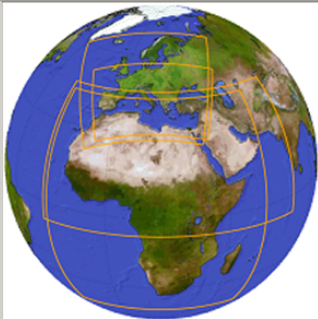
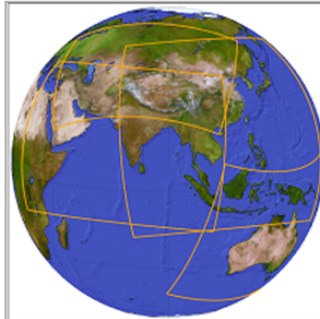


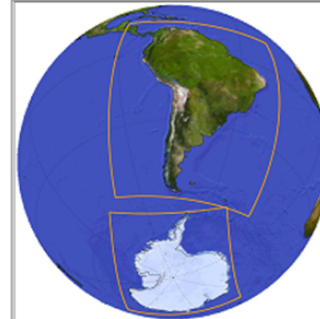
- Arctic CORDEX
- North America CORDEX
- Central America CORDEX



- EURO-CORDEX
- MED-CORDEX
- CORDEX Africa
- MENA-CORDEX



- Central Asia CORDEX
- South Asia CORDEX
- East Asia CORDEX
- South East Asia CORDEX
- Australasia CORDEX



- South America CORDEX
- CORDEX Antarctica



Coordinated Regional Downscaling Experiment (CORDEX)

The CORDEX South Asia Workshop
December 13-15, 2021

Irène Lake
Director for IPOC at SMHI

www.cordex.org

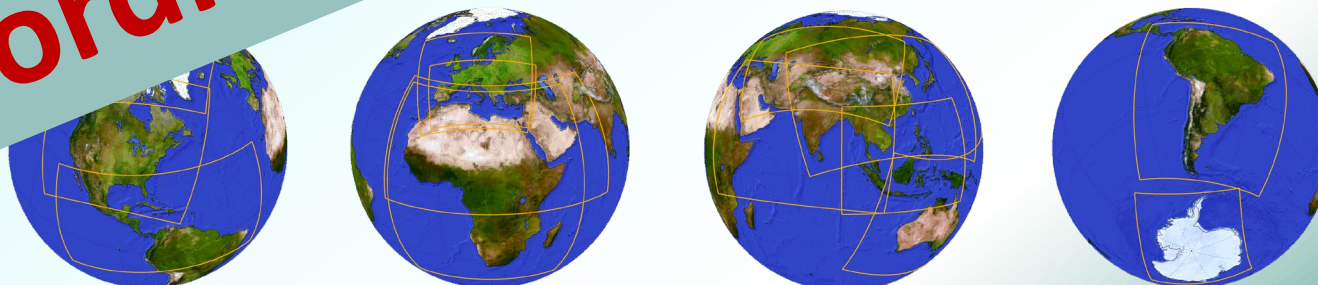


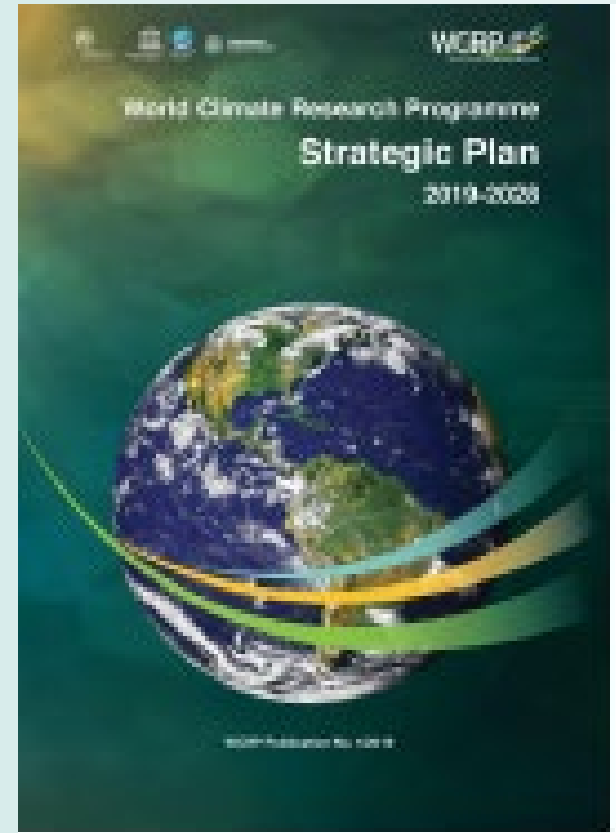
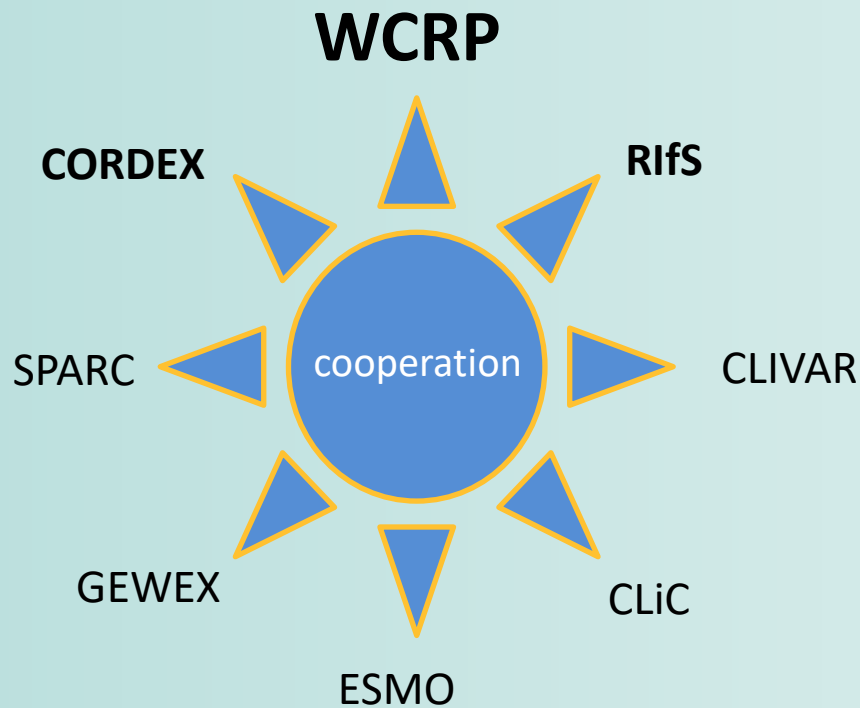
CORDEX focus/vision

