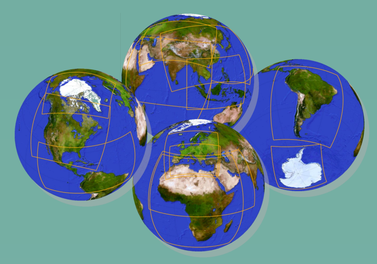
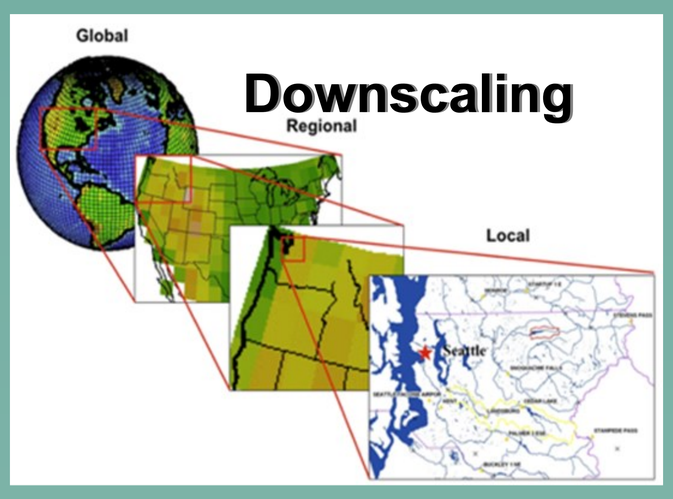
High-resolution climate modelling: on the way to actionable information



WCRP CORDEX
Coordinated Regional Climate Downscaling Experiment



Source: Andrew Wood

Future Challenges for CORDEX

- Smaller domains & Increasing resolution for Regional Climate Models (RCMs)
- Increasing Complexity
  - Regional Earth System Models
  - Exascale Computing

Flagship Pilot Studies (FPS)

- Regional/local challenges with focus on fine scale processes, transferable
- Implementation (Vulnerability-Impact-Adaptation)
- Observations for verification

Convective Phenomena over Europe and the Mediterranean

Understanding convective extremes and related phenomena under changing climate conditions

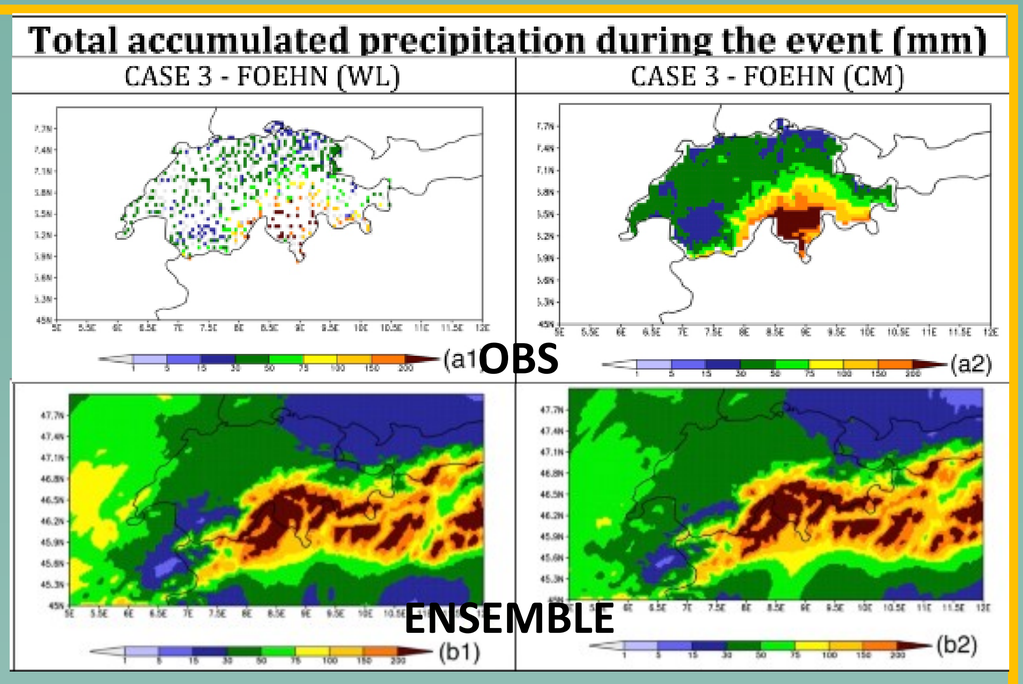
Science aims

- Better understanding of processes & phenomena relevant for regional climate change
- Impacts of convective extremes at local to regional scales in a changing climate
- Collective multi-model ensemble assessment and intercomparison

Societal aims

- Establish confidence in simulated changes
- Probabilistic assessments that can be tailored for decision makers
- Communicate findings in clear actionable manner

Current status: simulations for the present and future periods are currently running. Partial ensemble complete by early summer 2019.



Test case; Foehn event in Switzerland. The agreement between ensemble means (bottom panel) and observations (upper panel) demonstrates the power of an ensemble based approach (Fig Coppola et al., 2018).

