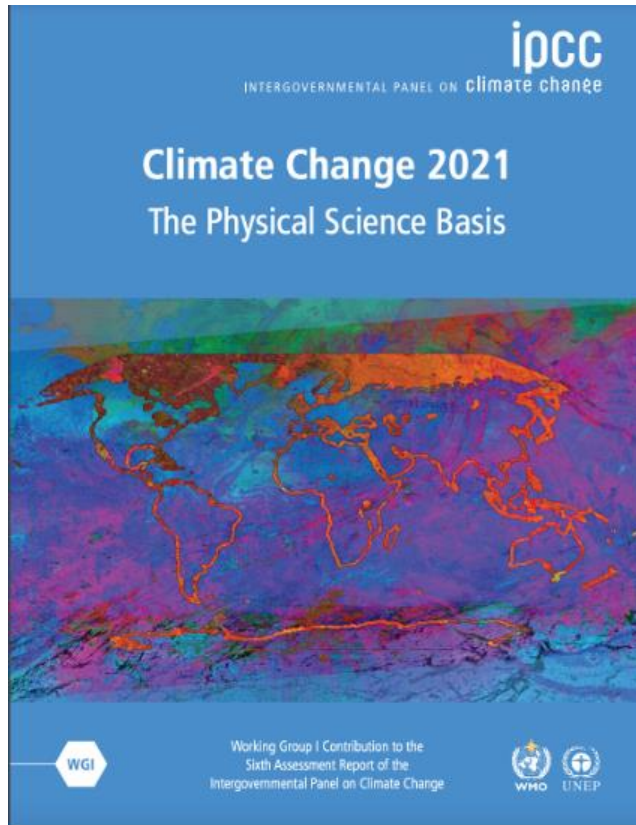


Advances in and methodologies for regional climate modeling and scenario use: CORDEX experience

18th Research Dialogue
9 June 2026

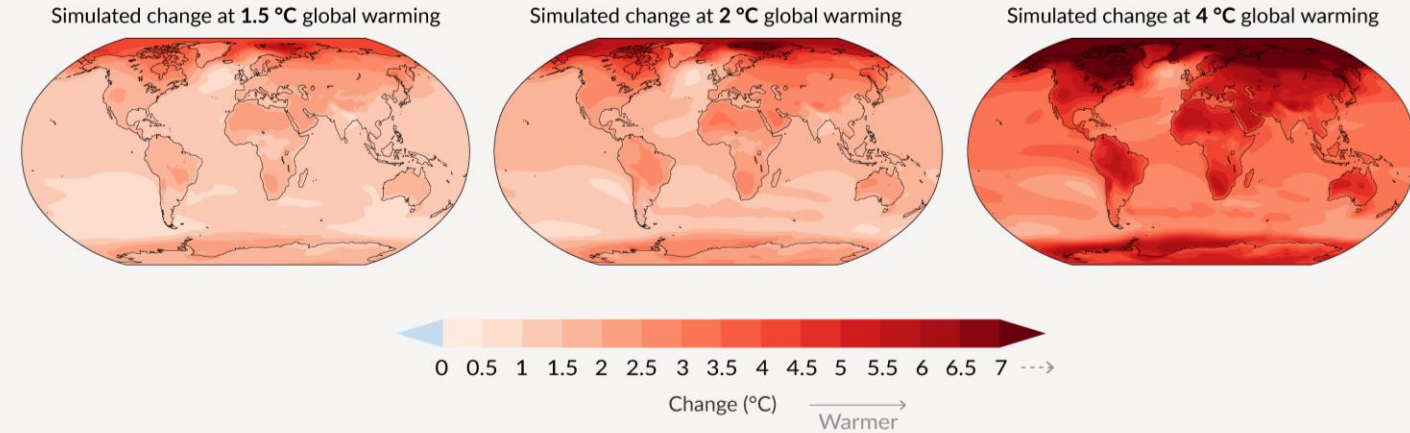


With every increment of global warming, **larger changes** in regional mean temperature, precipitation and soil moisture



