Foreign & Commonwealth Office

Climate Change in La Plata Basin

Jose A. Marengo
CPTEC/INPE,
São Paulo, Brazil

Earth System Science Partnership

Climate change studies and modeling efforts

-Long term observational trends (mean and extremes)

-Climate Change projections using global and regional trend (hydroclimatic) using AOGCMs (IPCC TAR and AR4)

-Regional climate change projections using RCM for 2071-2100 (derived from IPCC TAR HadAM3P and 3 Regional models)—Currently available

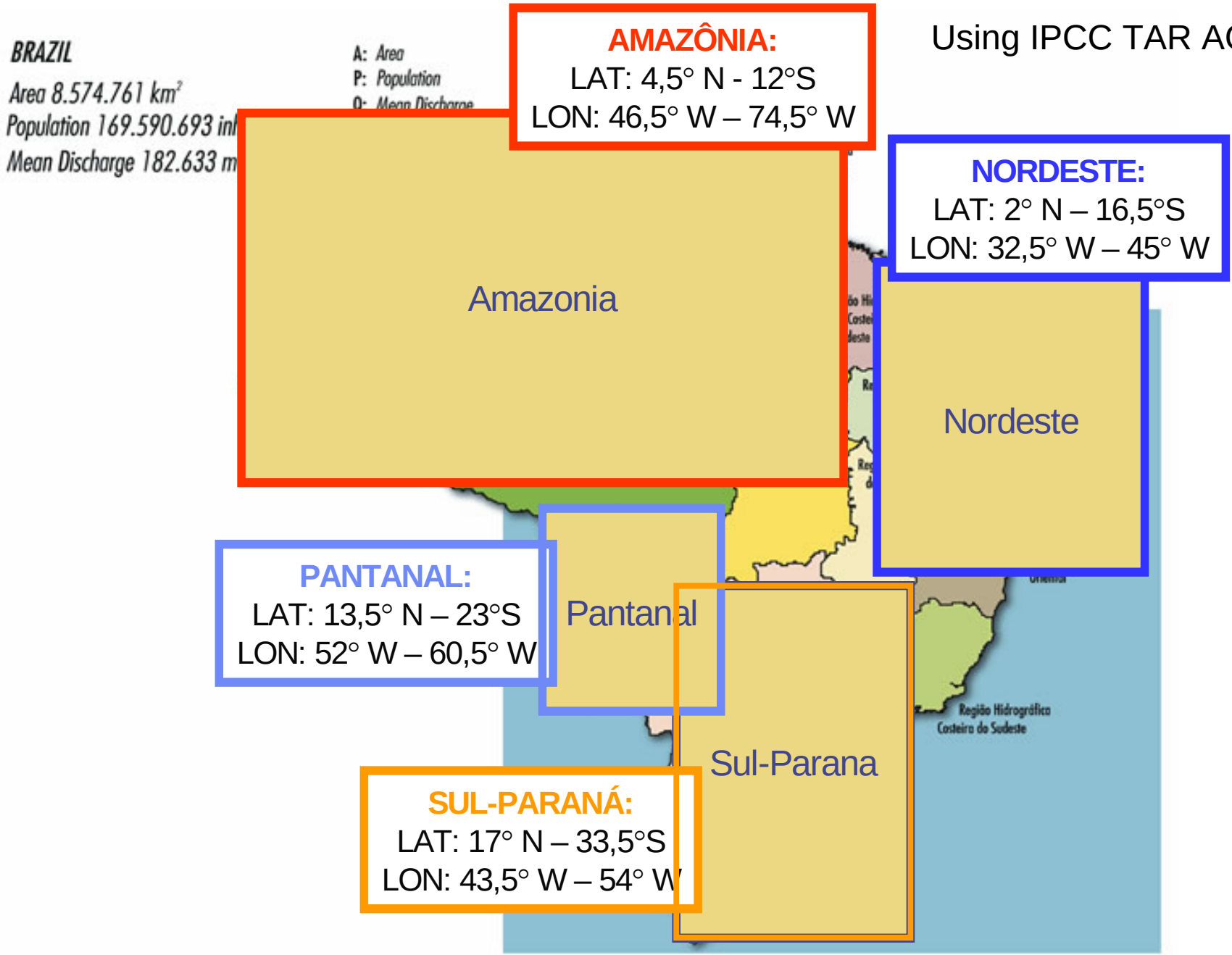
-Regional climate change projections using RCM for 2001-2100 (derived from IPCC AR4 HadGEM1 and ECHAM5 and 1 regional model)—Available in 2008

-Integration studies→Impact studies, vulnerability assessments and adaptation measurements

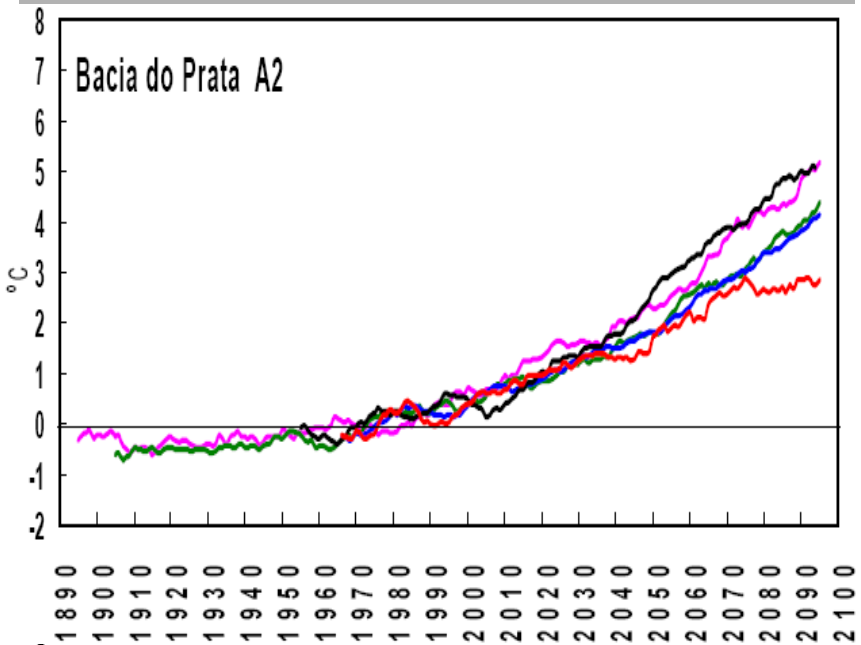
-Current developments of coupled modeling for climate change using CPTEC AOGCMs (past and future climates)

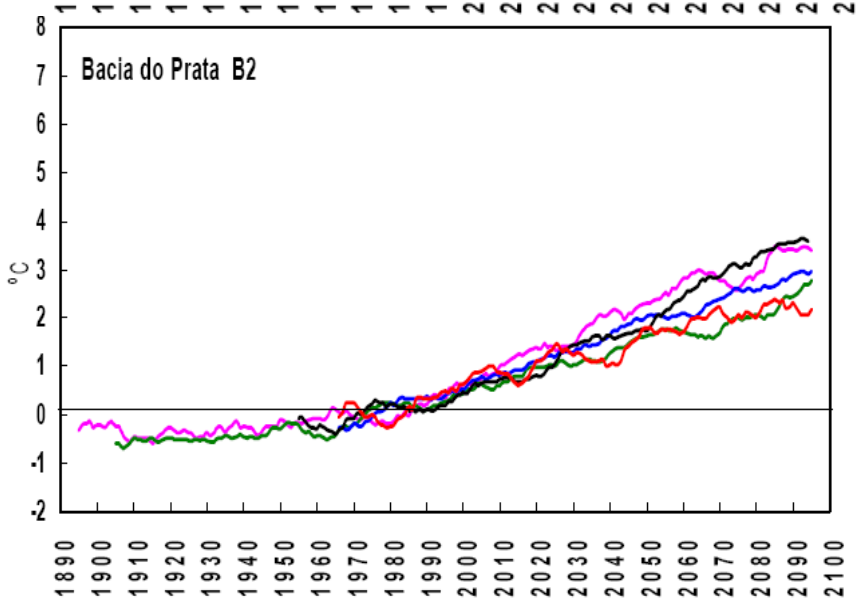
-Simulation of paleoclimates (Holocene) using the CPTEC AOGCM

