

La Plata Basin (LPB) Project

Reporting Period: 2006

Starting Date: 2005

End Date: 2015

URL: <http://www.eol.ucar.edu/projects/lpb/>

Chair(s) and Dates of Terms: E. Hugo Berbery (for CLIVAR);
M. Assuncao Silva Dias (for GEWEX); 2005-2009.

Overview

Objectives

The La Plata Basin (LPB) is the fifth largest basin in the world and second only to the Amazon Basin in South America. La Plata basin presents a large diversity of challenges, from its vulnerability to notable positive trends in precipitation and stream flow, to the management of hydropower production. The scientific community is thus confronted with aspects that are of significant magnitude, as important natural resources and the quality of life of a large population are at stake. The uniqueness of the basin's climate and hydrology has been recognized in the recent years, and a concerted international effort by scientists has led the World Climate Research Programme GEWEX and CLIVAR Panels to name the LPB a Continental Scale Experiment (CSE). CSEs are major basins that have been identified because the study of their distinct features can lead to significant improvement of the world's water resources.

The fundamental issues to be addressed in LPB can be summarized in three main questions:

- What climatological and hydrological factors determine the frequency of occurrence and spatial extent of floods and droughts?
 - How predictable is the regional weather and climate variability and its impact on hydrological, agricultural and social systems of the basin?
 - What are the impacts of global climate change and land use change on regional weather, climate, hydrology and agriculture?

Status

An LPB Implementation Steering Group is elaborating the activities that need to be performed to address the above questions. This interdisciplinary group is working with research and operational centers on an Implementation Plan that will articulate the most efficient ways of addressing the activities to be developed. The implementation plan envisions two main activities: monitoring of hydroclimate variables and a field experiment to develop a set of unique data that will (a) help understand the land surface-atmosphere processes that may lead to persistent events, and (b) to calibrate and improve parameterizations in regional and global models employed for forecasting and prediction up to seasons. The two activities will be complemented with modelling and diagnostics of the coupled system. The implementation plan will become available in the coming months.

An informal meeting of members of the LPB ISG with the scientific community took place in Foz do Iguassu in April 2006, during the Conference on Southern Hemisphere Meteorology and Oceanography. The objective was to disseminate the activities planned for LPB as well as receive suggestions from other scientists.

The First La Plata Basin (LPB) Implementation Steering Group Meeting will be held in Brazil to:

1. Provide a background for and launch the implementation plan of the La Plata Basin Continental Scale Experiment – LPB-CSE.
2. To articulate the paths to integrate modelling, observational and operational activities that are expected to take place during the LPB Program.
3. Develop recommendations on LPB observing system components
4. Define LPB milestones

New directions

The scientific areas that will be covered include: (a) remote effects, (b) land surface atmosphere feedbacks, land cover and land use changes, (c) extreme events, variability and trends, (d) predictability of the hydrologic system and (e) climate change scenarios and vulnerability of the basin to those changes.

The monitoring of hydro-climate variables will include an enhanced network of digital rain gauges, soil moisture measurements, turbulent flux measurements with flux towers, radar products and calibration and merging of these observations with satellite products. During the field campaign, measurements of soil moisture will be estimated with remote sensing from aircraft and MCS contributions to precipitation will be further examined with portable radar.

Modelling activities will focus on coupled land-atmosphere parameterizations, uses of distributed hydrological models, data assimilation, and finally on the production of a set of regional reanalysis developed at CPTEC. Different efforts will be initiated to perform land data assimilation of satellite and in situ observations. Global and regional multi-model experiments will be routinely employed for seasonal predictability studies.

A novel aspect of this Continental Scale Experiment is the assessment of the potential effects of climate change on the basin's hydro-climate. Previous studies have shown that precipitation and river discharge have experienced important trends over large parts of the La Plata Basin in the last decades, and this has led to more frequent and severe floods. Climate change scenarios will be employed to assess the vulnerability of the region to modified conditions, and how they may impact the livelihood, economical and societal needs of the region.

Future: Next year foreseen activities

Several activities have been underway for the last 4-5 years that may be considered a pre-LPB phase, the most important being the South American Low Level Jet Experiment - SALLJEX – presented in Vera et al (2006). The operational and experimental data of the SALLJEX may be found at <http://www.eol.ucar.edu/projects/salljex/> . The LPB CSE, however, is in its implementation phase, and the main field activities are still a couple of years in the future. Nevertheless, as an operational center that is supporting the LPB activities, the Center for Weather Forecasts and Climate Studies - CPTEC – in Brazil, has started to develop the necessary tools to be LPB major data center and distributor. At present, the homepage <http://www.cptec.inpe.br/lpb> points out to the different products of numerical weather prediction, seasonal climate forecasts and monitoring that are related to the LPB. CPTEC has as data policy a free access to all the data and products that are generated by CPTEC or are in the operational networks following the no-restriction principle meaning that no financial implications are involved in data exchange.

