CORDEX-South America

- Overview of on going activities
- Evaluation of regional climate change scenarios

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Seventh ICTP Workshop on the Theory and Use of Regional Climate Models
Trieste - Italy, 12 - 23 May 2014

CORDEX –South America

- Status of CORDEX-South America
  - **RCM simulations**
  - CORDEX-LAC Workshops

CORDEX- South America simulations driven by CMIP5 GCMs

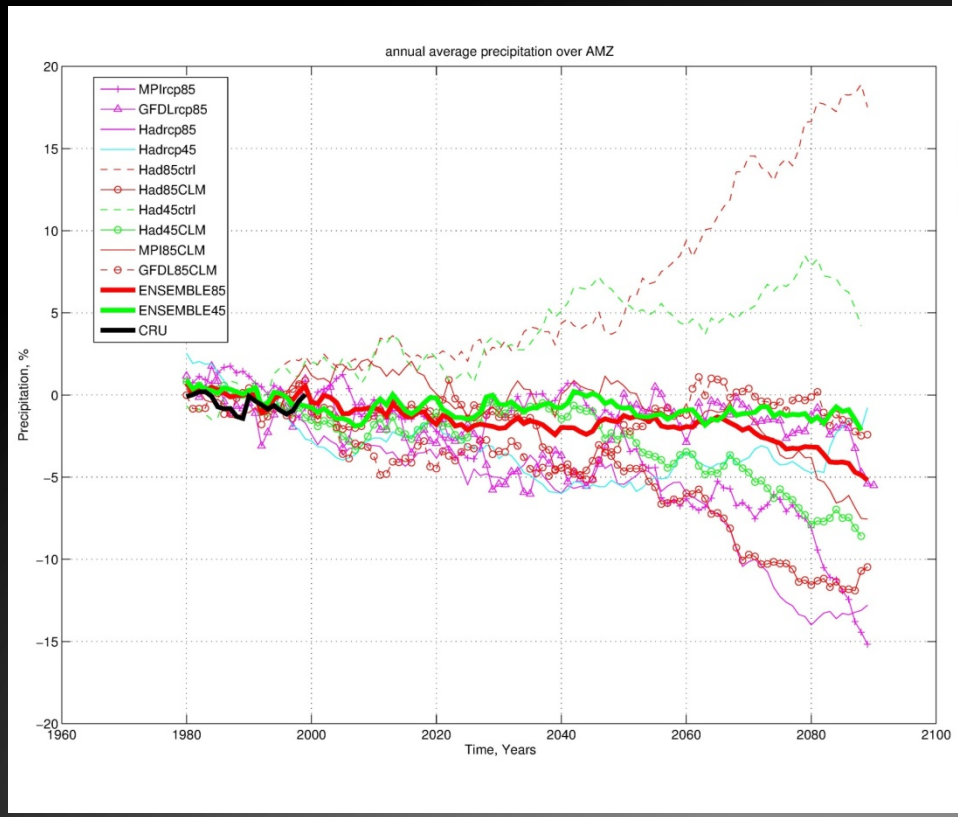
RCM/ GCM	ERA-Interim 1979-2008	Histrorical 1950-2005	RCP8.5 2006-2100	RCP4.5 2006-2100	RCP2.6 2006-2100
REMO/MPI-ESM		✔	✔	✔	✔
LMDZ/IPSL-CM5A	✔	✔		✔	
RCA/EC-Earth	✔	✔	✔	✔	
RegCM4/HadGEM2		✔	✔	✔	
RegCM4/MPI		✔	✔	✔	
RegCM4/GFDL		✔	✔	✔	
PRECIS V2/HadGem	✔				
HadGEM3-RA /CMIP5	✔				
COSMO	✔	✔	✔		
WRF/IPSL	✔				