Using IPCC TAR AOGCMs

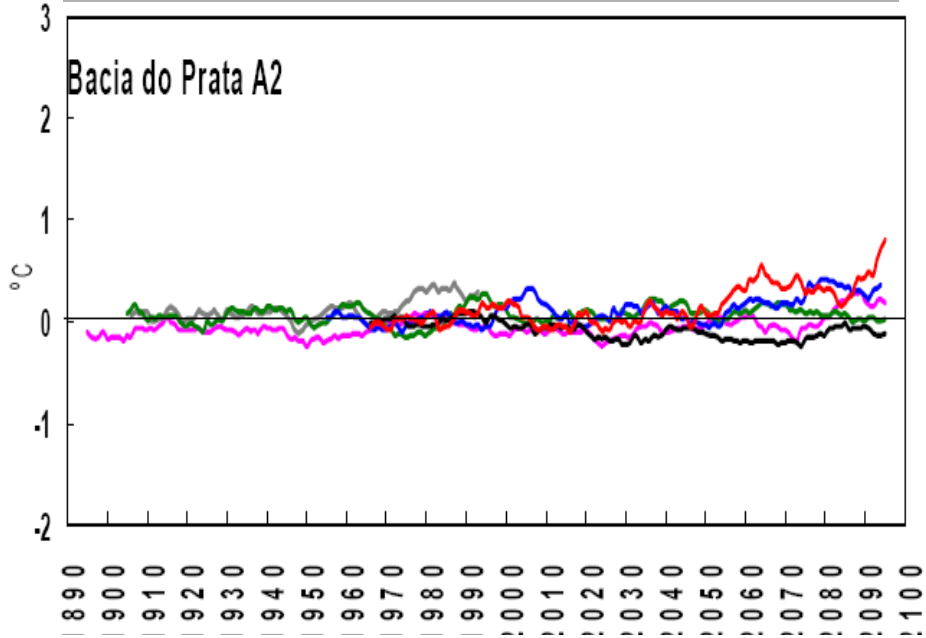


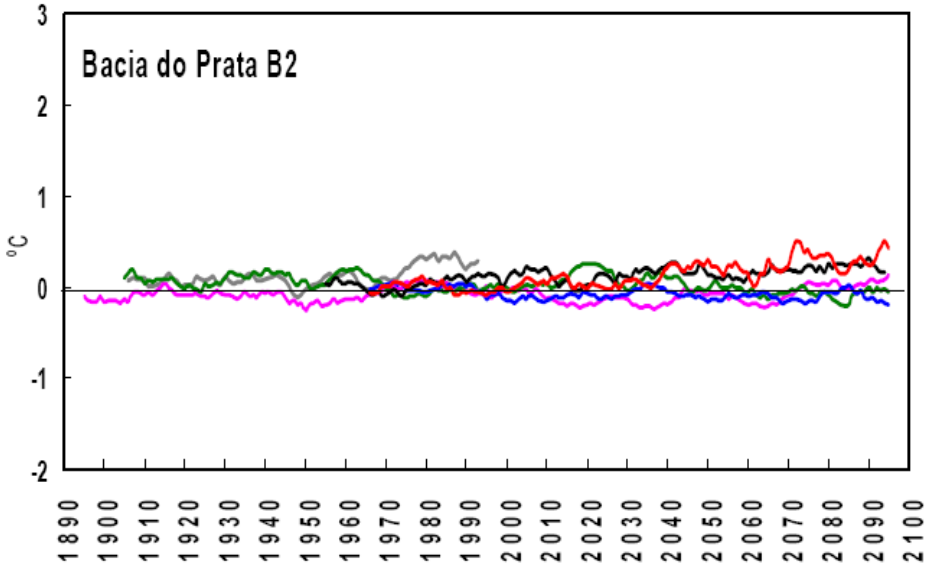
Regional air temperatureanomalies (C) from 6 IPCC AOGCMs

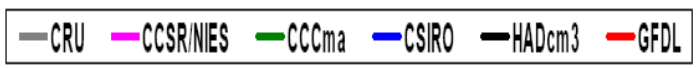




Regional rainfall anomalies (mm/day) from 6 IPCC AOGCMs



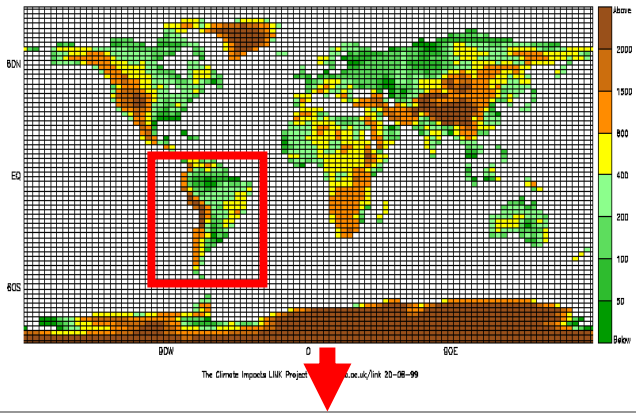




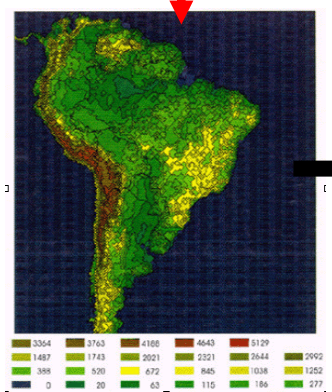
Experiences in South America-Downscaling of Climate change scenarios				
Country **Institution**	**Global Model (Análisis)**	**Regional Model**	**Modelo Regional Control**	**Modelo Regional Escenarios**
Argentina CIMA	HadAm3P	MM5, Eta, PRECIS	MM5, Eta, PRECIS	**MM5, Eta, PRECIS South of 20 S**
Brazil CPTEC, USP	COLA/ CPTEC, HadAm3P	Eta, RegCM3,PRECIS	Eta, RegCM3, PRECIS	**Eta, RegCM3, PRECIS (2071-2100) South America**
Bolivia SENAMHI, U. La Paz/U. Tarija		Eta	Eta	
Paraguay LIAPA		PRECIS	PRECIS	
Uruguay IMFIA/INIA	GFDL UCLA	PRECIS	PRECIS	**MAS, PRECIS Uruguay**

CREAS- Strategy Phase I-GOF UK

IPCC global models (HadAM3P)



Downscaling (40-50 km)
RCM (Eta, RegCM3,HadRM3*)



(*PRECIS)

