



UMI3351 research in the context of CLIMAX Project

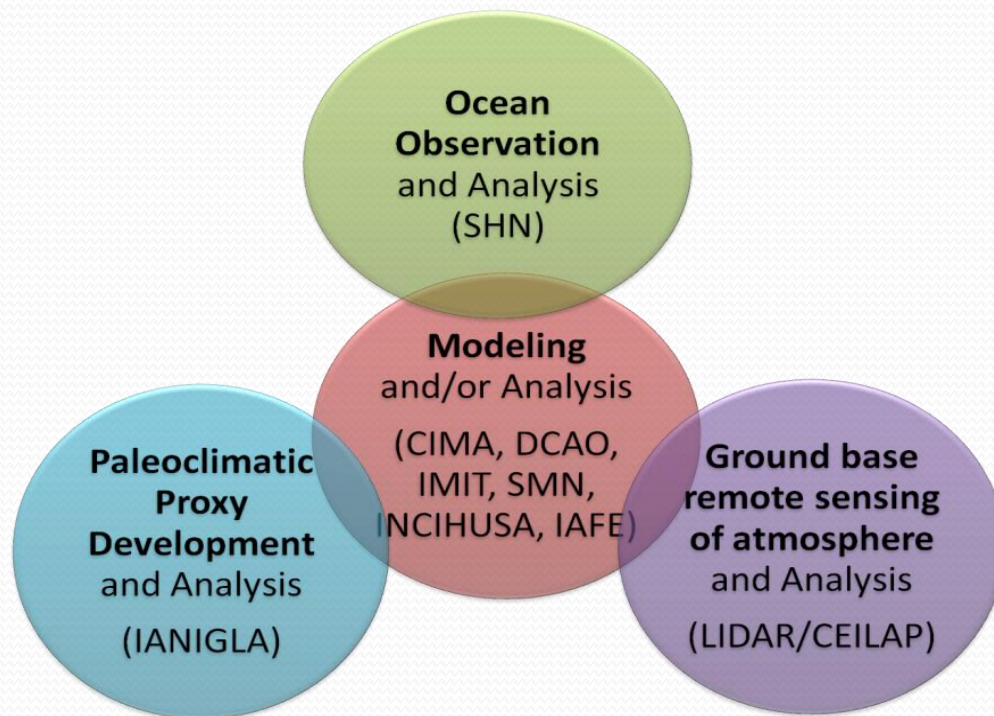
Carolina Vera on behalf of

M. Alvarez, L. Diaz, M. Osman, P. Spennemann, F. Robledo, A.
Rolla, A. Sörensson, M. I. Ortiz de Zárate,

CIMA/University of Buenos Aires-CONICET, UMI-IFAECI/CNRS

Buenos Aires, Argentina

UMI-IFAECI was established to strengthen France-Argentina scientific collaboration on a research agenda oriented to better understand, simulate and predict climate variability and change, as well as their impacts in southern South America and surrounding Oceans



Main research focus at the different UMI-IFAECI facilities

Research Themes

*T1: Climate variability
and change in
southern South
America*

*T2: Mathematical
methods for studies of
weather and Climate*

*T3: Weather and
Climate Prediction*

*T4: Regional climate
modeling and
sensitivity studies*

T5: Impact studies

*T6: Ground-base
remote sensing of the
atmosphere and its
applications*

*T7: South Atlantic
Studies*

*T8: Physical
atmospheric
processes at meso
and synoptic scales*

*T9: Physical processes
in coastal areas and
the Rio de la Plata
Estuary*

DIVAR Research Group:

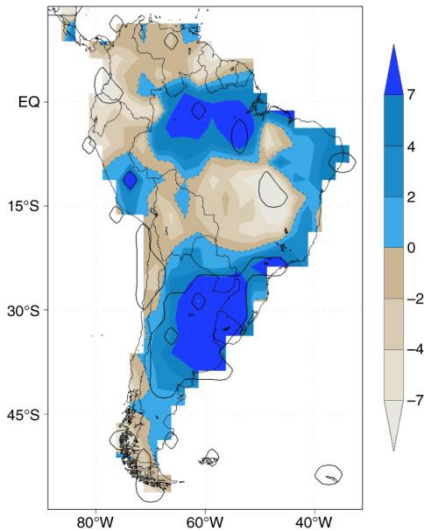
Dinámica de la Variabilidad atmosférica sobre Sudamérica

- DIVAR Goal: Increase knowledge on climate variability and change in South America to develop new tools to predict regional climate and its impacts, on weekly, monthly, annual and decadal scales
- Besides the DIVAR group, other researchers from UMI-IFAECI and the SMN participate in CLIMAX Project

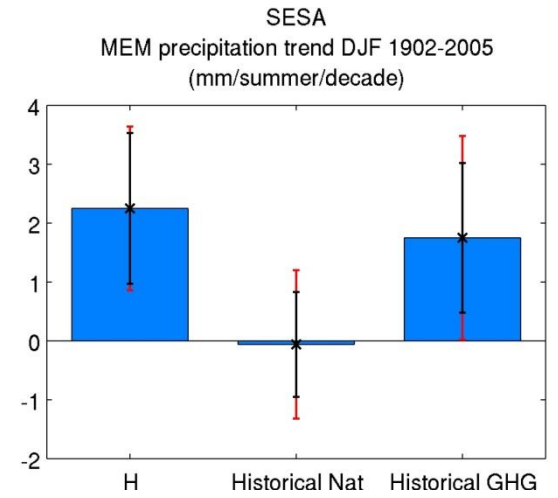


Contributions to WP1

Understanding drivers and mechanisms of observed large-scale variability and trends on interannual to decadal time scales (Leandro Díaz)



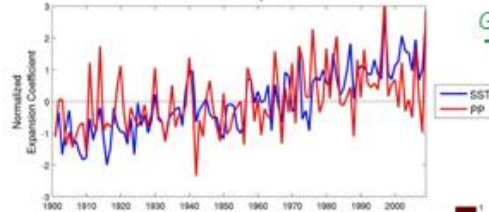
Observed DJF Rainfall linear trends (1902-2005)



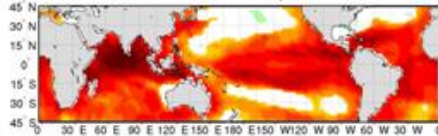
How does the regional climate variability in South America will evolve in the next years-decades?

