La Plata Basin (LPB)
Regional Hydroclimate Project

An update of activities

Outline

- Research Networks
  - -EU: CLARIS-LPB
  - -IAI: LCLUCs
- Monitoring activities in LPB RHP

LPB's web site: http://www.eol.ucar.edu/projects/lpb

LPB Funding – (update Mar '09)

Multiple Regional Projects
-Mesonet, Flux Towers in San Luis, AR
-Flux Tower in Cruz Alta, BR;
-Several other projects (including regional collaborations) > $2.5 M

CLARIS - LPB
A Europe-South America Network for Climate Change Assessment and Impact Studies - ~ € 3.35M

IAI
Ecosystems, Biodiversity, Land Use and Cover, and Water Resources > $2.0 M

NASA
Remote Sensing/Data assimilation - Capacity Building

CIC-GEF
Framework Program for the sustainable management of the La Plata Basin water resources, in relation to climate variability and change $ 10.7 M (~0.9 M)
[+ 45 M in kind contrib.]

NCAR (NSF)
Collaborations during Field Experiment

ARM (DOE)
Collaborations during Field Experiment

CLARIS | LPB

HYDRO-CLIMATE AND SOCIETY IN LA PLATA BASIN

A Europe-South America Network for Climate Change Assessment and Impact Studies in La Plata Basin

A project within the EC 7th Framework Programme

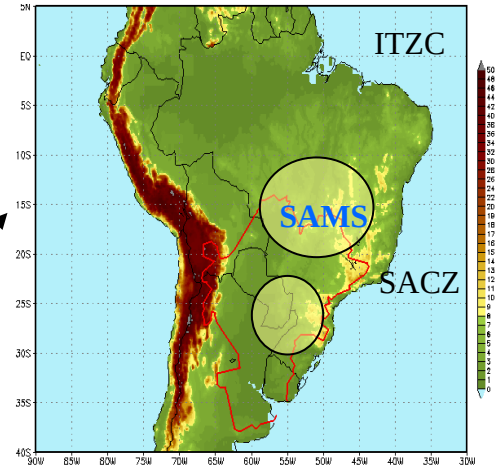
1 October 2008 to 30 September 2012

Coordinator: Dr. Jean-Philippe Boulanger (IRD; jpb@locean-ipsl.upmc.fr)

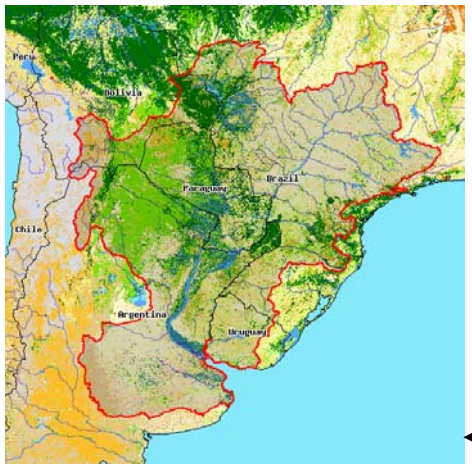
Project Officer: Dr. Philippe Tulkens

The CLARIS LPB Project aims at

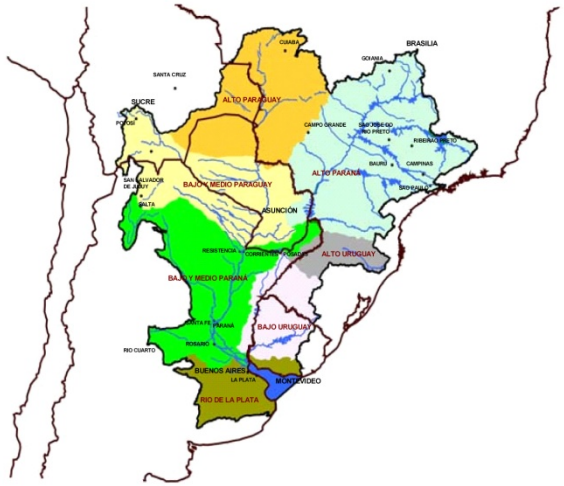
Predicting the regional climate change impacts on La Plata Basin



Designing adaptation strategies for



Land-use
Agriculture cropping systems
Rural development
Hydropower production
River transportation
Water resources
Ecological systems in wetlands



CLARIS LPB PARTNERS

CLARIS LPB

- 10 countries, 20 institutions -

Courtesy of Anna Sorensson

Subproject 2: Past and future hydroclimate

Subproject 4: Socio-economic scenarios and adaptation/ prevention strategies

- **WP3**: Improving our description of recent **past climate variability** in La Plata Basin
- **WP4**: Hydroclimate past and **future low-frequency variability, trends and shifts**
- **WP5**: Regional **Climate Change assessments** for La Plata Basin
- **WP6**: Processes and future evolution of **extreme climate events** in La Plata Basin
- **WP8**: **Land use change, agriculture and socio-economic** implications
- **WP9**: **Water resources** in La Plata Basin in the context of climate change

CLARIS LPB Four Major Tasks

1. **Improving** the description and understanding of **decadal climate variability for short-term regional climate change projections (2010-2040).**

2. **Improving the prediction capacity of climate change** and its impacts in the region, through an **ensemble of coordinated regional climate scenarios** in order to quantify the amplitude and sources of uncertainties in LPB future climate at two time horizons: 2010-2040 for adaptation strategies and 2070-2100 for assessment of long-range impacts.

3. **Designing adaptation strategies** to regional scenarios of climate change impacts. through a **multi-disciplinary research and trans-sectorial (i.e. with public and private actors) approach**

4. **Involving and integrating stakeholders in the design of adaptation strategies** through an interactive and communicative process, ensuring their dissemination to public, private and governmental policy-makers.

