



CLARIS | LPB

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A Europe-South America Network for Climate Change Assessment

And Impact studies in La Plata Basin

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1. Publishable Summary

The CLARIS LPB Project aims at projecting the regional climate change impacts in La Plata Basin (LPB) in South Eastern South America focusing on the 2010-2040 and 2070-2100 periods, and at designing adaptation strategies for land-use, agriculture, rural development, hydropower production, river transportation, water resources and ecosystems in wetlands.

To reach such objectives, the project gathers more than 190 scientists from various disciplines. Their specific objectives cover a large range of activities: (i) to improve the description and understanding of decadal climate variability for short-term regional climate change projections (2010-2040); (ii) to improve 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 ; (iii) to design adaptation strategies to regional scenarios of climate change impacts through a multi-disciplinary research ; (iv) to involve and integrate stakeholders in the design of adaptation strategies through an interactive and communicative process, ensuring their dissemination to public, private and governmental policy-makers ; (v) to foster long-term collaborations between European and South American Partners (sustained beyond the project lifetime) ; (vi) to train young scientists in South American and European institutes.

During the first two periods (36 months) of the project, the activities were organized along the following lines:

- Communication between the partners and workpackages (WP) and between the project and stakeholders, together with the set-up of a common data and application framework (WP2 and WP7). The communication actions included the creation of a young scientist forum and the allocation of grants to foster exchanges between the partners.
- Climate studies focusing on observations, process studies, model evaluation and regional modelling ensembles (WP3, WP4, WP5 and WP6).
- Design of a common framework for the agriculture and hydrology impact studies together with the recollection of specific data needed to perform the analysis (WP8 and WP9)

Project Common Activities

The purpose of WP2 is to foster and coordinate dissemination activities of the CLARIS LPB initiatives and results at scientific, public, and stakeholder levels, in order to gain public support for national/regional efforts to address climate change, improve collective responses and promote the development of national climate change action plans.

Several workshops with stakeholders were organized in order to foster the interaction between scientists and the different social actors. In addition, project members participated actively in agricultural exhibitions in

Argentina and Brazil. These activities allowed us to create a permanent dialogue with stakeholders, to understand their needs and to make them aware of climate change issues and impacts on their sectors and their lives.

The formation of young scientists is one of the main goals of the project, hence, a “Young students/scientists group” and a “Young Student Forum” were created.



CLARIS LPB M26 Meeting, Florianópolis, November 2011

In addition, an exchange grant system was implemented to promote European-South American inter institutional formation and cooperation. CLARIS LPB WP2 contributed with 52.709 Euros, and Partners provided an equal amount. Thirty scientists, most of them young scientists, received grants. The Project also supported 38 students to attend CLARIS LPB meetings (37,800 Euros granted by WP2 and an equal amount by the partners).

The project meetings organized so far (Kick-off, November 2008, Buenos Aires; Month 18 Meeting, February 2010, Rome; Month 26 Meeting, November 2010, Florianopolis; Month 36 Meeting, September 2011, Toledo; and several WPs meetings) fostered multidisciplinary interactions between scientists.

WP7 major objective is to facilitate climate data exchange and the transfer and further development/tailoring of knowledge between large-scale climate, regional-scale climate and impact partners. In order to achieve this objective the work performed during the first 36 months by WP7 focused on: a) the implementation of the web

portal for data access and data extraction; b) development of a software architecture for implementing applications (downscaling, model evaluation, data quality control) freely accessed by all the project members; c) reviewing and investigating currently available methods for the calibration and combination of multi-model climate simulations; d) the circulation and evaluation of a questionnaire for the impact partners of WP8 and WP9 on data needs for climate, biogeophysical and socio-economic data, as well as software tools. WP7, through the CLARIS LPB Data Archive Centre, developed user-friendly interfaces for CLARIS LPB partners to extract data and model outputs (see figure).