- the internal natural variability mostly associated with the tropical ocean evolution
- The external climate forcing associated with both natural and anthropogenic sources

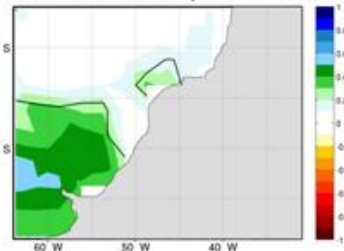
Mode 1 DJF 1902-2010 Explained Variance: 71%



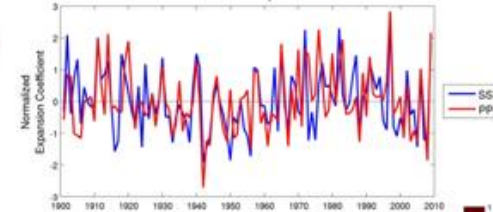
Correlation SST and SST Expansion Coefficient



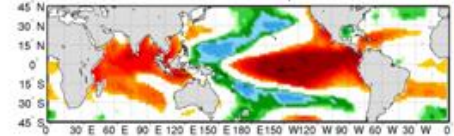
Correlation PP and SST Expansion Coefficient



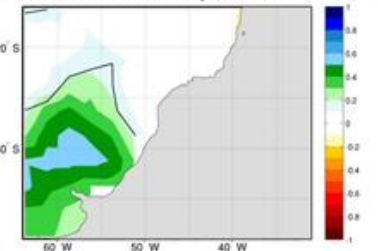
Mode 1 DJF 1902-2010 Explained Variance: 51%



Correlation SST and SST Expansion Coefficient

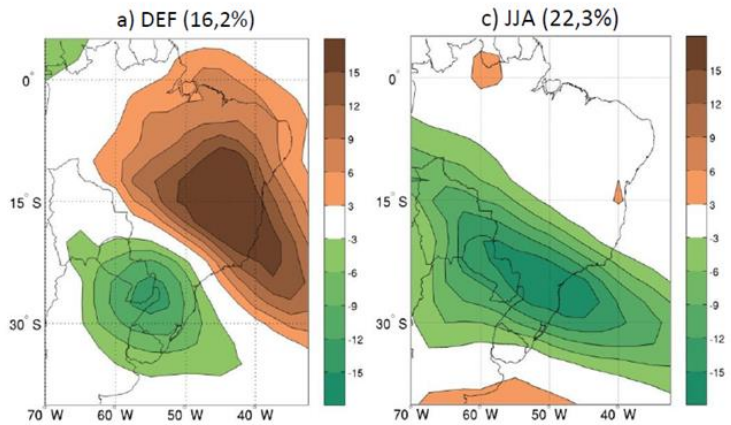


Correlation PP and SST Expansion Coefficient



Understanding drivers and mechanisms of climate variability in SSA on subseasonal timescales (Mariano Alvarez)

SIS pattern: EOF1 of IS-filtered OLR' (10-90 days)



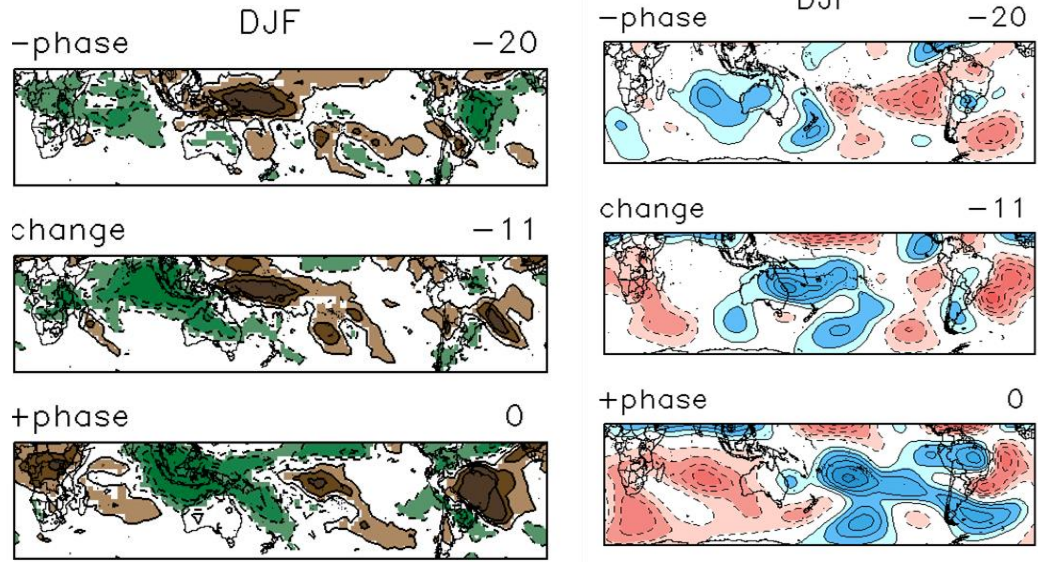
SIS index = PC1. Describes activity of SIS pattern



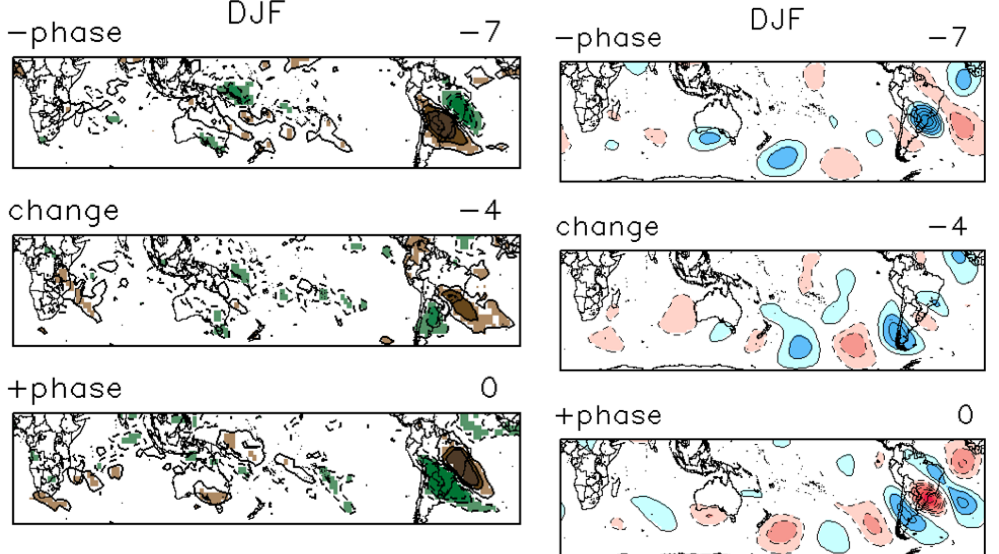
if positive, pp favored in **green** area