CLARIS LPB Focus

1. Forming young scientists in South American and European institutes

2. Strengthening the collaborations between European and South American partners.

WP-5

1 Regional climate change and downscaling

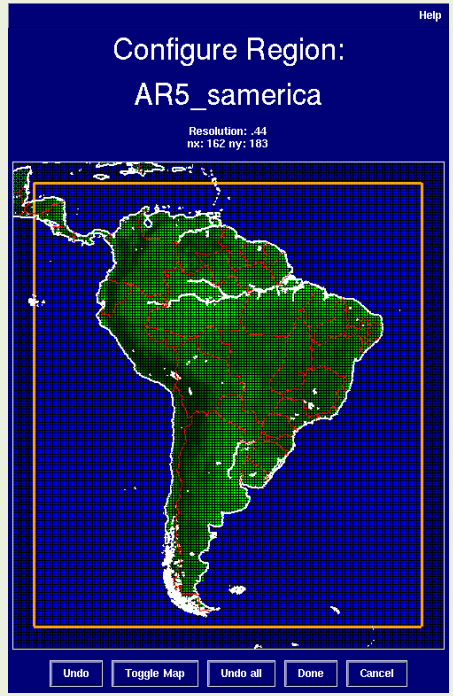
Regional climate model scenarios (**A1B**)

1990-2005 (ERA-Interim), *GCMs*

2010-2040

2070-2100

Metrics



REGION: SOUTH AMERICA

~90W-32W; 58S-12N

2 Process studies

Land-Atmos feedbacks

Vegetation/land use

Soil moisture

Cooperative Research network: The Impact of Land Cover and Land Use Changes on the Hydroclimate of the La Plata Basin

1. Assess the **impact of LCLU changes on the hydroclimate of the La Plata Basin**, and the physical mechanisms by which the impacts take effect.

2. Investigate the **role of LCLU changes in the intensity and length of extreme events** (floods and droughts).

3. Investigate the **potential changes in the hydrological character** (soil moisture, infiltration, and runoff) of the La Plata Basin due to the changes in LCLU.

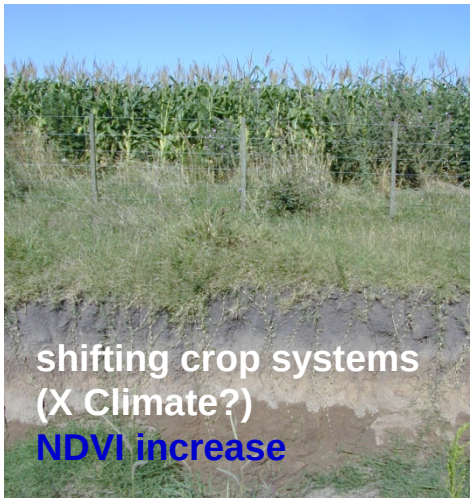
Participants

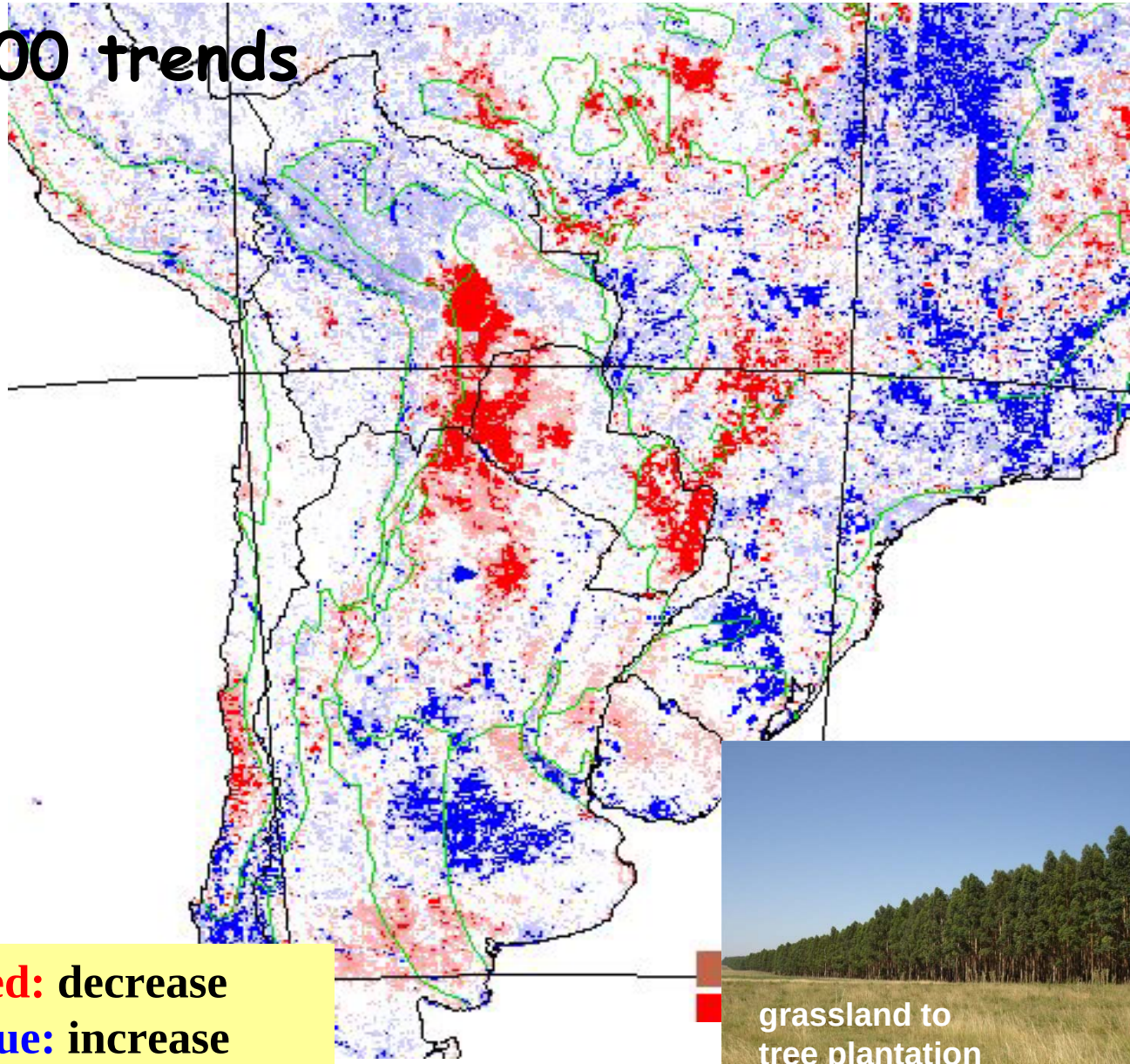
Univ Maryland (US)
Univ Washington (US)
NASA (US)
Univ Florida (US)
Univ Miami (US)
Univ Almeria (SP)
INPE/CPTEC (BR)
Univ San Luis (AR)
Univ Catol Asuncion (PY)
U Passo Fundo (BR)
Univ Sao Paulo (BR)
U Buenos Aires/Agronomy (AR)
UBA/Sociology (AR)
CIMA (AR)