Users and Decision makers
Government and policy makers
Society, NGO, Academics

Socioeconomic development

Impacts of climate change

Vulnerability Assessments

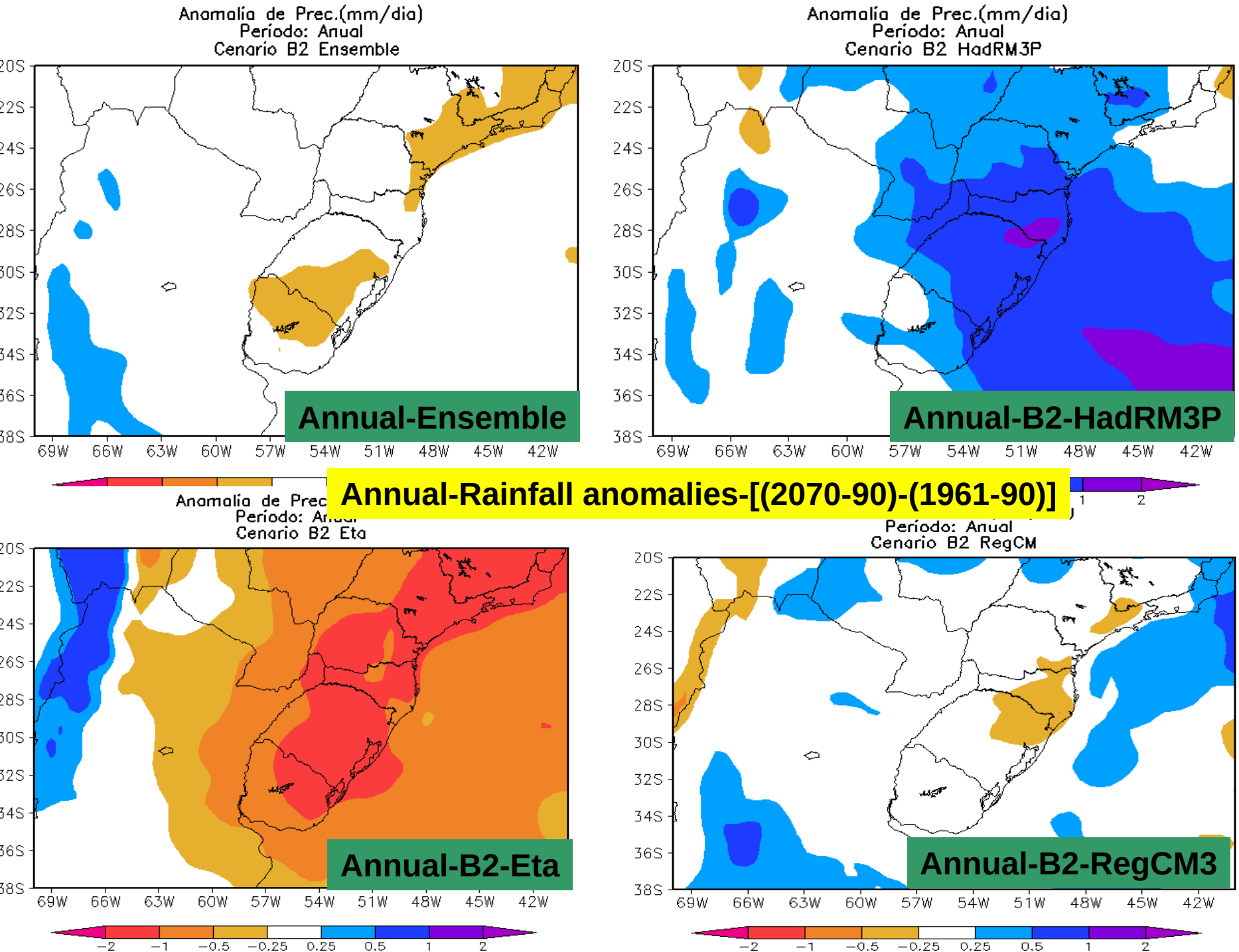
Adaptation and mitigation measures

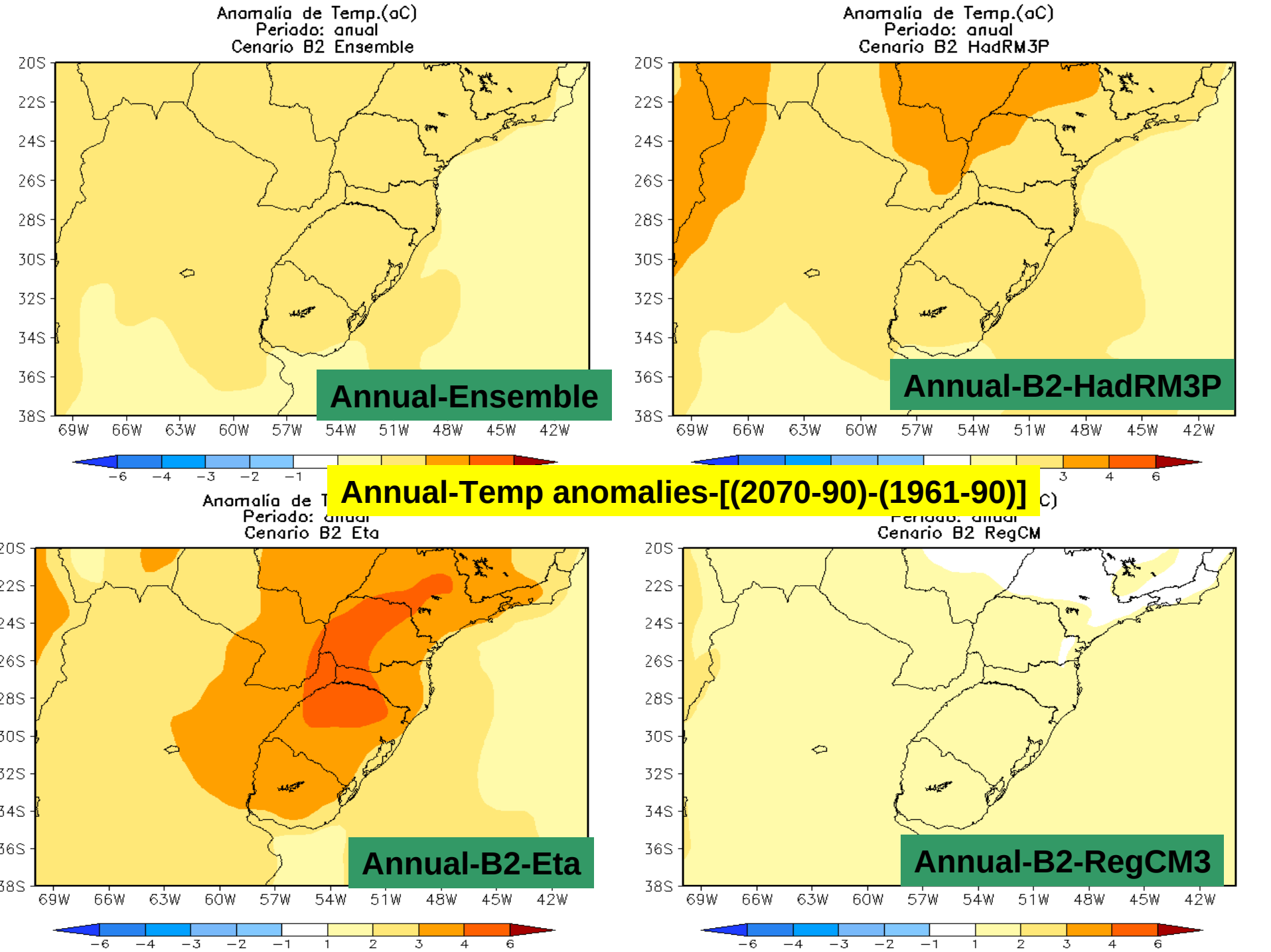
Development and Applications/Uncertainities

