



Ministério de Ciência e Tecnologia
Instituto Nacional de Pesquisas Espaciais
Centro de Previsão de Tempo e Estudos Climáticos

LBA/GEWEX and PROSUR

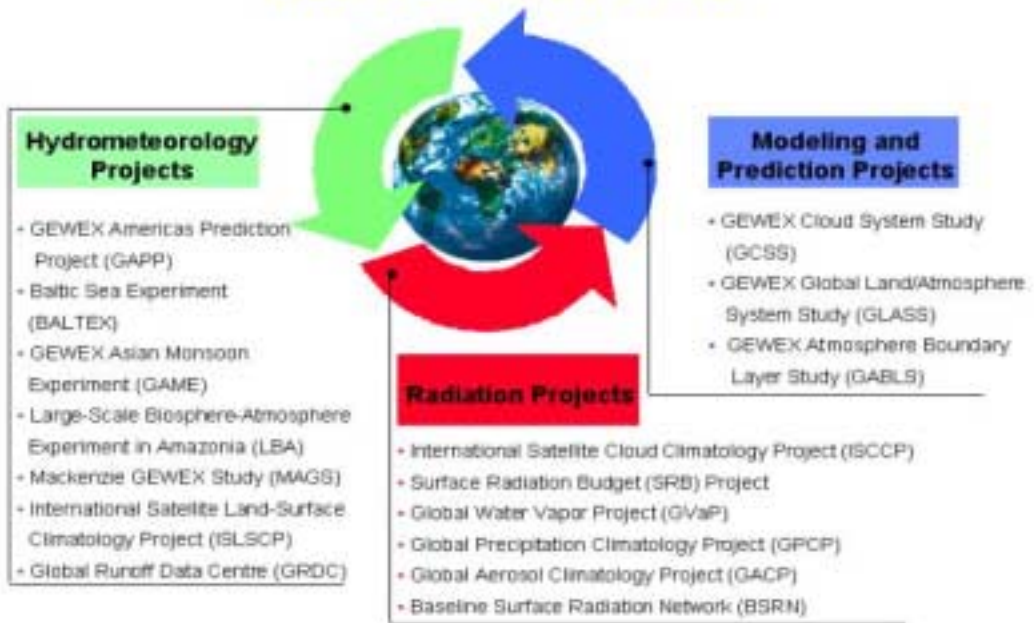
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The **Global Energy and Water Cycle Experiment (GEWEX)** is a program initiated by the [World Climate Research Programme \(WCRP\)](#) to observe, understand and model the hydrological cycle and energy fluxes in the atmosphere, at land surface and in the upper oceans. GEWEX is an integrated program of research, observations, and science activities ultimately leading to the prediction of global and regional climate change.

Objectives of the GEWEX Program → Relevant to PROSUR

- Determine the hydrological cycle and energy fluxes by means of global measurements of atmospheric and surface properties.
- Model the global hydrological cycle and its impact on the atmosphere, oceans and land surfaces.
- Develop the ability to predict the variations of global and regional hydrological processes and water resources, and their response to environmental change.
- Advance the development of observing techniques, data management, and assimilation systems for operational application to long-range weather forecasts, hydrology, and climate predictions.

GEWEX PROJECTS



GEWEX Continental Scale Experiments (CSEs)



CONTINENTAL SCALE INFORMATION

There are 5 continental-scale studies being conducted around the world:

Features	GCIP	BALTEX	LBA	GAME	MAGS	CATCH [*]	CATCH ^{**}
Drainage Area (10 ⁶ km ²)	3.2	2.0	6.2	0.1	1.8	0.01	0.01
Annual Discharge (km ³ /yr)	570	470	5300	30	300	0	2.6
Mean Precipitation (mm/yr)	300-1200	720	2000	910	-400	560	1140
Mean Evaporation (mm/yr)	300-700	340	975	675	-230	500-530	920
Discharge/Precipitation Ratio	0.6-0.2	0.3	0.5	0.3	0.4	0.0	0.2

- GAME figures are for the Huaihe Basin of China and upstream of the Bangbu hydrologic station.

* - CATCH (Niamey square) semi-arid Sahelian climate.