Characterization of land use changes using remotely sensed biophysical variables

NDVI 1981-2000 trends

surrogate for primary production from NOAA-AVHRR images





Red: decrease
Blue: increase

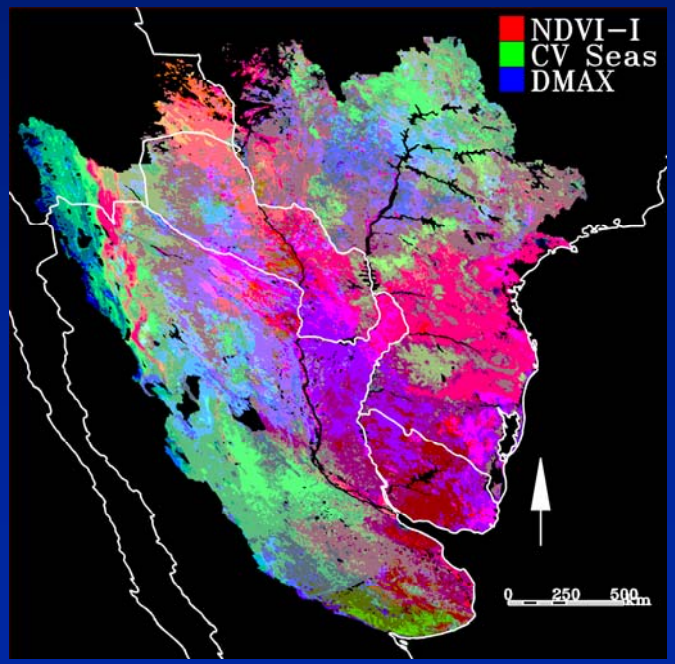
Normalized Difference Vegetation Index

OUTLINE

I. **Ecosystem Functional Types (EFTs):** an approach to assess and monitor the spatial heterogeneity of ecosystem functioning (C gains)

II. **Characterizing ecosystem functioning**

III. **Assessing EFTs in the Río de la Plata basin through satellite imagery**



Ecosystem Functional Types of La Plata Basin based on three descriptors of the seasonal dynamics of the NDVI estimated from MODIS images for the 2000-2006 period. NDVI-I (NDVI annual integral, CV_Seas (annual coefficient of variation), DMAX (Date of the Maximum NDVI).

Education and outreach

A capacity building course **aimed at graduate students and young scientists** will take place later this year at the Itaipu Hydropower Plant in the Brazil-Paraguay border. The **course will focus on land cover changes, land-atmosphere interactions and their effect on the Climate and Hydrology of the La Plata Basin**. It will provide

(1) a physical/theoretical background,
(2) current research methods,
(3) relate to activities at operational centers, and
(4) train students in practical tools (software) that they will need for their future research.

The proposed syllabus includes:

1. Land Data assimilation systems
2 Satellite products and their input in data assimilation systems
3. Ecosystems, land cover/land use
4. Regional modeling and Hydrological modeling
5. Land-atmosphere interactions and feedbacks
6. The hydroclimate of the La Plata basin

Monitoring of seasonal conditions

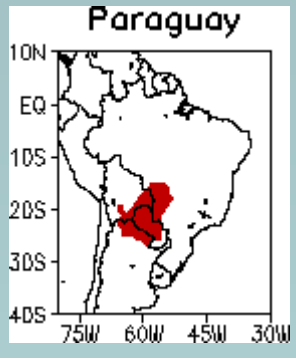
Activities being carried out at operational centers

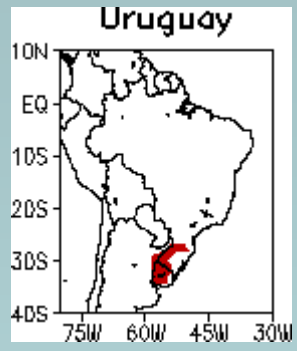
CPC - CPTEC - SMN(AR) - MASTER (USP)