- Global collaboration
- Understanding/knowledge to develop

**Platform/facilitator for
coordination and cooperation**

Office for CORDEX, SMHI,
Sweden





“Bridging climate science and society”

CORDEX and the WCRP Strategic Plan

- Fundamental Science/understanding and long-term response. LHA Climate Risk, Digital Earths
- Trans-disciplinary Engagement. LHA Safe landing and LHA Academy.
- Fundamental part of the new CORE project Regional Information for Society
- Envisaged strong partnership with the Earth System Model and Observations new CORE project

- 1 *Fundamental understanding of the climate system*
- 2 *Prediction of the near-term evolution of the climate system*
- 3 *Long-term response of the climate system*
- 4 *Bridging climate science and society*

Regional Information for Society (RifS)

Societal value of regional climate information

Core principles: Facilitate/catalyze research for actionable information.

Science foci: Research for regional information on physical climate system, co-production, social sciences, communication, ethics and values.

Importance of climate change information?



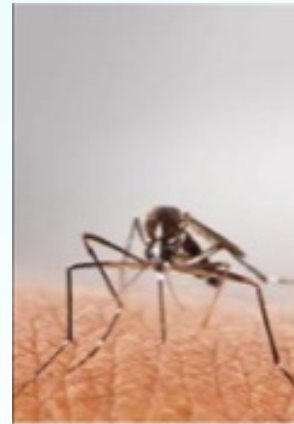
Agriculture and food security



Disaster risk reduction



Water



Health



Energy



“If you can’t
measure it, you
can’t manage
it”

Peter Drucker

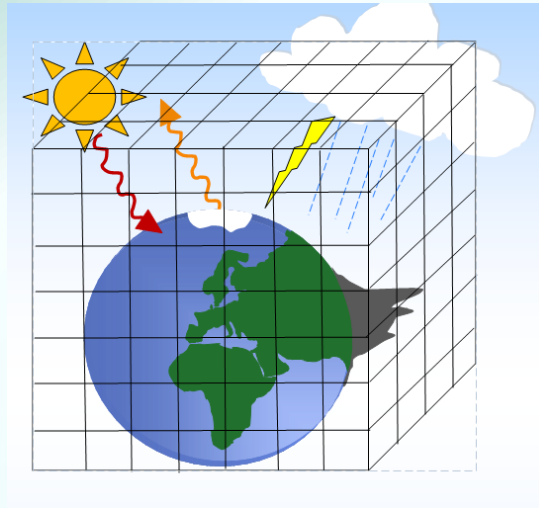
Data or information?



- **Climate info = messages relevant to users**
- **... backed by clear, robust physical scientific analyses**



+



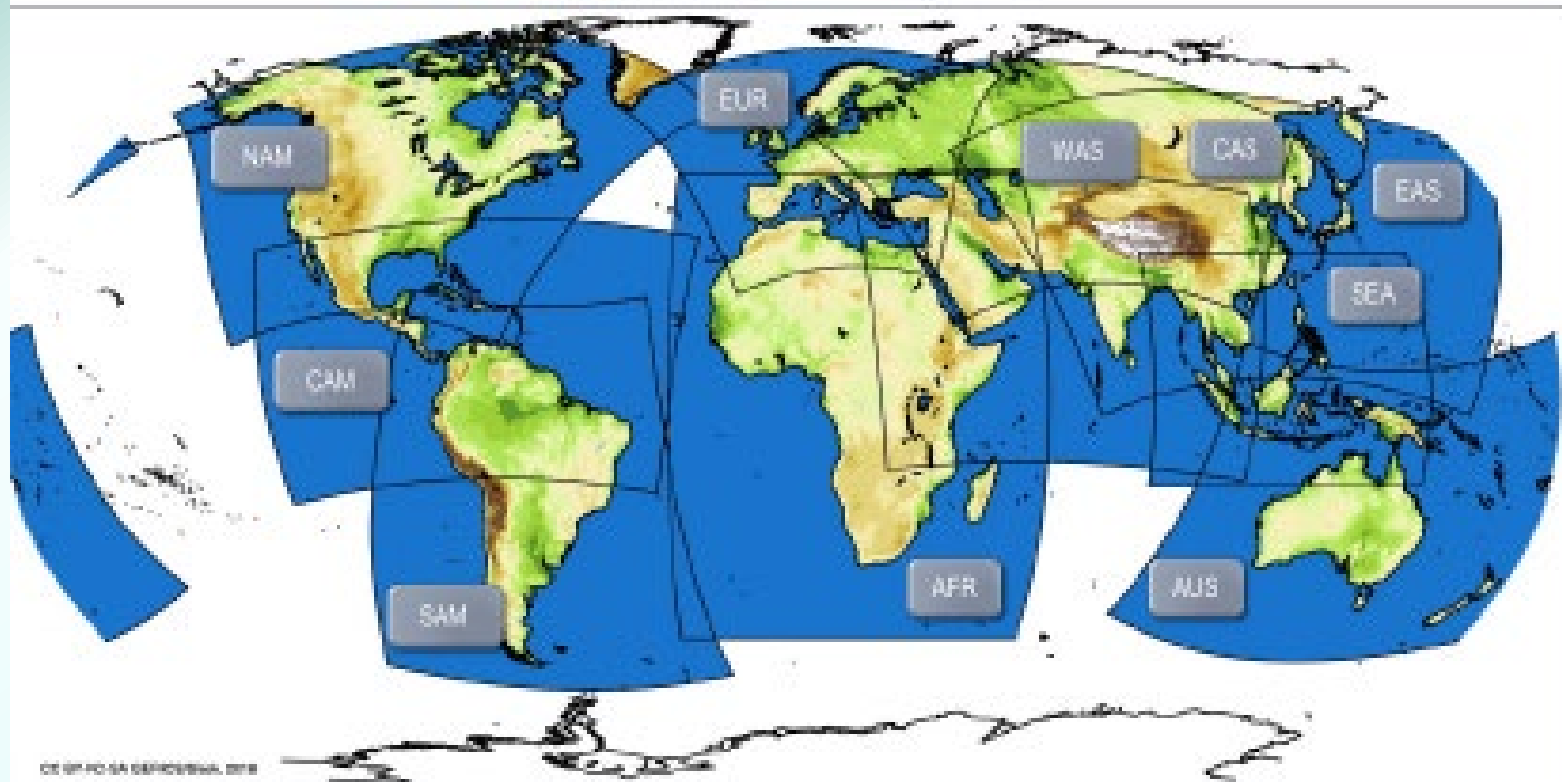
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Robust /usable climate information for decisions/VIA