** - CATCH (upper Ouémé catchment) tropical Soudanian climate.

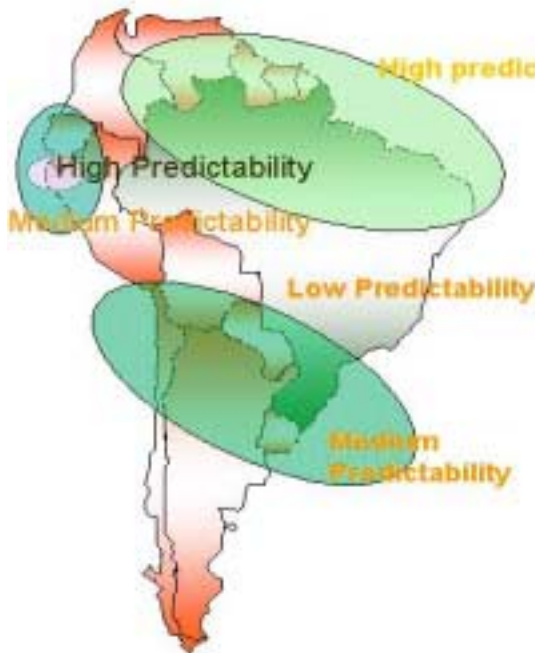
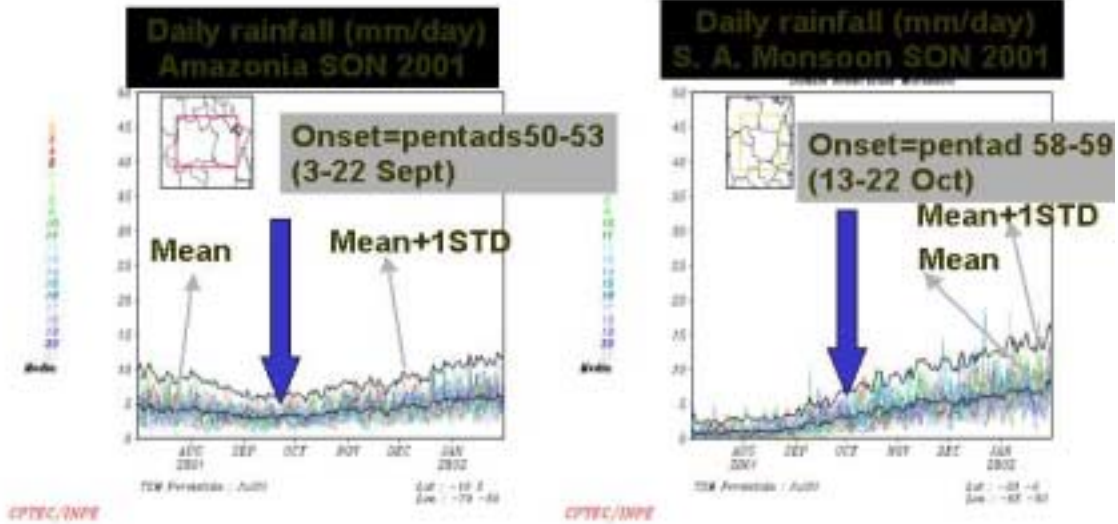
GHP [GEWEX Hydrometeorology Panel] STRATEGY

One of the most critical issues associated with water in the climate system is its availability over land areas. This is consequently the focus for a major GEWEX activity, the GHP.

GHP will work with other WCRP initiatives to demonstrate skill in predicting changes in water resources and soil moisture on time scales up to seasonal and annual as an integral part of the climate system. It is expected that this can be realized by about 2005.

1. Ensure proper characterization of surfaces and a knowledge of discharge.
2. Ensure appropriate access to observations of key parameters and model information within the CSEs and other regions as necessary.
3. Carry out detailed water and energy cycle observations and modelling over a few selected areas around the world.
4. Concentrate on needed process, diagnostic and remote sensing studies to ensure that critical features affecting the CSEs, and other regions of interest
5. Develop and validate appropriate large scale hydrological-surface models that will be coupled with atmospheric ones. Ensuring that such models operate and interact adequately over large scales having great variations in surface and hydrological conditions is a very critical challenge.
6. Conduct transferability-validation model studies within the CSEs and to other regions as appropriate.
7. Conduct predictability studies within the CSEs and to other regions as appropriate.
8. Inform others of the progress within GHP (water resource agencies, education..)