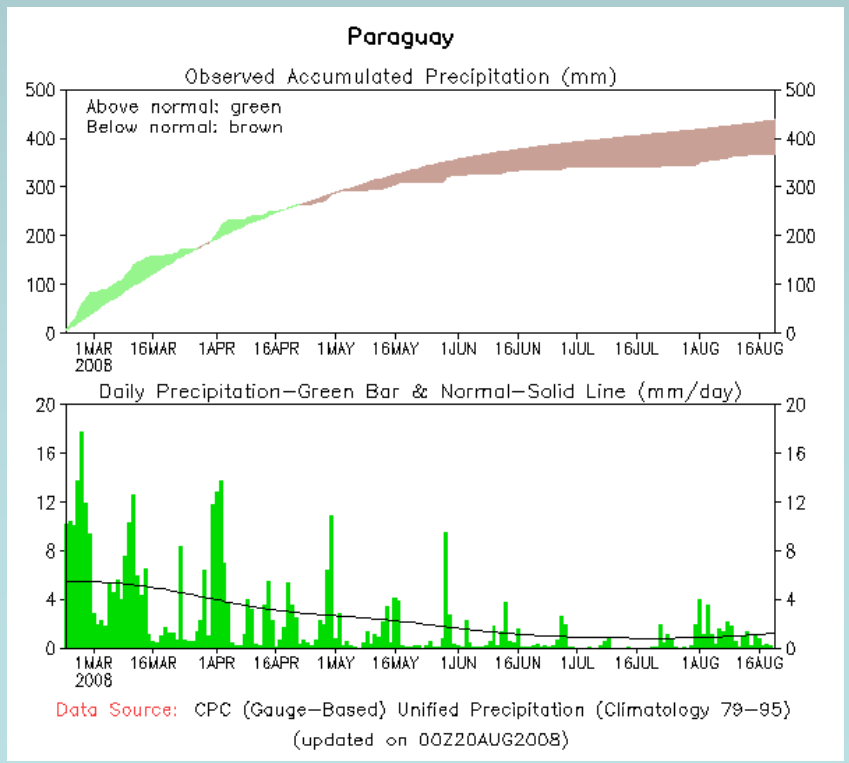
An LPB-IRI cooperation agreement has been signed

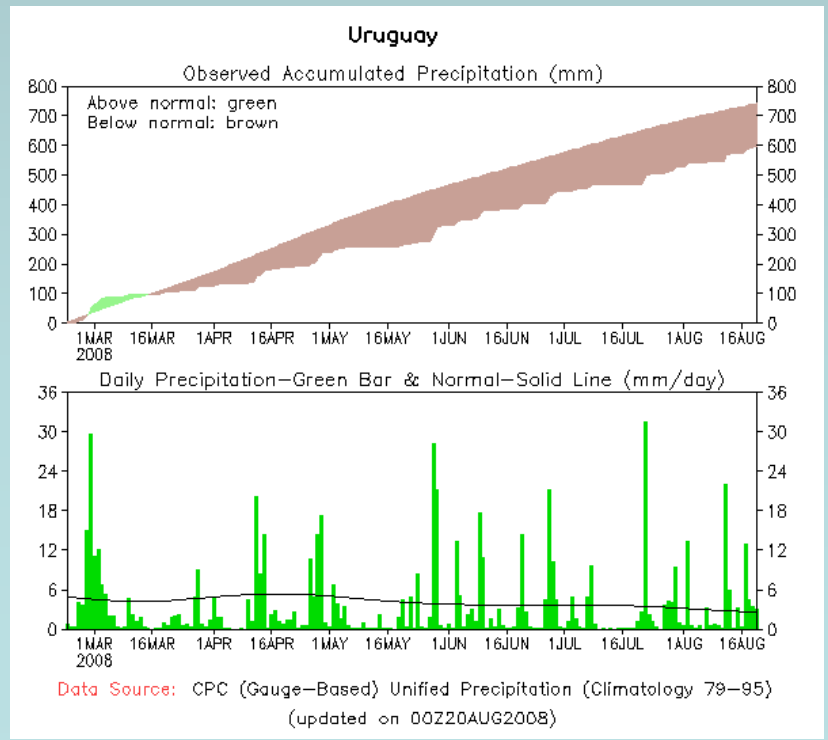
Example 1: Basin averages.
180-day accumulated P (% of normal)
1MAR08 – 16AUG08