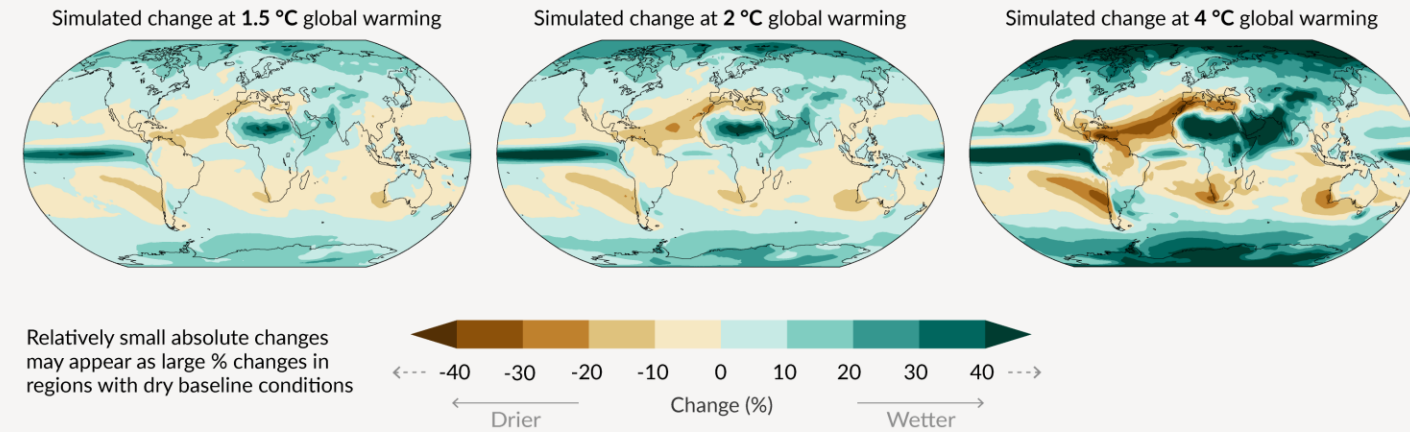
b) Annual mean temperature change (°C) relative to 1850-1900

Across warming levels, land areas warm more than oceans, and the Arctic and Antarctica warm more than the tropics.



c) Annual mean precipitation change (%) relative to 1850-1900

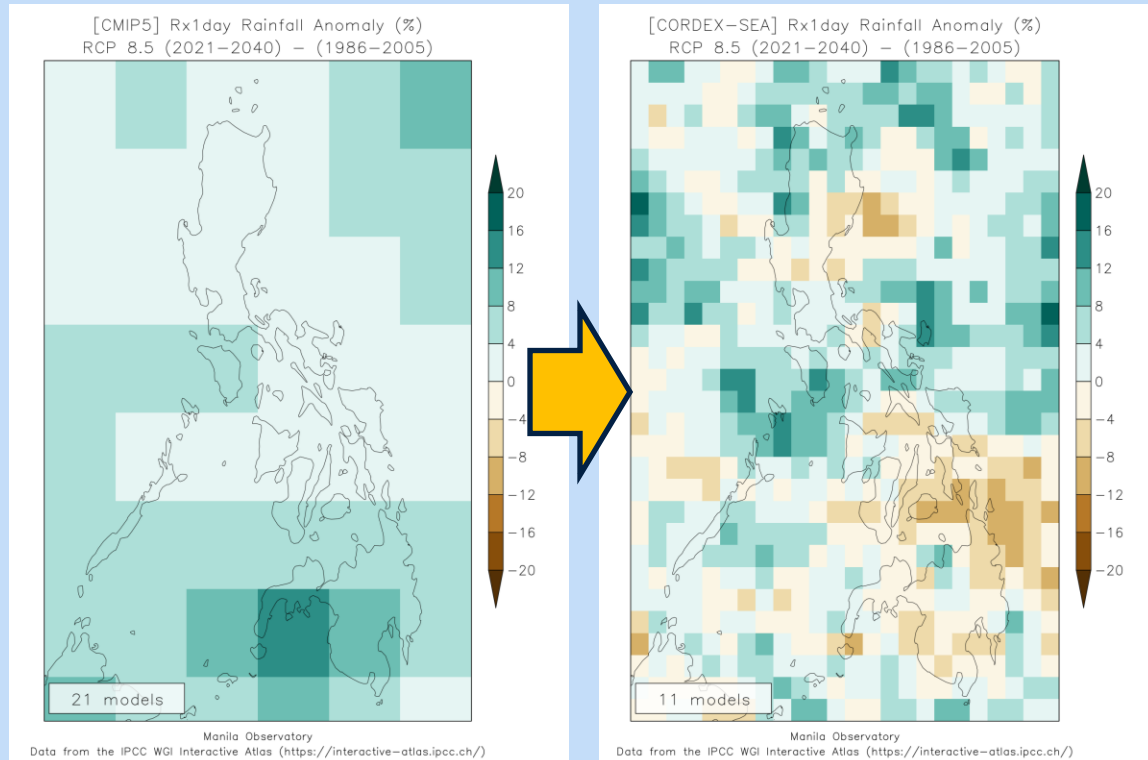
Precipitation is projected to increase over high latitudes, the equatorial Pacific and parts of the monsoon regions, but decrease over parts of the subtropics and in limited areas of the tropics.