Some experiences in predicting the onset of the rainy season in South America (based on CPTEC/COLA AGCM)



Limits of seasonal climate Predictability

- SE Brazil, S. A. Monsoon region: Low predictability
- Intraseasonal scales: dry spells, onset of rainy season, fronts and frost
- Smaller scales: breezes, MCCs, LLJ, topography.
- Lower resolution → downscaling and use of regional climate models

CLIMATE PREDICTABILITY IN THE AMAZON AND S. AMERICAN MONSOON REGIONS



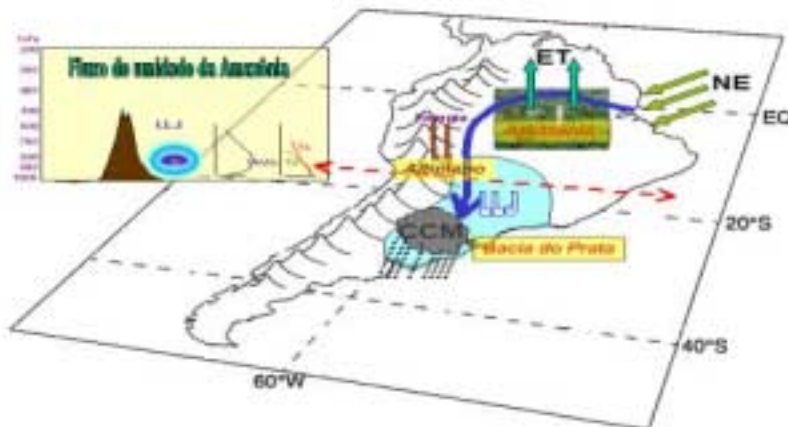
LBA Field Campaigns 2002-2003

■ South American Low Level Jet (SALLJ) [GEWEX and CLIVAR]