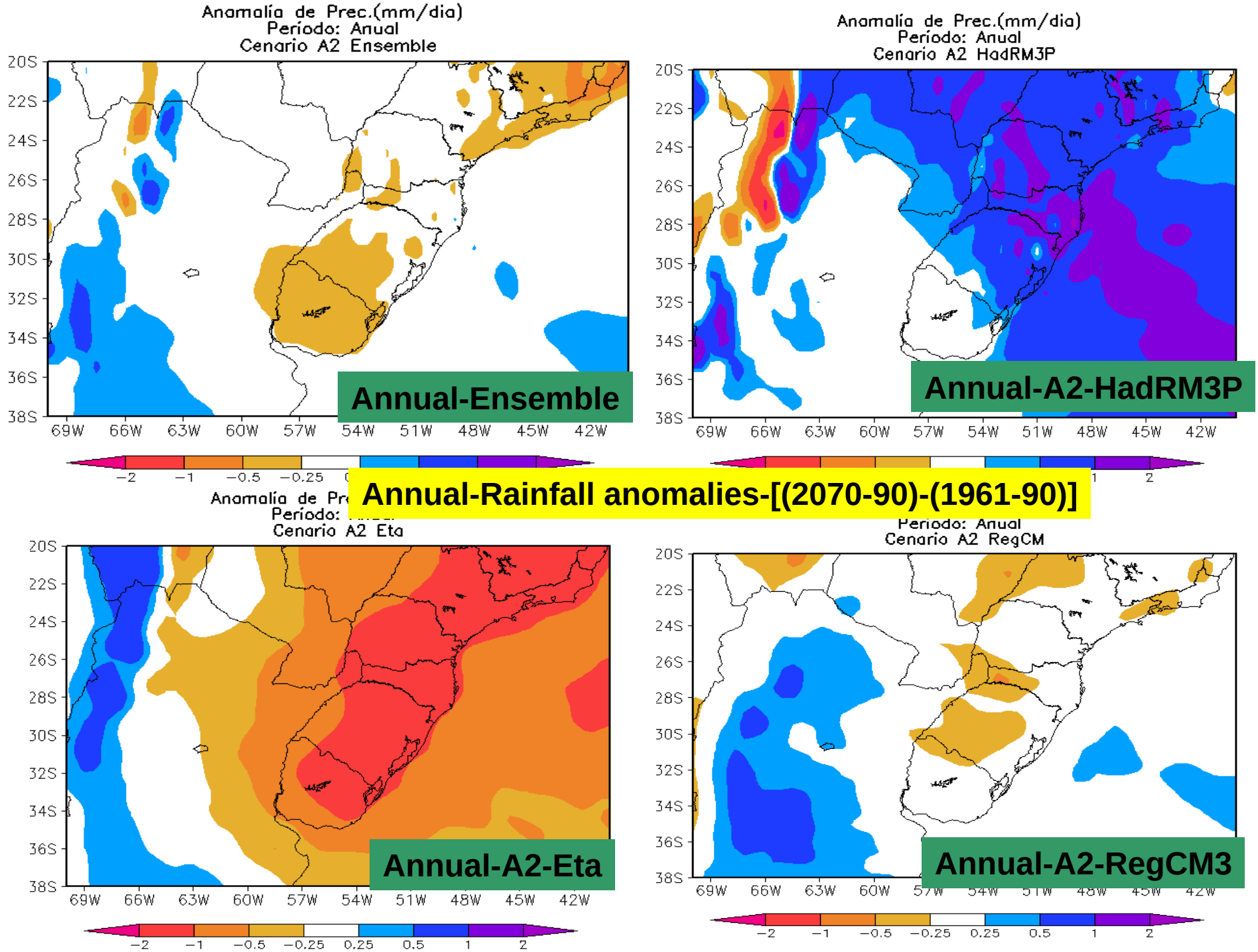
Detection and attribution

Capacity building

Products: (Paper, digital and GIS)
-Maps of climate change projections for time slices, A2, B2 (and uncertainties)
-Reports, publications…. ..


Anomalia de Prec.(mm/dia)
Periodo: Anual
Cenario B2 Ensemble
Annual-Ensemble
Anomalia de Prec.(mm/dia)
Periodo: Anual
Cenario B2 HadRM3P
Annual-B2-HadRM3P
Annual-Rainfall anomalies-[(2070-90)-(1961-90)]
Periodo: Anual
Cenario B2 Eta
Annual-B2-Eta
Periodo: Anual
Cenario B2 RegCM
Annual-B2-RegCM3
20S
22S
24S
26S
28S
30S
32S
34S
36S
38S
69W
66W
63W
60W
57W
54W
51W
48W
45W
42W
−2
−1
−0.5
−0.25
0.25
0.5
1
2


Anomalia de Temp.(oC)
Periodo: anual
Cenario B2 Ensemble
Annual-Ensemble
Anomalia de Temp.(oC)
Periodo: anual
Cenario B2 HadRM3P
Annual-B2-HadRM3P
Annual-Temp anomalies-[(2070-90)-(1961-90)]
Cenario B2 Eta
Annual-B2-Eta
Cenario B2 RegCM
Annual-B2-RegCM3
20S
22S
24S
26S
28S
30S
32S
34S
36S
38S
69W
66W
63W
60W
57W
54W
51W
48W
45W
42W
-6
-4
-3
-2
-1
1
2
3
4
6