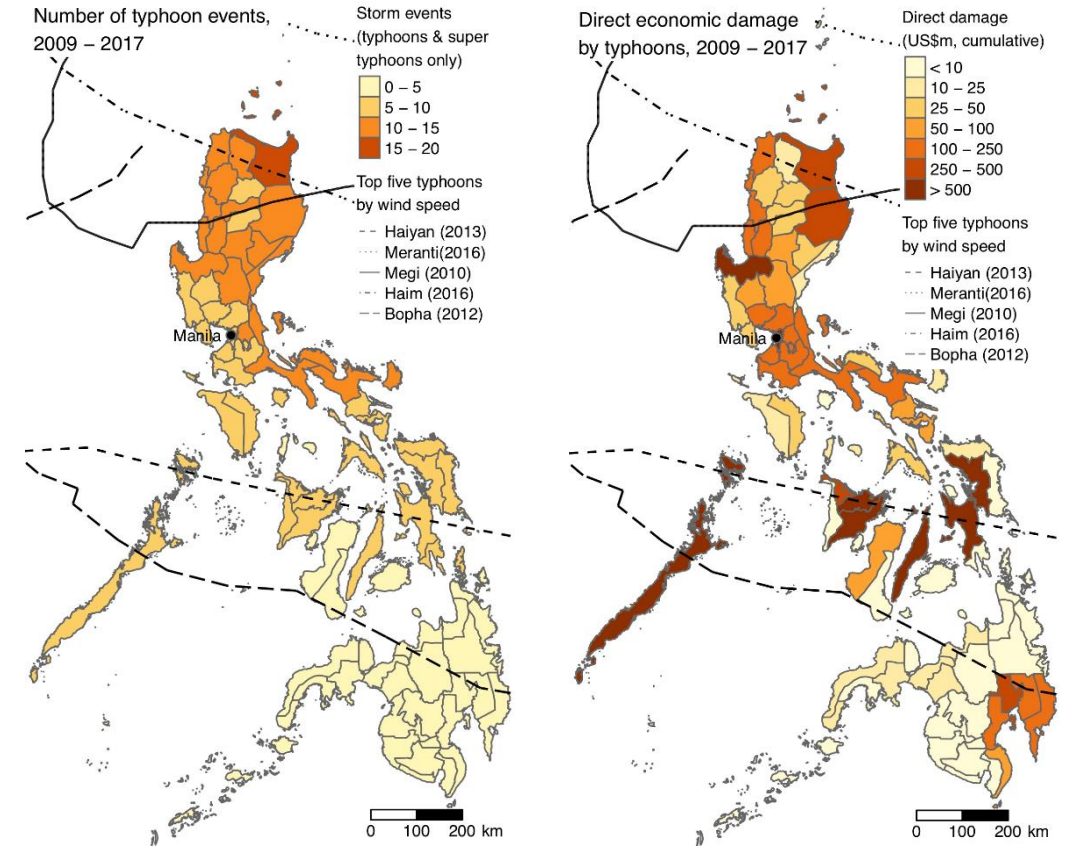
Relatively small absolute changes may appear as large % changes in regions with dry baseline conditions