CORDEX-CORE Regions/Domains



Robust /usable climate information for decisions/VIA

Downscaling of CMIP6

Experiment protocol RCMs is published!

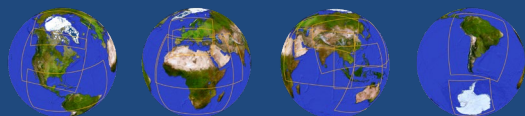
Variable list

Planned simulations

CORDEX-CMIP6 Data Request: "Atmospheric" variables (v1)									
aggregation: f: instantaneous; a: averaged over output interval (in model); c: cumulative over sampling period									
output variable	units	freq	local name	standard name	CORDEX-CMIP6				Priority
					mon	day	thr	thr	
tas	K	f	Near-Surface Air Temperature	air_temperature	x	x	x	x	1
tmax	K	f	Daily Maximum Near-Surface Air Temperature	air_temperature	x	x	x	x	1
tmin	K	f	Daily Minimum Near-Surface Air Temperature	air_temperature	x	x	x	x	1
ts	K	f	Surface Temperature	surface_temperature	x	x	x	x	1
prc	kg m-2 s-1	a	Precipitation	precipitation_flux	x	x	x	x	1
prfx	kg m-2 s-1	a	Convective Precipitation	convective_precipitation_flux	x	x	x	x	1
prhmax	kg m-2 s-1	a	Daily Maximum Hourly Precipitation Rate	precipitation_flux	x	x	x	x	1
prfx	kg m-2 s-1	a	Precipitation	precipitation_flux	x	x	x	x	1
evap	kg m-2 s-1	a	Evaporation	water_evaporation_flux	x	x	x	x	1
evapot	kg m-2 s-1	a	Potential Evapotranspiration	water_potential_evaporation_flux	x	x	x	x	1
runoff	kg m-2 s-1	a	Surface Runoff	surface_runoff_flux	x	x	x	x	1
runoff	kg m-2 s-1	a	Total Runoff	runoff_flux	x	x	x	x	1
runoff	kg m-2 s-1	a	Surface Snow Melt	surface_snow_melt_flux	x	x	x	x	1
hurs	%	f	Near-Surface Specific Humidity	specific_humidity	x	x	x	x	1
hurs	%	f	Near-Surface Relative Humidity	relative_humidity	x	x	x	x	1
ps	Pa	f	Surface Air Pressure	surface_air_pressure	x	x	x	x	1
psl	Pa	f	Sea Level Pressure	air_pressure_at_sea_level	x	x	x	x	1
taux	Pa	a	Surface Downward Eastward Wind Stress	surface_downward_eastward_stress	x	x	x	x	1
tauy	Pa	a	Surface Downward Northward Wind Stress	surface_downward_northward_stress	x	x	x	x	1
u10	m s-1	f	Near-Surface Wind Speed	wind_speed	x	x	x	x	1
u10	m s-1	f	Daily Maximum Near-Surface Wind Speed	wind_speed	x	x	x	x	1
u10	m s-1	f	Eastward Near-Surface Wind	eastward_wind	x	x	x	x	1
v10	m s-1	f	Northward Near-Surface Wind	northward_wind	x	x	x	x	1
v10	m s-1	f	Daily Maximum Near-Surface Wind Speed of Gust	wind_speed_of_gust	x	x	x	x	1
cl	%	a	Total Cloud Fraction	cloud_area_fraction	x	x	x	x	1
chl	%	a	High Level Cloud Fraction	cloud_area_fraction_in_atmosphere_layer	x	x	x	x	1
clm	%	a	Mid Level Cloud Fraction	cloud_area_fraction_in_atmosphere_layer	x	x	x	x	1
cll	%	a	Low Level Cloud Fraction	cloud_area_fraction_in_atmosphere_layer	x	x	x	x	1
tsun	s	c	Duration of Sunshine	duration_of_sunshine	x	x	x	x	1
rsds	W m-2	a	Surface Downwelling Shortwave Radiation	surface_downwelling_shortwave_flux_in_air	x	x	x	x	1
rsds	W m-2	a	Surface Downwelling Longwave Radiation	surface_downwelling_longwave_flux_in_air	x	x	x	x	1
rsus	W m-2	a	Surface Upwelling Shortwave Radiation	surface_upwelling_shortwave_flux_in_air	x	x	x	x	1
rsus	W m-2	a	Surface Upwelling Longwave Radiation	surface_upwelling_longwave_flux_in_air	x	x	x	x	1
rsus	W m-2	a	TOA Outgoing Longwave Radiation	toa_outgoing_longwave_flux	x	x	x	x	1
rsus	W m-2	a	TOA Incident Shortwave Radiation	toa_incoming_shortwave_flux	x	x	x	x	1
rsus	W m-2	a	TOA Outgoing Shortwave Radiation	toa_outgoing_shortwave_flux	x	x	x	x	1
rsus	W m-2	a	Surface Upward Latent Heat Flux	surface_upward_latent_heat_flux	x	x	x	x	1
rsus	W m-2	a	Surface Upward Sensible Heat Flux	surface_upward_sensible_heat_flux	x	x	x	x	1
rsus	W m-2	a	Soil Frozen Water Content	soil_frozen_water_content	x	x	x	x	1
rsus	W m-2	a	Total Soil Moisture Content	soil_moisture_content	x	x	x	x	1
rsus	W m-2	a	Surface Snow Amount	surface_snow_amount	x	x	x	x	1
rsus	W m-2	a	Snow Area Fraction	surface_snow_area_fraction	x	x	x	x	1
rsus	W m-2	a	Snow Depth	surface_snow_thickness	x	x	x	x	1
rsus	W m-2	a	Sea Ice Area Fraction	sea_ice_area_fraction	x	x	x	x	1
rsus	W m-2	a	Height of Boundary Layer	atmosphere_boundary_layer_thickness	x	x	x	x	1
rsus	W m-2	a	Water Vapor Path	atmosphere_water_vapor_content	x	x	x	x	1
rsus	W m-2	a	Condensed Water Path	atmosphere_cloud_condensed_water_content	x	x	x	x	1
rsus	W m-2	a	Ice Water Path	atmosphere_cloud_ice_content	x	x	x	x	1

