

CRN-055 REPORT OF ACTIVITIES

Second year activities

I- Project General Information
<p>Principal Investigator Dr. Mario N. Nuñez (Argentina)</p> <p>Co Principal Investigators Vicente Barros, Guillermo Berri, Matilde Nicolini, Walter Vargas and Carolina Vera (Argentina). Tercio Ambrizzi, Iracema Cavalcanti, Alice Grimm, Jose Marengo, Carlos Nobre, Maria Asuncao Silva Dias and Pedro Silva Dias (Brazil). Genaro Coronel and Benjamín Grassi (Paraguay). Mario Bidegain and Mario Caffera (Uruguay). Hugo Berbery, Henry Diaz and Brant Liebmann (USA).</p> <p>In the Project more than 40 collaborators and students are also participating.</p>
<p>Project Title Development of a Collaborative Research Network for the Study of Regional Climate Variability and Changes, their Prediction and Impact in the MERCOSUR Area (IAI CRN-055).</p>
<p>Major Institutions Involved ARGENTINA: Centro de Investigaciones del Mar y la Atmósfera (CONICET - UBA) and Departamento de Ciencias de la Atmósfera y los Océanos de la Universidad de Buenos Aires. BRAZIL: Instituto Astronómico e Geofísico de la Universidad de Sao Paulo, CPTEC/INPE and Universidad do Parana. PARAGUAY: Facultad Politécnica and Facultad de Ciencias Exactas y Naturales de la Universidad de Asunción. URUGUAY: Facultad de Ciencias de la Universidad de la República. USA: Climate Diagnostic Center of NOAA and Department of Meteorology of the University of Maryland.</p>
<p>Executive Summary A Collaborative Research Network (CRN) has been developed to promote research into the causes of climate variability in the Mercosur region of South America. Scientists from Argentina, Brazil, Paraguay, Uruguay and the United States are participating.</p> <p>The goals for the year 2001 were: <i>(a) Promote the research and interactions among PIs on the floods in La Plata Basin; (b) To promote studies on the physical and dynamical processes of extreme events in the MERCOSUR area; (c) Assess the degree of understanding of these extreme events by stakeholders and population in the context of Human Dimension Pilot Project; (d) To develop and support activities related to South American Low Level Jet Field Experiment; (e) Support modeling studies to investigate regional climate variability.</i></p> <p>The overall achievements during the reported year are summarized next:</p> <ul style="list-style-type: none">- 17 Journal articles/book chapters were submitted or published- 47 presentations/extended abstracts were produced- 15 visits to further ongoing collaborations- 4 PhD Fellowships were granted and initiated- Organized 3 workshops with specific PROSUR agendas. <p>All these efforts involved the collaboration and interactions of scientists and graduate students from the different research units participating in PROSUR.</p>

WORK PLAN FOR THE YEAR 2001

The main objectives of the IAI CRN (*Collaborative Research Network*) Program, the CRN 055 (PRO-SUR) are:

- 1) To support an environment conducive to collaborative research. This is accomplished by sponsoring scientific visits to each of the participating institutions holding regular meetings where results are disseminated and discussed, and by encouraging the free exchange of data.
- 2) To promote the capacity building in the participating institutions, mainly in those with scarce development in the scientific interest area of the Project. The exchange of scientists and students will be strongly promoted, searching for alternative funds for post degree fellowships.
- 3) To promote the free exchange of data among investigators of the CRN. The data have already been useful in several diagnostic studies undertaken by scientists within PROSUR.

For the collaborative research, three main focus will be promoted:

- ❖ Physical and dynamical processes related to climate variability in southeast South America.
- ❖ Tropical – extratropical interactions related to circulation and precipitation variability over southeast South America.
- ❖ Impacts of climate variability on sectors of social and economic importance in the Mercosur region.

Specifically for the year 2001, the goals were:

- Promote the research and interactions among PIs on the floods in La Plata Basin.
- To promote studies on the physical and dynamical processes of extreme events in the MERCOSUR area.
- Assess the degree of understanding of these extreme events by stakeholders and population (consultar las dimensiones).
- To develop and support activities related to South American Low Level Jet Field Experiment.
- Support modeling studies to investigate regional climate variability.