High-resolution climate information needed for local adaptation

Climate downscaling: From LOW resolution to HIGH resolution



Spatial variability in hazards and impacts



CORDEX is a key scientific pillar in the RfS core project of the WCRP

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

- Global collaboration and communities of practice
- Understand regional climate phenomena and variability
- Coordinated climate projections for regions
- Foster communication and knowledge exchange with users of regional climate information

Platform / facilitator for coordination and cooperation



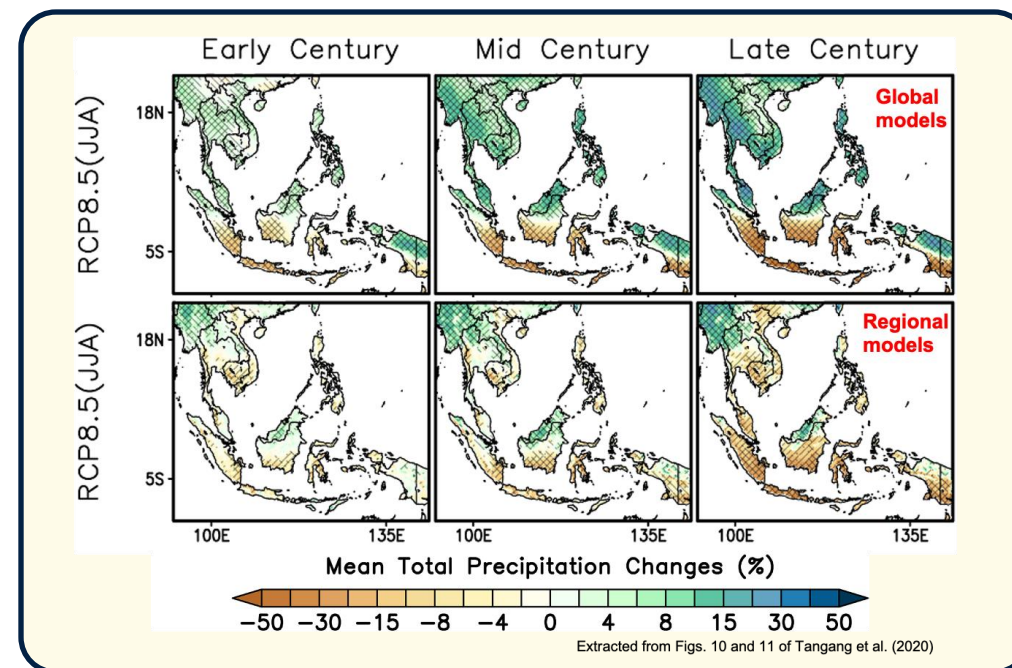
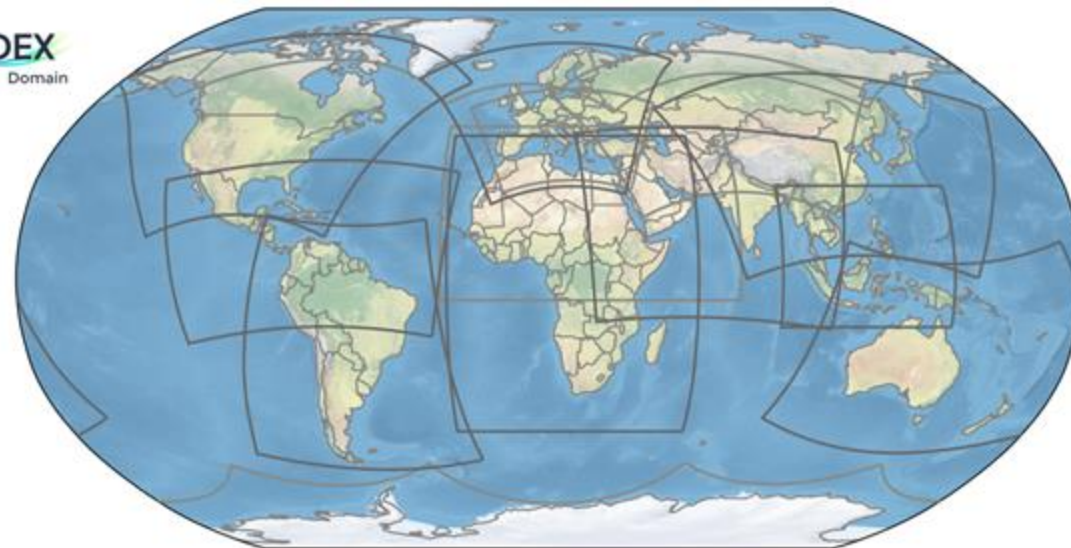
- Regional climate research, including climate downscaling
- Capacity building activities
- CORDEX CORE* (Coordinated Output for Regional Evaluation)