CORDEX vision:

Advance and coordinate science and application of regional climate downscaling through global partnerships



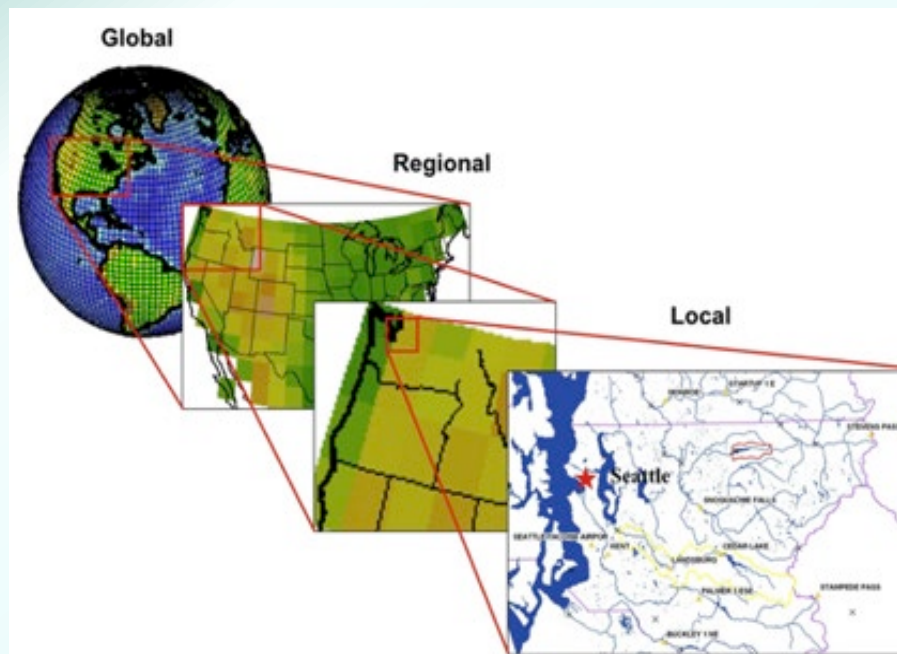
WCRP
CORDEX

Coordinated Regional Climate Downscaling Experiment

SMHI

Future challenges in White Paper

- ☐ Smaller domains, convection permitting resolution > risks/VIA - local scales



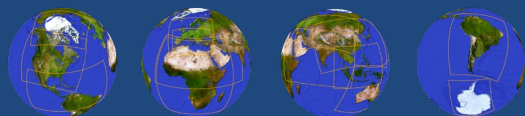
- ☐ Regional Earth System Models (human dimension land use, oceans-sea-ice,...) > increasing complexity?
- ☐ Data and infrastructure
 - ☐ Sub-daily data, increasing data amounts

> computer capacity, compromise resolution/complexity/domain size?



CORDEX vision:

*Advance and coordinate
science and application of
regional climate
downscaling through
global partnerships*

