



CORDEX-South America: Overview of on-going activities

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First CORDEX-WRF Workshop
Tenerife, October 1-5, 2012



CORDEX experimental design

**Model Evaluation
Framework**

**Climate Projection
Framework**

**Multiple regions
0.44 0.22° grid spacing**

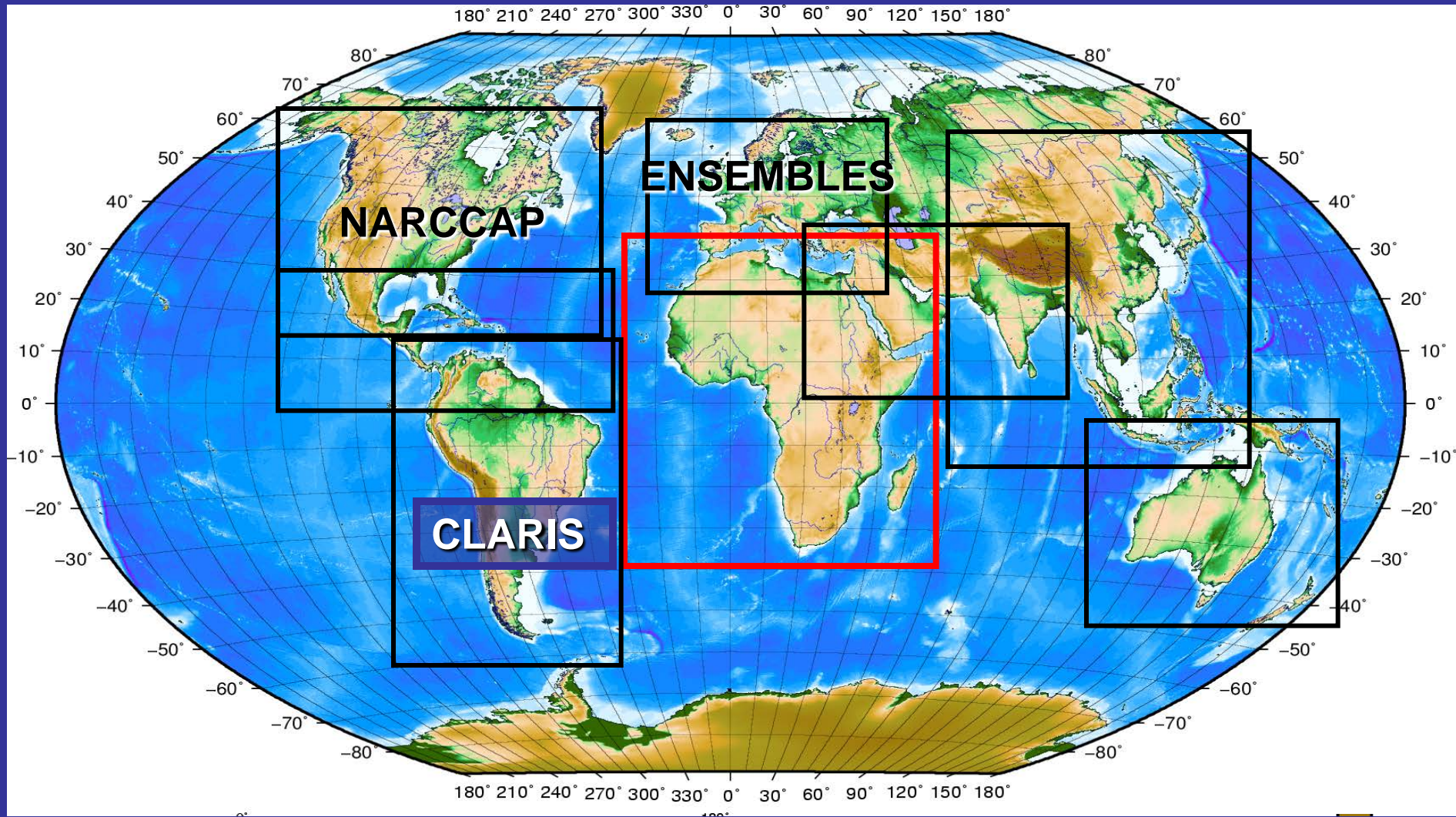
**ERA-Interim LBC
1989-2008**

**RCP4.5, RCP8.5
1951-2100**

Multiple AOGCMs-ESMs

**Regional Analysis
Regional Databanks**

CORDEX Domains



CLARIS-LPB contribution to CORDEX-South America

CLARIS-LPB

The EU FP7 CLARIS LPB project (2008-2012)

Goals

- To predict the regional climate change impacts on La Plata Basin (LPB).
- **To provide an ensemble of regional hydroclimate scenarios and their uncertainties for climate impact studies.**

CORDEX

Initiative promoted by the WCRP

Goals:

- To Provide a quality-controlled data set of RCD-based information for the recent historical past and 21st century projections, covering the majority of populated land regions on the globe
- to provide a more solid scientific basis for impact assessments and other uses of downscaled climate information



CORDEX: South America/CLARIS-LPB

**Model Evaluation
Framework**



**ERA-Interim LBC
1989-2008**



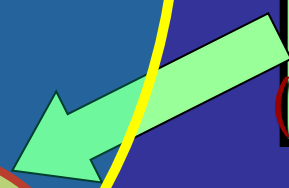
**Regional Analysis
Regional Databanks**