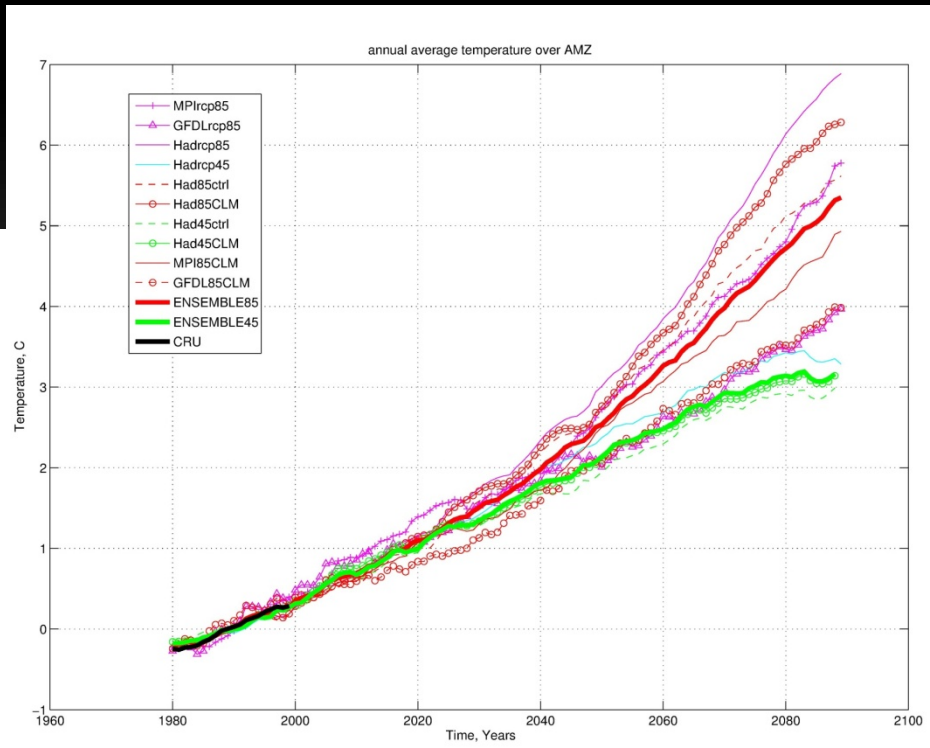
✔ Available at ESGF

CORDEX using the RegCM4 RCM

- Interannual variability associated with ENSO: present and future climate projectionsof RegCM4 for South America-CORDEX domain, by Rosmeri Porfirio da Rocha et al.
- Climate change impact on precipitation for the Amazon and La Plata Basin, by Marta Llopart et al.

Annual average precipitation and temperature for the Amazon basin using the RegCM4





Courtesy M. Llopart

CORDEX –South America

- Status of CORDEX-South America
  - RCM simulations
  - **CORDEX-LAC Workshops**

ICSU

WCRP VAMOS/CORDEX Workshop on Latin-America and Caribbean CORDEX LAC: Phase I – South America

A partnership between CLIVAR/VAMOS and CORDEX
11th-13th September 2013, Lima -Perú

70 participants from 19 countries
(50% were early-career scientists)

Main outcomes

- Identifying regionally focused VIA analysis and user-knowledge needs;
- Evaluating regional climate model downscaled projections and
- Developing a regional network including VIA and modeling scientists from the LAC region

WCRP VAMOS/CORDEX Workshop on Latin-America and Caribbean CORDEX LAC: Phase II – The Caribbean

A partnership between CLIVAR/VAMOS and CORDEX
7th-9th April 2014, Santo Domingo, Dominican Republic

Main outcomes

- A deeper understanding of approaches for identifying vulnerability and risk;
- Developing skills in integrating and communicating climate related risk and the appropriate policy responses.
- Enhanced synthesis and relevance of regional climate information and projections;
- Improved understanding of potential vulnerabilities and impacts of global change at the regional scale

CORDEX-LAC mailing list:

