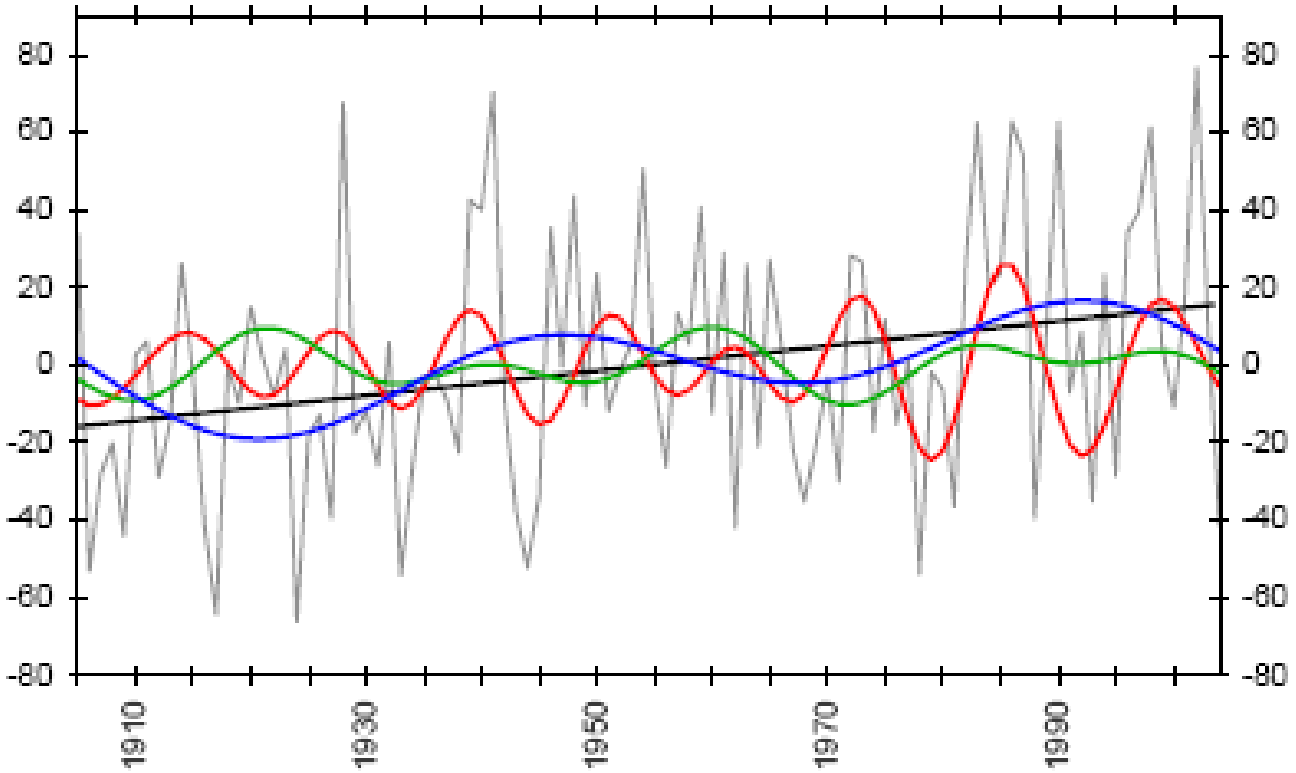
# CIMA-UMI Contributions to WP2

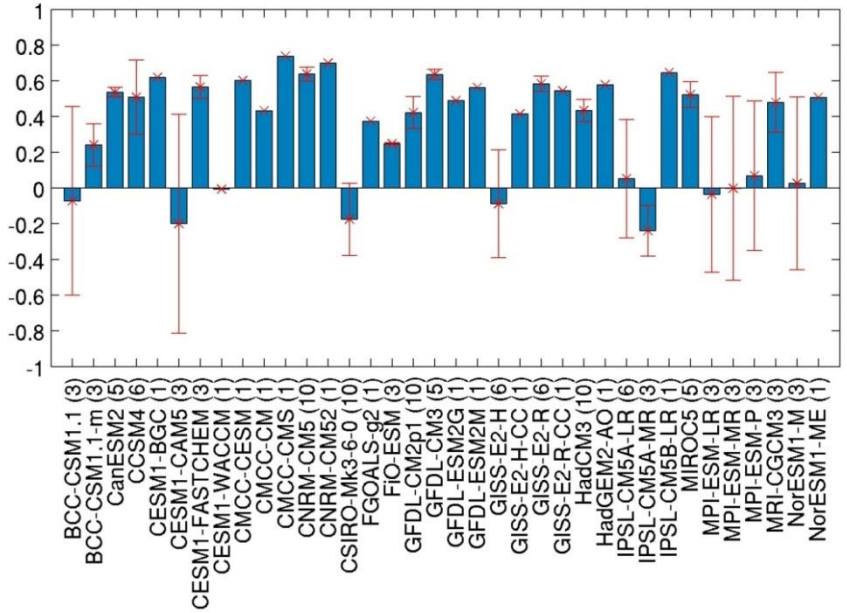
# Motivation:
# Climate variability and Change in southeastern South America



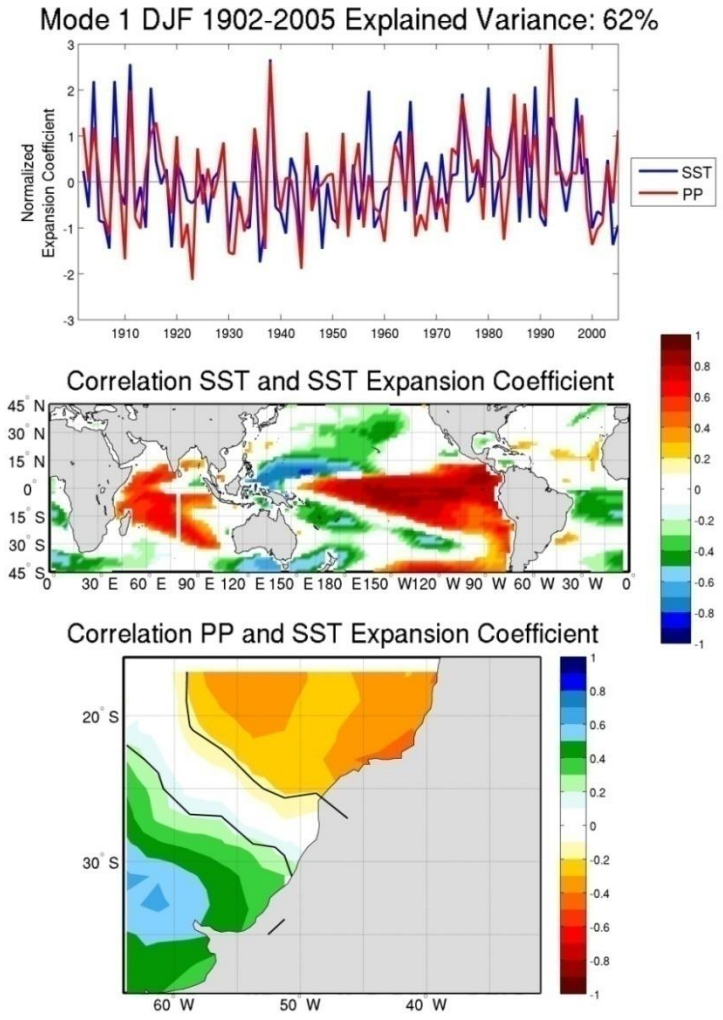

**(gris) Anomalías de lluvia de DEF en el sudeste de Sudamérica y su correspondiente (rojo) variabilidad decadal, (verde, azul variabilidad multidecadal y (línea negra) tendencia lineal**