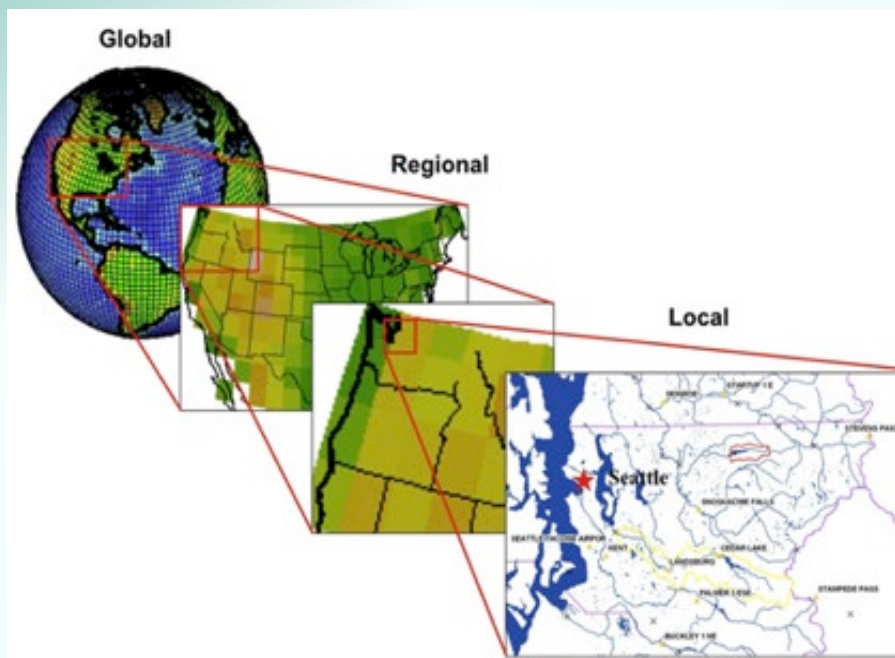


WCRP
CORDEX

Coordinated Regional Climate Downscaling Experiment

SMHI

Ongoing White Papers



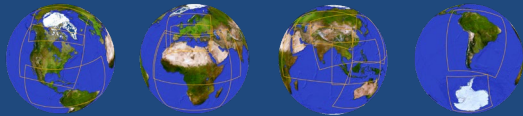
☐ ESD under development, merge dynamical and statistical

☐ Bridge to society -coming



CORDEX vision:

*Advance and coordinate
science and application of
regional climate
downscaling through
global partnerships*



SMHI

Science Plan Implementing White Paper

Understand regional phenomena

Identify drivers, assess impact

*Evaluate, improve, combine
downscaling techniques > scientific
challenges, societal needs*

*Coordinated worldwide
historical/projections*

*Capacity building - local
expertise/knowledge exchange*

Future challenges; White Papers/science Plan

☐ Small regions, local scales > risks/VIA

☐ Regional Earth System Models (human dimension)

☐ Data amounts

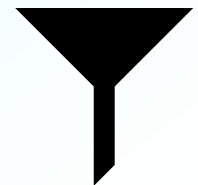
☐ Multiple downscaling approaches

☐ Distillation – merge, choose, understand

☐ Capacity exchange

☐ Societal needs, drivers, assess impacts

☐ Bridge to society



Co-produce
Co-explore
Co-design
Co-define
Co-refine



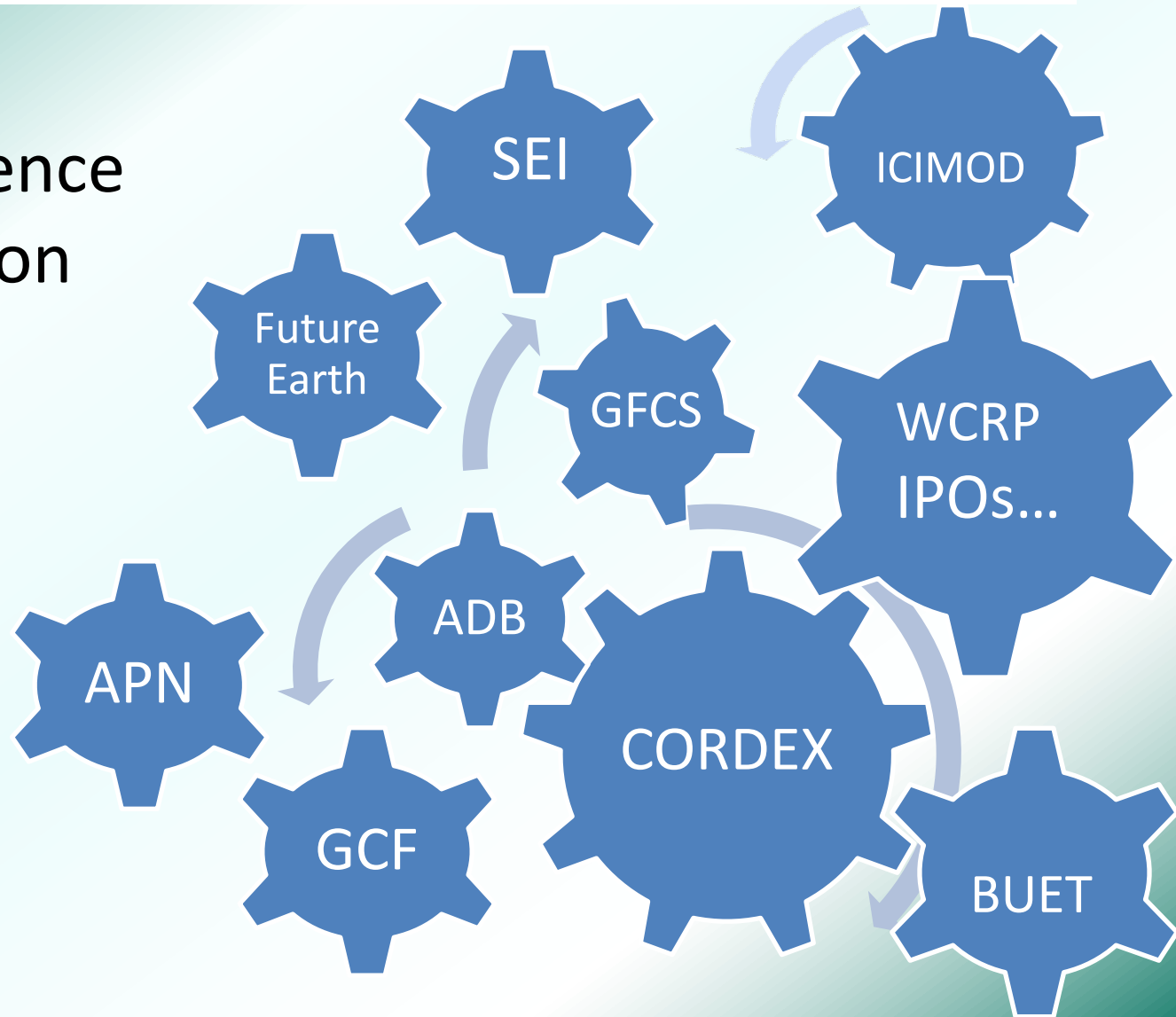
Climate Change Adaptation is one of the most important tasks facing us!