if negative, pp inhibited in **green** area

IS variability on 30-90 days

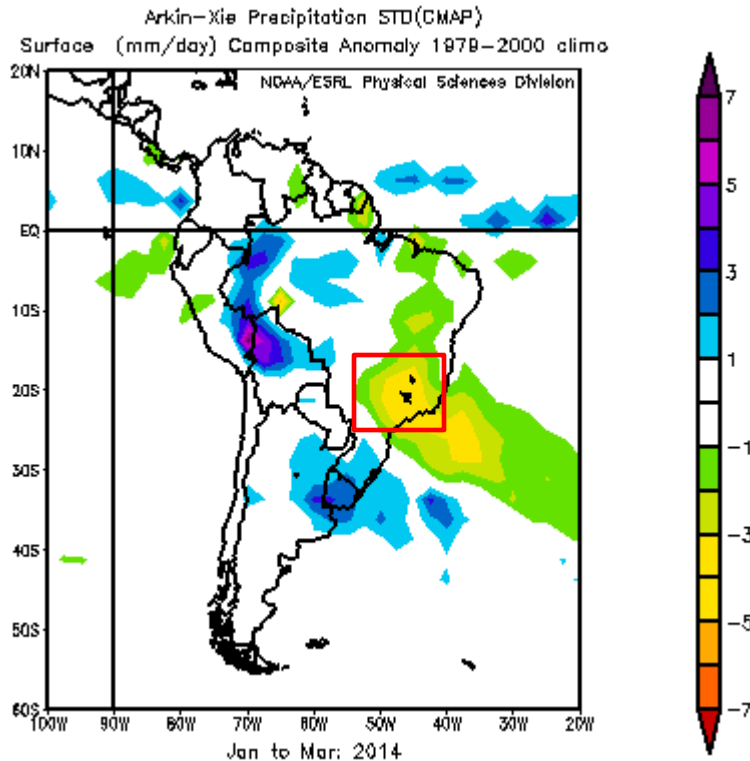


IS variability on 10-30 days

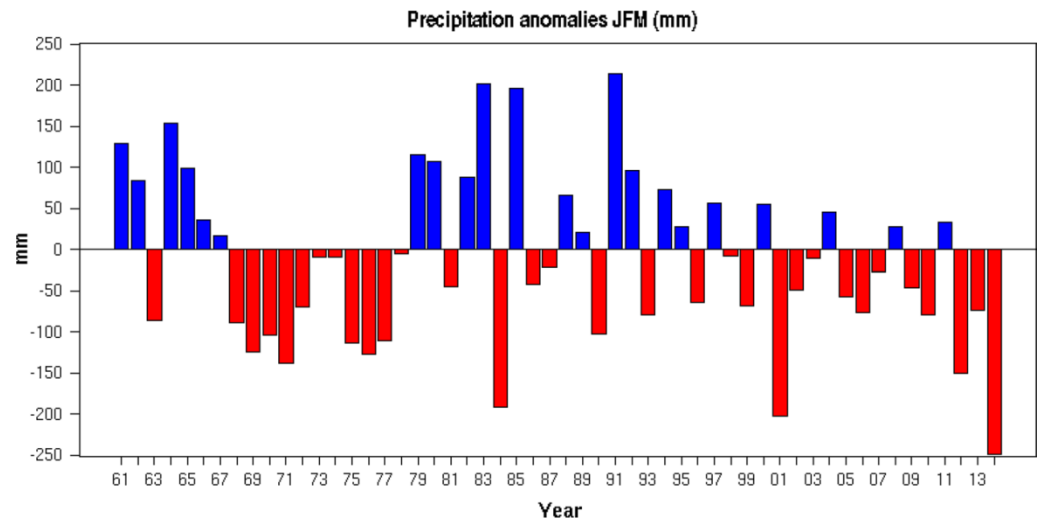


The 2014 southeast Brazil summer drought: Extreme case of a positive EOF1 phase

JFM Precipitation anomaly in 2014



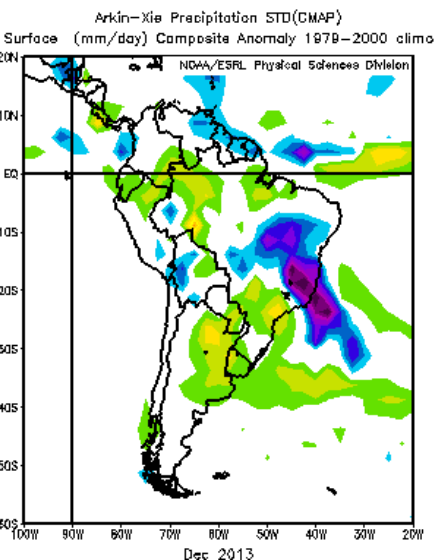
Observed JFM Precipitation anomalies averaged over southeast Brazil from 1961 to 2014



Coelho et al. (2015)

2013 December: Extreme case of a negative EOF1 phase

2013 December Precipitation anomaly



Extreme heat wave in Argentina

- More than 15 days with extreme hot conditions
- Collapse of the energy system of Buenos Aires