The Timetable of activities supporting the above goals follows. Given the nature of these activities they were develop simultaneously along the year.

See the enclosed Timetable for the Second year of Activities (Appendix A).

[Relevant publications related with the Project \(Authors are COPIs, collaborators and students, participating in the CRN\).](#)

[-Journal articles/book chapters submitted or published](#)

Antico, P.A. and G. J. Berri, (2001):, The subtropical jet stream over South America, *submitted to Revista Brasileira de Meteorología*.

Barros, V, and G. Silvestri, (2001): On the relation between sea surface temperature at the subtropical south-central pacific and precipitation in southeastern South America. *J. Climate*, 15, 251-267. Accepted

Barros, V., A. Grimm and M. Doyle, (2001): Relationship between temperature and circulation in South-eastern South America and its influence from El Niño and La Niña events. *J. of the Meteo. Soc. of Japan*. Accepted

Berbery, E. and V. Barros (2001): The Hydrologic Cycle of the La Plata basin in South America. *J. Hydrometeorology*. Accepted

Carvalho, L. M. V., C. Jones, M. A. F. Silva Dias, (2001): Intraseasonal large-scale circulations and meso-scale convective activity in tropical South América during the TRMM-LBA campaign. *J. Geophys. Res.* Accepted.

Coelho, C. and T. Ambrizzi, (2001): The influence of the tropical Pacific and Atlantic SST on the precipitation patterns over South America during ENSO. Submitted to *J. of Climate*.

González, M., V. Barros and M. Doyle (2001): Relation between the onset and the end of the South American summer monsoon and rainfall in subtropical South America. *Climate Research*. Accepted

Herdies, D.L., A. da Silva, and M.A.F. Silva Dias, R. N. Ferreira, (2001). The bi-modal pattern of the summertime circulation over South America *J. Geophys. Res.* Accepted.

Liebmann, Brant, and J. A. Marengo, (2001): Interannual Variability of Rainfall and the Rainy Season in the Brazilian Amazon Basin. Submitted to *Journal of Climate*.

Marengo, J. A., Douglas, M. and Silva Dias, P., (2001): The South American Low-Level Jet East of the Andes during the 1999 LBA-TRMM and LBA-WET AMC campaign. Submitted *J. Geophys Res.*

Marengo, J., Ambrizzi, T., Kiladis, G., Liebmann, B., (2001): Upper-air wave trains over the Pacific Ocean and wintertime cold surges in tropical-subtropical South America leading to Freezes in Southern and Southeastern Brazil. Sent to *Theoretical and Applied Climatology*.

Marengo, J., Soares, W., (2001): Episódio de Jatos de baixos níveis durante 13 a 19 de abril de 1999. Sent to *Revista Brasileira de Meteorologia*.

Menéndez, Claudio G., Andrea C. Saulo, Silvina A. Solman and Mario N. Nuñez: Assessment of a regional climate scenario for Central Argentina: A dynamical downscaling approach. *Detecting and Modeling Regional Climate Change*. 525 – 535. M. Brunet and D. López Editors. Springer – Verlag, Berlin. 2001.

Rusticucci, M. and W. Vargas, (2001): Cold and warm events over Argentina and their relationship with the ENSO. *Int.J. of Climatology (accepted)*.

Solman, Silvina A., Mario N. Nuñez and Claudio G. Menéndez: Assessment of a regional climate scenario for Central Argentina: A statistical downscaling approach. *Detecting and Modeling Regional Climate Change*. 515 – 523. M. Brunet and D. López Editors. Springer – Verlag, Berlin. 2001.

Veiga, J., Marengo, J., Rao, V. B., (2001): A influencia das anomalias de TSM dos oceanos Atlântico e Pacífico sobre as chuvas de monção da América do Sul. Sent to *Revista Brasileira de Meteorologia*.

Vera, C. S., P. K. Vighiarolo and E. H. Berbery, (2001): Cold season synoptic scale waves over subtropical South America. *Monthly Weather Review*, in press.

[Conference presentations, extended abstracts and other publications](#)

Berbery, E. H., (2001): Sources of moisture for the South American monsoon at regional scales. Presented at the Symposium “Monsoon Systems around the World” at the IAMAS Assembly, Innsbruck, July 2001.