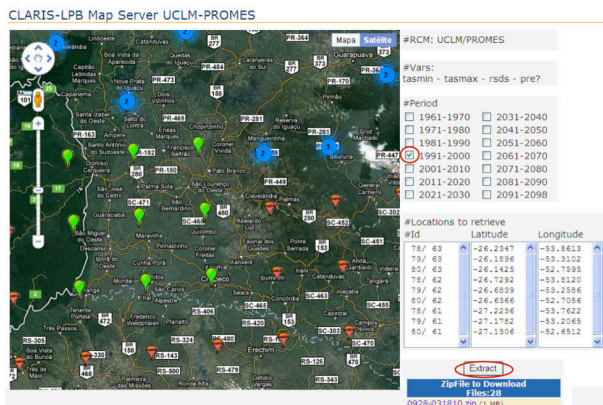


Figure: CLDAC interface to extract WP5 regional model scenarios at model grid points

Climate Studies

Climate studies are performed by the workpackages 3, 4, 5 and 6. Their main objectives during the first two periods of the CLARIS LPB project were to:

- To improve the description of past climate variability in La Plata Basin in order to provide an observational basis for quantifying past climate variability, evaluating climate scenarios and providing high-quality data (stations and gridded) for impact model scenarios (WP3).

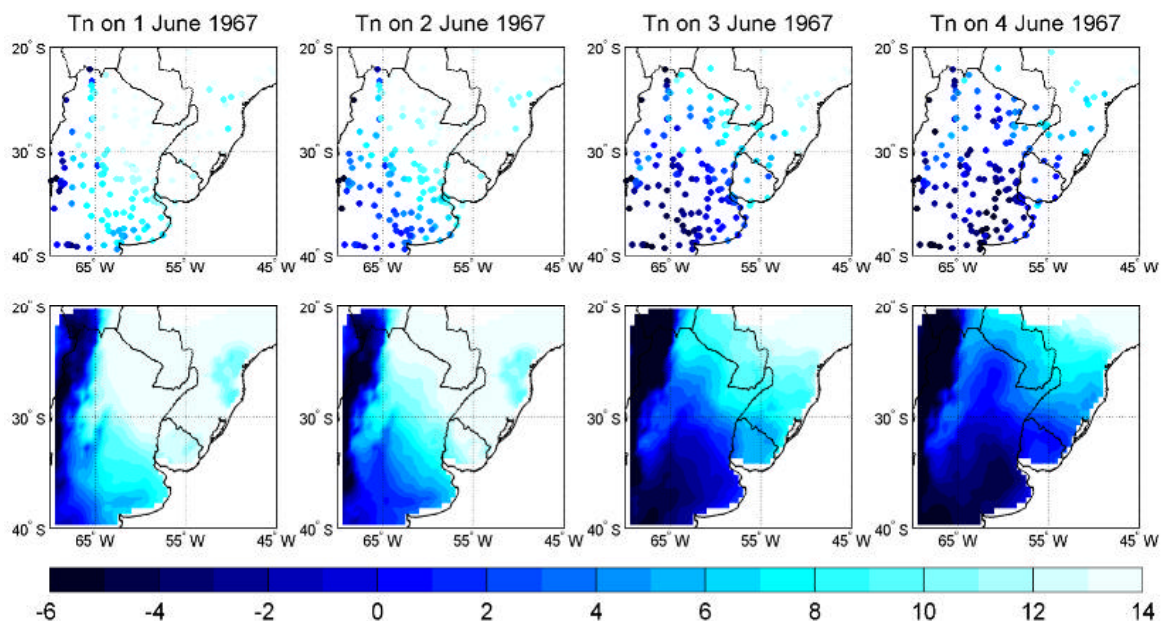


Figure: 4-day sequence of minimum temperature (°C) shown on a 0.5° grid (lower panels) and at station points (upper panels). Color scale is the same for both datasets.