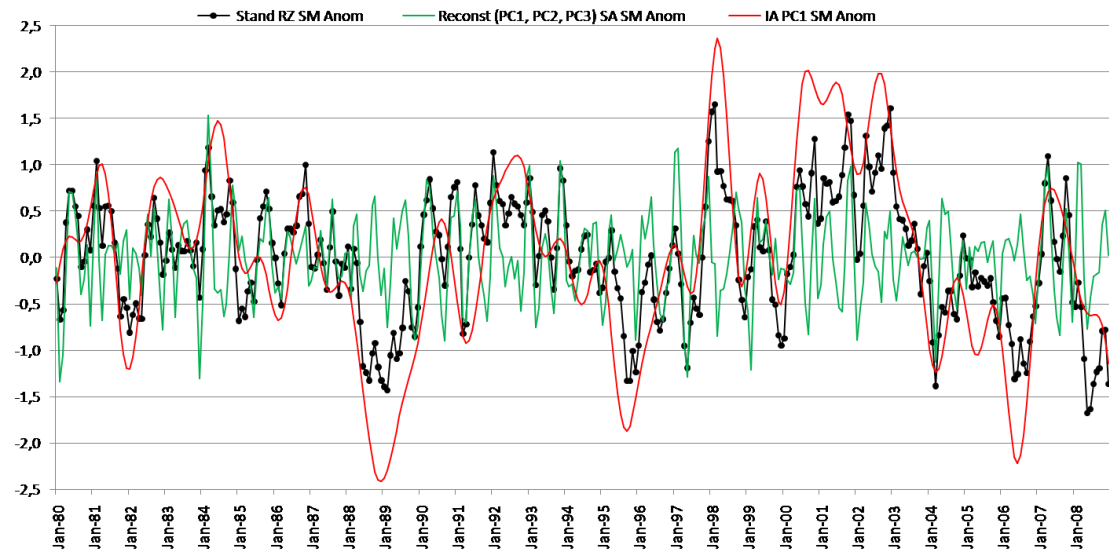
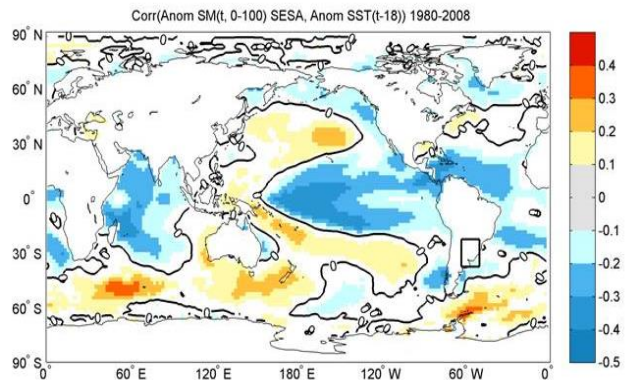
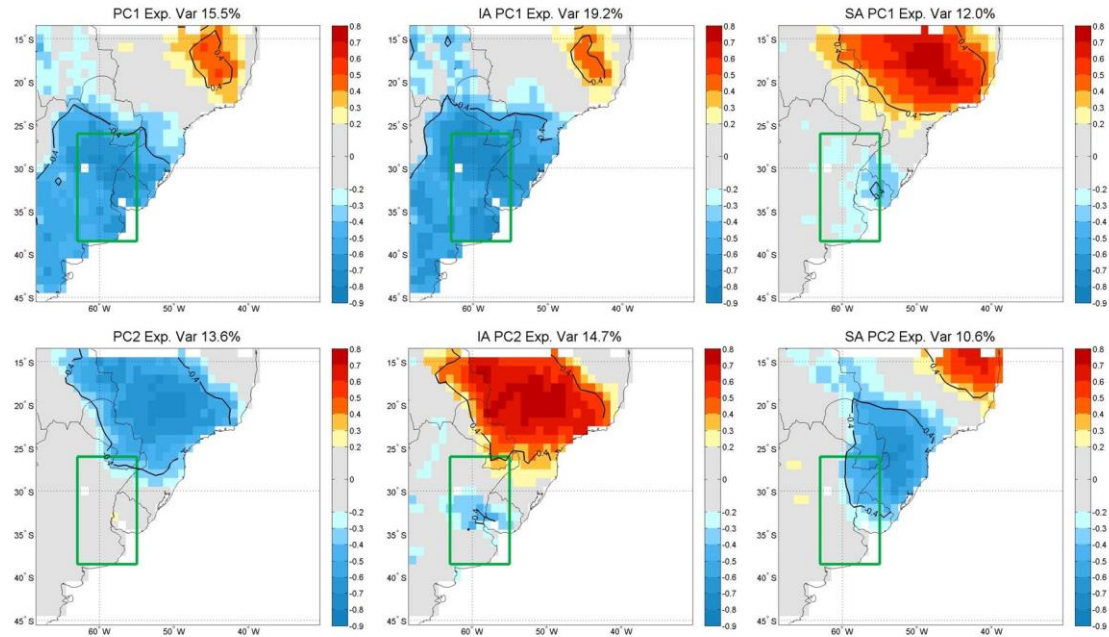


Extreme precipitation and floods in Southeast Brazil

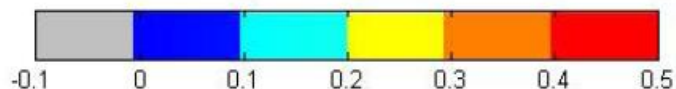
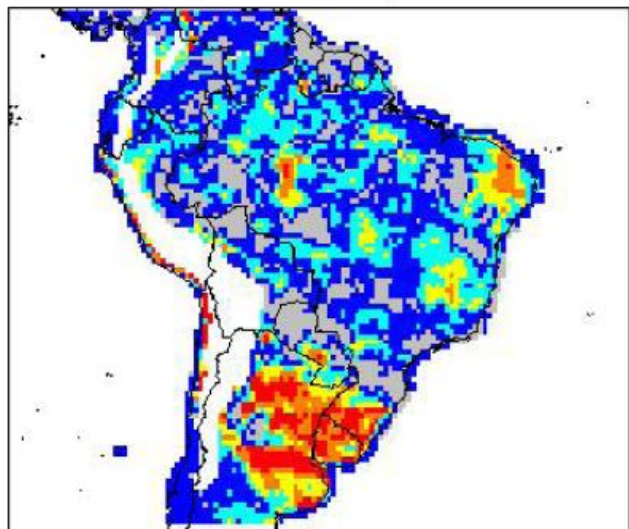
- More than 15 days with extreme rainfall conditions
- Emergency at many states, serious and large socio-economic impacts



Understanding drivers and mechanisms of soil moisture variability in SSA on subannual and interannual timescales (Pablo Spennemann)



Understanding of the influence of land use change, floodplains and irrigation on hydrology in SSA (Anna Sörensson)



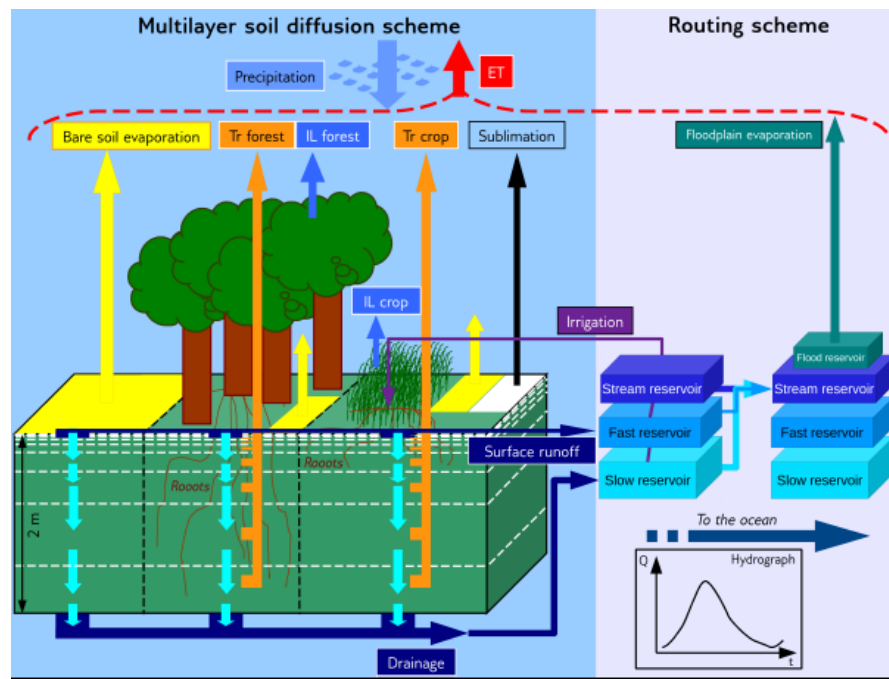
Southeastern South America is a hot spot of land surface – atmosphere interaction both in present and future climate.