# Predictability of decadal climate variability in South America

CMIP5 Model skill in representing EOF1




**GFDL-CM3 Model historical run**

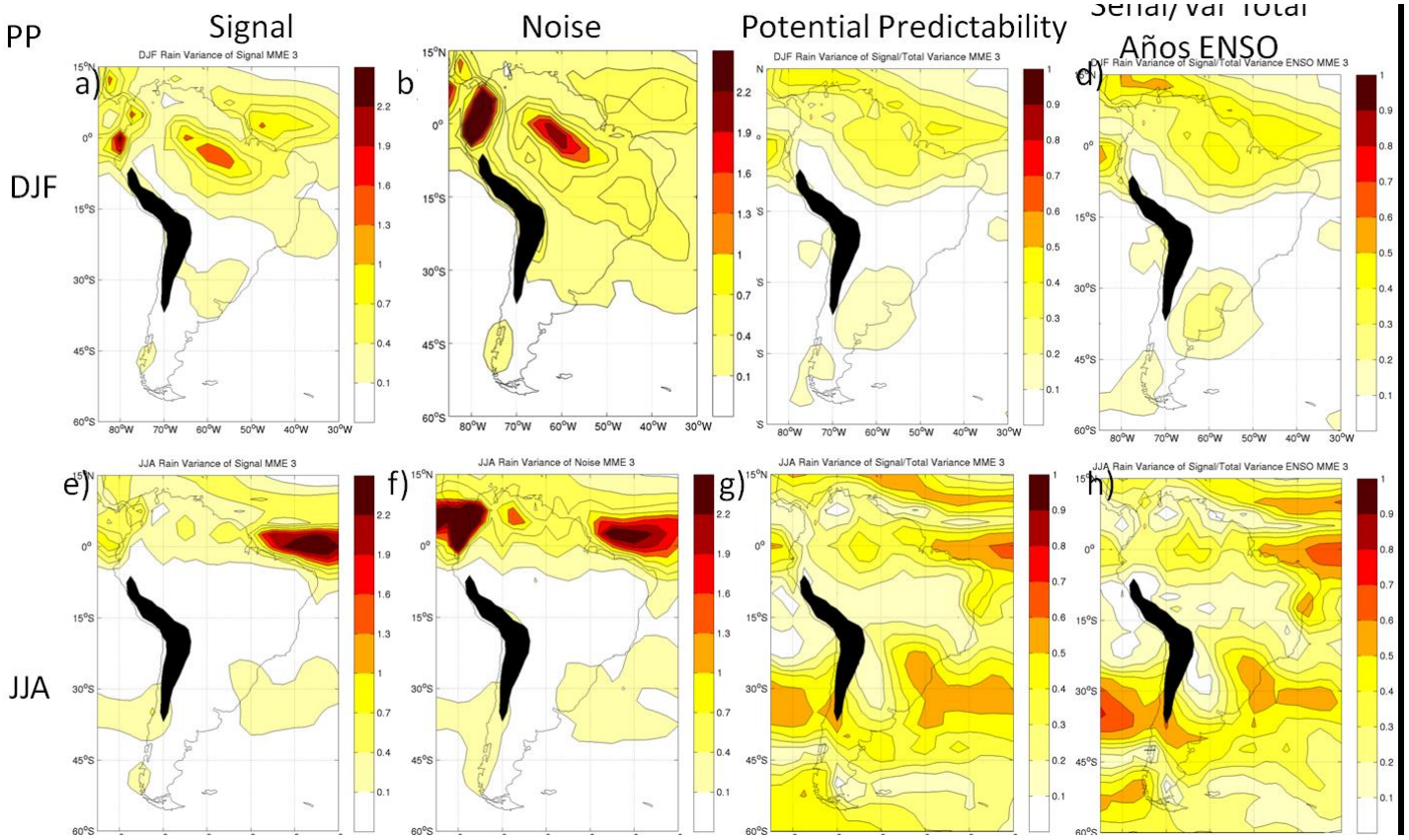



**(Assessment of CMIP5 decadal predictions is in progress)**

Díaz Vera, and Saurral (2016)