Berbery, E. H., (2001): Sources of moisture for the South American monsoon at regional scales. Presented at the Symposium “Monsoon Systems around the World” at the IAMAS Assembly, Innsbruck, July 2001.

Berri, G.J. and H. Hordij,, (2001): *Preliminary Evaluation of the Seasonal Forecast Produced at the Climate Outlook Fora Conducted in Southeast South America since 1997*, in *Coping with Climate: A Way Forward*, IRI-CW/01/1, pp. 33-41.

Berri, G.J., Some aspects of climate variability over La Plata River basin and opportunities for applications, pp 31-33, *WCRP No.13/2001, ICPO No. 49, World Climate Research Programme, June 2001*.

Berri, G.J., E.A. Flamenco, L. Spescha, R.A. Tanco and R. Hurtado, *Some Effects of La Niña on Summer Rainfall, Water Resources and Crops in Argentina*, chapter of *Facts and Speculation about La Niña and Its Societal Impacts*. Glantz, M.H. (Ed.), Public Affairs Section, United Nations University Press, Tokyo,

Japan, in press 2001.

Camilloni, I. y V. Barros. (2001): Caudales máximos registrados en el río Paraná durante el último siglo: forzantes climáticos IV Dialogo Interamericano de Gerenciamiento de Aguas. Foz de Iguazú, Brasil. Septiembre 2001.

Douglas, M., Marengo, J., Nicolini, M., Paegle, J., Paegle, J. N., Baez, J., Silva Dias, P., Miranda, G., Genta J., 2001: *American Low Level Jets Study. East Andean Low Level Jet Field program* Draft. April 2001.

Grimm, A.M., I.F.A. Cavalcanti, Y.Pscheidt y C. C. Castro. Contribuição de anomalias de temperatura da superfície do mar à ocorrência de eventos extremos de precipitação no sul do Brasil em Novembro. Anais do IV Diálogo das águas, Foz do Iguacu, sep. 2001.

Nogues-Paegle, J., Douglas, M., Nicolini, M., Vera, C., Marengo, J., Garreaud, R., Shuttleworth, J., Mechoso, R., Berbery, J., 2001: *S. American Low Level jet. A scientific Prospectus and Implementation Plan.* Draft. March 2001.

Vera, C. S. and E. H. Berbery, (2001): Influence of South Atlantic conditions on cyclogenesis over the Southeastern coast of South America. Presented at the IAPSO Assembly, Mar del Plata, October 2001.

Vera, C. , B. Liebmann, L. Carvalho and C. Jones, (2001): On the dynamics of daily extreme precipitation events in the state of Sao Paulo, Brazil. Presented at the 8th Scientific Assembly of IAMAS. Innsbruck, Austria, 10-18 July 2001.

Papers presented to the PROSUR Second CoPIs workshop, October 2001, Asunción, Paraguay,.

See PROSUR WEB Site: <http://cima.at.fcen.uba.ar/prosur> 22 complete texts of the presentations.

Papers presented to the IX Congreso Latinoamericano e Iberico de Meteorología y VIII Congreso Argentino de Meteorología, hold in Buenos Aires, 7-11 May 2001 (authors belong to different participating laboratories). Published on the CD of the Conference.

Antico P. y G. J. Berri, *La posición e intensidad media mensual de la corriente en chorro subtropical sobre América del Sur y su relación con la temperatura de la superficie del mar en el océano Pacífico.*

Berri, G.J. y Antico P., *Una validación de los pronósticos estacionales de precipitación realizados en los Foros de Perspectiva Climática del sudeste de América del Sur desde fines de 1997.*

Bidegain M. and P. Krecl. *Anomalías de la presión de vapor en el Sudeste de Sudamérica (Uruguay) asociadas al fenómeno ENSO.*

Bidegain M. and M. Renom.. *Distribuciones de temperaturas mínimas diarias condicionadas segun fase del fenómeno ENSO en Uruguay*

Caffera, R.M. *Caracterización de las rachas de sequía sobre Uruguay en la segunda mitad del siglo veinte mediante quintiles de precipitación.*