- **Do we know what climate we should adapt to?**
- **There is an illusion by some decision makers that we already know everything about the future climate and can simply focus on “*adapting*”**
- **Assessing and informing on expected climate change in both the near and far future is an on-going scientific process, and must be an integral part of the adaptation agenda**

Application-inspired, Transdisciplinary

Cooperation/partnerships/networking across regions/disciplines

Policy ↔ Science
Human dimension



How do these combine?



Co-design & Co-production

- Joint research proposals, capacity building activities
- Common topics and potential funding opportunities
- Combine existing projects and platforms



Multi-disciplines & Multi-stakeholders

- Cross-cutting global change issues
- Links across disciplines and regional/global
- Engage with policy/community



Synergies

- Interaction and/or cooperation with other relevant groups through information and data sharing



How the customer explained it



How the Project Leader understood it



How the Analyst designed it



Aerosols

Coupled
models

Convection
permitting
scales

Urban climate

Climate
Hazards/Extremes

Land use,
land change

Hydrology

Local/regional challenges with large
socioeconomic impacts

➡ Actionable Climate Information !



CORDEX-FPS: CPTP

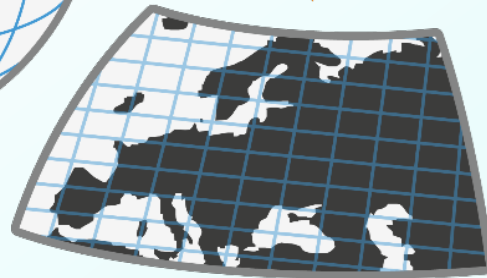
Introduction

The project CPTP (Convection-Permitting Third Pole), abbreviation for the project "High resolution climate modelling with a focus on mesoscale convective systems and associated precipitation over the Third Pole region", was endorsed by WCRP-CORDEX as a [Flagship Pilot Study](#) (FPS) in 2019. This project aims to enhance our understanding of the water cycle over the TP region; with an initial focus on assessing model skill in the simulation of convection and precipitation, building towards skillful multi-year simulation of the regional precipitation and hydrological regime. There are two working groups (WGs): WGI focuses on modeling and WGII focuses on data. The two WGs will work closely with each other. This project will be carried out during the period 2020-2024.

This project is a community effort and contribution from anybody in any way and at any time is more welcome. Please contact the lead investigator or group leads for more information (related information can be found below).

The chain from global to local

- from data to knowledge to societal benefit -



**HCLIM 12-25 km
CORDEX standard**

**HCLIM 1-3 km
CPM**

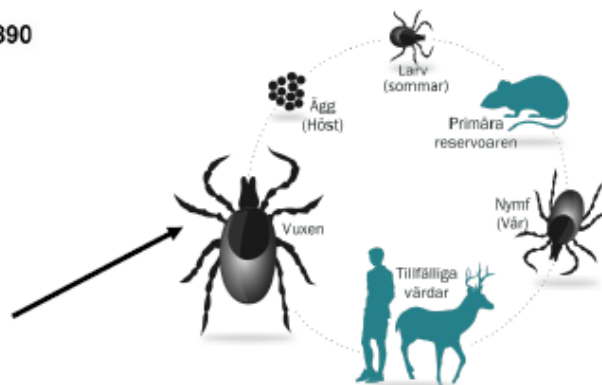
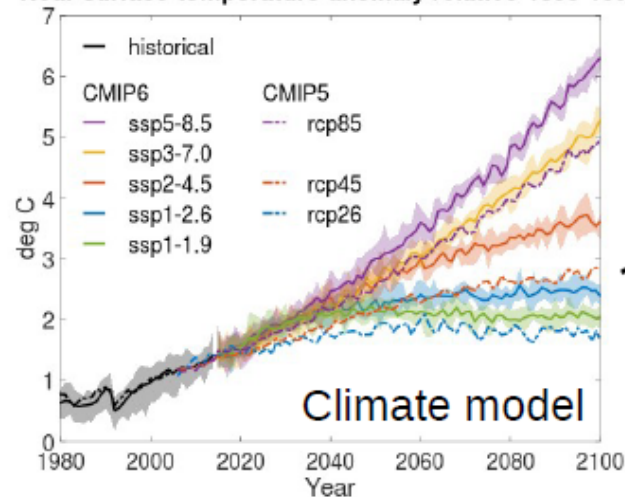


Spreading of diseases related to climate

Project CLAIRE on spreading of

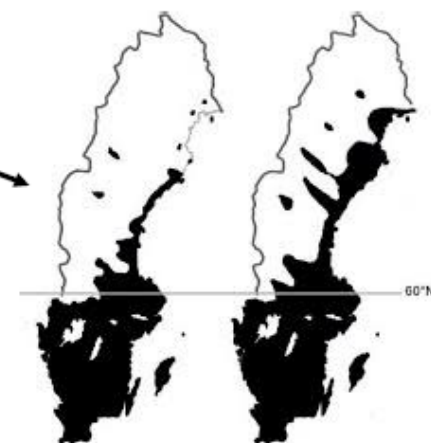
- zika, dengue och west nile-fever
- tick-based borrelia infection
- seasonal and climate-dependent patterns of for Covid-19