(Sörensson and Menéndez 2011, Ruscica et. al 2016)

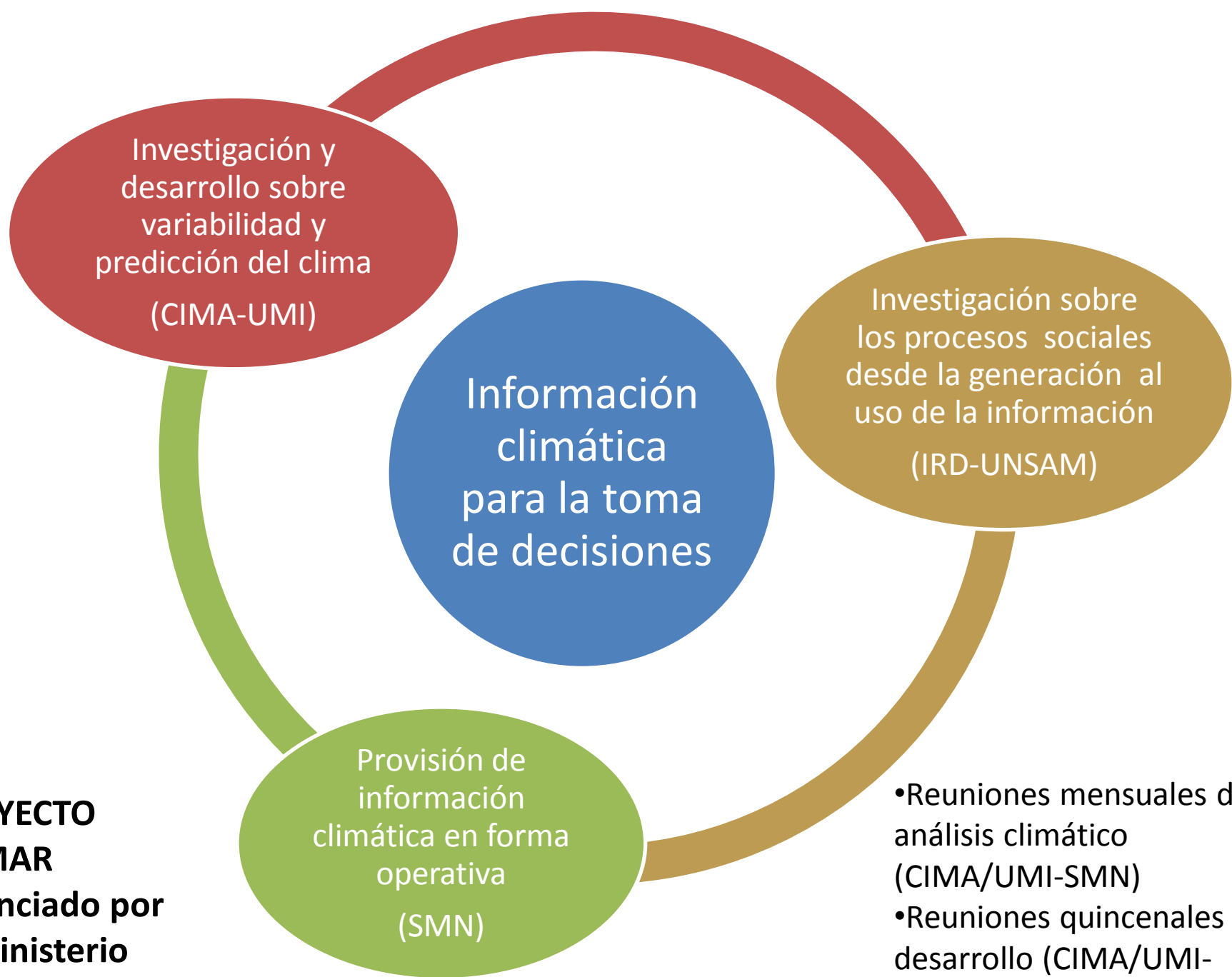
How has historical land use change influenced on the hydrology of the rivers in the la Plata Basin?

How do horizontally propagating soil moisture anomalies (floodplains, irrigation) influence on hydrology, local surface climate and precipitation?

Tools: ORCHIDEE (*Organizing Carbon and Hydrology In Dynamic Ecosystems*) coupled to WRF



Contributions to WP2 and WP0



Investigación y desarrollo sobre variabilidad y predicción del clima (CIMA-UMI)

Información climática para la toma de decisiones

Investigación sobre los procesos sociales desde la generación al uso de la información (IRD-UNSAM)

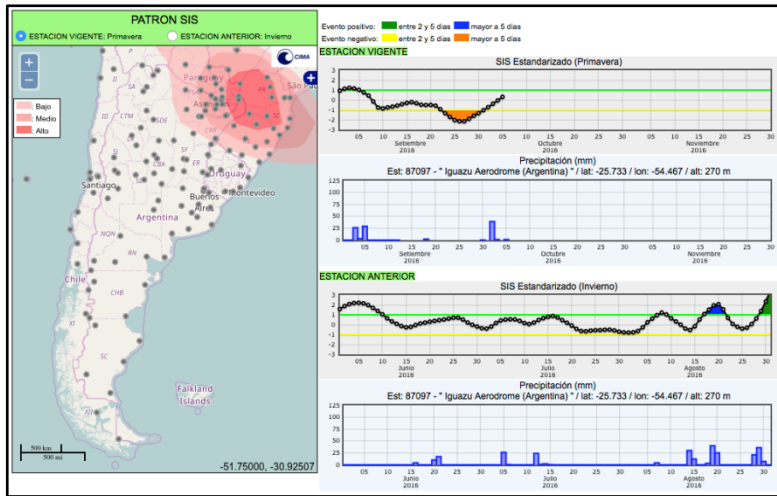
Provisión de información climática en forma operativa (SMN)

- Reuniones mensuales de análisis climático (CIMA/UMI-SMN)
- Reuniones quincenales de desarrollo (CIMA/UMI-SMN-UNSAM)

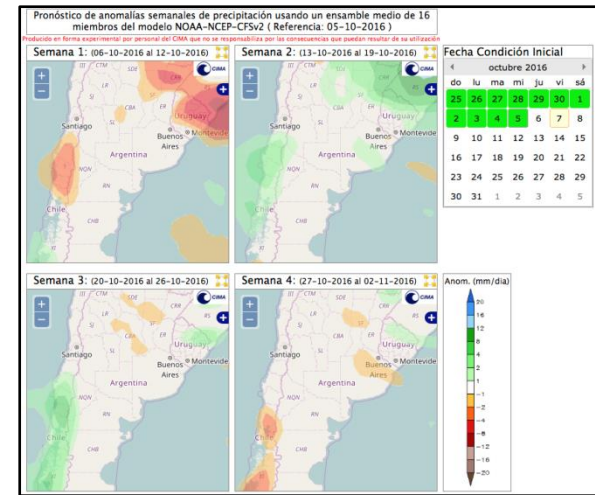
PROYECTO CLIMAR
Financiado por el Ministerio de Defensa