# 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 seasonal timescales (Marisol Osman)

## Goal

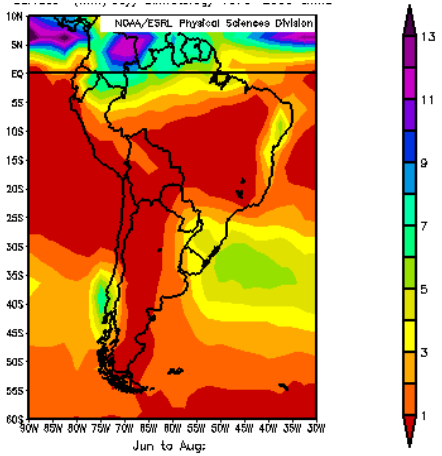
- To apply the Ensemble Regression Technique to precipitation model outputs from WCRP/CHFP project over South America.

- To assess the performance over tropical and extratropical regions against the direct multi-model output

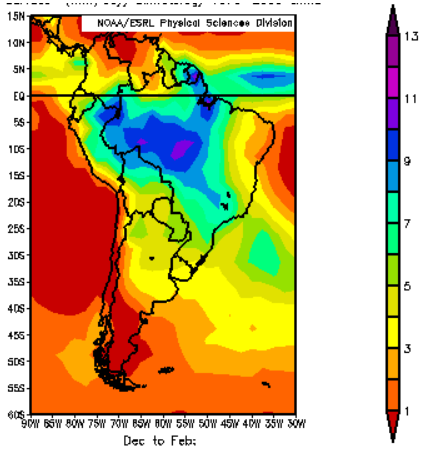
# Data

- 11 models participating in the Climate Historical Forecast Project (CHFP). ~ 10 ensemble members each
- Precipitation forecast valid at December-January-February and June-July-August for the 1982-2006 period, made with IC from Nov and May, respectively (Lead 1 month).
- CMAP precip used as observations

JJA




DJF



# Methods

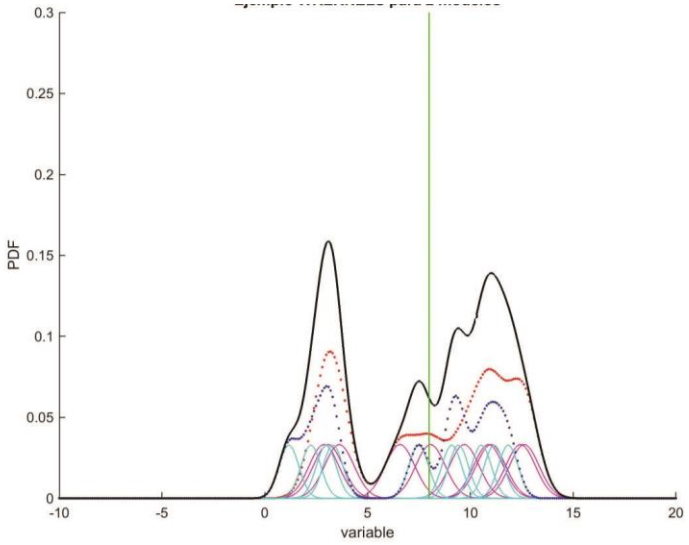
For each model:

- Detrended and Standardized ensemble
- We applied Ensemble Regression → PDF that represents each ensemble set
- We evaluated the PDF of each model at the observation → Determine the probability of each model of being the best → Model's Weight
- One-year-out cross-validation was used