- To advance our understanding on the key processes that govern the climate natural low-frequency variability and trends over the past 150 years in La Plata Basin, to assess the impact of climate change on the natural climate variability for the 21st century and to determine the uncertainties involved with the projected hydro-climate changes on two time horizons: 2010-2040 and 2070-2100 (WP4).

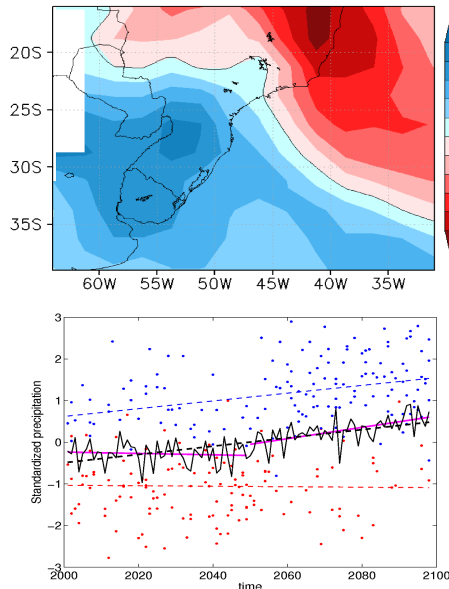


Figure. (Upper panel) Differences of the mean DJF rainfall between 2050-2098 and 2001-2049 periods. The difference is standardized by the total number of years. Contour interval is 0.2 mm/day and black contour indicates the 0 level. (Lower panel) Temporal evolution of the standardized DJF rainfall in Southeastern South America from 9-model mean during the XXI century and its linear trend. The linear trends for the two halves of the XXI century are also shown. Blue (red) dots correspond to rainfall anomalies associated to each of the positive (negative) events of the first EOF of rainfall in the region for each of the models (modified from Junquas et al 2011a).

- To produce a coordinated ensemble of regional climate change scenarios and to better understand the regional effects of climate change and variability on various components of the hydrologic cycle of La Plata Basin, with emphasis in land-surface-atmosphere feedbacks and their impact on extreme events (WP5).

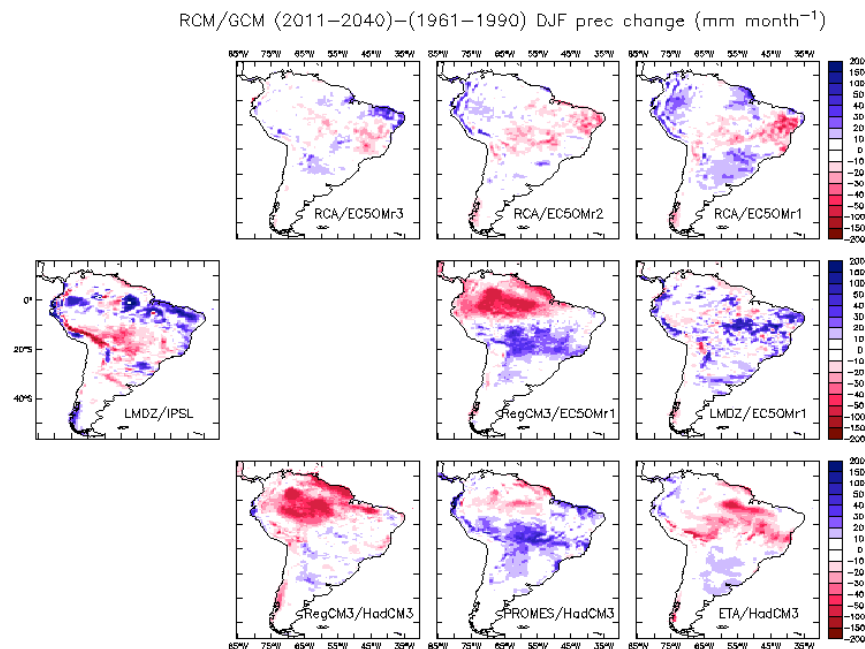


Figure: Precipitation changes in December-January-February from 1961-1990 to 2011-2040 simulated by the CLARIS LPB Coordinated Regional Ensemble.