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CORDEX –South America

Evaluation of regional climate change scenarios

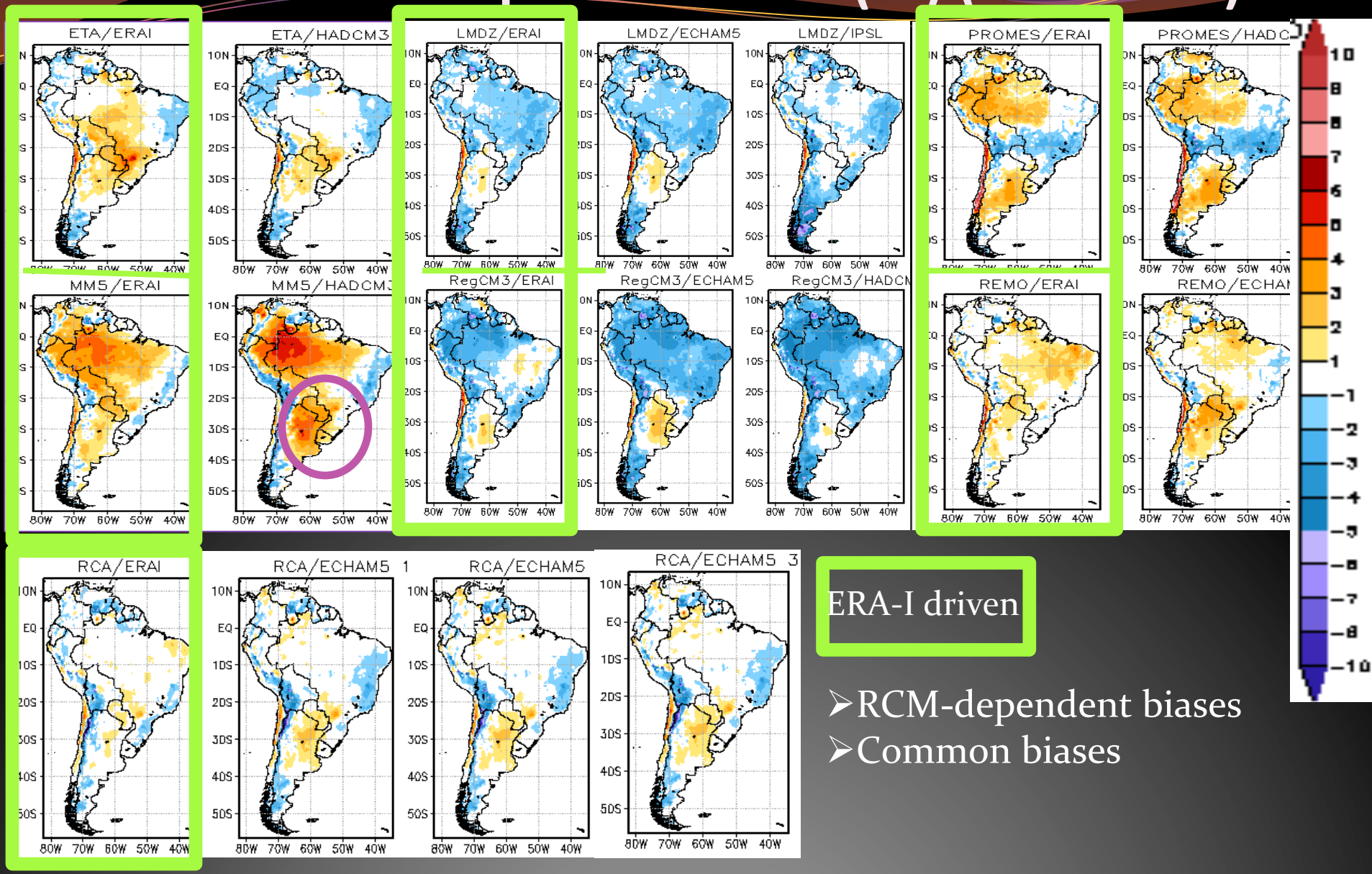
- How do RCMs behave over South America?
  - ERA-Interim driven simulations
  - GCM-driven simulations
- How do models project the future climate over South America?
  - Common climate change signals
  - Bias vs climate change signals

How do RCMs behave over South America?