**Climate Projection
Framework**

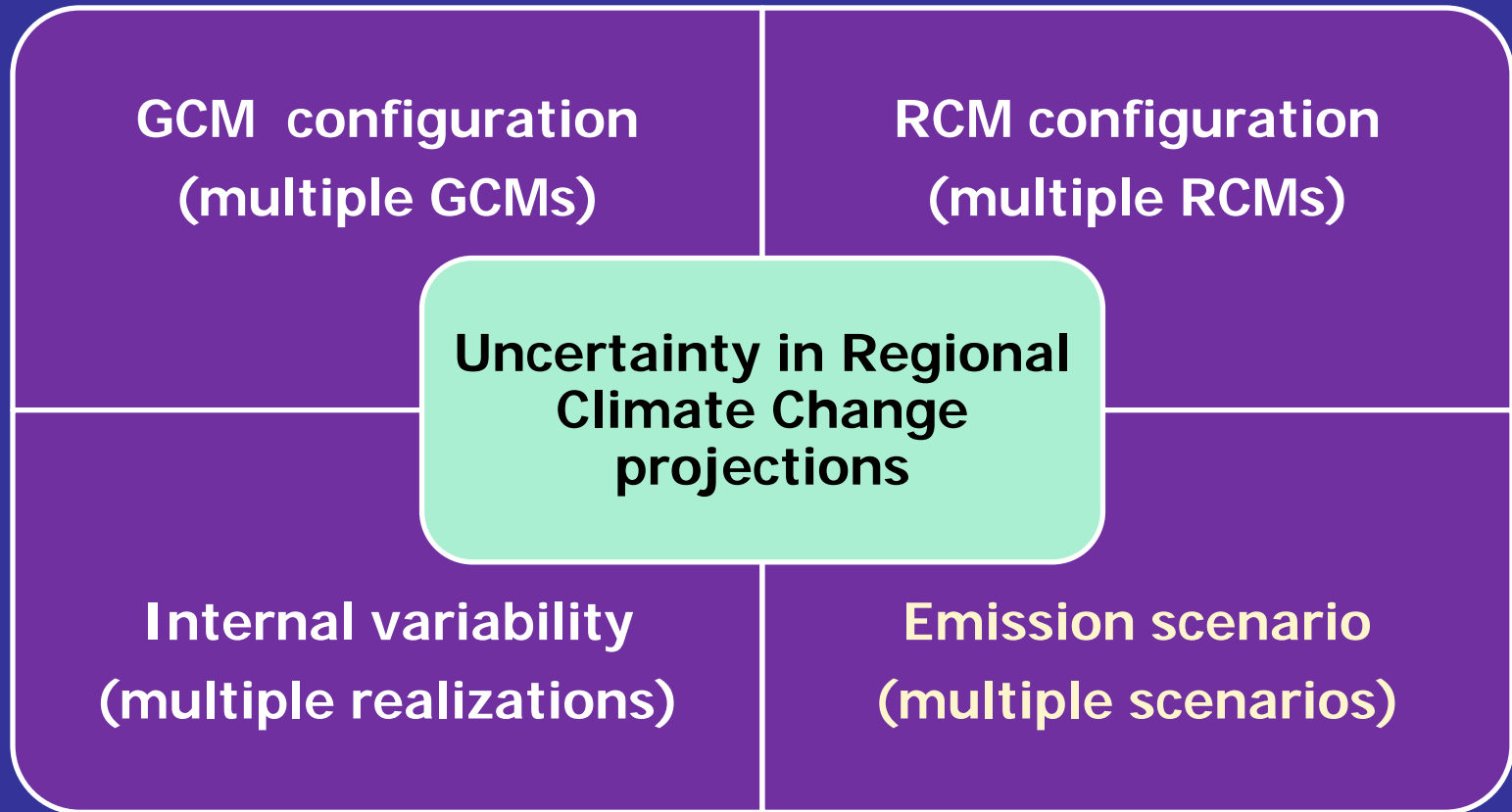


**A1B
Continuous runs &
Timeslices
(2010-2040 and 2070-2100)**

**Multiple AOGCMs
HadCM3-Q0, ECHAM5OM-R3, IPSL
(CMIP3)**



Characterizing uncertainties in Regional climate change Projections



CLARIS-LPB coordinated experiments over South America/**CORDEX-SAM**

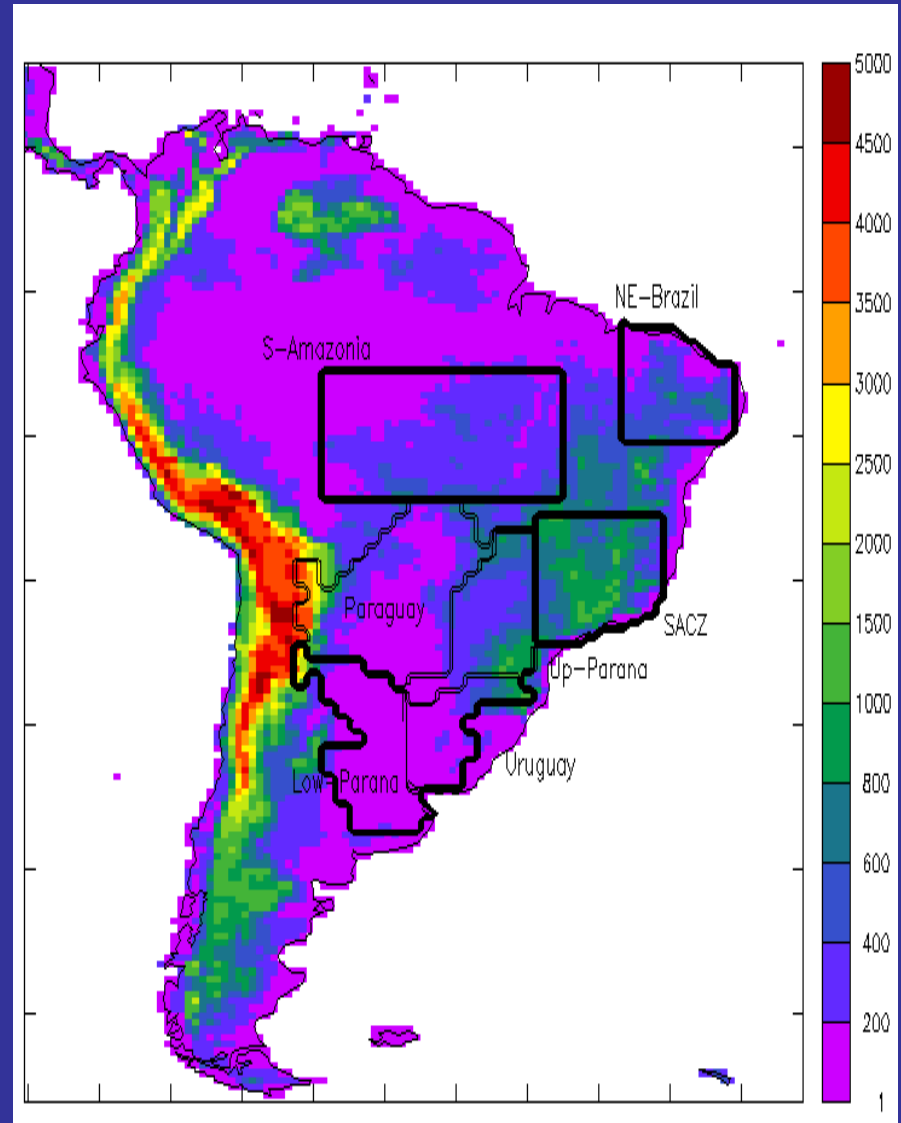
RCM/ Institution	ERA- Interim (1990- 2008)	GCM	Present climate (1961- 1990)	Near future (2011-2040) A1B	Far future (2071-2100) A1B	Continuous run (1961-2100)
RegCM3/USP	X	HadCM3-Q0	X	X	X	
		EC50M-R1	X	X	X	
RCA/SMHI	X	EC50M-R1				X
		EC50M-R2				X
		EC50M-R3				X
MM5/CIMA	X	HadCM3-Q0	X	X		
REMO/MPI	X	EC50M-R3	X	X	X	X
PROMES/UCLM	X	HadCM3-Q0				X
LMDZ/IPSL	X	IPSLA1B				X
		HadCM3-Q0				X
ETA/INPE	X	HadCM3-Q0	X	X	X	

Solman et al, 2012 Clim Dyn (under revision)

CLARIS-LPB/CORDEX-SOUTH AMERICA

Model Domain and observational Data for model validation

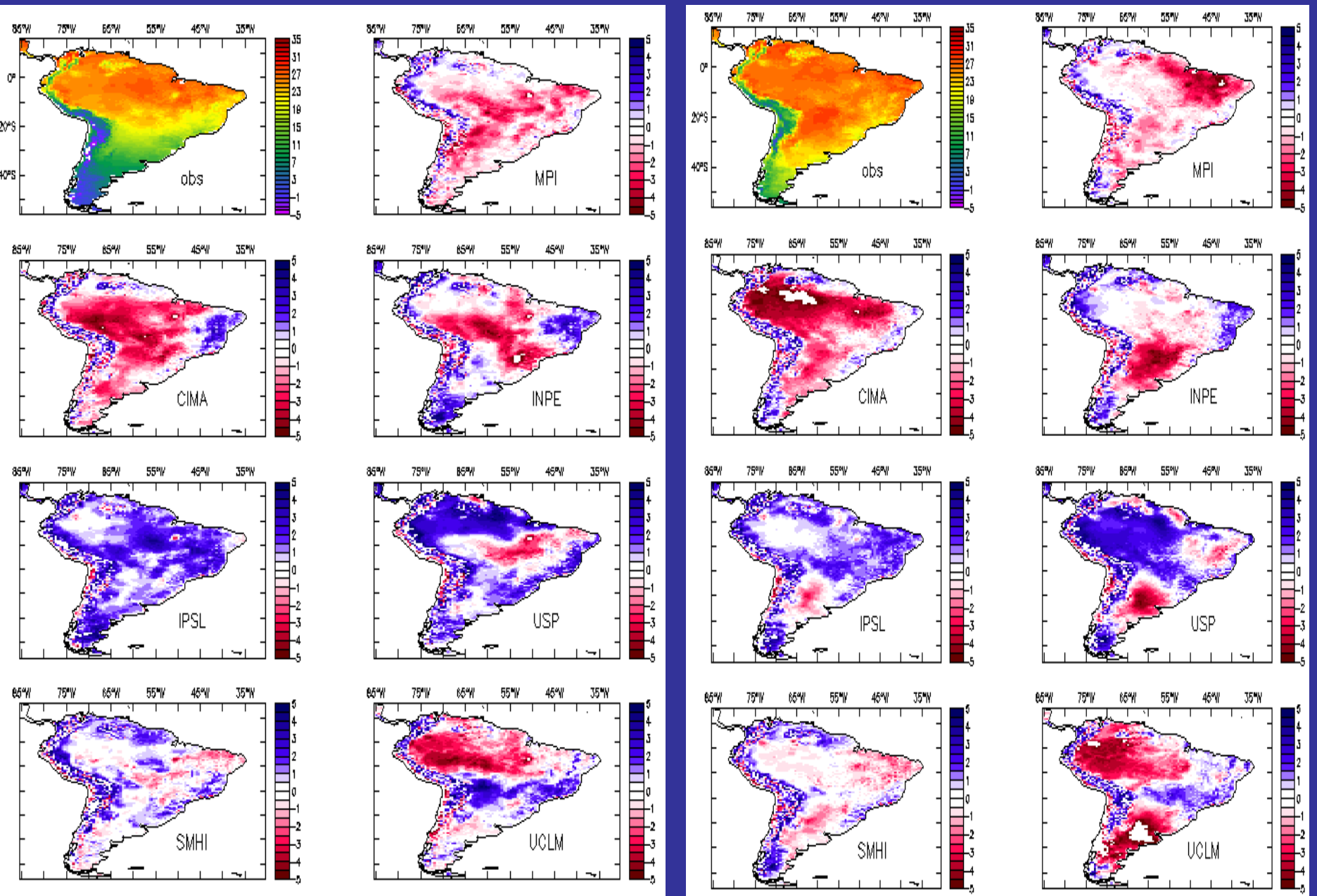
- Resolution $\sim .44^\circ$
- Precipitation: CRU; UDEL; GPCC; CPC-UNI
- Temperature: CRU; UDEL