Climate Prediction Center



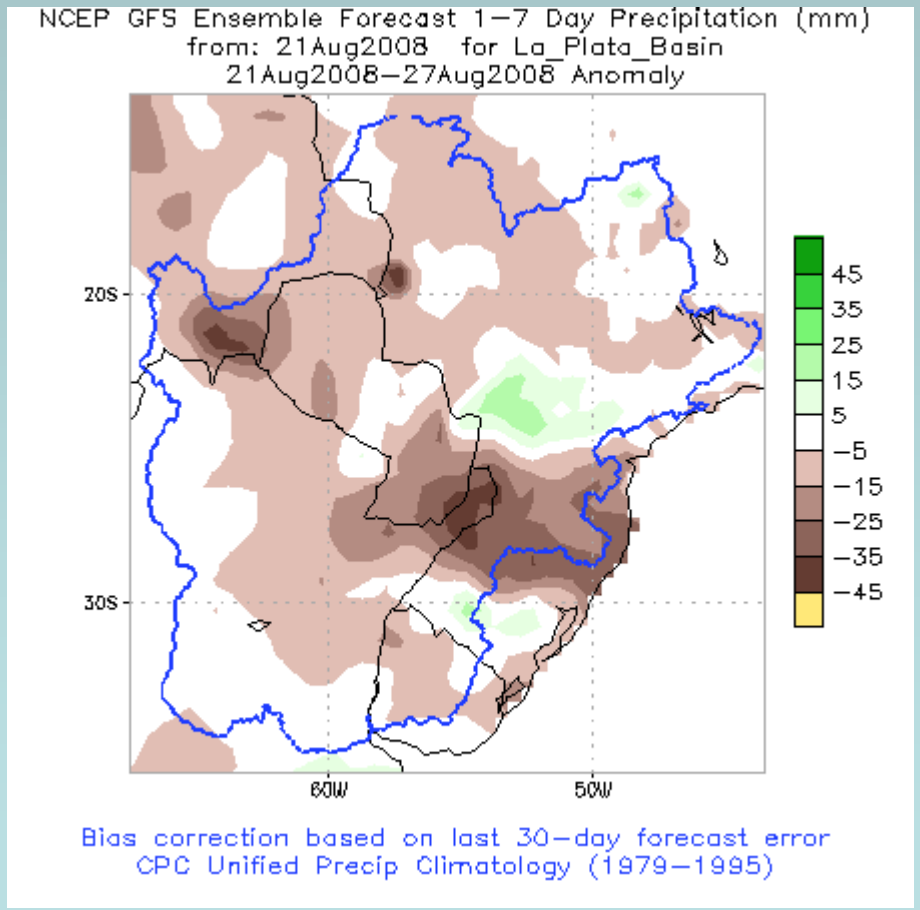




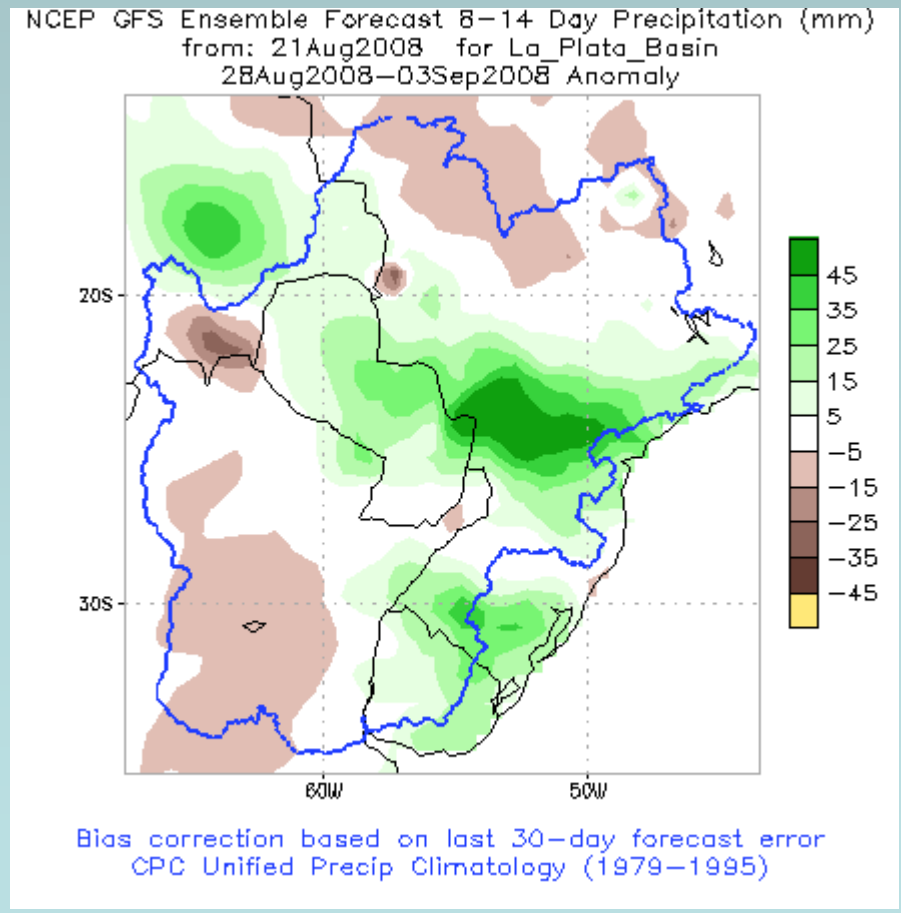


Example 1':
GFS ensemble forecasts
Accumulated P (% of normal)