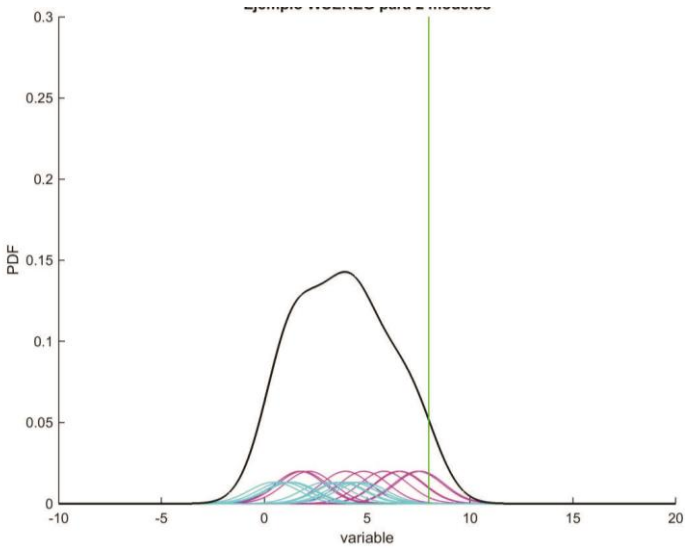
# Consolidation

Two ways to consolidate models

WKERNELS:
Sum Weighted PDF to get a consolidated PDF

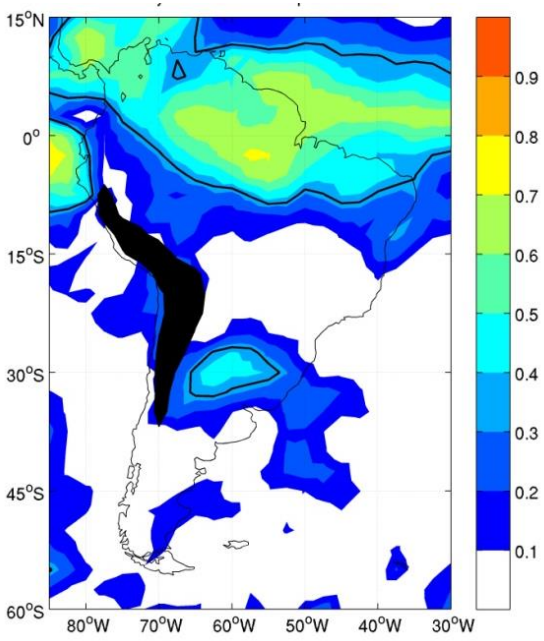



WSEREG:
Apply EREG to the Weighted Super-Ensemble

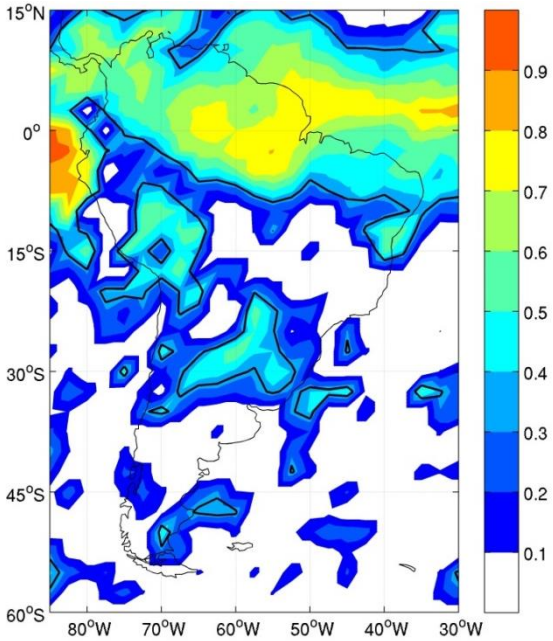


# DJF ACC

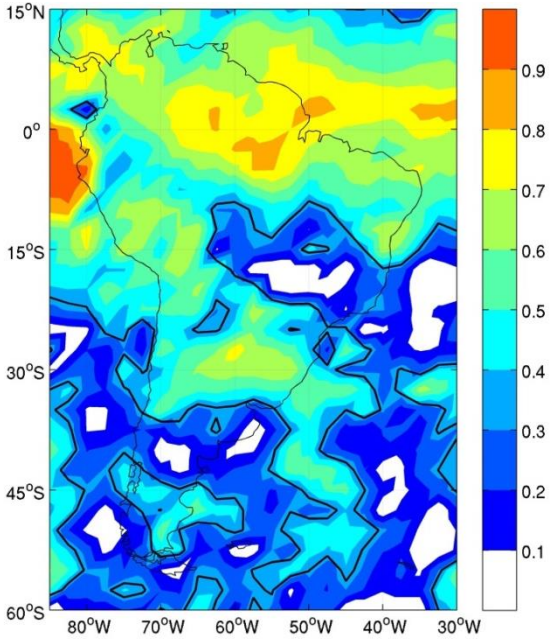