ERA-Interim (ERA-Interim) BC: Tas BIAS (2m temp)

JJA

DJF



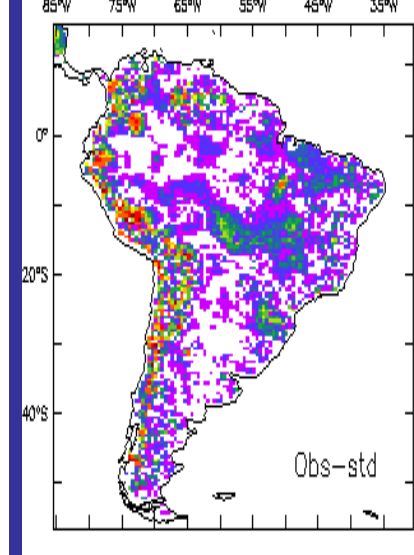
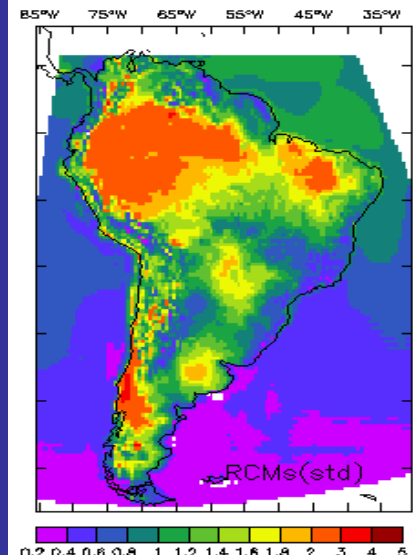
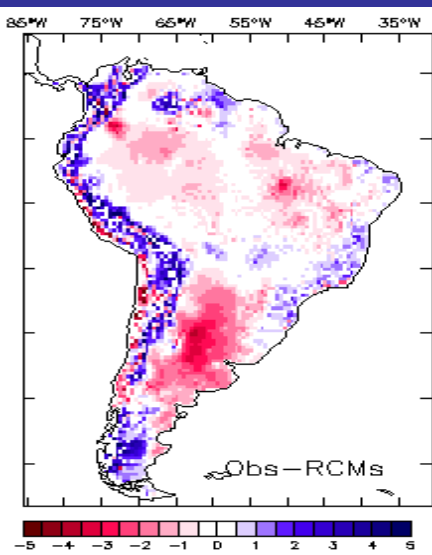
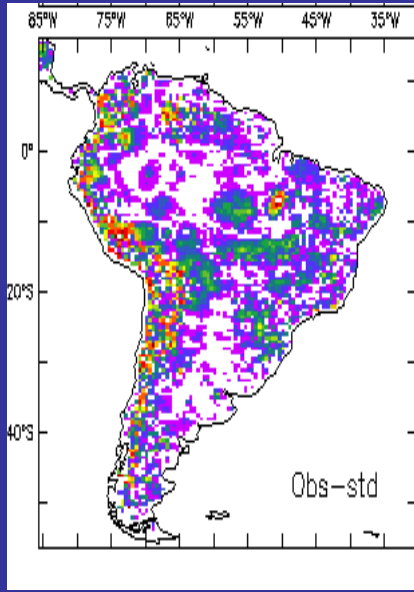
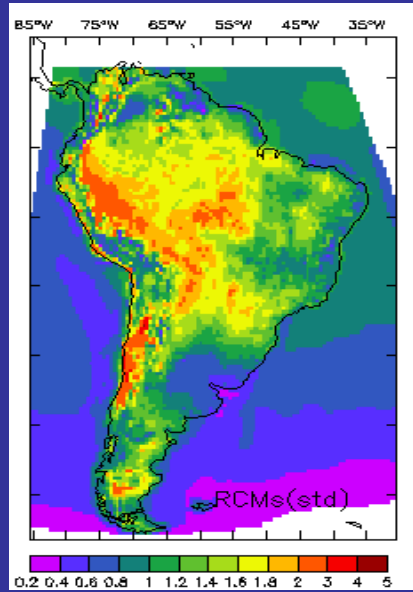
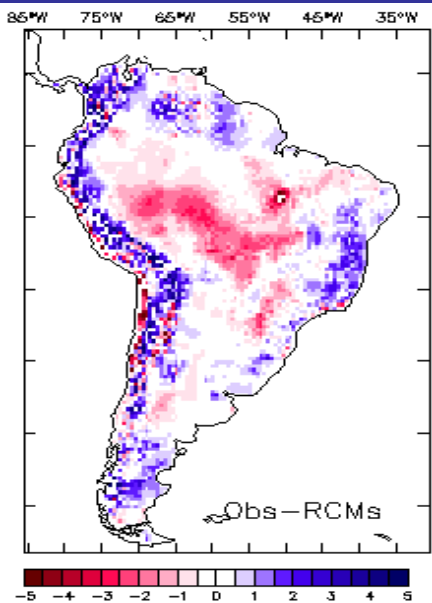
Temperature: Ensemble bias & spread