- ERA-Interim driven simulations
- GCM-driven simulations

Results based on CIMP3 driven simulations
CLARIS-LPB EU Project

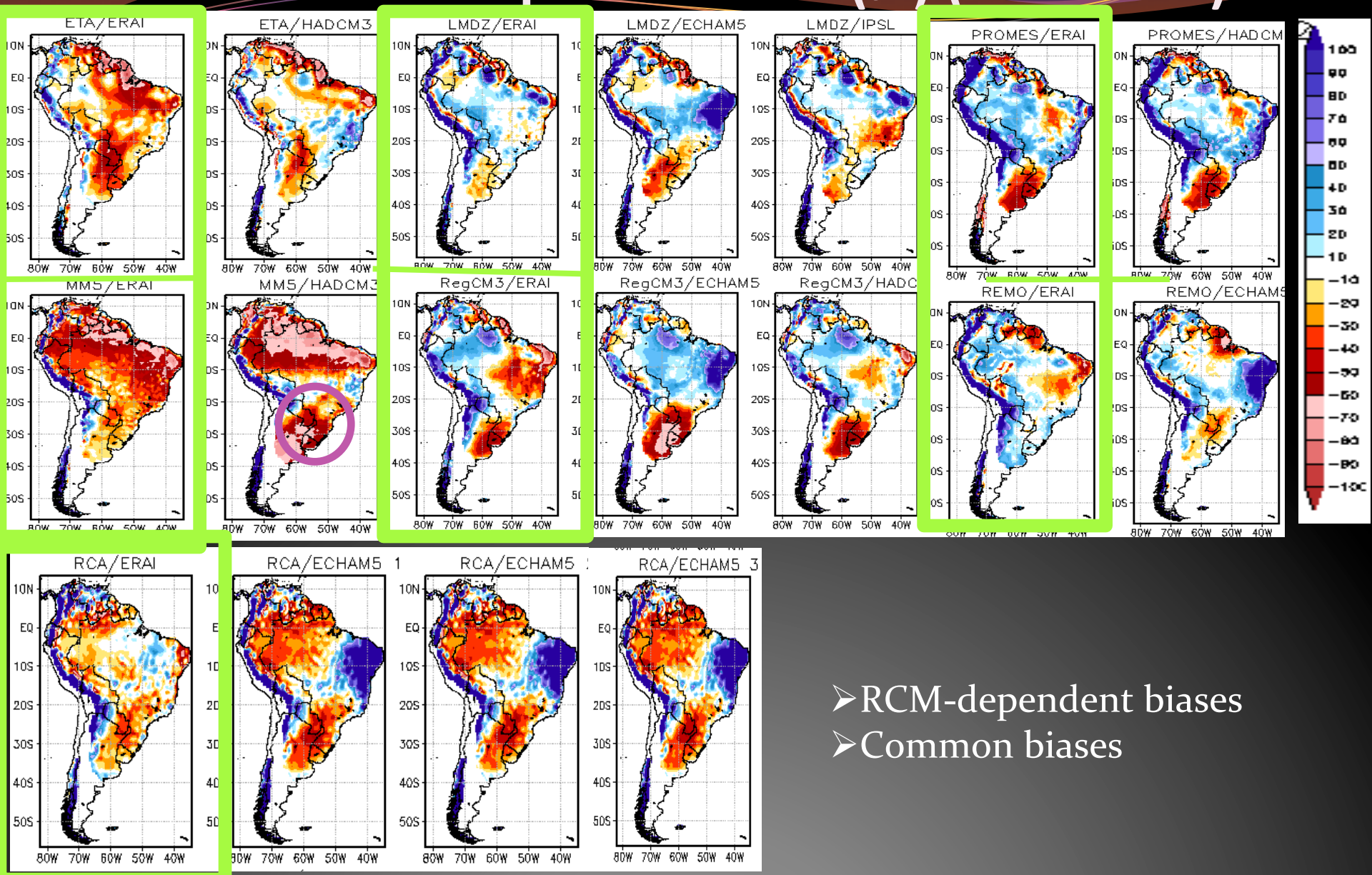
Annual mean Temperature bias (°C) (RCM-CRU)



ERA-I driven

- RCM-dependent biases
- Common biases

Annual mean Precipitation bias (%) (RCM-CRU)