Week 1

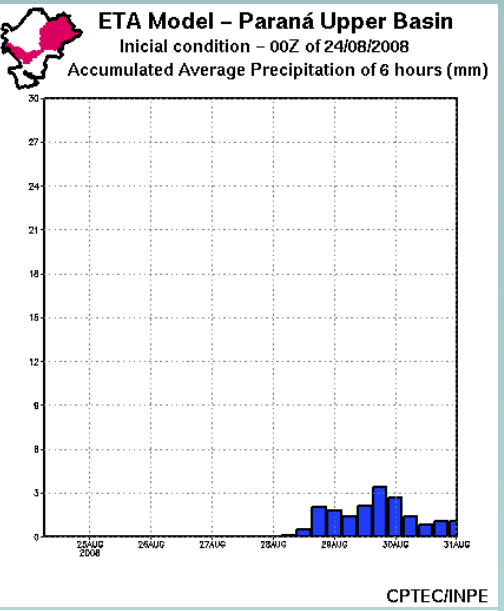


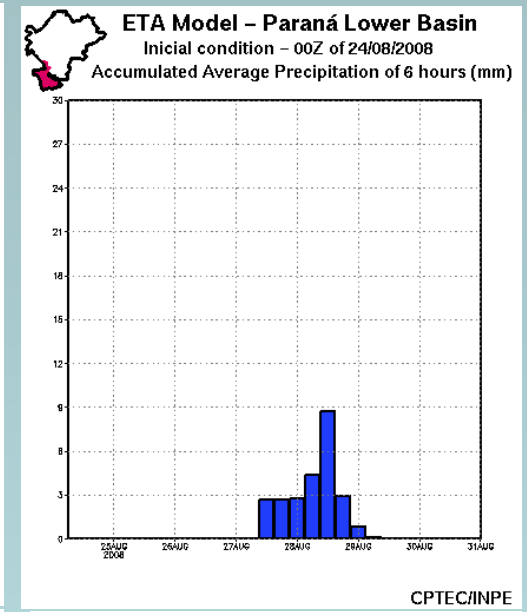
Week 2

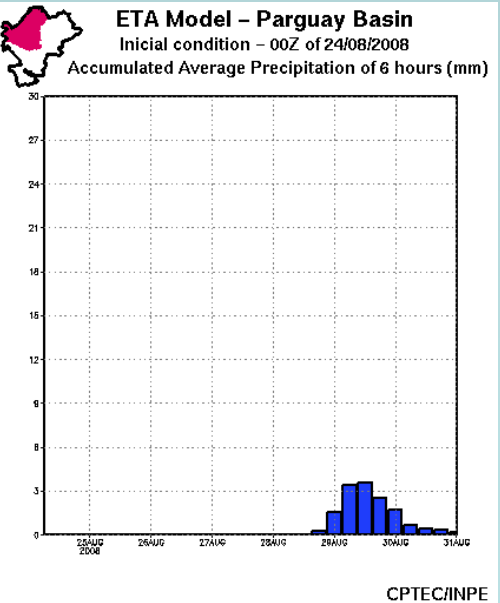


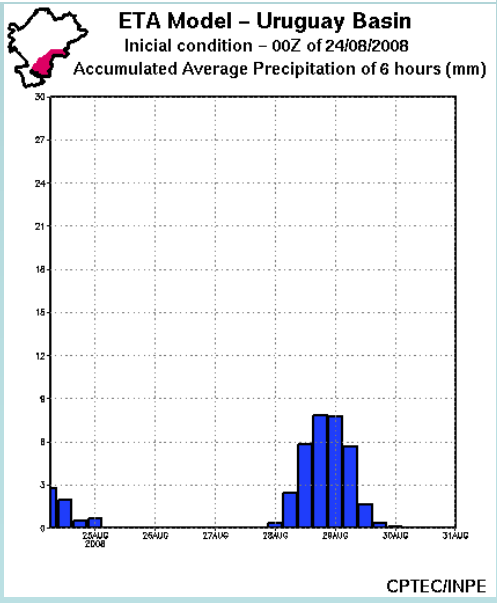
Example 2: Products at CPTEC/INPE

Basin forecasts

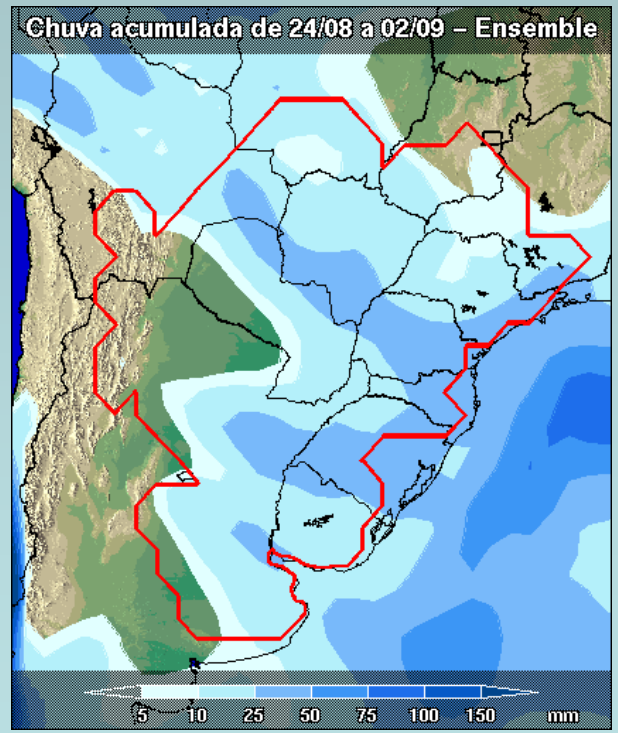