BIAS

RCMs SPREAD OBS SPREAD

Bias = OBS-RCM

JJA

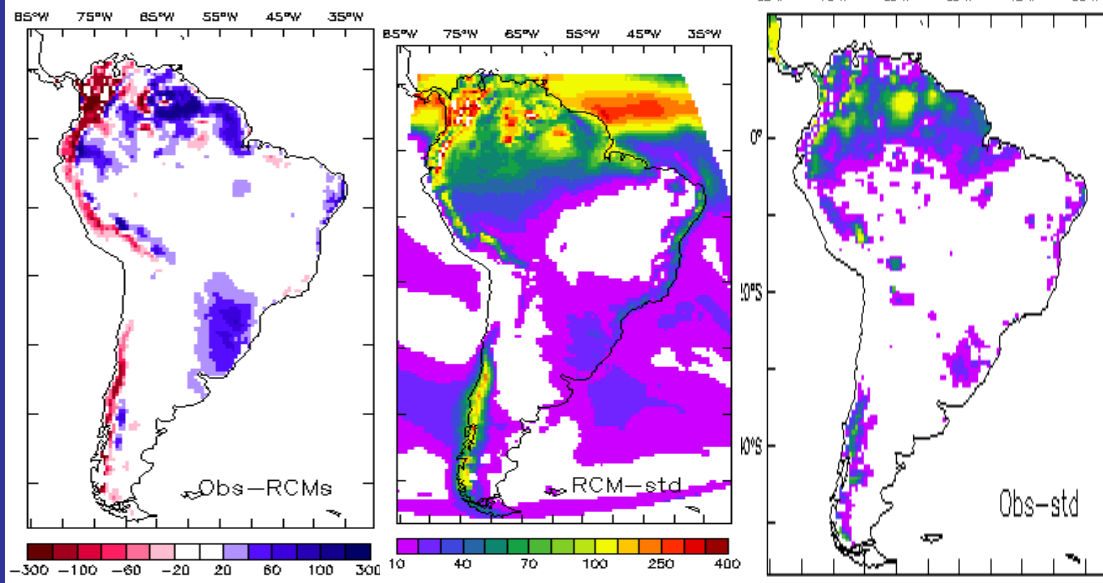


DJF

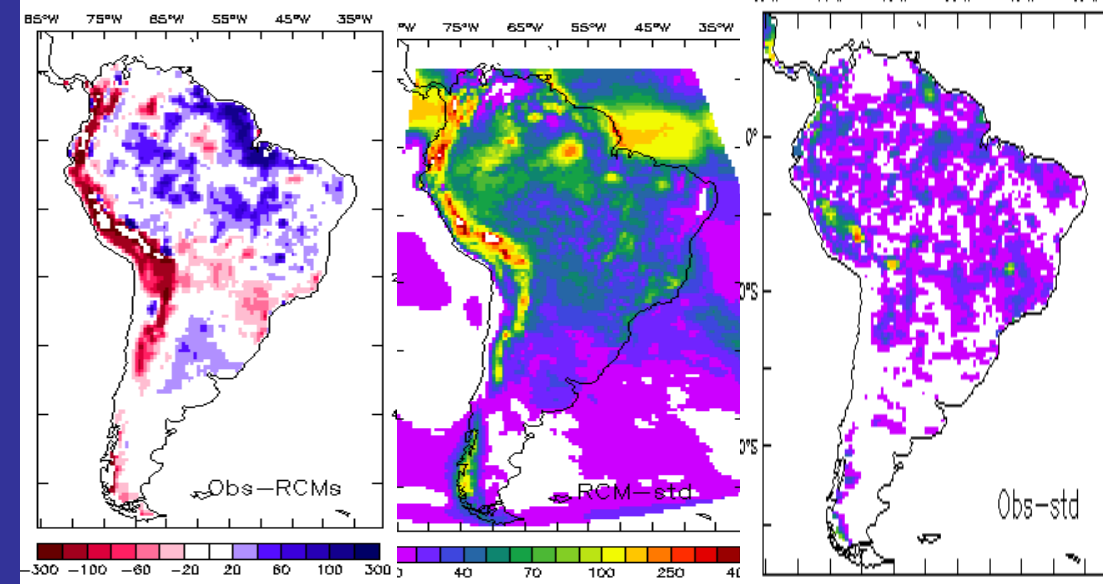
Precipitation: Ensemble bias & spread

BIAS RCMs SPREAD OBS. SPREAD

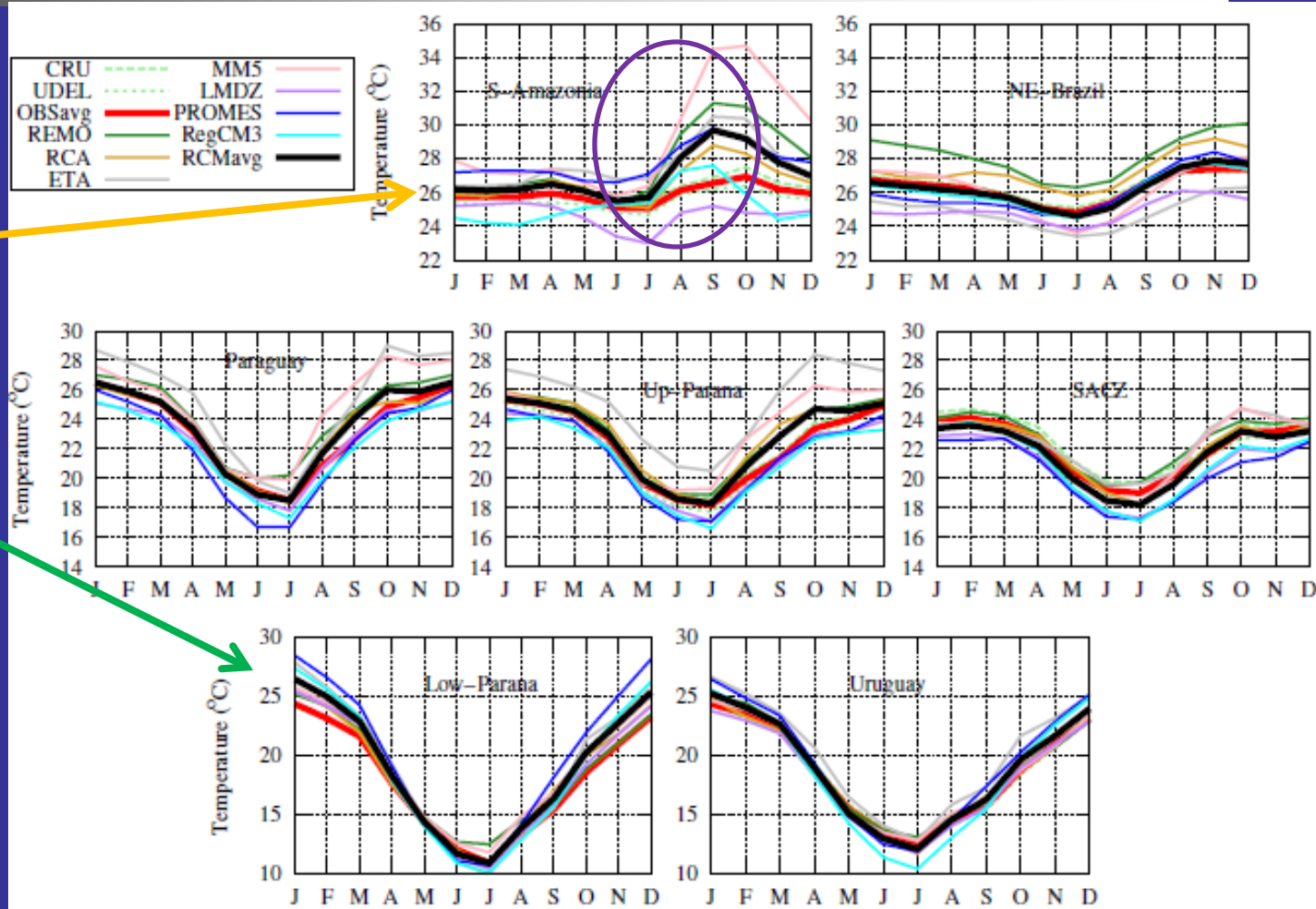
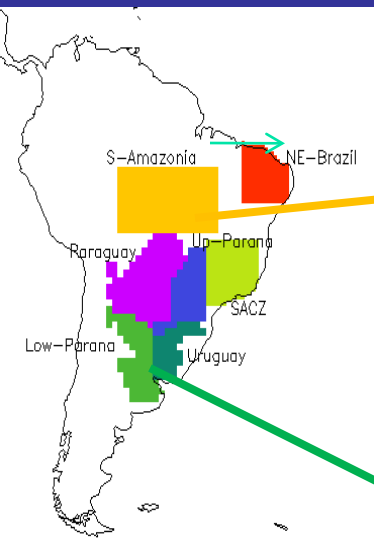
JJA



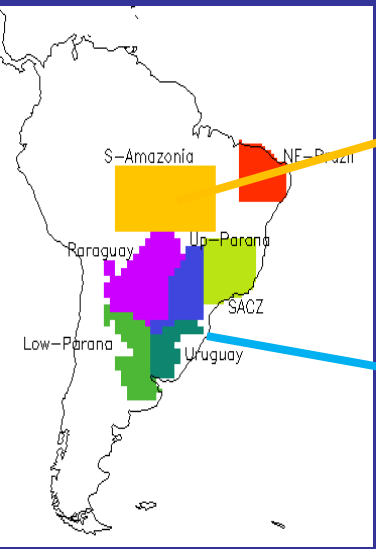
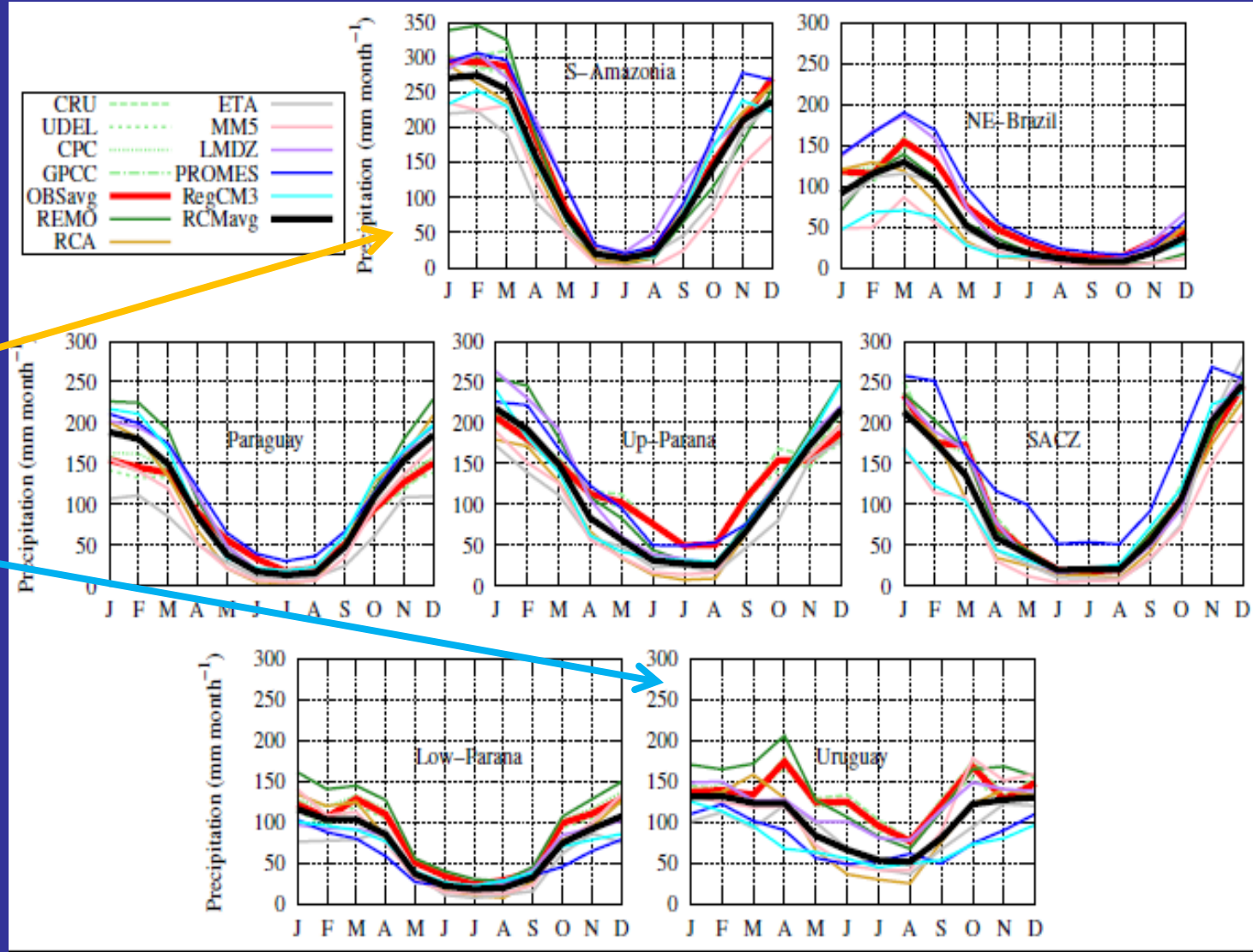
DJF