Simple MME



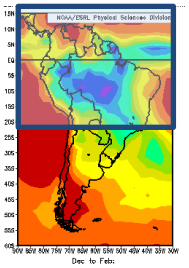

WKERNELS



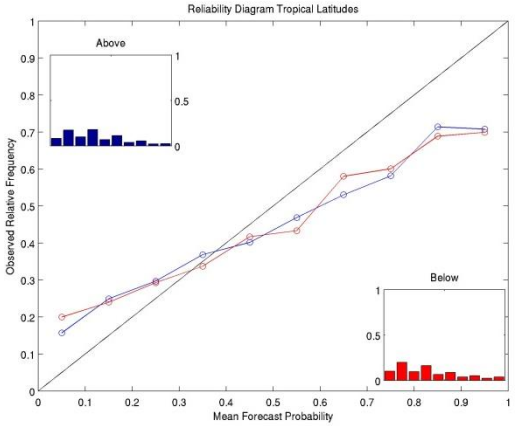

WSEREG

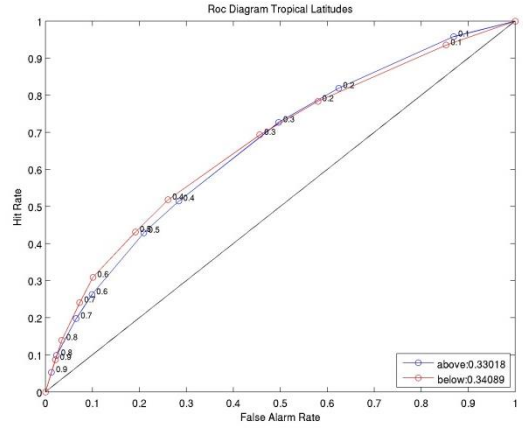


# DJF Reliab. and ROC diagrams - Tropics

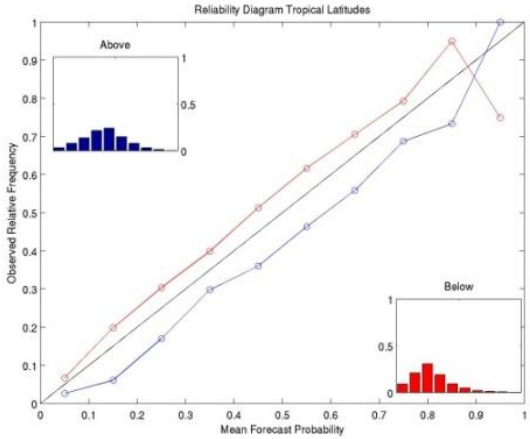


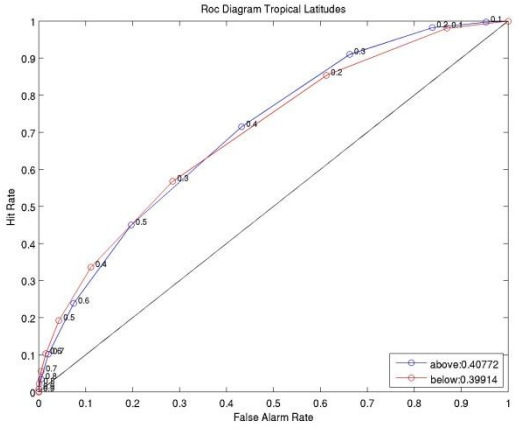
## Simple MME



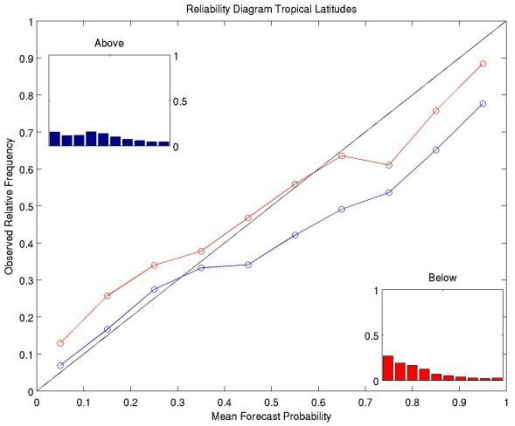