Region 1: South America
Region 2: Central America
Region 3: North America
Region 4: Europe (EURO)
Region 5: Africa
Region 6: South Asia
Region 7: East Asia
Region 8: Central Asia
Region 9: Australasia
Region 10: Antarctica
Region 11: Arctic
Region 12: Mediterranean (MED)
Region 13: Middle East North Africa (MENA)
Region 14: South-East Asia (SEA)

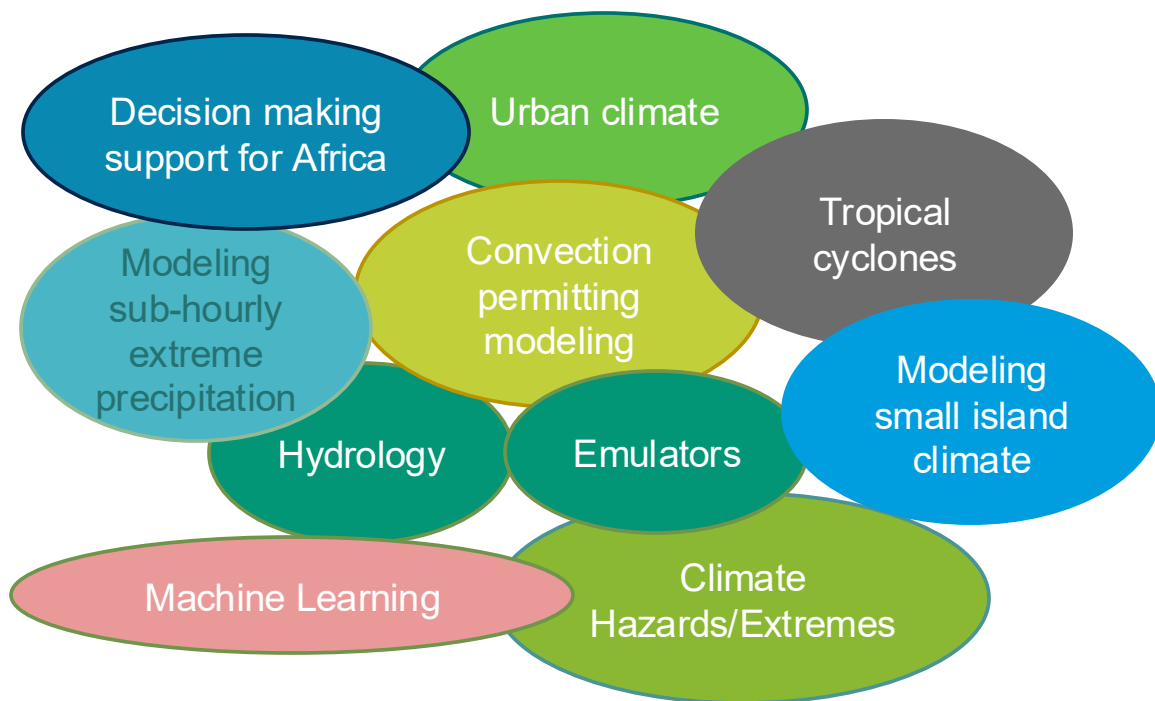
* CORDEX CORE: a cross-domain experiment aiming at a balanced, homogeneous ensemble of global projections



- SAM
- CAM
- NAM
- EUR
- MED
- MENA
- AFR
- WAS
- CAS
- EAS
- SEA
- AUS
- ARC
- ANT



- Frontier scientific developments
- Addresses emerging scientific challenges within/across regions in connection with users