Annual cycle over selected regions: Tas



Annual cycle over selected regions: Precip



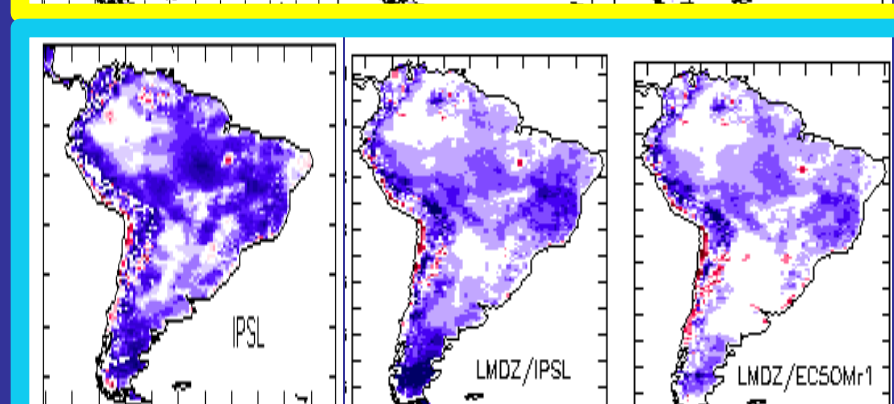
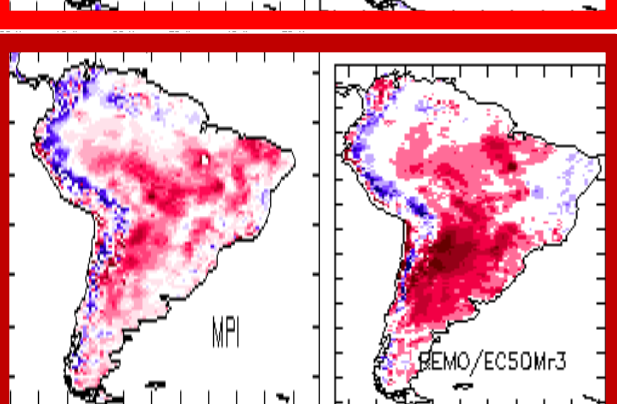
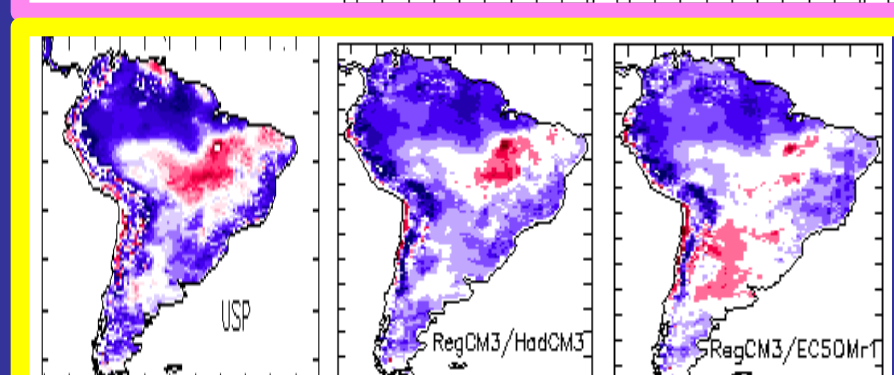
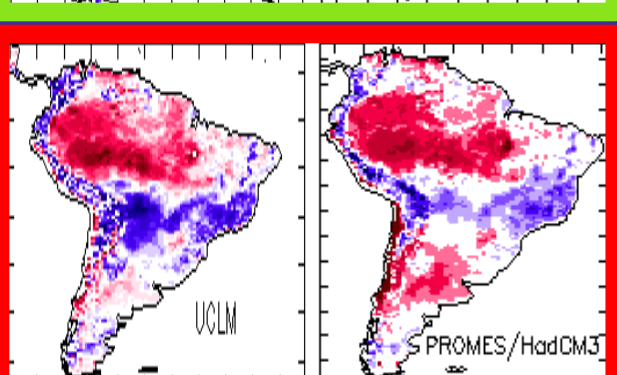
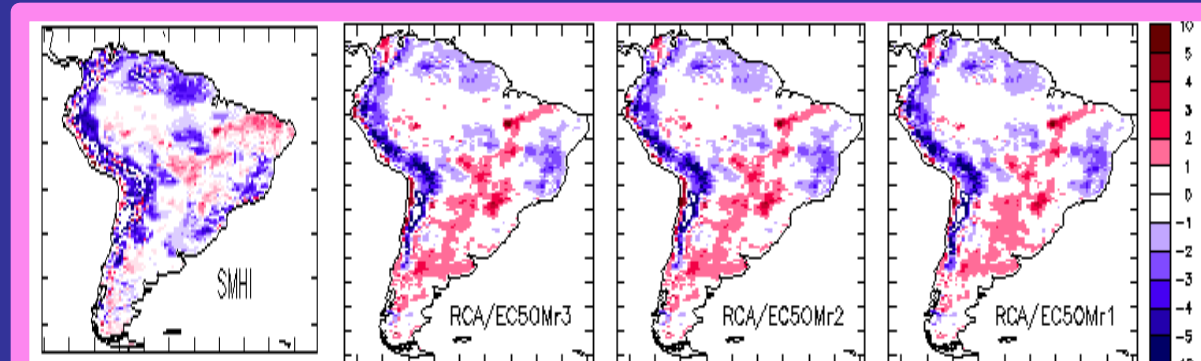
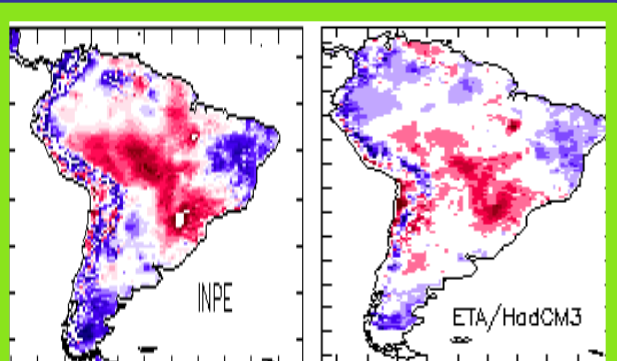
2m Temperature JJA: BIAS