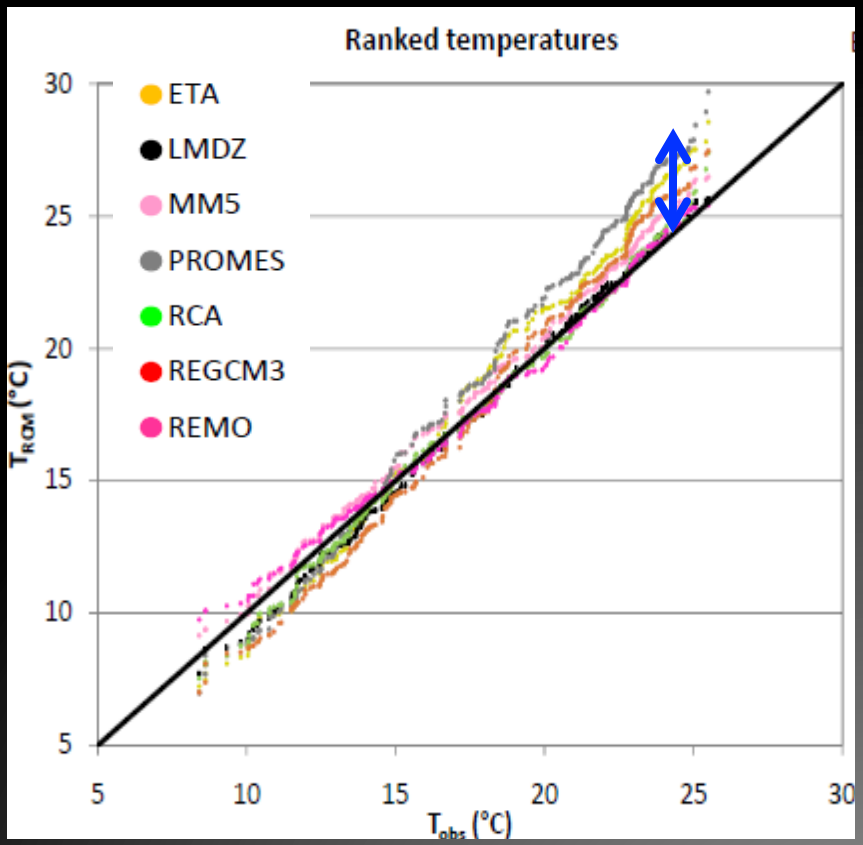


- RCM-dependent biases
- Common biases

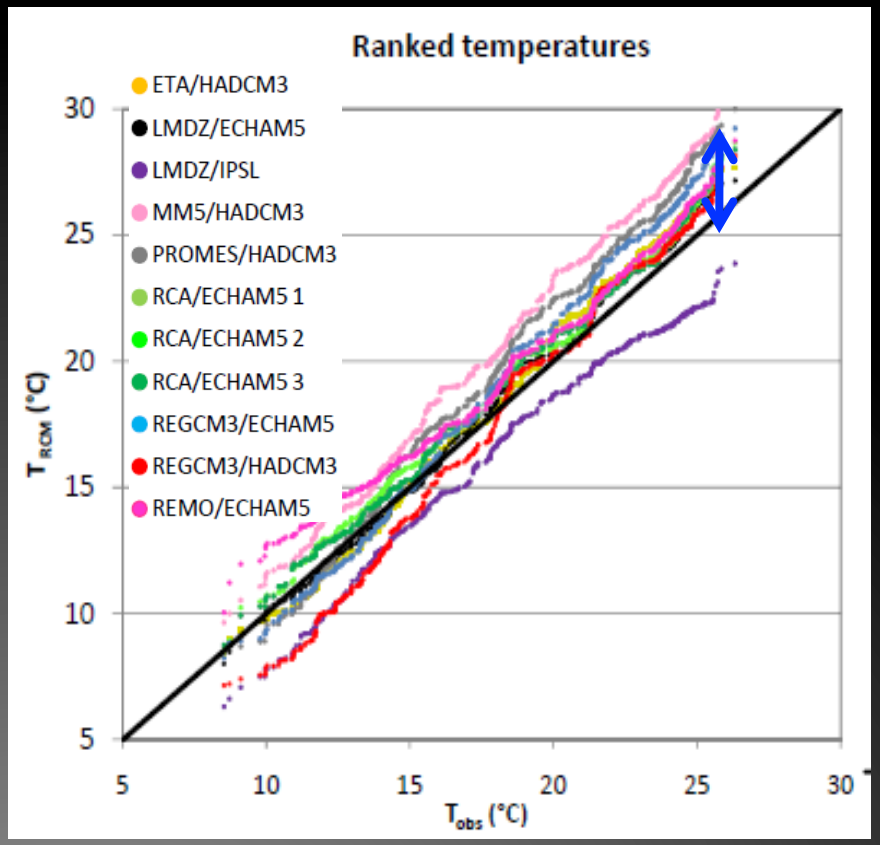
Temperature biases over LPB

ERA-Interim and GCM driven RCMs