Web-based tools of climate monitoring and prediction (Alfredo Rolla)

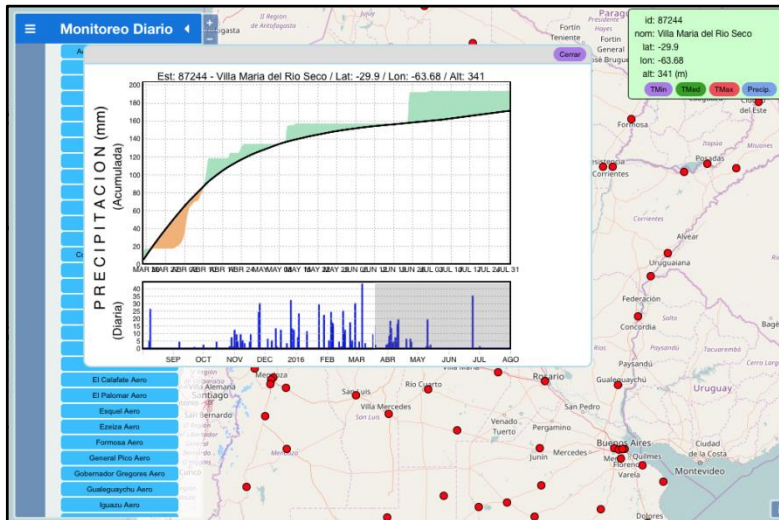
❖ SIS web implementation



❖ CFSv2 weekly forecast anomalies visualization (pre, t2m, z200,olr)



❖ Monitoring variables visualization (tmax,tmin,tmed,pre)

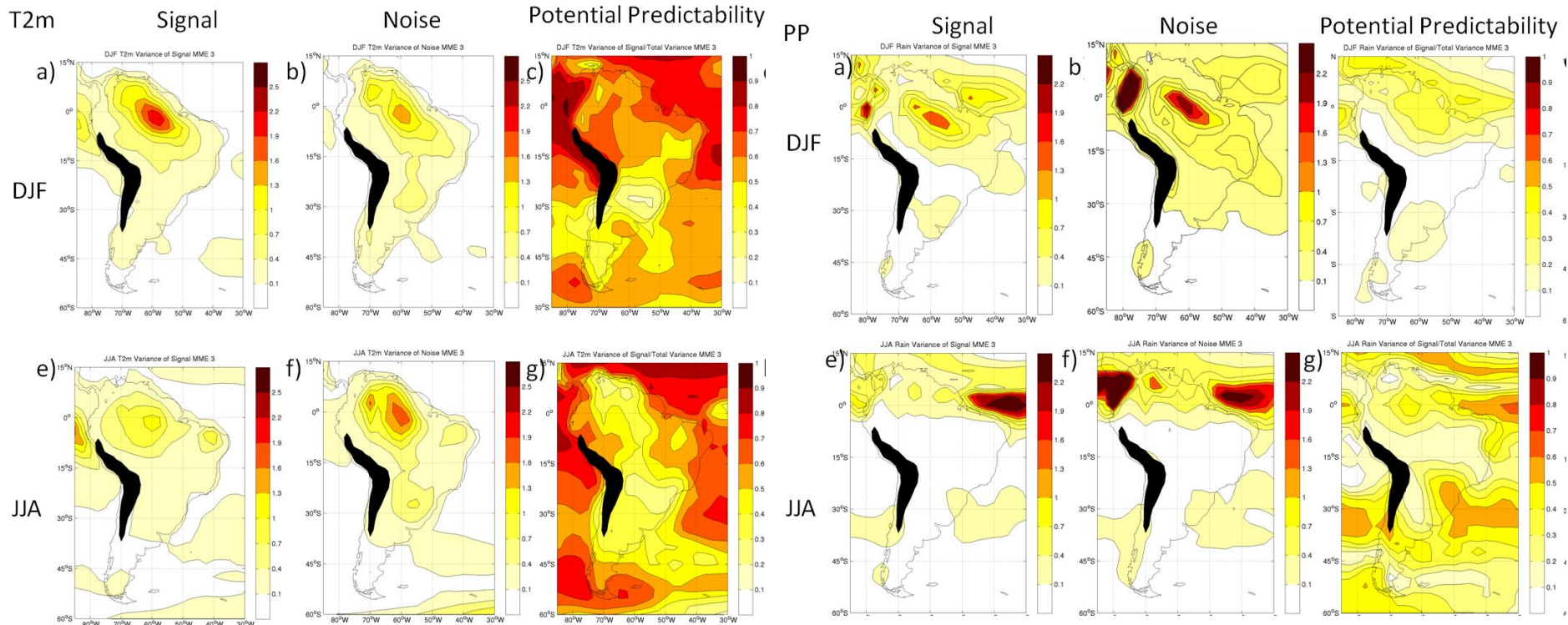


❖ Visualization Libraries (building block) :

- ✓ Openlayers (mapping)
- ✓ D3js (Data Driven Documents)
- ✓ D3jsgeo (Geographic projections ext.)

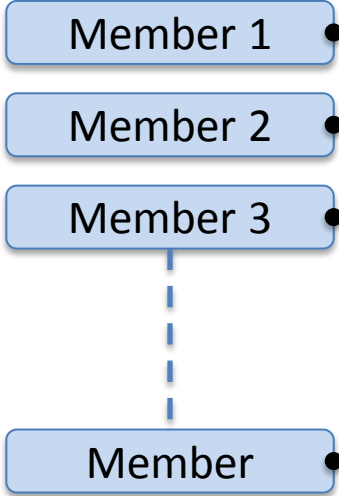
Regional predictability on seasonal timescales (Marisol Osman)

- Assessment of the predictability and skill of climate anomalies over South America considering a multi-model ensemble of 99 seasonal forecasts from 9 coupled global circulation models included in the Climate Historical Forecast Project (CHFP)/WCRP.