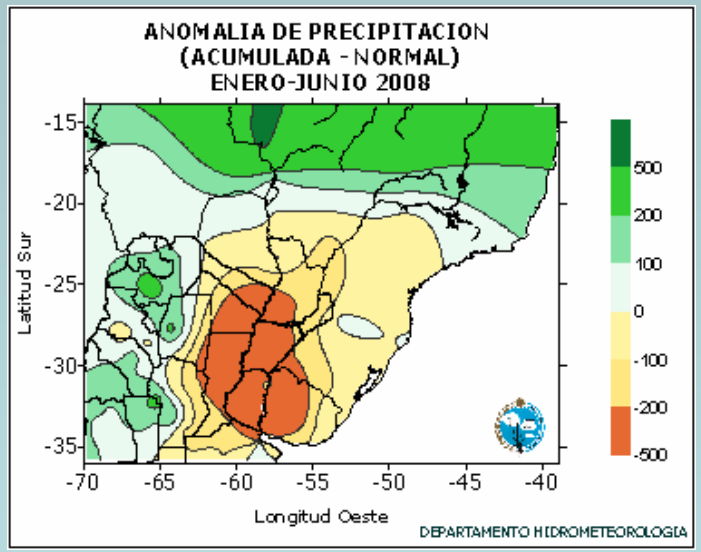


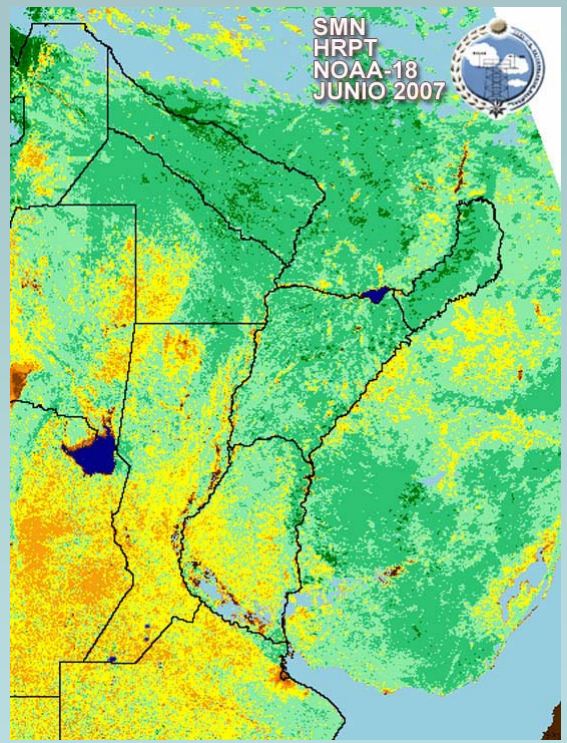
Ensemble Forecasts

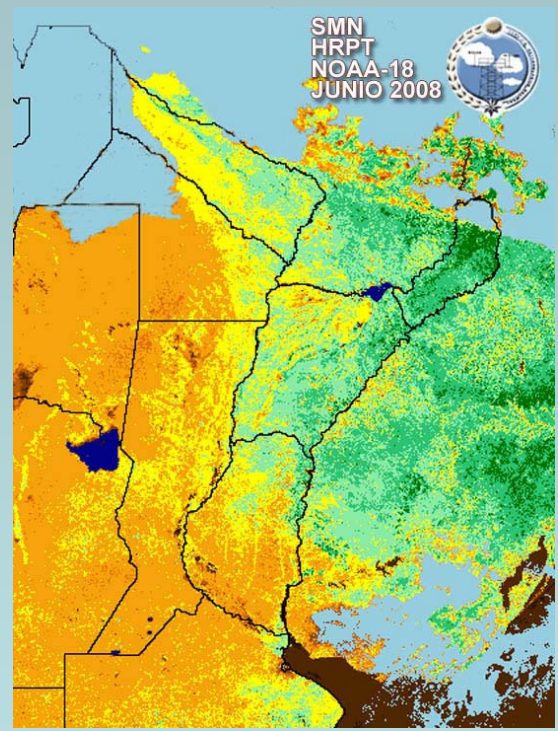


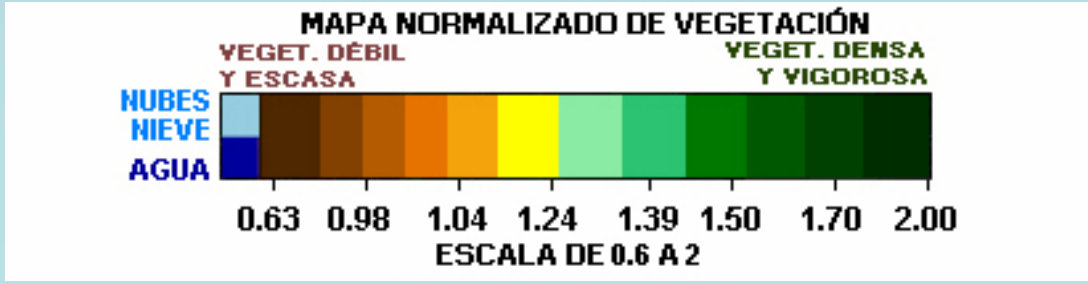
Ministerio de Defensa
Secretaría de Planeamiento
Servicio Meteorológico Nacional

Example 3: Products at SMN(AR)