ERA-I driven RCMs



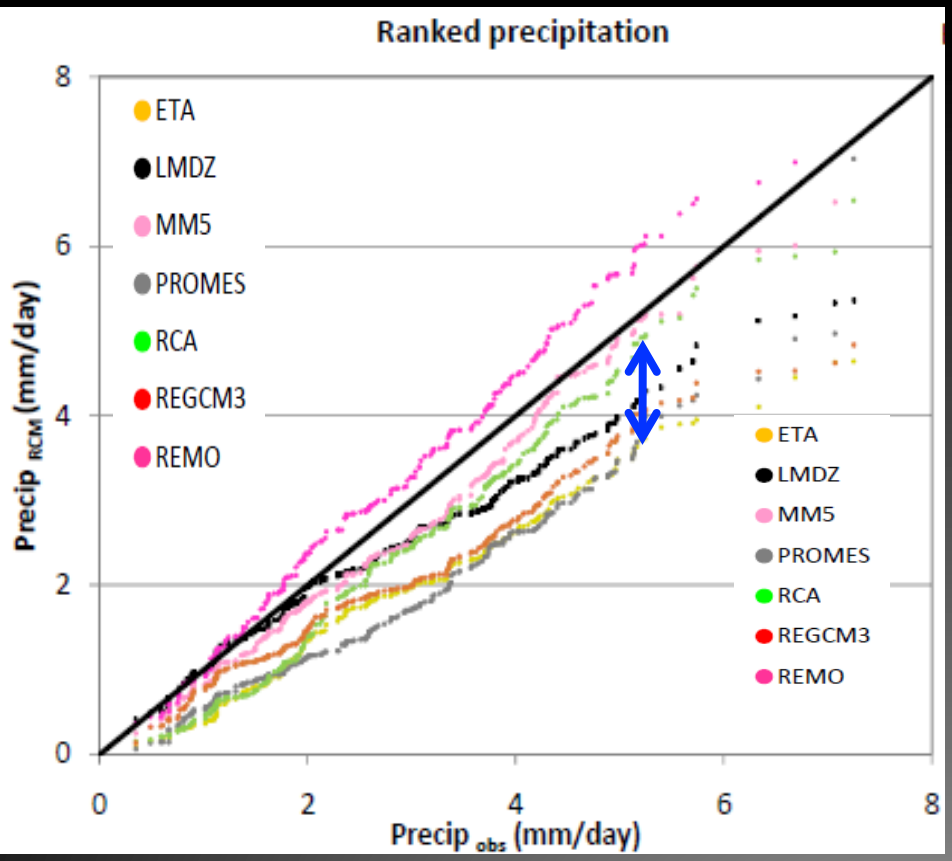
GCM driven RCMs



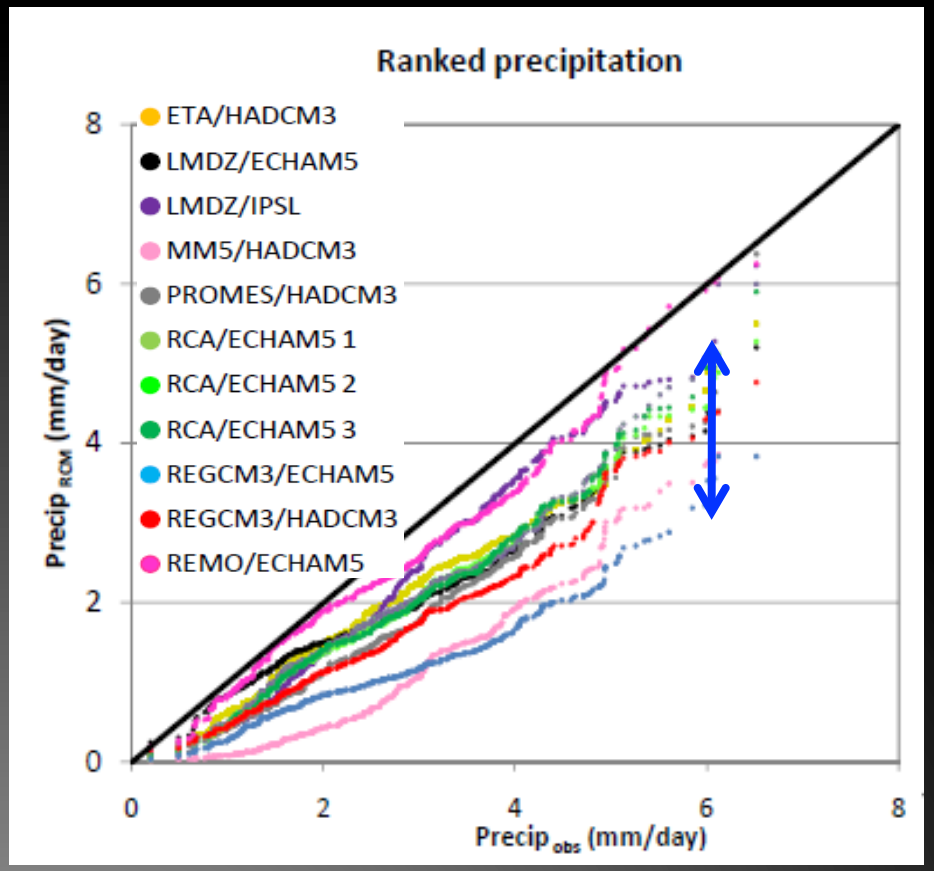
- Models are (always) warmer for warmer conditions