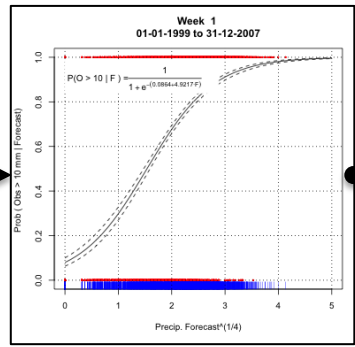
Calibrated probabilistic climate predictions on subseasonal timescales (Alfredo Rolla)

Weekly Climate Forecasts



$$\sqrt[4]{F_{ens}}$$

Calibrated regional statistical models of logistic regression



CFSv2
40 models / region
GEFv2
20 models / region

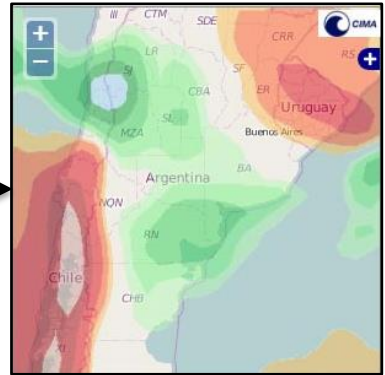
$$P[O > Tr | F]$$

Where:

O: Observations
Tr: Threshold
F: Forecast

$P[O > Tr | F]$:
Probability that observation in the region exceeds the threshold of 10 mm given the forecast

Expected result



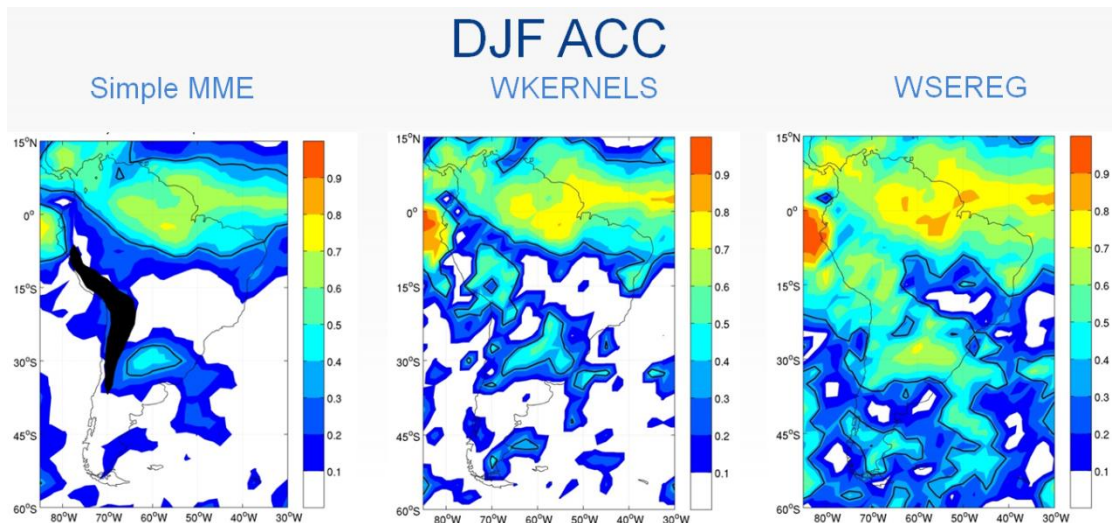
CFSv2 n:16 (4 weeks)
GEFSv2 n:11 (2 weeks)

Calibrated probabilistic climate predictions on seasonal timescales (Marisol Osman)

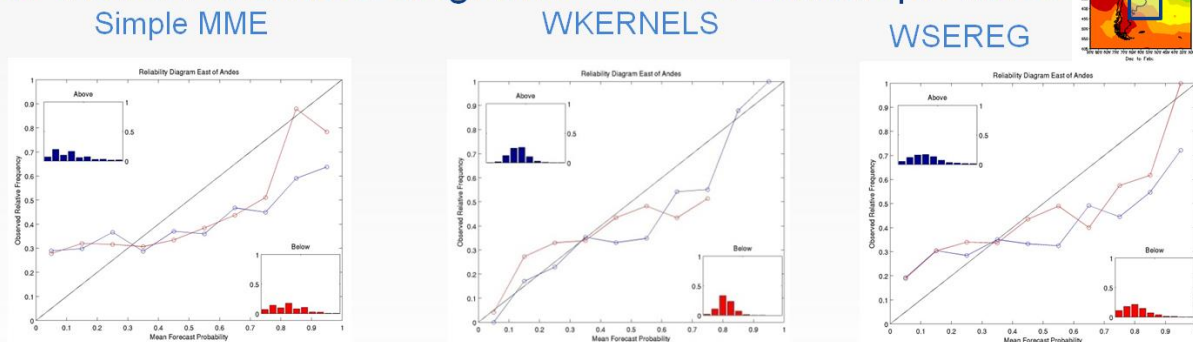
- 11 models participating in the Climate Historical Forecast Project (CHFP). ~ 10 ensemble members each. Precipitation forecast valid at DJF and JJA for the 1982-2006 period, made with IC from Nov and May, respectively (Lead 1 month).

- For each model: Detrended and Standardized ensemble, we applied Ensemble Regression → PDF that represents each ensemble set, Determine the probability of each model of being the best → Model's Weight

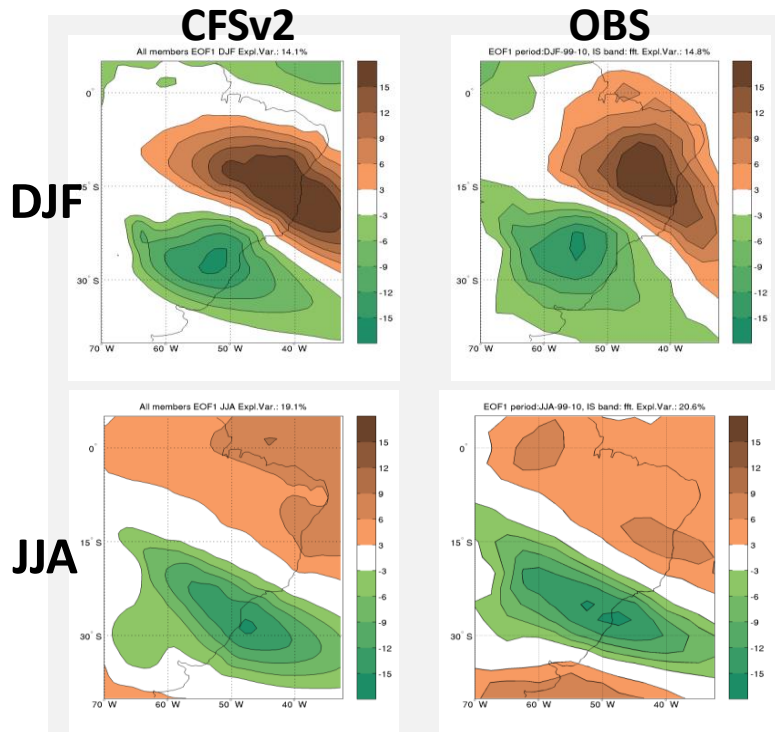
- Model consolidation: WKERNELS: Sum Weighted PDF to get a consolidated PDF. WSEREG: Apply EREG to the Weighted Super-Ensemble.