ERA-I BCs

GCM BCs

ERA -I BCs

GCM BCs



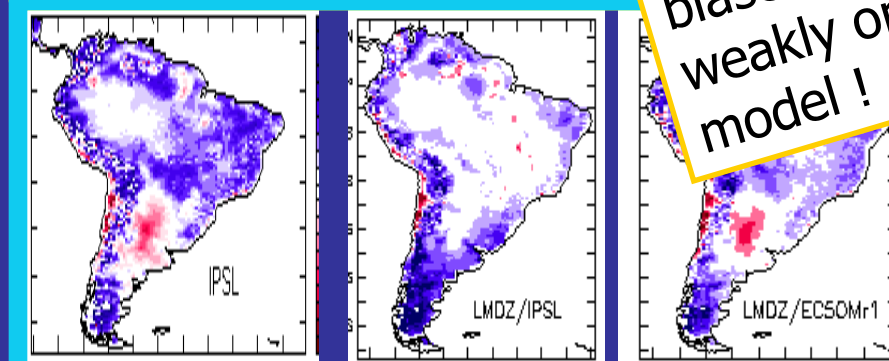
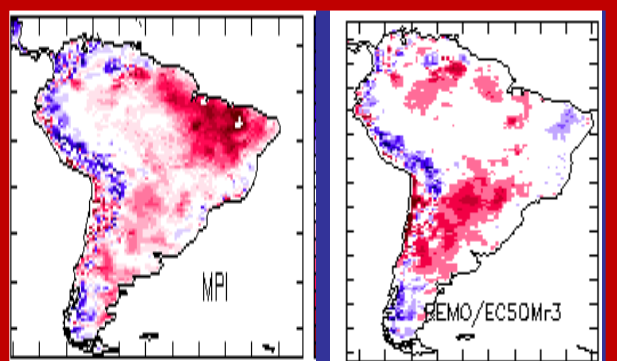
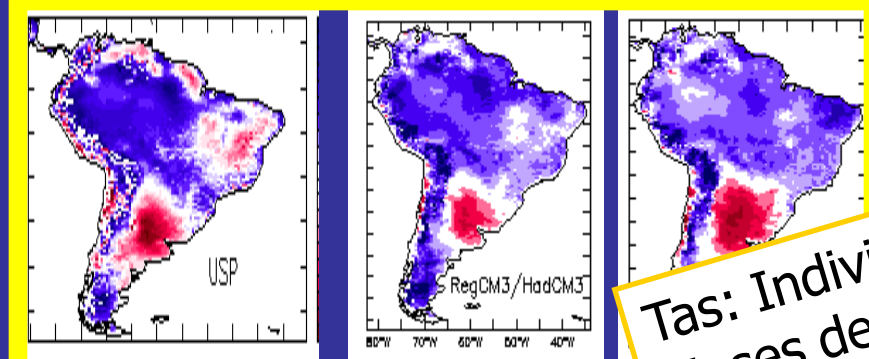
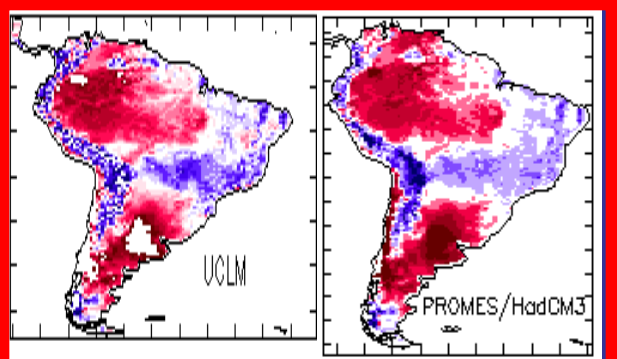
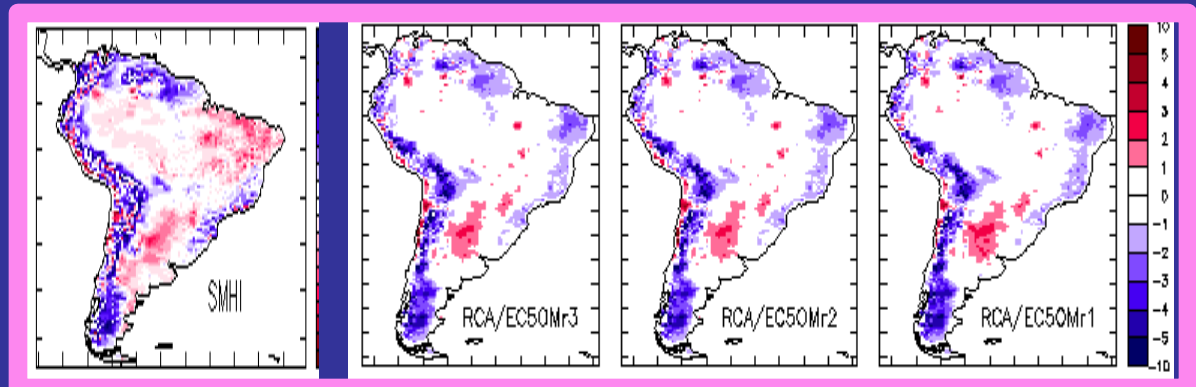
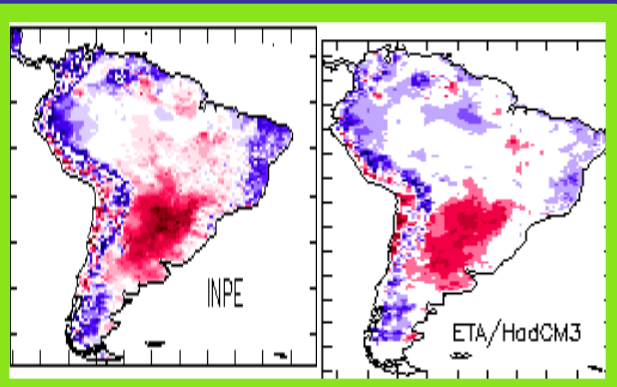
2m Temperature DJF: BIAS

ERA-I BC

GCM BC

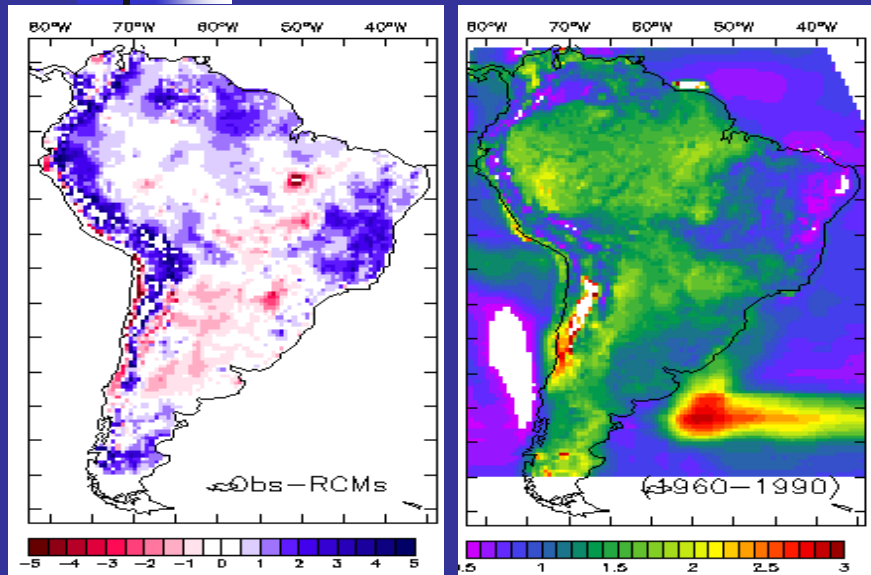
ERA-I BC

GCM BC

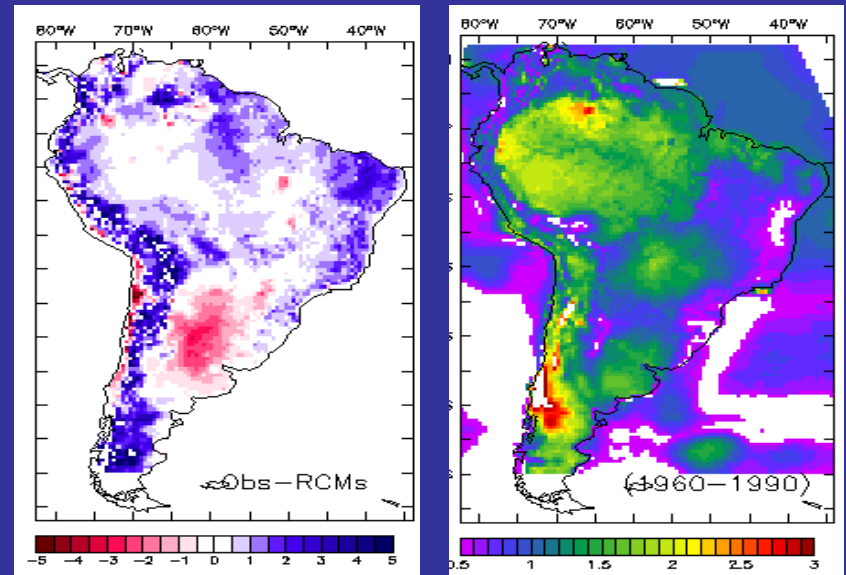


Tas: Individual model biases depend only weakly on the driving model!