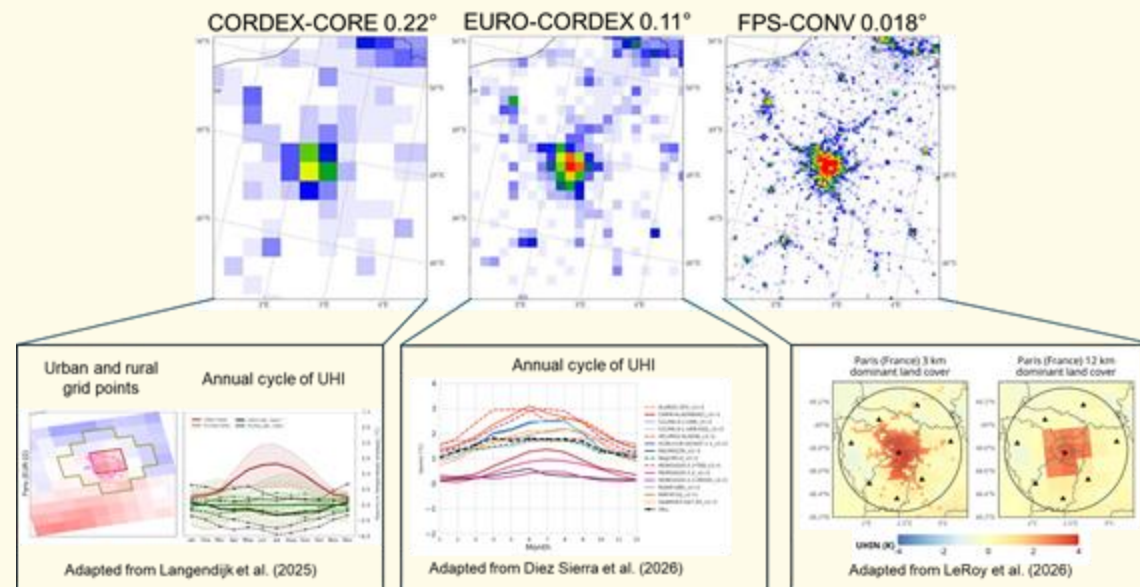


FPS: URbAn environments and Regional Climate Change (URB-RCC)

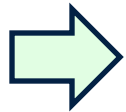
Coordinators: Tomas Halenka, Gaby Langendijk, Peter Hoffmann

Main goal: to understand the two-way interactions between urban areas and regional climate change, with the help of coordinated experiments with urbanized RCMs.

Analysis of existing CORDEX/RCM datasets



Hoffmann et al., submitted



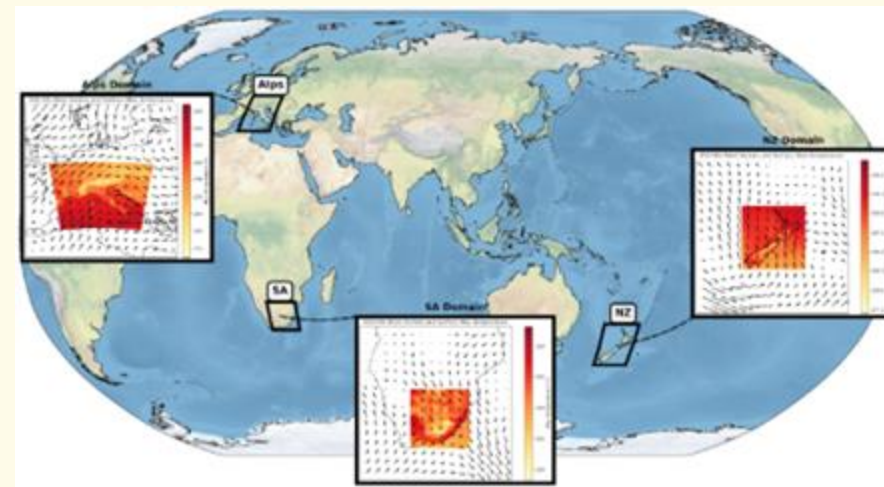
Emerging challenges that require urgent planning and coordination:

- CMIP6 CORDEX CORE
- Preparations for CMIP7
- Machine learning
- Convection permitting modeling
- Regional ocean climate projections



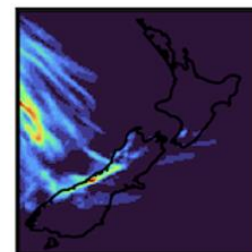
Task Force: Machine Learning (ML)

20 members, N. Rampal and J.M. Gutiérrez as leaders

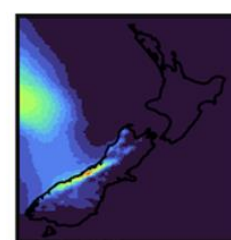


Benchmarking RCM downscaling emulators:

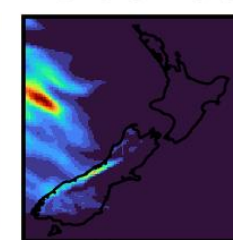
Ground Truth



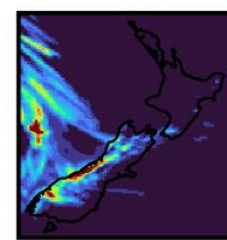
Convolutional



Transformers



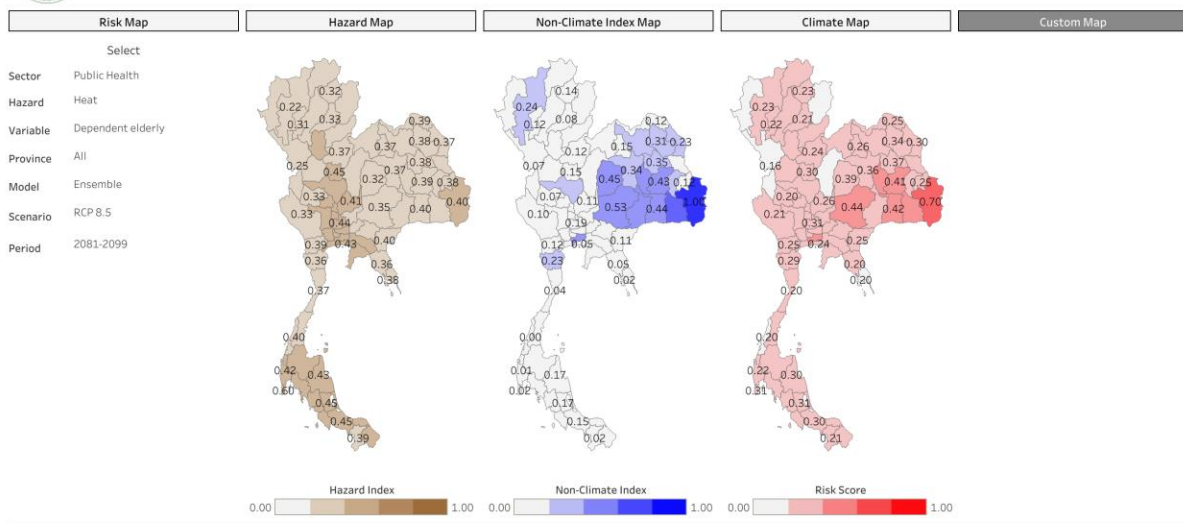
Diffusion



Further information at <https://github.com/WCRP-CORDEX/ml-benchmark>



Office Of Natural Resources and Environmental Policy and Planning <https://rucore.ru.ac.th/SARCCIS/Riskmaps>
Risk Map Database under Climate Change



Ramkhamhaeng University Center Of Regional Climate Change and Renewable Energy.

Other example applications of climate data from CORDEX Southeast Asia:

- Thailand: Interactive Climate Risk Maps; Interactive High Resolution Climate Data Visualization (for application in sectoral economic impact assessments)
- Indonesia: 4th National Communication Report to UNFCCC
- Vietnam: National Climate Change Scenarios (*upcoming*)

<http://bagong.pagasa.dost.gov.ph/climate/climate-change/dynamic-downscaling>



Third National Climate Change Study (V3) of Singapore

<https://www.mss-int.sg/v3-climate-projections>