Near surface temperature anomaly relative 1850-1890



Borrelia
Spreading model

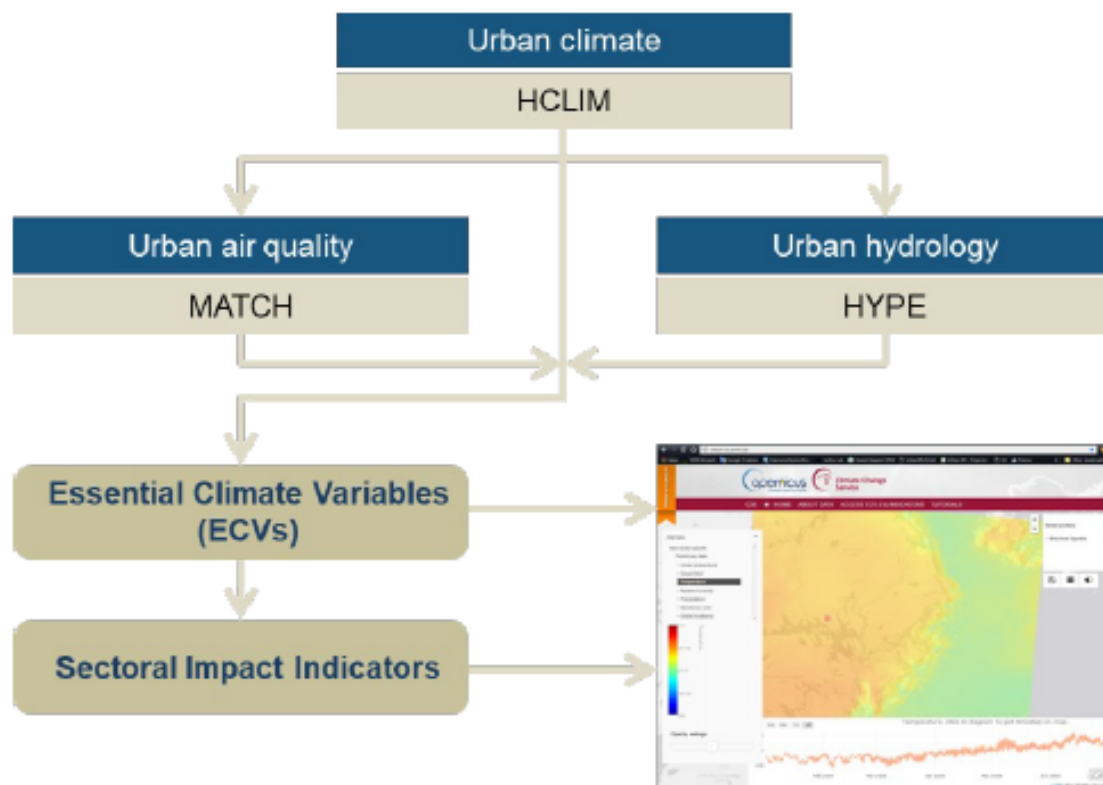
risk for borrelia



Climate on the km scale

HCLIM, 1 km

Example: UrbanSiS project for Copernicus Climate Services

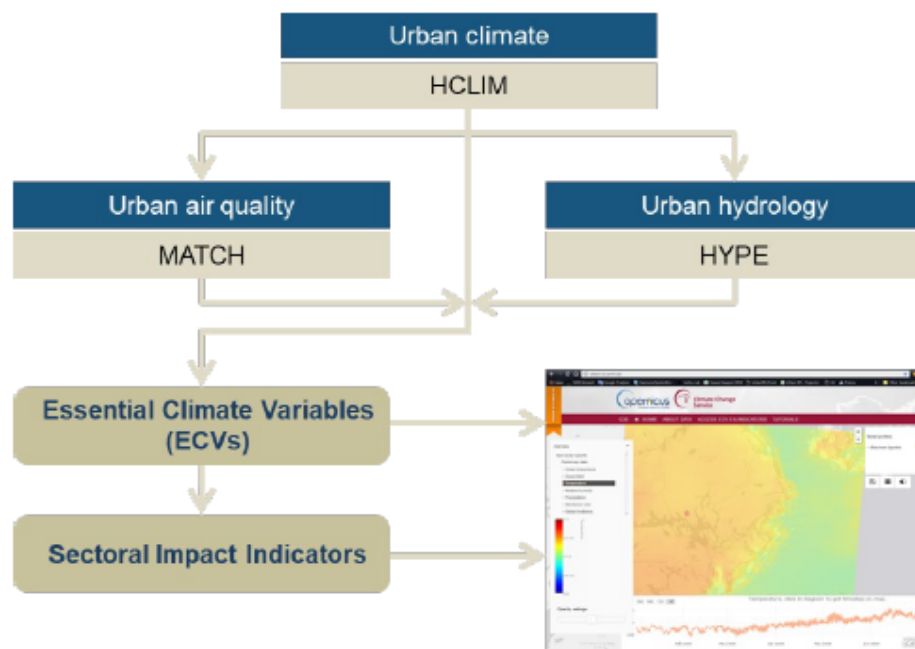


Climate on the km scale

HCLIM, 1 km

Example: UrbanSiS project for Copernicus Climate Services

resolution
1x1km²
1h



- **Health sector**
 - **Air quality**
 - **Heat stress**
 - **Discomfort**
- **Energy sector**
 - **Energy consumption**
 - **Solar energy**
- **Infrastructure sector**
 - **Flooding**
 - **Green infrastructure**
 - **Transport**
- **Non-sector specific indicators**