- To analyse extreme events of precipitation and temperature over La Plata Basin region based on observational datasets and ensembles of 20th and 21st century large-scale (IPCC) and regional model simulations (WP6).

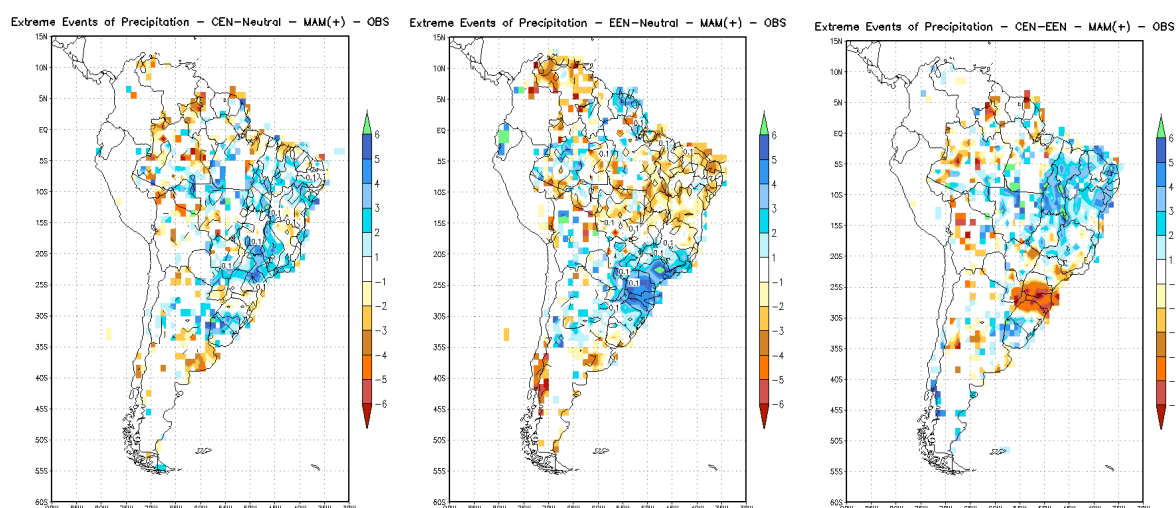


Figure: (Left panel) Differences between average numbers of extreme rainfall events during austral autumns following the onset of central Pacific El Niño events and during neutral years; (central panel) the same, but for eastern Pacific El Niño events and neutral years; (right panel) the same but for central Pacific El Niño and eastern Pacific El Niño. (From Tedeschi, Grimm and Cavalcanti 2011)

Adaptation strategies for agriculture and hydrology sectors

The primary objective of Work Package 8 (WP 8) is to reveal deep and comprehensive insights into the complex net of impacts and interdependencies of climate variability and change and anthropogenic adaptation measures to climate change on land use, agriculture and deforestation. In this regard, collaboration with stakeholders is very important in particular to confront stakeholders' projections and strategies to pressures induced on the system by the future climate. The WP8 comprehends four tasks: (i) identification of the most important land use sectors in the region; (ii) the agricultural sector with a specific focus on pasture and crop yields; (iii) Socio-economic implications; and (iv) stakeholder participation in the agricultural sector. The final year of the project will lead to various technical reports on climate change impacts and a framework to build adaptation strategies with stakeholders.