DJF Reliab. and ROC diagrams – East of Extratrop. Andes



Climate information on subseasonal timescales: Monitoring and prediction (Mariano Alvarez)



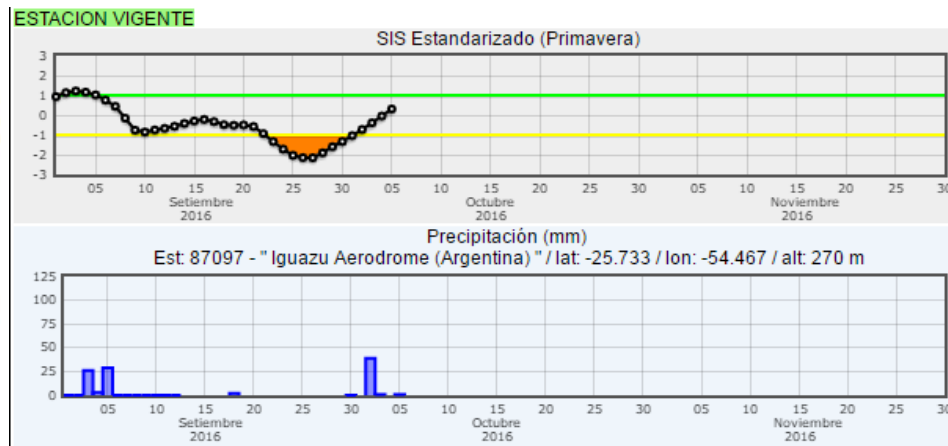
SIS pattern: EOF1 of IS-filtered OLR' (10-90 days)

Well represented by the CFSv2 model, which runs operationally

- Current efforts in:
- Improving RT index performance
 - Assessing predictability levels and prediction skill of SIS pattern

SIS index monitoring →

Uses quasi-RT OLR obtained from NOAA. With A. Rolla



Participatory Research: “Anticipando la crecida” (Federico Robledo)



Anticipando la crecida-Anticipating the flood

An inter-disciplinary and inter-sectoral project to develop tools to support disaster risk management associated with storm surges and flooding rains



Rio de la Plata, Quilmes 8
Junio, 2013

¿How do we anticipate the flood?



- Coordinated by young people
- Based on a co-design and co-production framework including actors from:
 - Different offices of the local government
 - Different civil society organizations
 - Academic-scientific institutions (social and natural sciences)
 - Operational agencies (National Weather Service, National Water Agency)

Contributions to WP4

Project Management and organization: Web-based tools (M.I. Ortiz de Zárate)



Trello: A cloud-based project management tool



A cloud-based team collaboration tool



A screenshot of the CLIMAX web-portal. The page has a blue header with navigation links: Home, Consortium, Organisation, and Contact. The main content area is titled "CLIMAX: Climate Services Through Knowledge Co-Production: A Euro-South American Initiative for Strengthening Societal Adaptation Response to Extreme Events". Below the title, it says "A project funded by:" followed by logos for BELMONT FORUM and JPI Climate. The page contains several paragraphs of text, including a description of the project's interdisciplinary framework and its objectives. On the right side, there is a list of partners and their affiliations, including the Instituto Franco-Argentino sobre Estudios de Clima y sus Impactos, Centre National de la Recherche Scientifique (CNRS), Instituto Nacional de Pesquisas Espaciais (INPE), Laboratoire des Sciences du Climat et de l'Environnement (LSCE/UMR 8122), Commissariat à l'énergie atomique et Energies Alternatives (CEA), Wageningen Environmental Research (ALTERRA), Wageningen University & Research (WUR), Technische Universität München (TUM), Potsdam-Institut für Klimafolgenforschung (PIK), and Centre d'études en sciences sociales sur les mondes africains, américains et.

CLIMAX web-portal

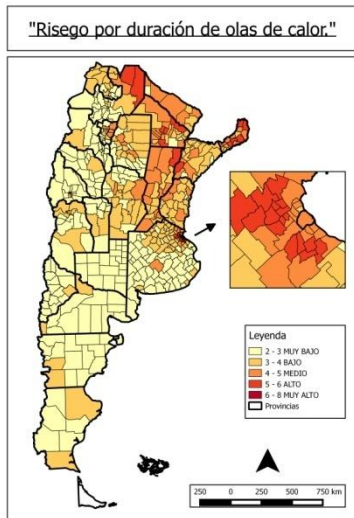
Impact studies of 3rd National Assessment of Argentina: Data Portal and key results

<http://3cn.cima.fcen.uba.ar>

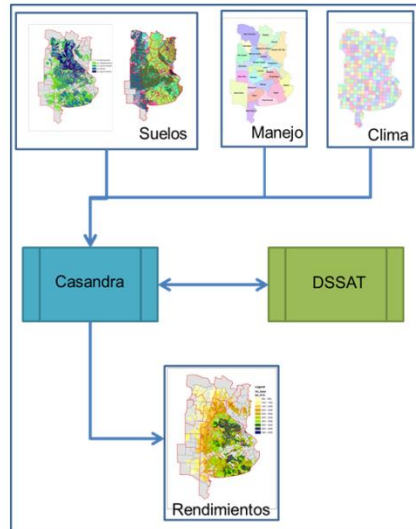
The image shows three screenshots from the 3CN Data Portal. The leftmost screenshot is the homepage, titled 'Base de Datos Climáticos' and '3ra. Comunicación Nacional de la República Argentina a la Convención Marco de las Naciones Unidas sobre Cambio Climático'. The middle screenshot shows a search interface with a table of search criteria and a list of search results. The rightmost screenshot shows a map of Argentina with a data overlay and a table of monthly precipitation data for the period 1960-2010.

PROVINCIA	PRECIPITACION
Buenos Aires	1960-2010
Catamarca	1960-2010
Chaco	1960-2010
Chubut	1960-2010
Córdoba	1960-2010
Corrientes	1960-2010
Dariel Fierro	1960-2010
Entre Ríos	1960-2010
Formosa	1960-2010
Jujuy	1960-2010
La Pampa	1960-2010
La Rioja	1960-2010
Mendoza	1960-2010
Misiones	1960-2010
Río Negro	1960-2010
Salta	1960-2010
San Juan	1960-2010
San Luis	1960-2010
Santa Fe	1960-2010
Santiago del Estero	1960-2010
Tierra del Fuego y de los Antillas	1960-2010
Tucumán	1960-2010

Social vulnerability



Yield of principal crops



Livestock production