ELVIC – Climate Extremes in the Lake Victoria Basin

Extreme weather events; heavy precipitation, heat waves, droughts, wind storms, are expected to have even larger impacts with population growth and urbanization

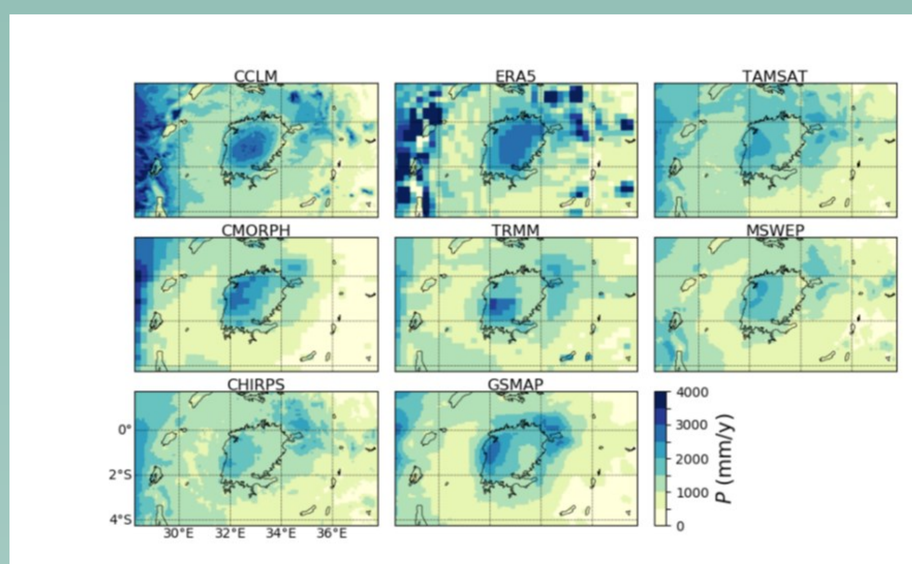
Science aims

- Representation of moist convective systems in Equatorial Africa: CPM vs parametrized convection
- Best combination of information from CMIP and CORDEX-Africa with Convection Permitting Models (CPM) climate change integrations
- Future evolution of extreme weather events in the LVB

Societal aims

- Tailor probabilistic information on convective extremes for the impact community

Current status: CPM model integrations performed by several groups > Good spatial precipitation distribution and realistic contrast in daily cycle of precipitation over the lake compared to the land areas. Substantial sensitivity to the driving re-analyses (ERA-5 versus ERA-interim).



Spatial evaluation of yearly accumulated precipitation of one of the ELVIC members (CCLM) with ERA5 and several observational derived products.

Extreme precipitation events in Southeastern South America:

Multiple model configurations/methods to investigate multi-scale processes leading to extreme precipitation events

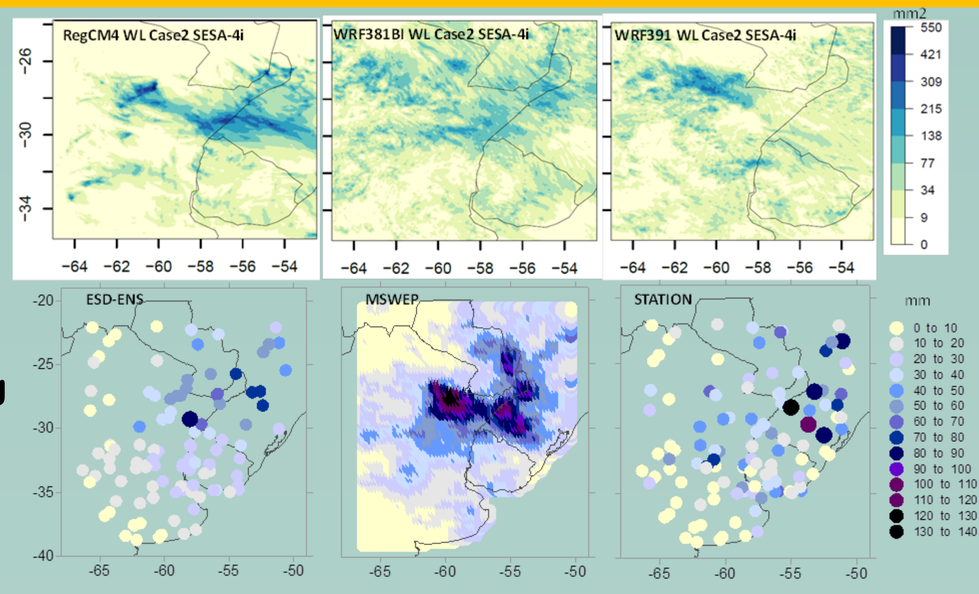
Science aims

- Coupled CPMs and statistical (ESD) models to investigate multi-scale aspects, processes and interactions that result in extreme precipitation events
- Compare and validate ESD and RCM products exploring the added value of downscaling
- Understand sources of uncertainty as a function of methods, scales and processes

Societal aims

- Tailored information to assess impact of extreme events on flooding and crops

Current Status: RCM/ESD runs and intercomparisons; analysis of daily cycle of extremes, capability in reproducing extreme events 2009/2010, representation of the associated synoptic environment, sensitivity of RCMs to resolution and physics, ESDs sensitivity to dataset and predictors choice.



Accumulated precipitation during a three-day extreme precipitation event (Case 2, 18 –20 January 2010). Upper panel; RCMs in Weather Like (WL) mode at 4km. Bottom Panel; ensemble of six ESD methods (ESD-ENS) and observations (MSWEP and STATION).