Camilloni, I. *Predictabilidad estacional de la precipitación estival en la cuenca del Paraná en base a las temperaturas de los océanos Atlántico y Pacífico.*

Cavalcanti, I.F.A., A.M. Grimm, e V.R. Barros, 2000: *Variabilidade interanual da precipitação sobre a região sul/sudeste da América do Sul simulada pelo modelo de circulação global da atmosfera CPTEC/COLA.*

Cavalcanti, I.F.A; J.A Marengo; M. N. Nuñez; M. Sanches. *Análise do desempenho do MCGA CPTEC/COLA na previsão sazonal da região sul/sudeste da América do Sul nos anos de 1998 a 2000.*

Collini, E. A. y E H. Berbery, 2001: *Pronósticos de Mesoescala para Sudamérica con énfasis en Argentina.*

Drumond, A. R. and T. Ambrizzi. *GCM numerical simulations during Southern Oscillation negative events over South America.*

Marengo, J., M. Nicolini, P. Silva Dias, M. Douglas. *Casos de Estudio de Jets de Bajos Niveles (LLJ) y de Jets del Sur (SJ) al este de los Andes durante el verano de 1999.*

Pezza, A. and T. Ambrizzi. *Cold waves propagation over South America and the cyclones and anticyclones tracks: A climatological study.*

Rusticucci, M. y M. Barrucand. *Variabilidad interanual de temperaturas extremas en la República Argentina.*

Solman, S. A., C. Menéndez, M. N. Nuñez, I. Cavalcanti y C. Nobre. *Estudio preliminar sobre la predicción climática regional en la Pampa Húmeda.*

Scientific Visits to laboratories.

Hugo Berbery to CIMA/Dpto de Ciencias de la Atmósfera y los Océanos, Buenos Aires, Argentina on two occasions: March 2001 and August 2001.

Mario Caffera to University of Buenos Aires, Buenos Aires, Argentina. Visits as a Ph.D. Student. Several times during the year 2001.

Between 2 and 4 May 2001, the working group “Studies of precipitation extreme events over La Plata River Basin” (Ambrizzi, Liebmann, Penalba, Vargas and Vera), met at the CIMA/Department of Atmospheric and Oceanic Sciences of the University of Buenos Aires in Buenos Aires.

Between 2 and 4 May 2001, the working group “Studies of daily temperature extreme events over Southern South America” (Ambrizzi, Rusticucci and Vargas), met at the CIMA/Department of Atmospheric and Oceanic Sciences of the University of Buenos Aires in Buenos Aires.

Between 3 January to 28 February of 2001, C. Vera stayed at CDC working as a Visiting Scientist.

During the beginning of May 2001, B. Liebmann stayed at CIMA working as a Visiting Scientist.

Celeste Saulo stayed at CPTEC working with Marcelo Seluchi, supported by the Project, during February 2001 to start cooperation in the study and model simulation of regional processes (topographic influences, thermal low, LLJ).

During August 29-31, 2001, Grimm, Ambrizzi and Vera acted as members of a Selection Committee for a Professor position at the IAG/USP in Sao Paulo, Brazil.

Vicente Barros and Mario Nuñez visit the University of Asunción, Paraguay. May 2001

Moira Doyle visit CPTEC in September 2001 for a training practice with a soil water balance model.

Fellowships

During 2001 4 doctoral fellowships are been granted by the CRN (2 in Argentina and 2 in Brazil).
Argentina: Gabriela Müller and Moira Doyle.
Brasil: Wagner R. Soares and Anita R. Drumond.

Research Activities.

All PROSUR research lines are under development according to those Research Lines indicated in our web page.

Other Activities.

A PROSUR Web site has been established (see <http://cima.at.fcen.uba.ar/prosur>) and it is regularly up-

dated. Papers presented at PROSUR workshops can be seen in it.

A [Human Dimensions PROSUR](#) workshop has been organized and hold in Buenos Aires, at the end of February 2001.

A Second [Human Dimension PROSUR](#) workshop has been organized and hold in Buenos Aires, at the end of October 2001.

The Pilot Project on [Paraná Plata Basin floods](#) was developed and is currently under way as an initiative within the IAI CRN-055 Project (see our web site).

Reports of both Pilots Projects can be seen at the end of the present report as Appendix B.