GCM-forced simulations: Ensemble Bias and spread



TAS JJA



TAS DJF

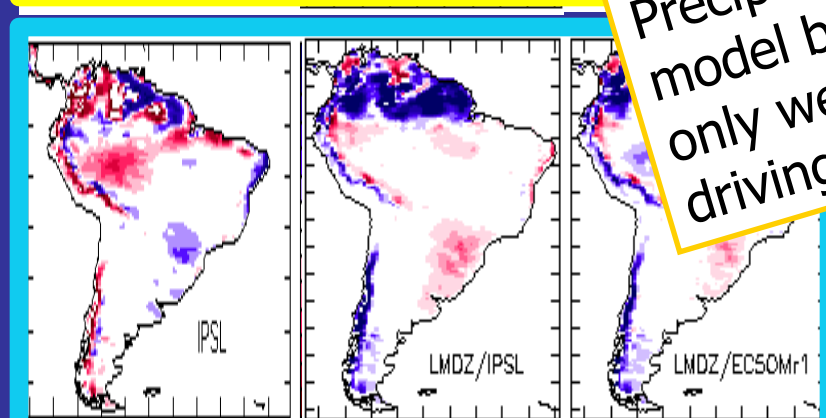
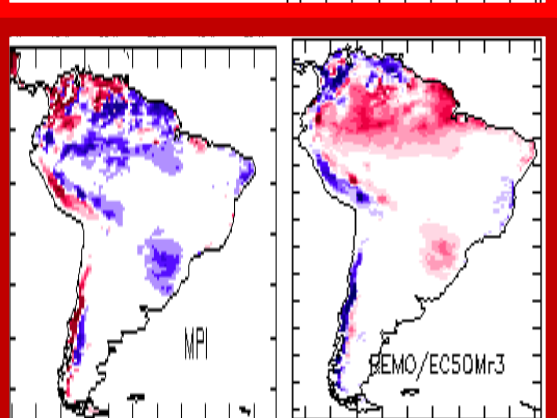
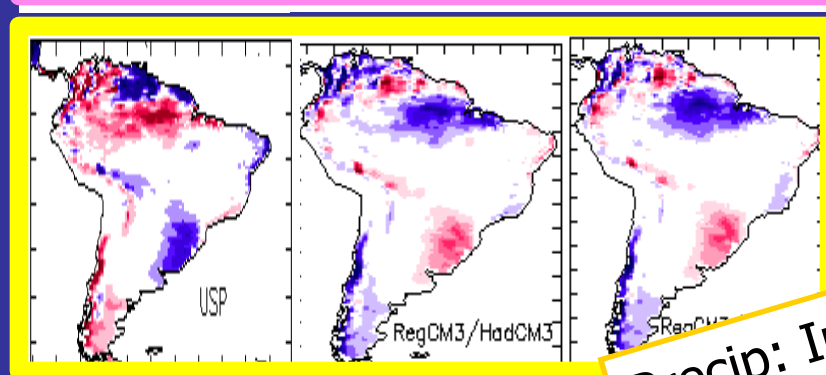
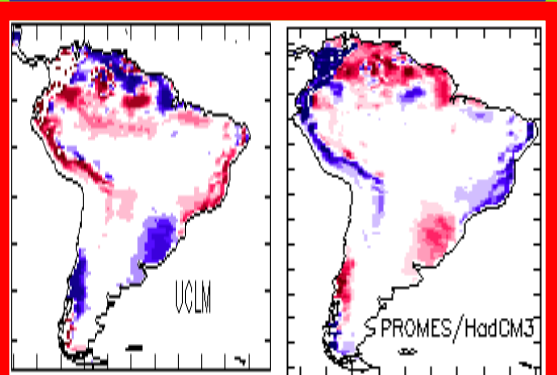
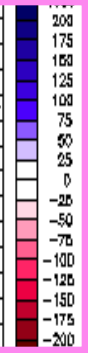
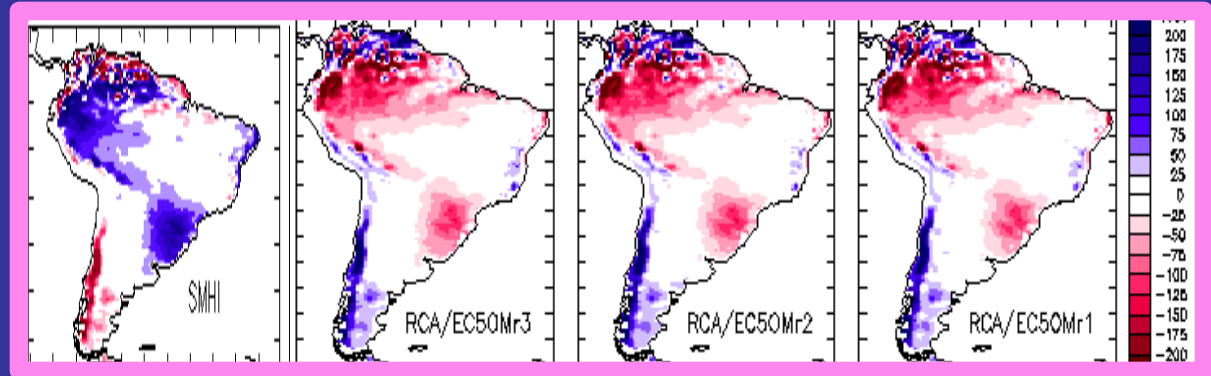
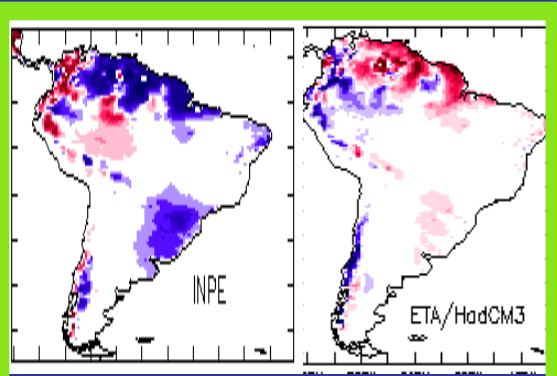
Precipitation JJA: BIAS

ERA-I BC

GCM BC

ERA-I BC

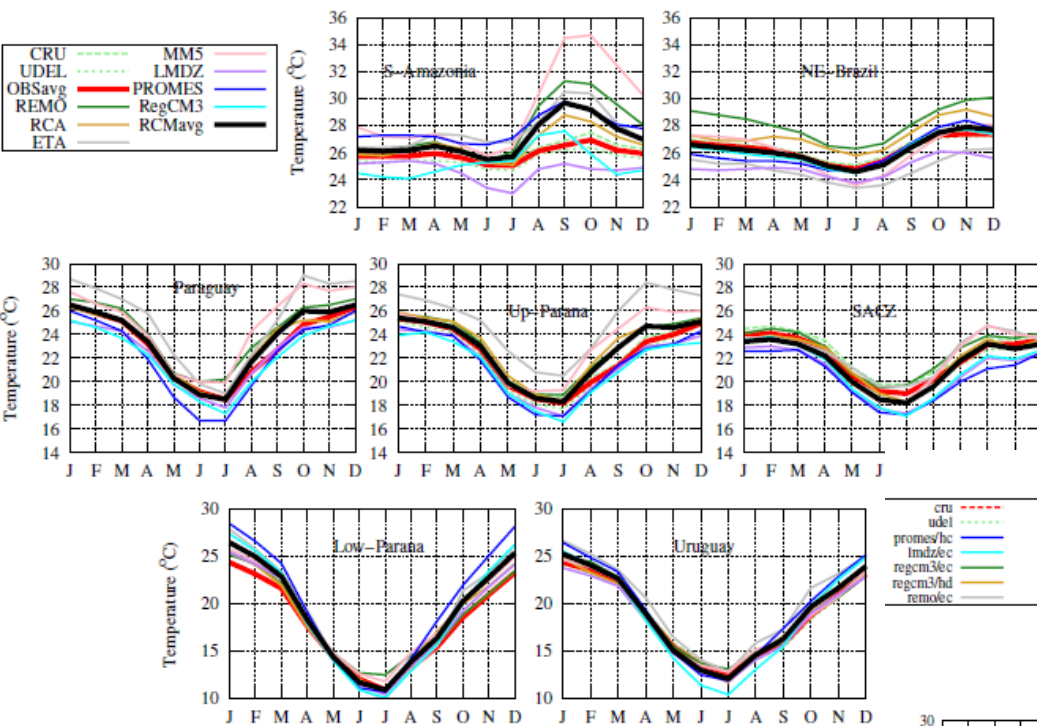
GCM BC



Precip: Individual model biases depend only weakly on the driving model!