Anomalia de Prec.(mm/dia)
Periodo: Anual
Cenario A2 Ensemble
Anomalia de Prec.(mm/dia)
Periodo: Anual
Cenario A2 HadRM3P
Annual-Rainfall anomalies-[(2070-90)-(1961-90)]
Periodo: Anual
Cenario A2 Eta
Periodo: Anual
Cenario A2 RegCM
Annual-Ensemble
Annual-A2-HadRM3P
Annual-A2-Eta
Annual-A2-RegCM3
20S
22S
24S
26S
28S
30S
32S
34S
36S
38S
69W
66W
63W
60W
57W
54W
51W
48W
45W
42W
−2
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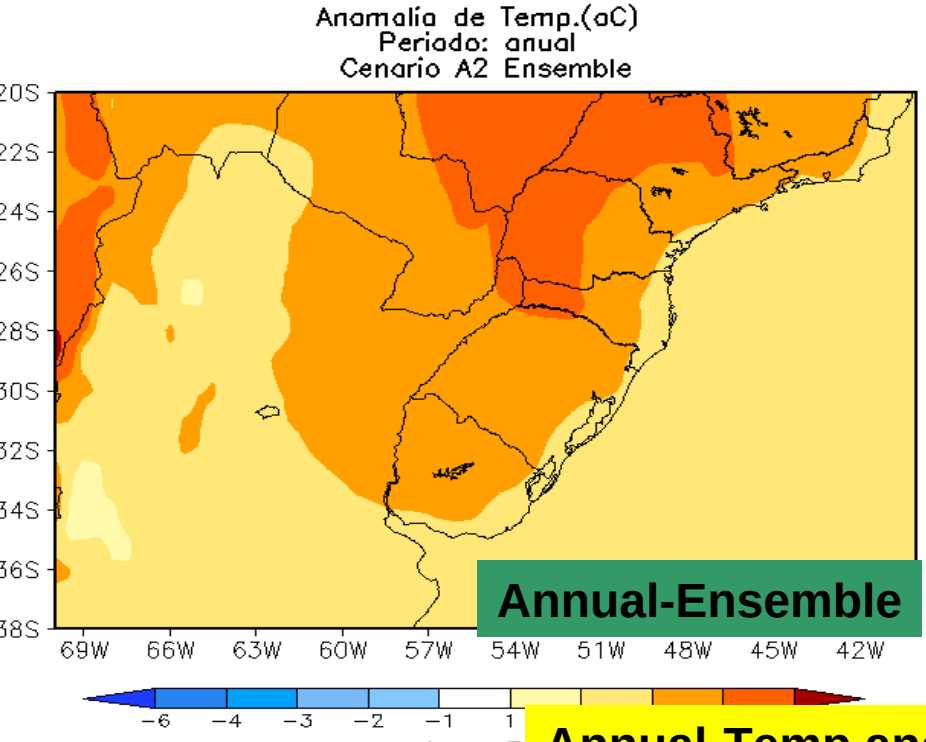
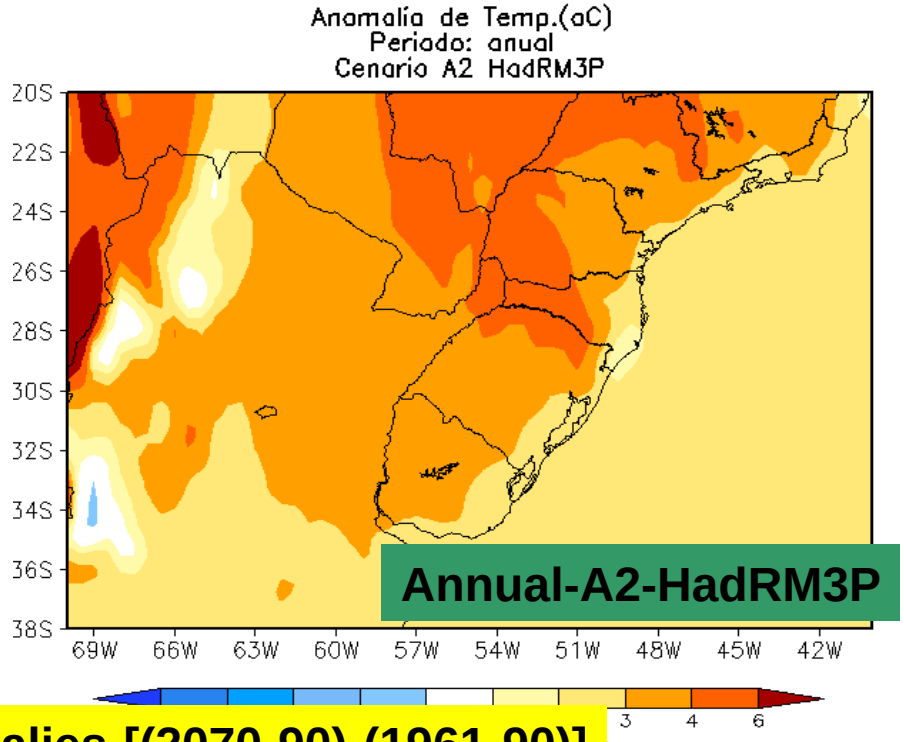
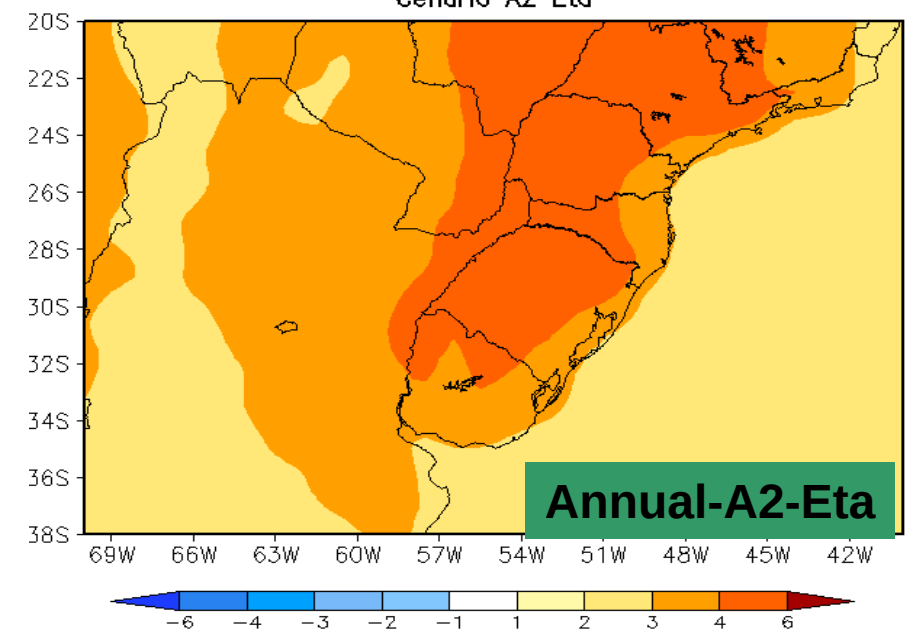
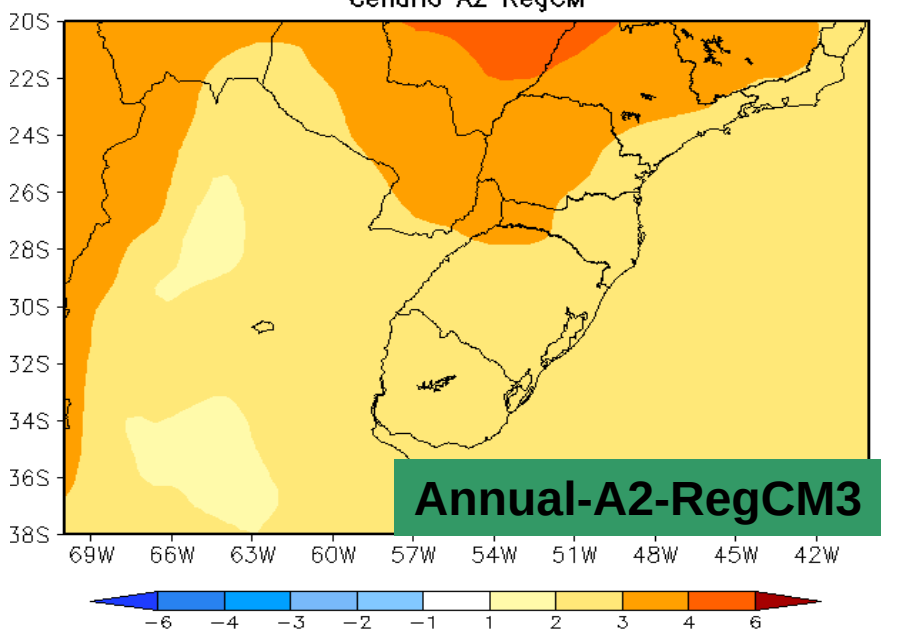
−0.5
−0.25
0.25
0.5
1
2