Climate impact; hydrology, land use, urban

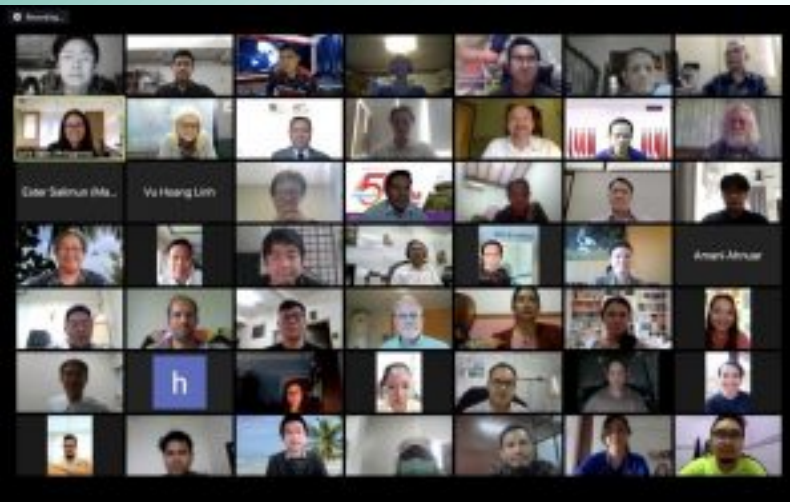


Air quality, extreme temperatures and health



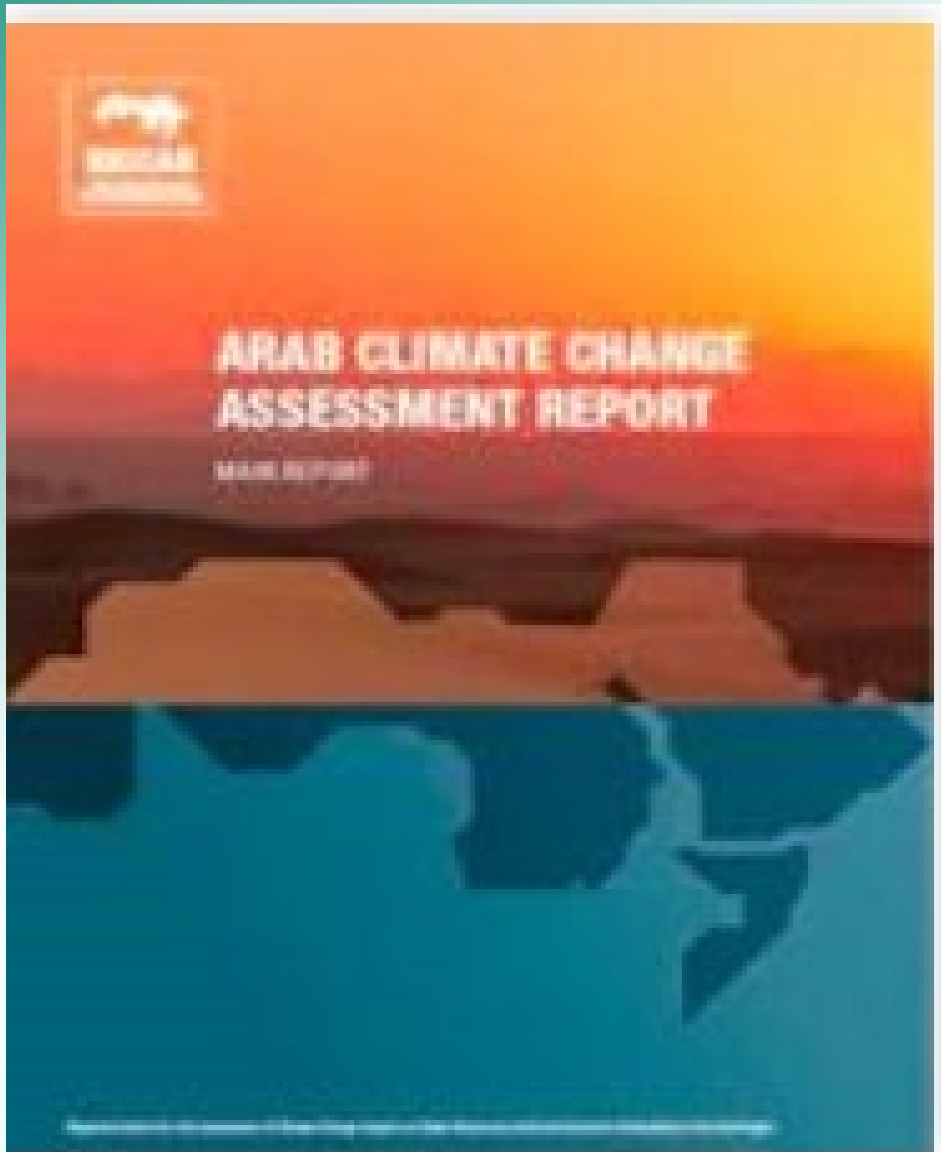


Contributions to IPCC 1.5



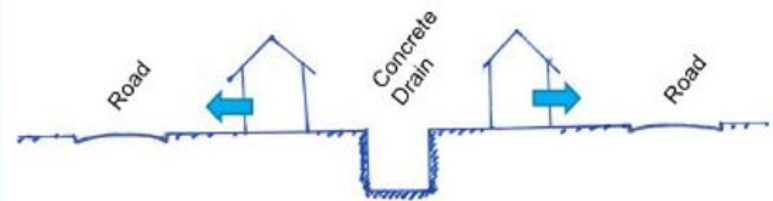
**‘CORDEX is very crucial
for IPCC’, Panmao Zhai ,
chair IPCC WGI**





Co-design & Co-production

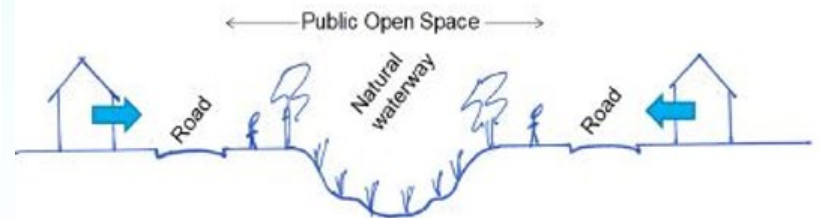
With/without knowledge...



Traditional approach



Action/future!!!?



Greener approach

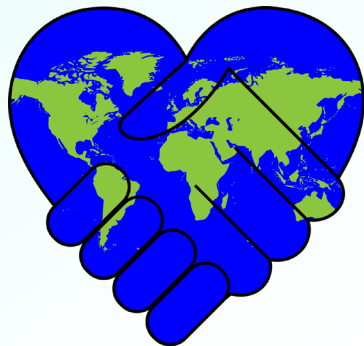
ICRC-CORDEX 2023



Hybrid; Physical/online
Regional hubs

Organization Committee
Scientific Committee

If you want to go fast, go
alone, but if you want to go
far, go together



Thank you!!