[Participation in Meetings and Congress of the IAI CRN-055 members.](#)

Second International Meeting of the IAI CRN-055 Project PROSUR (October 10-12, 2001). Asunción, Paraguay (participated most of the CRN CoPIs and collaborators).

2nd MEETING IAI CRN PI's. 3-4 October, 2001 – Rio de Janeiro – BRAZIL. The CRN-055 report has been presented by CoPI Carlos Nobre.

Montevideo, Uruguay (February 2001). 4th Session of the CLIVAR VAMOS Panel (Participants from CRN- 055: Barros, Nicoli, Vera, Berri, P. Silva Dias, Marengo, Grassi, Bidegain and Nuñez).

Buenos Aires, Argentina (May 2001). IX Congreso Latinoamericano e Ibérico de Meteorología y VIII-Congreso Argentino de Meteorología (participated most of the CRN CoPIs and collaborators).

Sao José dos Campos, Brazil (December 3, 4, 2001) Extreme climatic events in South America: tropics – extratropics links during modern and past times .

Participation in the 8th Scientific Assembly of the International Association of Meteorology and Atmospheric Sciences (IAMAS 2001), Innsbruck, Áustria, 10-18 July 2001 (Alice Grimm, Hugo Berbery and Carolina Vera).

Participation in the IAPSO Assembly, Mar del Plata, Mar del Plata, Argentina, October 2001 (C. Vera).

[Miscellaneous.](#)

The CRN-055 became an affiliated Program of the VAMOS, during 2001. (VAMOS: Variability of the American Monsoon Systems which is a component of CLIVAR under the auspices of WCRP).

[Future Activities of the PROSUR CRN-055](#)

The goals for the year 2002 and further are:

- Promote active participation of the PROSUR members in the activities of the South American Low Level Jet Field Experiment (SALLJEX). (November 2002 – April 2003).
- Support the SALLJEX.
- Finalize the PROSUR La Plata Basin Pilot Project. Prepare first draft of the Final Report and prepare the dissemination procedures of the results.
- Promote the exchange of PhD students among different laboratories of the members participating in PROSUR.

Research activities, interactions and cooperation during the year 2001 will be focused to promote the following PROSUR Agenda themes:

- South American Low Level Jet
- Extreme Events
- Land Surface Processes
- Atmospheric Modeling
- Climate Variability. Impacts and mechanisms

- Paraná Plata Basin floods

The proposed timetable for the year 3 is enclosed as Appendix C.

APPENDIX B

2001 Pilot Projects Reports

1- Pilot project on Paraná Plata Basin floods report (Dr. Vicente Barros, rapporteur).

1. The characterization of the major floods was started during the 2001:

G. Coronel and J. Baez coordinate the activity in the Paraguay River, I. Camilioni and V. Barros in the the Paraná River and R. Caffera in the Uruguay River.

1.1 In the case of the Paraná River, it was submitted the paper: " The greatest discharge events in the Paraná River and their climate forcing" by I. Camilloni and V. Barros to the Journal of Hydrology with the following results:

During the 1904-2000 period, huge discharges were registered at Corrientes, where the Lower Paraná River begins. The 16 greatest monthly anomaly discharges ranged from 15,000 m³/s to 38,300 m³/s. Since with few exceptions, the main source of the interannual variability in the Paraná streamflow is upstream from Corrientes, the focus was on the contribution to the greatest discharges from the sub-basins upstream from this location

Analyses were based on monthly discharges at Jupιά, Itaipú and Corrientes on the Paraná River, Salto Caxias on the Iguazú River and Puerto Bermejo on the Paraguay River. The location of these stations permits to estimate the contribution of the main sub-basin to the Paraná streamflow. The major discharge anomalies in Corrientes originated in the Middle Paraná basin, especially in its upper part. The contributions of the Paraguay and the Upper Paraná rivers to these anomalies were relatively small. Regarding the season, the major discharge anomalies occurred more frequently in autumn and spring and only in a few occasions in summer or winter.