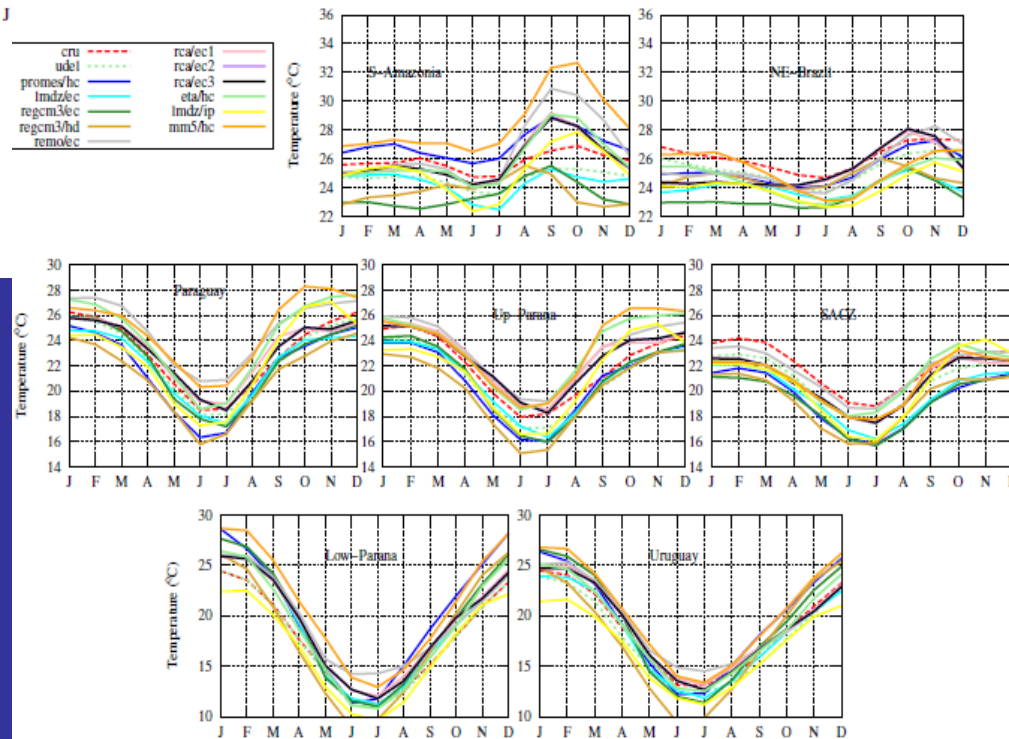
BIASES ARE REVERSED!! (ERA-I - GCM)

Annual cycles: Tas



ERA-Interim driven simulations

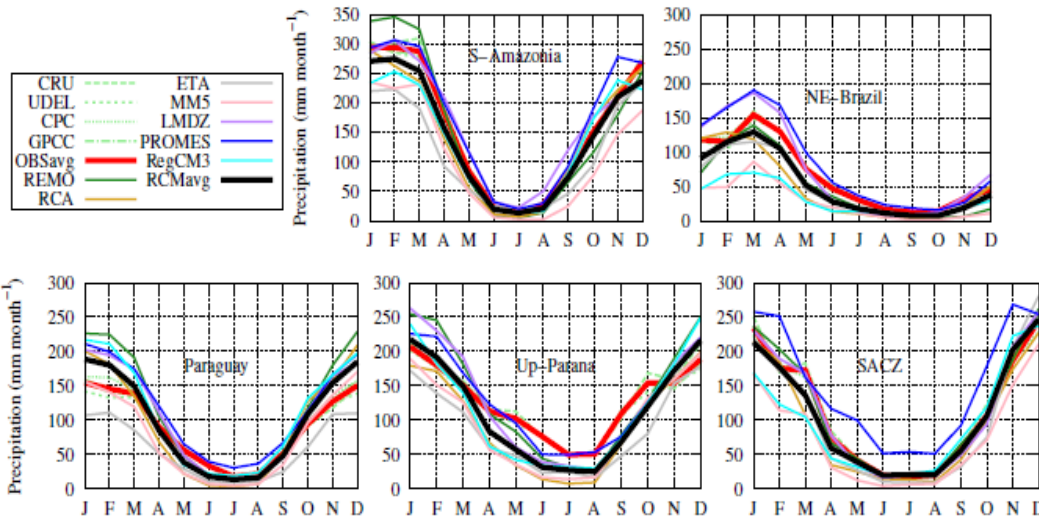
GCM driven simulations



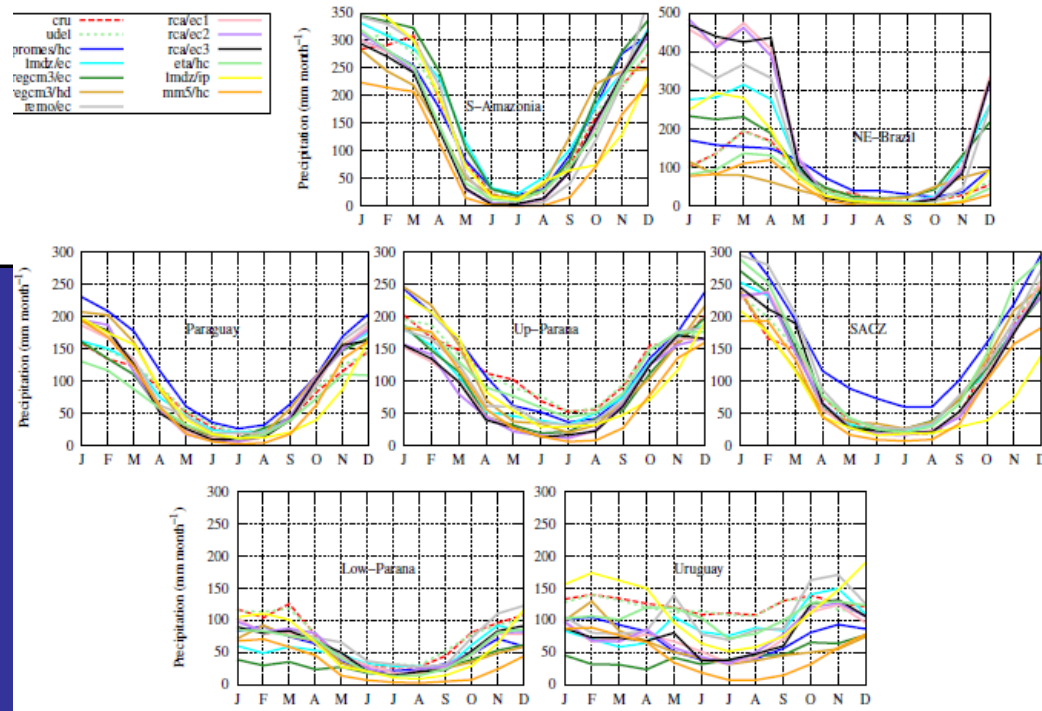
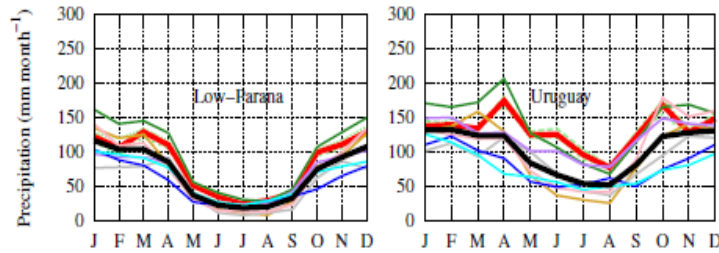
The spread among RCM/GCM is larger compared with the spread among RCM/ERA-I

Annual cycles: Precipitation

ERA-Interim driven simulations



GCM driven simulations



The spread among RCM/GCM is larger compared with the spread among RCM/ERA-I for both temperature and precipitation

Concluding remarks

- ERA-Interim forced simulations: characterizing ensemble bias and ensemble spread-
 - Subtropical regions seem to be better simulated than tropical regions in terms of both model bias and uncertainty.
 - Systematic underestimation of winter precipitation during winter season over South-eastern South America.
 - Systematic overestimation of summer temperature during DJF over LPB.
- GCM-forced simulations:
 - Biases on the simulated temperature and precipitation patterns seem to be independent of boundary forcing.
 - Biases and uncertainties larger than for the ERA-I simulations (as expected).

CORDEX-SAM

RCPs simulations (1951-2100) 0,44° res.

- List of regional models driven by CMIP5
 - LMDZ/IPSL RCP4.5 **finished**
 - REMO /MPI RCP4.5, RCP8.5, RCP2.6 **finished**
 - RegCM4/ not sure about driving GCMs RCP4.5, RCP8.5, RCP2.6 on-going
 - PROMES/various GCMs RCP runs in preparation
 - RCA/ ?? RCP runs planned

CORDEX-SAM Publications

Solman et al. 2012 Clim Dyn (under revision) ERA-I runs

Marengo et al. 2012 Clim Dyn (under revision) ERA-I runs

Samuelsson et al. 2012 in preparation GCM runs