For the LPB experimental data, it is understood that all data shall be delivered to users only for scientific studies designed to meet LPB objectives. Commercial use and exploitation is prohibited, unless specific permission, in writing, has been obtained from the LPB investigators concerned. The timing of the experimental data release clearly involves some conflicting aspects. The data user will obviously be interested in obtaining data as soon as possible after the time of measurement. The data providers, as well as the data center, will wish to ensure the highest attainable quality of the data. In general, data will be ready for general release after some specific period following its acquisition, during which the exchange process between the data provider, the data center and also the other data providers, including quality control and assurance, will have been completed. Six months has been considered as the appropriate length for this data turn-around period.

Contributions to WCRP strategic framework

The LPB program has plans for monitoring the hydroclimate of the basin, carry out a field experiment, and perform modelling studies with direct applications to data assimilation, predictability studies, and climate

change scenarios. Extensive diagnostics will take advantage of observations and models. Among the expected outcomes of the program, the following are worth mentioning:

- An end-to-end coupled modelling system (including coupled atmospheric, land surface and distributed models) covering the whole LPB
- New tools for seasonal prediction
- A comprehensive observational dataset for hydro-climate studies
- A 25-yr higher resolution regional reanalysis dataset
- Climate change scenarios for hydroclimate of the LPB
- Analysis of vulnerability to Climate Change, in a form that can be reported to the policy makers
- LPB will further contribute to the enhanced integration between the research/academic community and the operational forecasting and observation centers in the area.

Contributions to society and to WCRP/GEWEX visibility

CPTEC, as the LPB data center, will provide access to LPB related operational data through an internet interface (under construction – to be released in November 2006) to a real time and historical data base already available internally at CPTEC. The data base includes meteorological data, satellite images and products and gridded analysis and forecasts. The funds for the extension of this data base to include the experimental LPB data are still not secured but are included in the LPB campaign budget. In any case, the Earth Observing Laboratory's Data Management System at NCAR (<http://data.eol.ucar.edu/>) will be functioning as an alternative data center related to LPB with all its functionality already used for the SALLJEX.

Note submitted to GEWEX News

- M. A. F. Silva Dias, E. H. Berbery, Steve Williams, Jose Meitin, 2006: La Plata Basin CSE Data Centers

Seminars:

- Aug 2006 E. H. Berbery: The La Plata Basin (LPB) in South America – A GEWEX/CLIVAR Continental Scale Experiment. Office of Hydrological Development, NOAA.

Summary

List of key publications

Silva, V. B. S., and E. H. Berbery, 2006: Intense rainfall events affecting the La Plata basin. *J. Hydrometeor.*, 7, 769-787.

List of meetings, workshops

Sep 18-19, 2006: The First La Plata Basin (LPB) Implementation Steering Group Meeting, Guaratinguetá, Brazil.

List of members and their term dates:

Name	Institution	Country
E. Hugo Berbery (co-chair for VAMOS/CLIVAR)	University of Maryland (UMD)	US
Maria Assunção Silva Dias (co-chair for GHP/GEWEX)	Centro de Previsão do Tempo e Estudos Climaticos (CPTEC)	BR
Walter Baethgen	International Research Institute for Climate Prediction (IRI)	US/UY
Vicente Barros	Centro de Investigaciones del Mar y la Atmósfera/ Universidad de Buenos Aires (CIMA/UBA)	AR
Walter Collischonn	Universidade Federal de Rio Grande do Sul (UFRGS)	BR

Nicolas Failache	Universidad de la República (Uruguay)	UY
Dennis Lettenmaier	University of Washington (UW)	US
José Marengo	CPTEC	BR
Angel Menendez	Instituto Nacional del Agua (INA); UBA	AR
Roger Monte Domecq	Universidad de Asunción (UNA)	PY
Oswaldo Moraes	Universidade Federal de Santa Maria (UFSM)	BR
Carlos Morales	Universidade de São Paulo (USP)	BR
José Paruelo	UBA	AR
Marcelo Seluchi	CPTEC	BR
Pedro Silva Dias	USP	BR
Rafael Terra	Universidad de la República (Uruguay)	UY
Carlos Ereño (Ex-officio)	International CLIVAR Project Office (ICPO)	AR
José Meitín (Ex-officio)	UCAR/EOL	US