About two thirds of the major discharge anomalies in Corrientes occurred during El Niño events, and none of these major anomalies took place during La Niña events. The major discharge anomalies that were related to El Niño occurred either in spring of the year of El Niño onset or in the autumn of the following year (autumn (+)), accompanying the precipitation signal of El Niño in the Paraná basin. The top discharges of the Paraná River at Corrientes occurred in the autumn (+) when El Niño SST anomaly in El Niño 3 region persisted until this season. The remaining third of the major discharge contributions from the Middle Paraná, which were not related to El Niño, took place during the austral spring or the austral summer of neutral periods.

1.2 In the Paraguay River, there is a similar analysis that is expected to be documented in a similar paper by the end of 2002.

1.3 In the Uruguay River, due to the rapid runoff and the small dimension of the basin, the major floods are caused by synoptic events. R. Caffera and I. Camilloni are making the characterization of the synoptic conditions prevailing days before the huge rainfalls that originate these floods. They are using concepts developed in a paper by Barros, V and M. Doyle that was presented in the VAMOS/CLIVAR/WCRP Conference on South American low-level Jet in Santa Cruz de la Sierra, February 2002: "*Midsummer circulation in subtropical South America and related precipitation patterns*"

2. General description of the La Plata - Paraná Climate and Hidrology:: It was developed a framework paper by E. Berbery and V. Barros that was submitted to the J. of Hydrometeorology, and accepted subject to minor revisions.

3. Modeling: The especial case of the flood of 1998 that was originated mostly in the Low Paraná is being studied with a high-resolution model by E. Berbery and E. Collini. This study is part of the E. Collini thesis work at the University of Buenos Aires under the direction of E. Berbery and co-directed by V. Barros

The capacity of the climate model of CPTEC to forecast the major climate events that cause floods is being studied by I. Cavalcanti with the cooperation of A. Grimm, V. Barros and P.L. Silva Días.

4. Modeling soil moisture: M. Doyle visited CPTEC in September 2001 and with the direction of J. Tomasella was trained in the use of the CPTEC model of soil moisture. The model is now available for its use in the Province of Buenos Aires

The main effort is going to be dedicated to the Pilot Project on floods along the following lines.

- a) To assess the main climatic forcings.
- b) To develop a conceptual model of the climate and or synoptic forcings of the major floods in the Uruguay River.
- c) To understand what climate forcings in the Middle Paraná, other than El Niño are responsible for great floods, and if there is a remote forcing, how is the acting mechanism.
- d) To develop an objective statistical model to estimate the occurrence of major floods in the Lower Paraná.
- e) To understand, the physical forcing of the different climate response to El Niño events of 1982-83 and 1997-98.

2- PROSUR Pilot Project on Human Dimensions. Activities during 2001. (Drs. Matilde Rusticucci and Silvina Solman Reporteurs).

- First meeting of the Steering Committee of Human Dimensions, Buenos Aires, October 4th & 5th 2001.

The aim of this meeting was to prepare a proposal on Human Dimensions of Floods in the Rio de La Plata basin to be submitted to the "IAI Small Grant Program" request.

Participants from Argentina (Dra. Claudia Natenzon, Dra. Silvina Solman, Dra. Matilde Rusticucci, Dra. Graciela Caputo, Lic. Alejandra Celis y Lic. Mara Bartolomé), Brazil (Dra. Luci Hidalgo Nunes), Uruguay(Ing. Diego Piñeiro) and Paraguay (Ing. José Luis Ávila Rodas) discussed the main topics to be taken into account for the proposal. The focus was: Study of institutional management of catastrophic floods in the Rio de la Plata basin. Case studies in Brazil, Paraguay, Uruguay and Argentina. The general objective is to analyze the institutional management of disasters and to contribute to elaborate integrated mitigation plans associated to catastrophic floods related to El Niño events in selected case studies over the Rio de la Plata basin.

A Report on this meeting can be found in Solman, S. y Rusticucci, M. 2001. First meeting of the Steering Committee on Human Dimensions, Report. <http://www-cima.at.fcen.uba.ar/prosur/default.html>.

- Workshop on 'Climate variability and health over Southern South America', Buenos Aires, December 2001.

The meeting, sponsored by PROSUR, had the objective of the exchange of previous results among medical, social and natural scientists and to discuss the incorporation of health items into the agenda of the study of social vulnerability to climatic variability. Scientists from Brazil and Argentina participated.