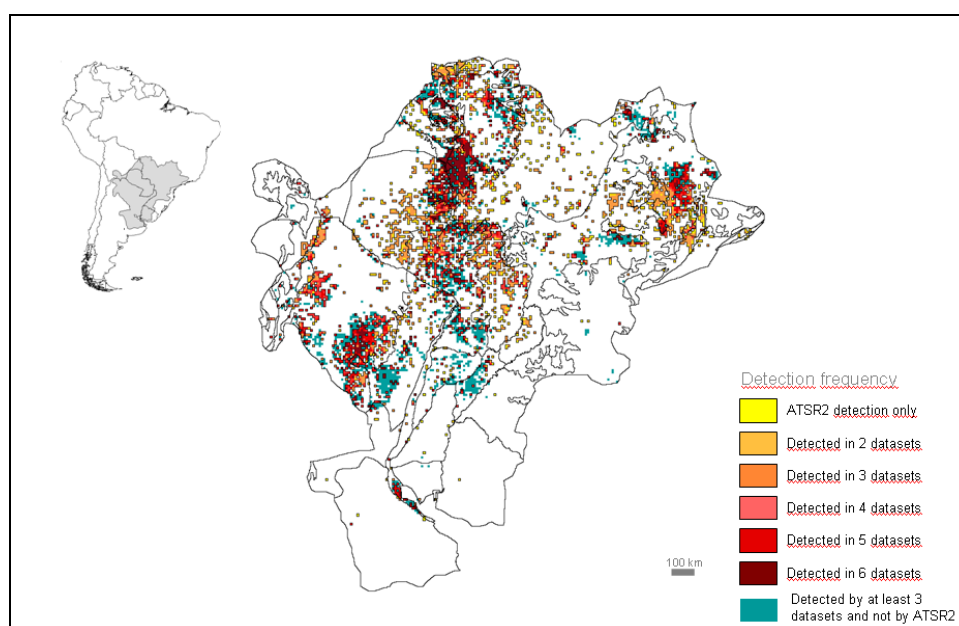


Figure: Map of agreement for fire detection in LPB

The different activities of WP9 (hydrology) respond to different hydrological aspects of climate change in the Plata Basin that requires different methodologies and were carried out by different working teams in 8 institutions, 5 in South America and 3 in Europe. The overall strategy of the WP9 was the tuning the impact models or methodologies according to present and /or past climate to use them with future climate scenarios. In particular, most of the subprojects require of the outputs of hydrological models. Two of these models were adjusted satisfactory to the Plata basin, one from the SMHI of Sweden and the other, the VIC model run by CIMA in Argentina. To produce future climate hydrological scenarios, these models will make use during the final year of the project of the CLARIS LPB Coordinated Regional Model Ensemble.

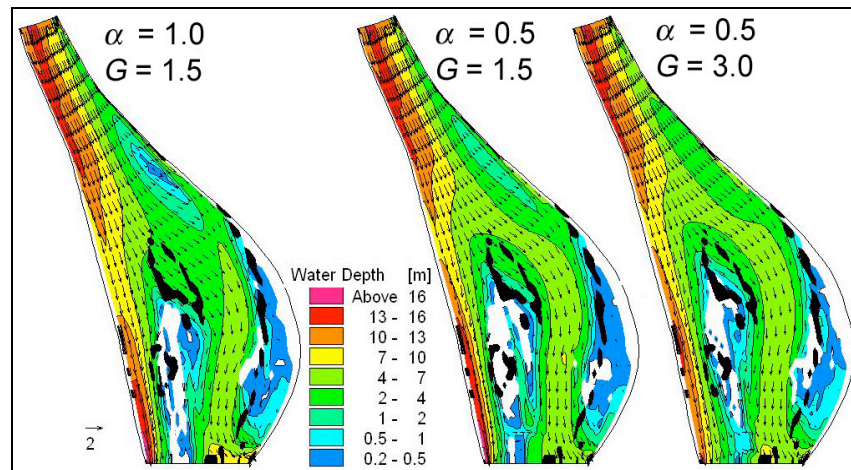


Figure. Comparison of 1976 historical margin to resulting depth maps from 2D model simulations of 1954-1976 period and for different helical flow (α) and transversal slope (G) parameter values.

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