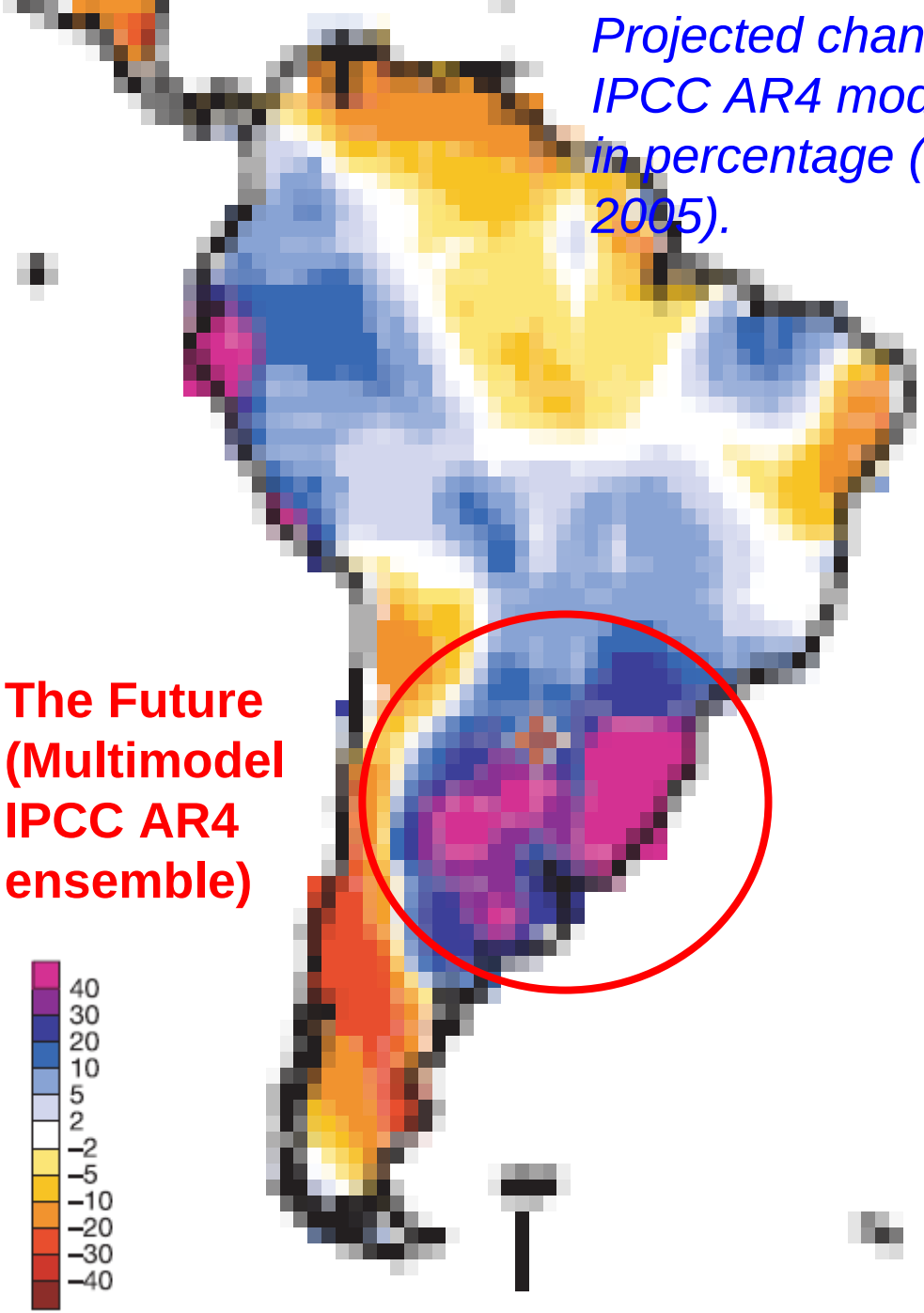




Annual-Temp anomalies-[(2070-90)-(1961-90)]







Projected changes in mean streamflow from 16 IPCC AR4 models for 2041-2060 relative to 1900-70 in percentage (%) for the A1B Scenario (Milly et al. 2005).

The Future (Multimodel IPCC AR4 ensemble)

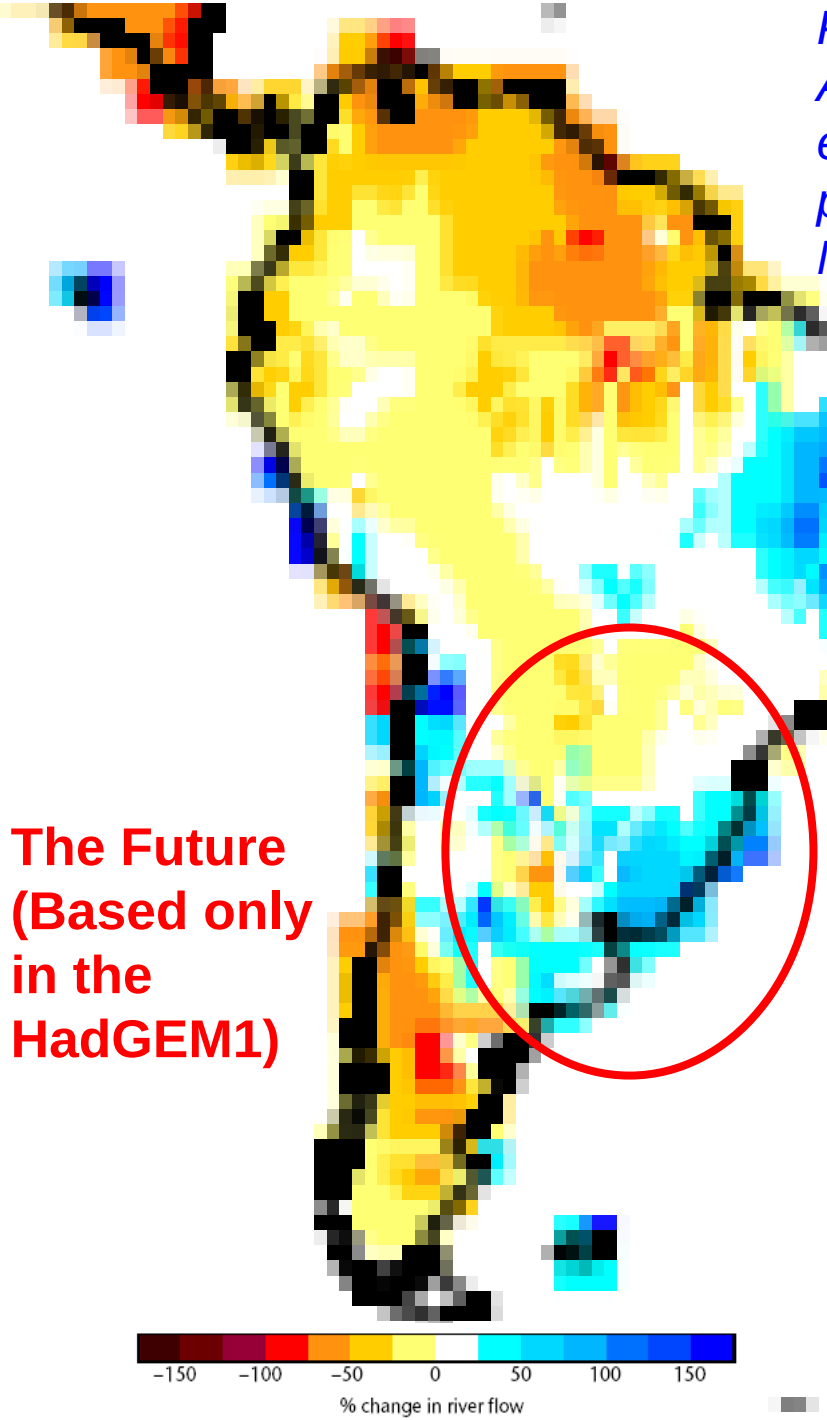
This study analyzes the impacts of climate change worldwide river streamflow. The mean was made using 16 IPCC models for the period 2041-2060 relative to present climate 1900-70 (Scenario A1B)

-Increases in the streamflow of the Parana-La Plata River by 20-60%

-Reductions between 10-15% in Amazonia and the São Francisco in Northeast Brazil streamflow, in oposition to the HadGEM1 only simulations

-More confidence in projections in Amazonia and in the Parana-La Plata Basin.