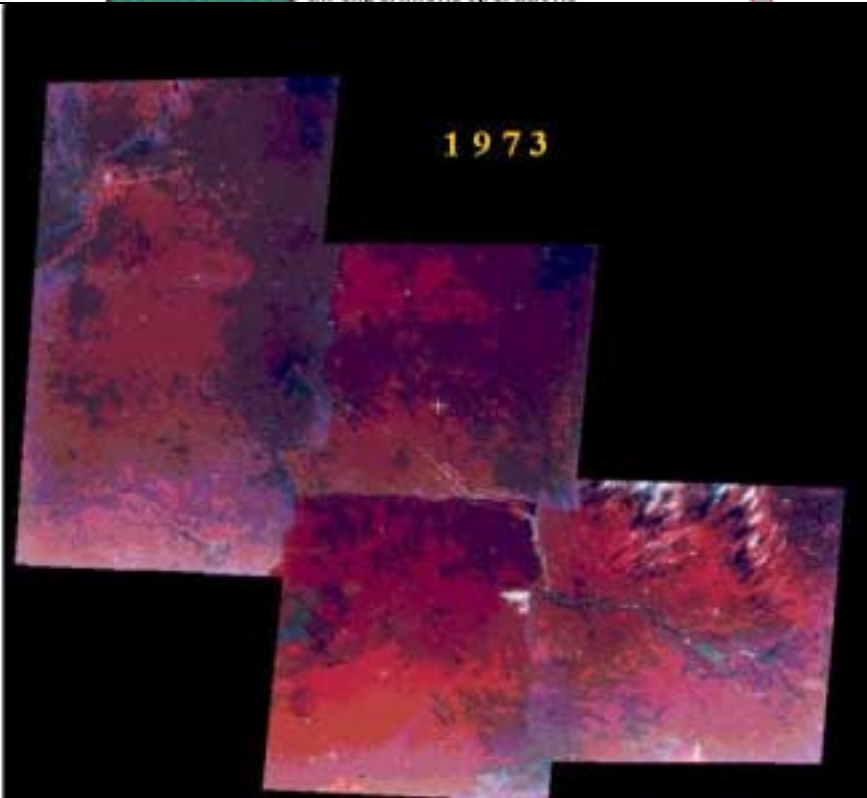
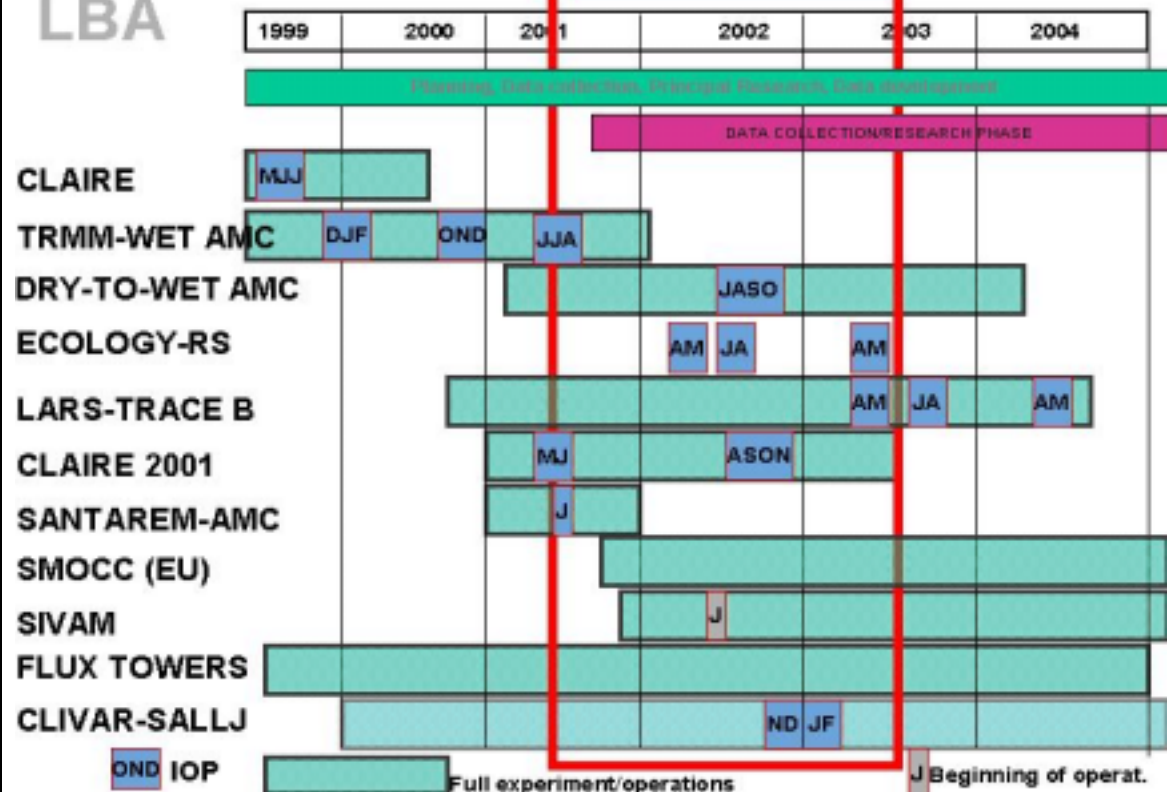
Focus: To augment the pre-existing routine observing systems over the region of interest with special observations that will be acceptable to describe the features of interest of the LLJ.

Observations: Planned for November 2002-February 2003, 2 SOPs: upper-air (4-6-per day, SOPs), wind profilers, aircraft (NOAA P-30), Special rainfall networks in S. America