Precipitation biases over LPB
ERA-Interim and GCM driven RCMs

ERA-I driven RCMs



GCM-driven RCMs

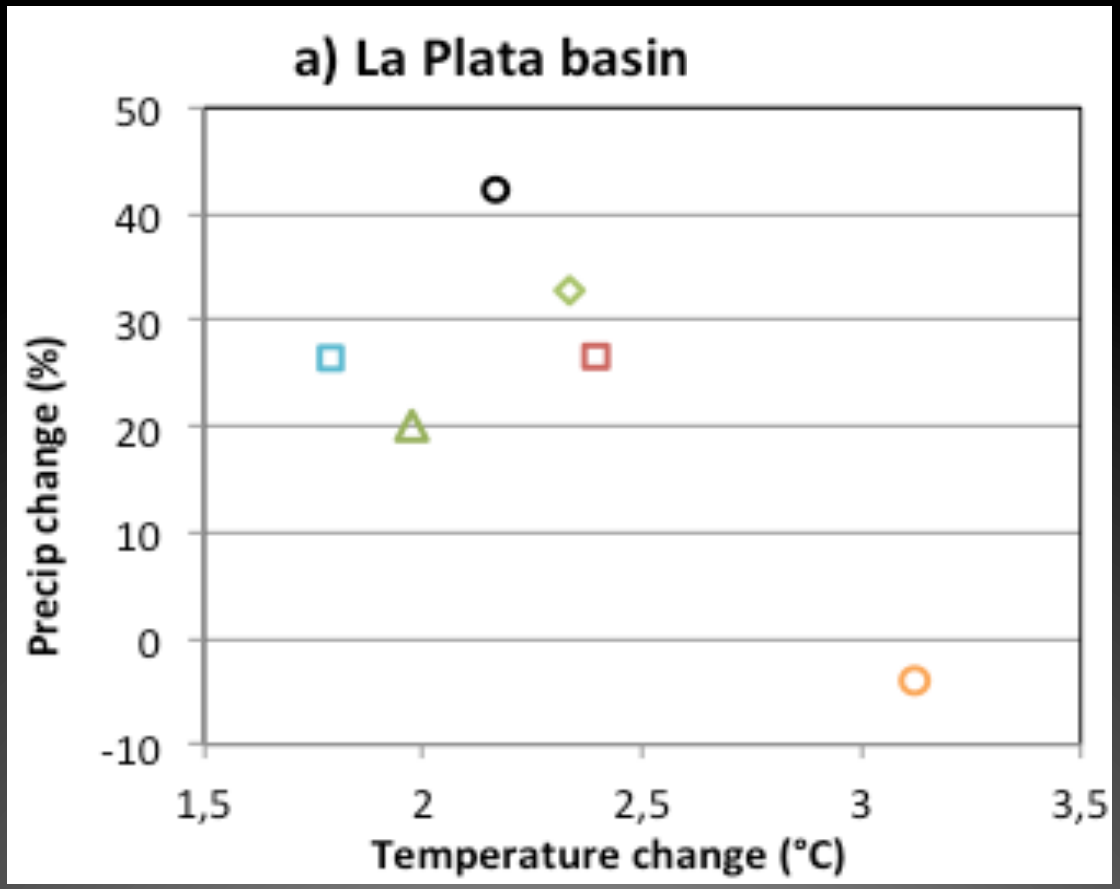


➢Models are (always) drier for wetter conditions

- The model biases are not invariant, but depend on both temperature and precipitation, respectively:
  - warm biases are amplified under warmer climate conditions
  - dry biases are amplified under wetter climate conditions