-Uncertainities still high in the São Francisco River streamflow changes.



Projected changes in mean streamflow in South America rivers ()Mudanças previstas de vazões em percentagem (%) na América do Sul, para o período 2061-2100, cenário A1B gerado pelo Modelo HadGEM1 (UK Met Office 2005)

The Future (Based only in the HadGEM1)

HadGEM1 model alone predicts that during the XXI century (2061-2100) in the planet, streamflow should increase by 2% até 2020. The model also considers the effect of atmospheric CO2 in plants the increase could reach 7%. This would lead to flooding and landslides in various region s of the planet (Scenario A1B)

Other models do not include the effect of increased CO2 concentration on plants.

-Discharge would increase between 25% and 150% in the semiarid Northeast Brazil

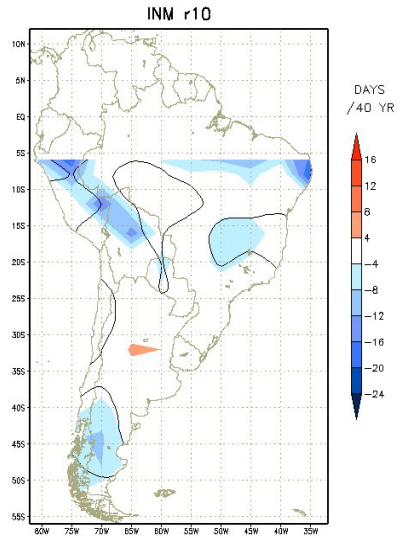
-In Amazonia and Pantanal there will be a reduction of about 25%-50%,

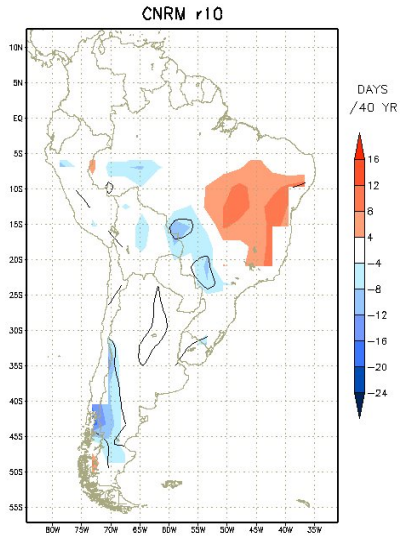
-In the Parana-La Plata Basin discharges will increase by 20-40%.

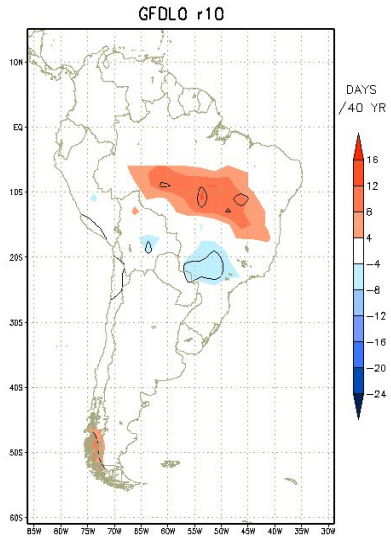
Marengo et al. (2006)

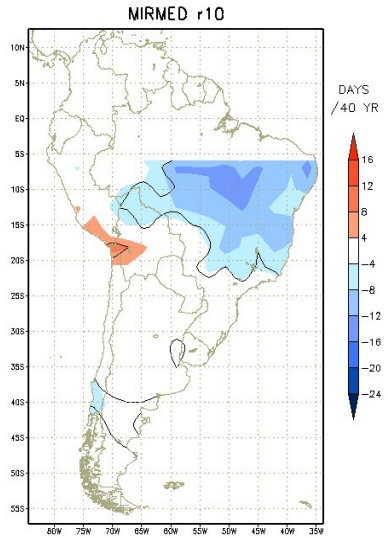
IPCC-AR4 AOGCMS

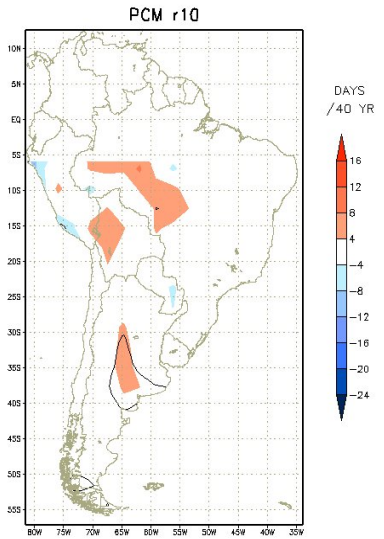
Tendency (1960-2000)
WGCM IPCC AR4 20C3M
para *prec>10mm* (r10)