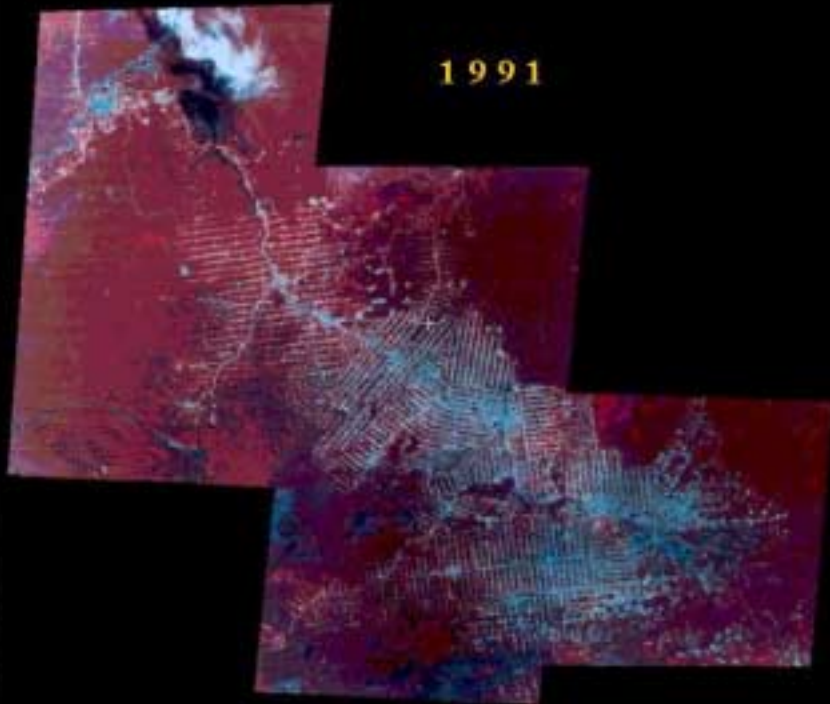
Funding: CONICET, FAPESP, NASA-LBA HYDROMET?, NOAA, PACS?, NSF?, regional funding.