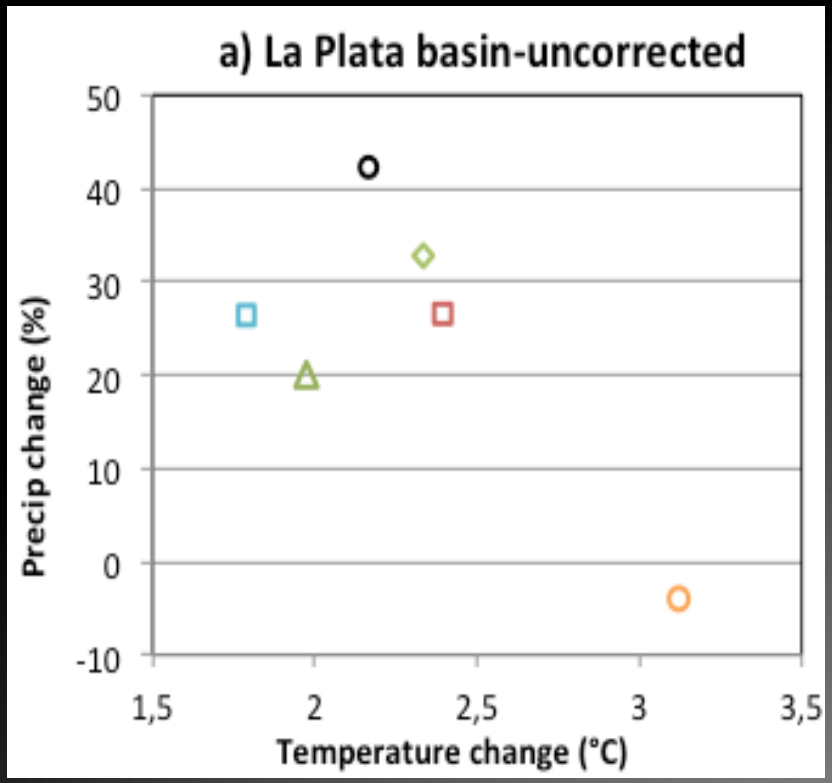
- How can this behavior may help interpreting future climate projections?

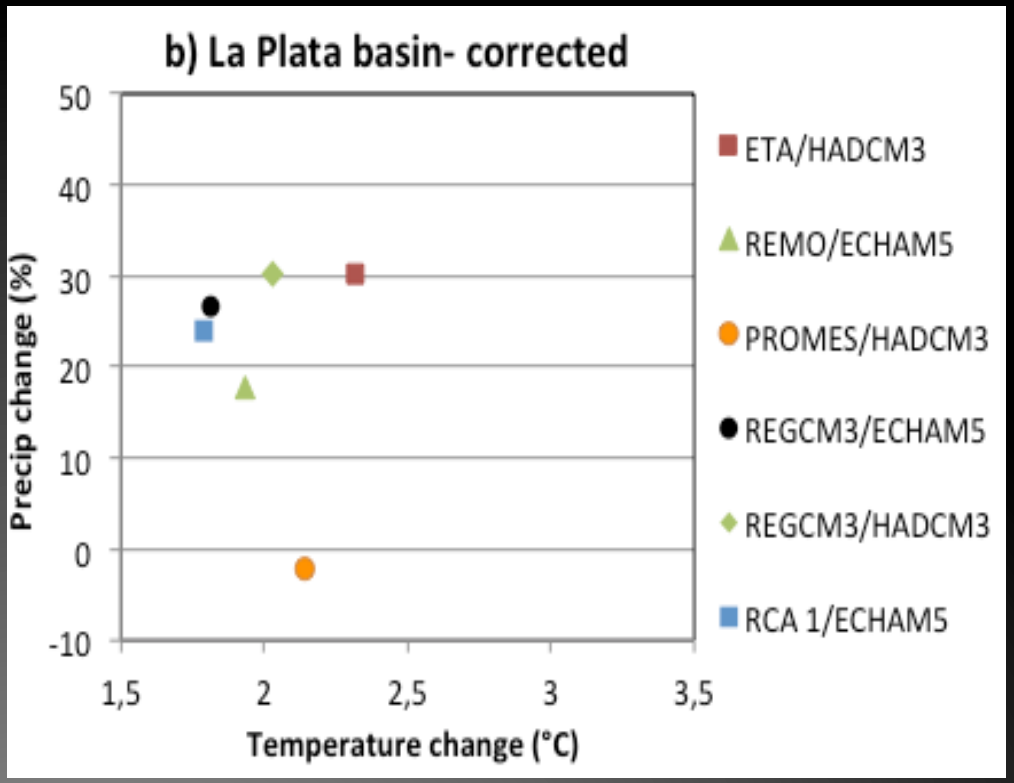
Regional climate change signal (2071-2100)



- Warmer and wetter future climate conditions

Regional climate change signal after bias correction (quantile-quantile mapping)





Projected temperature changes after bias correction are reduced as well as the spread among RCMs.

Conclusions

- Biases on the simulated temperature and precipitation patterns seem to be independent of boundary forcing.
- For the present climate simulations (LPB): RCMs are warmer under warmer conditions and dryer under wetter conditions (biases are not invariant).
- The climate change signal over LPB suggests a wetter and warmer climate.
- Bias identified may help reducing the uncertainty in the projected climate.
- Though applying bias correction methodologies to projected climate conditions is controversial, this study demonstrates that bias correction methodologies should be considered in order better interpret climate change signals.