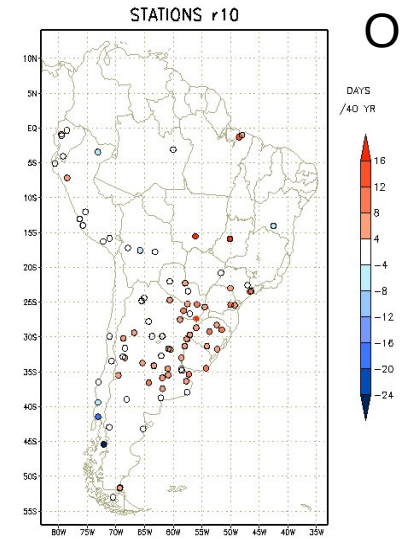


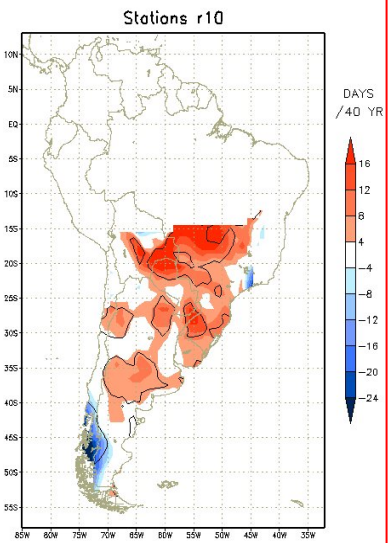


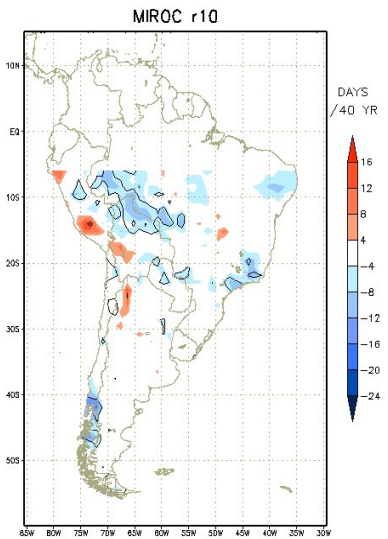




OBSV





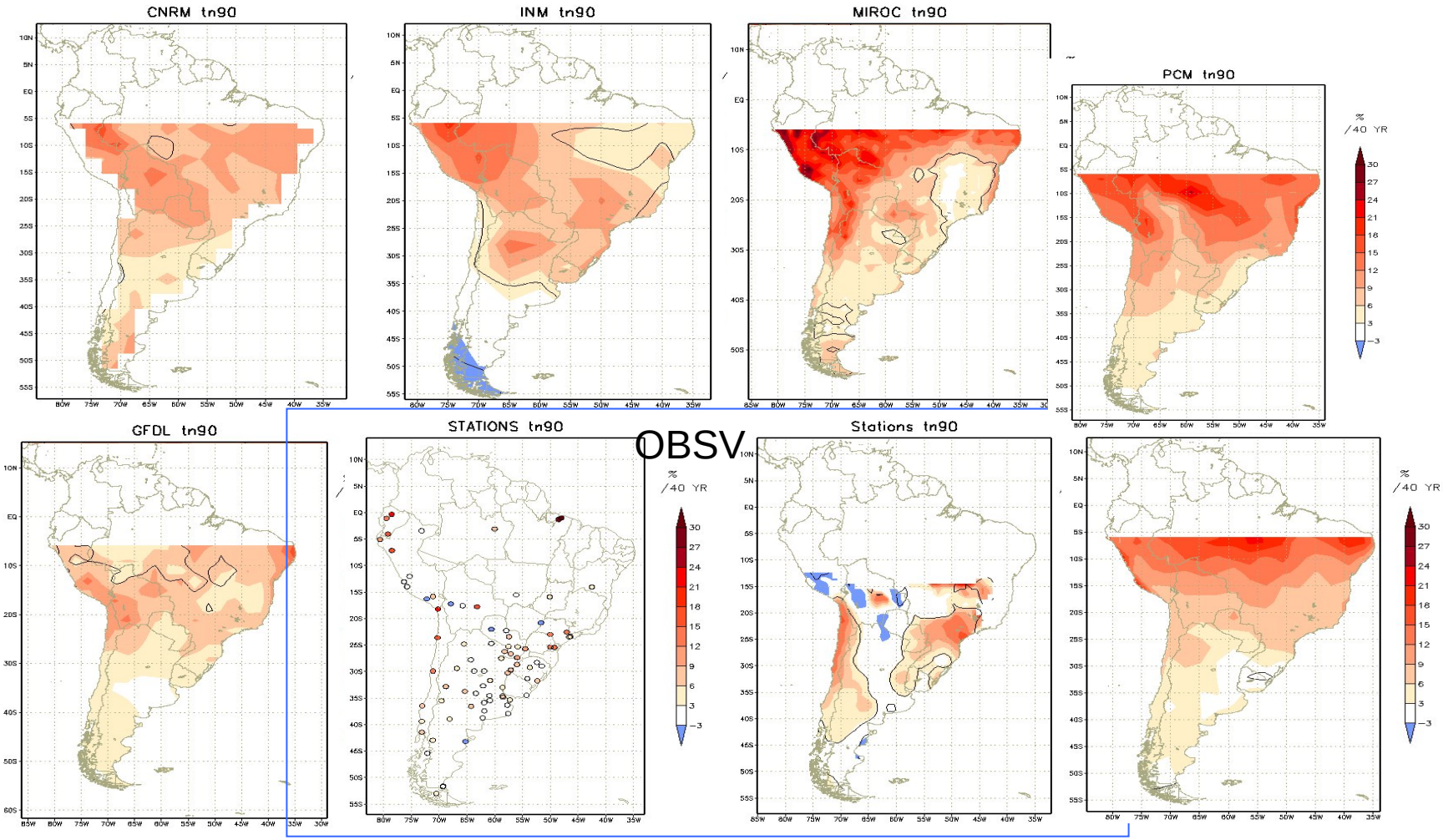


Tendency (1960-2000)

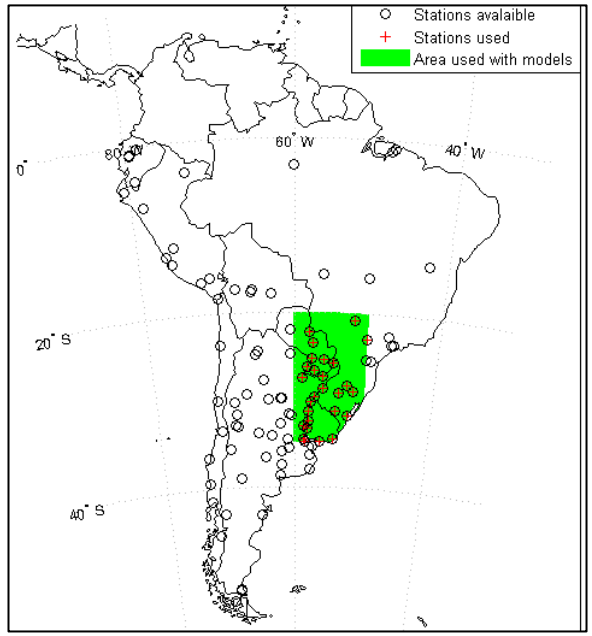
WGCM IPCC AR4 20C3M

IPCC-AR4 AOGCMS

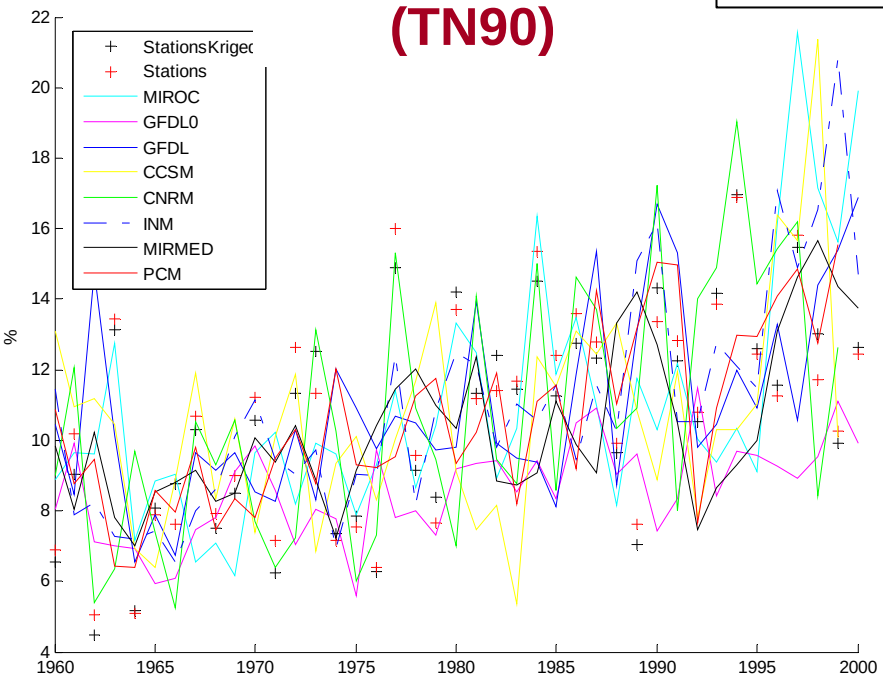
Warm nights (tn90)



Regional trends-SE SSA



Warm nights (TN90)



Prec>10mm (R10)