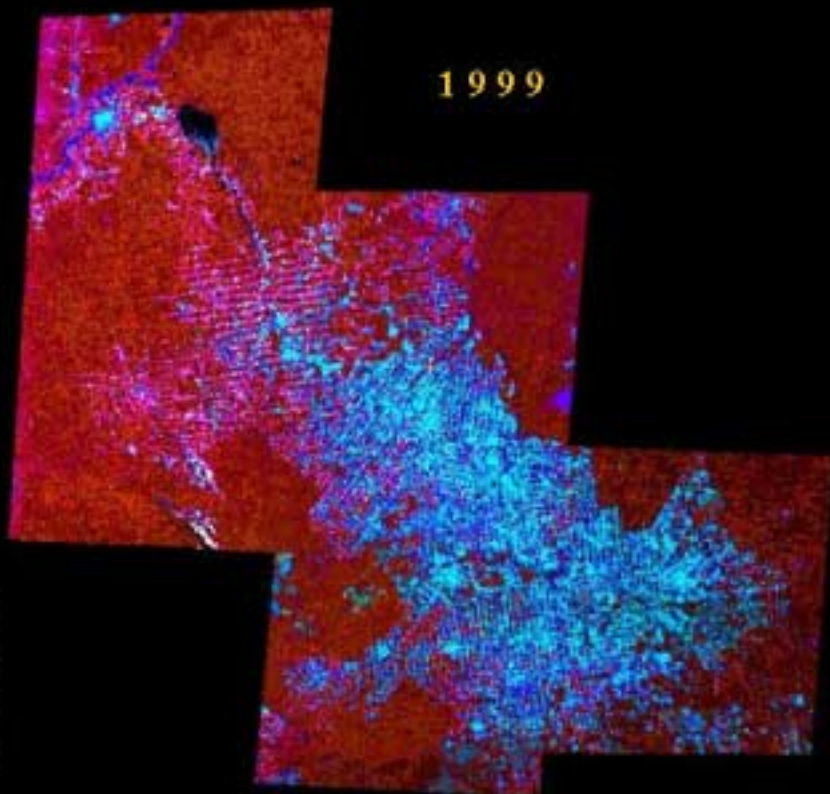
LBA



Satellite Image

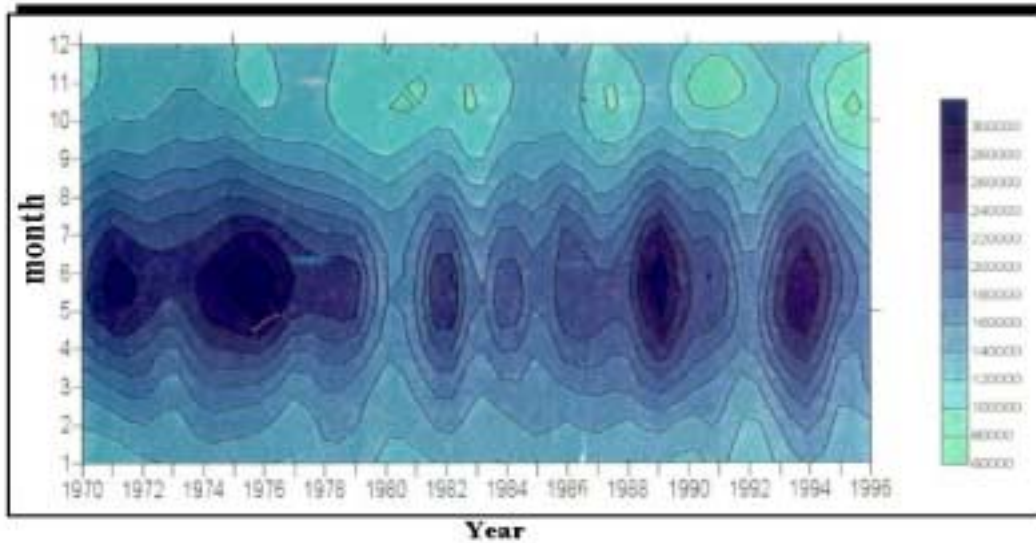


Courtesy: IBGE/INPE



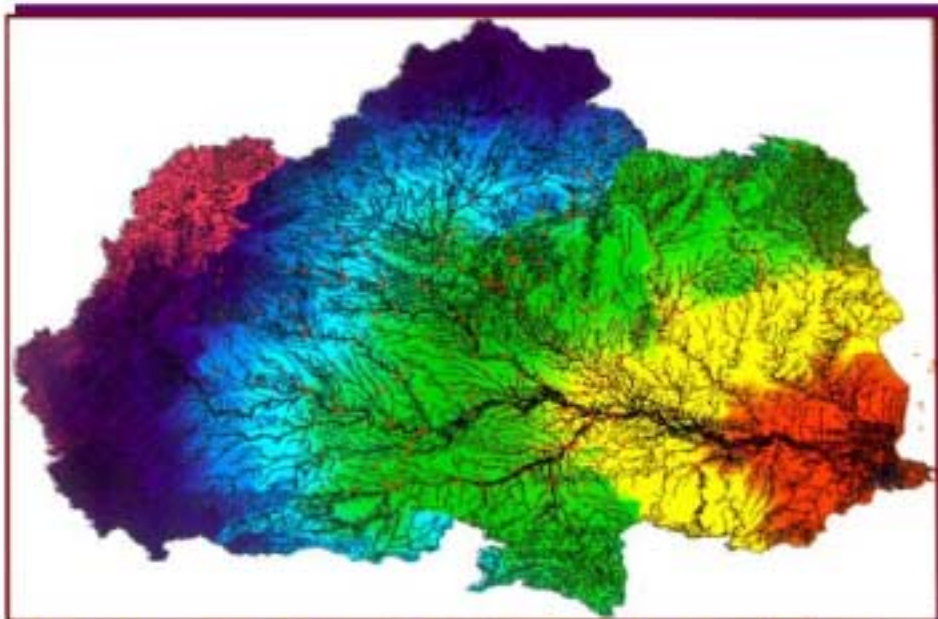
Courtesy: IBGE/INPE

Amazon River Discharge (in 10^9 m³)
station: Óbidos (01 S, 53 W)



Large interannual variability in the hydrological cycle

The Amazon River Basin



Colors represent time in months that the water takes to reach the ocean: red, one month; purple, six months. Courtesy R. Victoria and J. Richey.

Suggestions of future studies and collaboration → Focus on regional collaboration

- Common objectives and methodologies in PROSUR and GEWEX
- Closer collaboration between CLIVAR and GEWEX: SALLJ, PLATIN
- Many PROSUR scientists involved both in CLIVAR and GEWEX
- Modelling and predictability studies in La Plata basin
- Experiences in climate and hydrometeorology in the Amazon basin can be very useful for La Plata River basin studies.
- Development of transferability-validation studies in la Plata using Amazon basin's experience
- Sharing experiences between PROSUR and other Continental scale experiments
- PROSUR is represented in GEWEX.