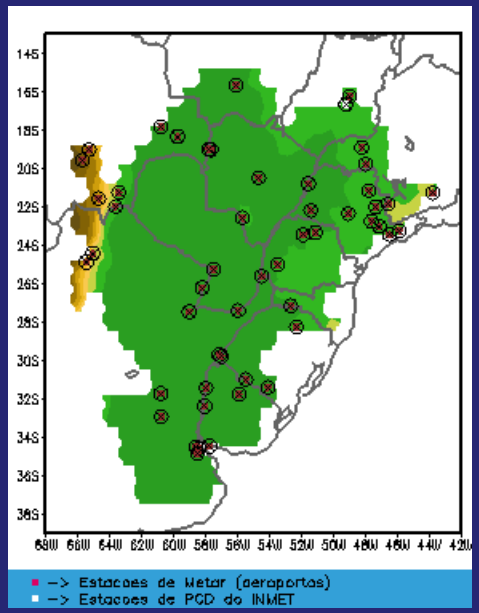


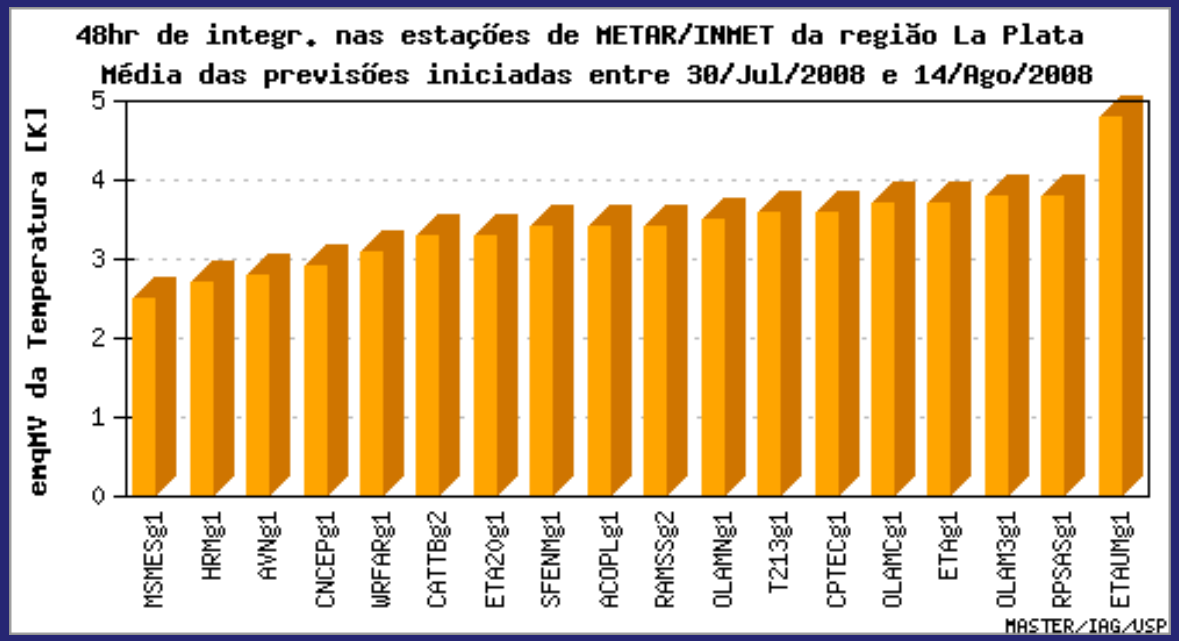


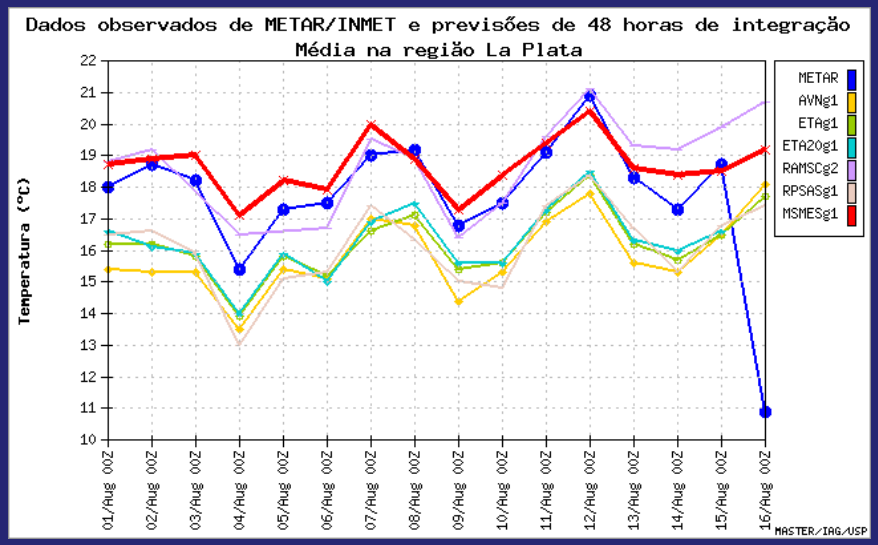


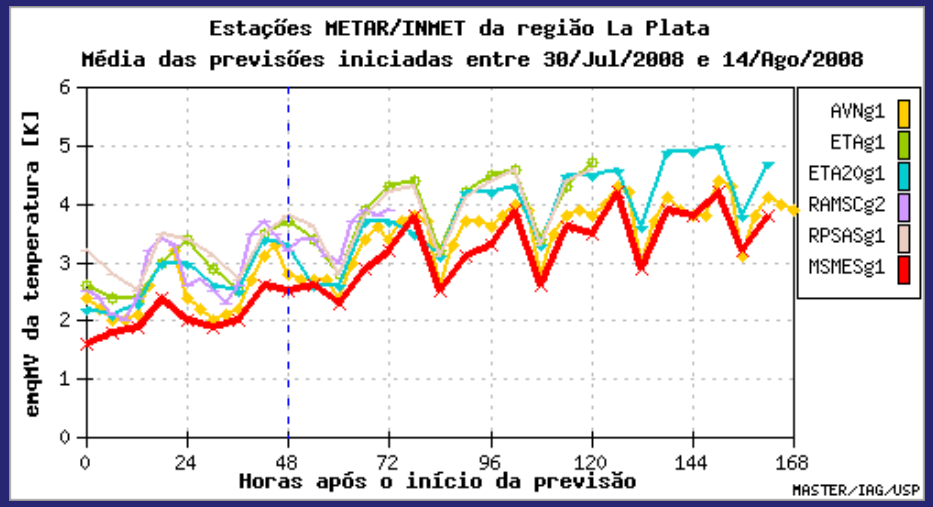


MASTER – Univ of Sao Paulo









Motivation for the LCLUC research

Depending on their physiological properties, crops have different evapotranspiration properties, and they reflect and/or absorb radiation differently (changes in albedo), thus affecting the processes that produce precipitation.

Likewise, their roots absorb water differently, thus impacting the soil moisture, deep runoff and ultimately river flows.