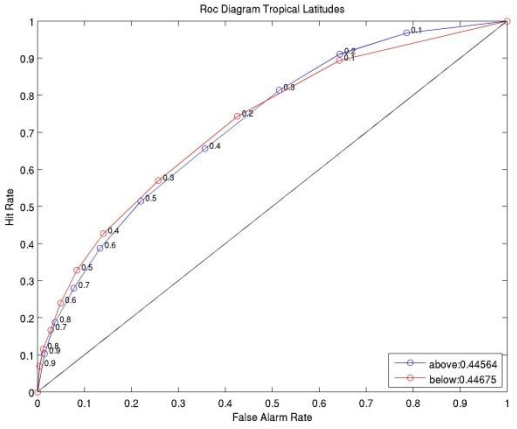

## WKERNELS



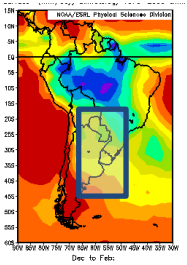




## WSEREG

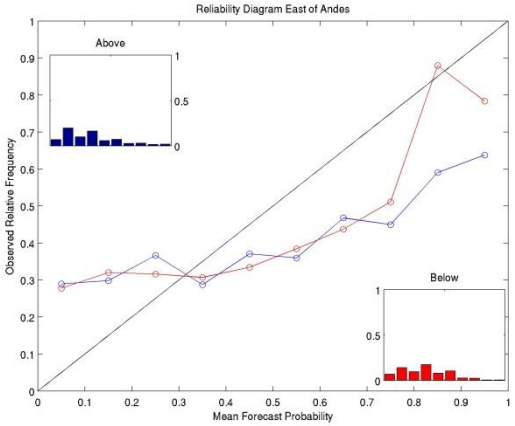


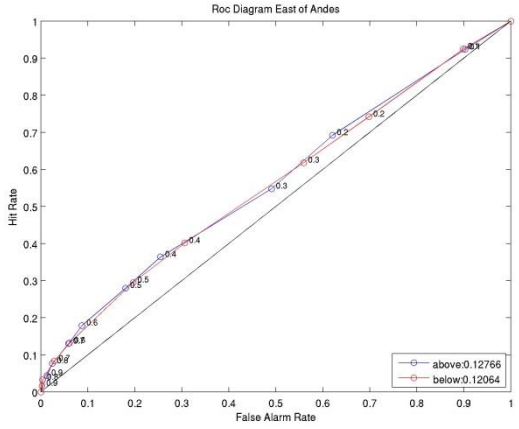



# DJF Reliab. and ROC diagrams – East of Extratrop. Andes

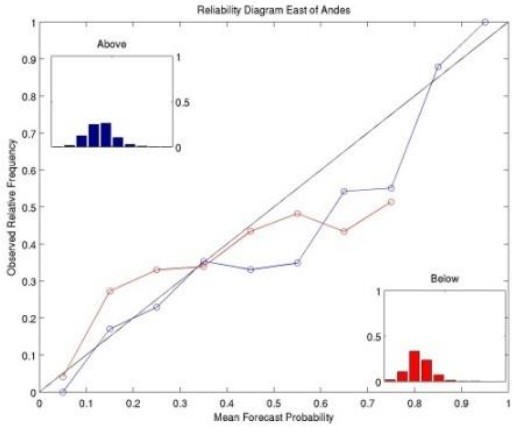


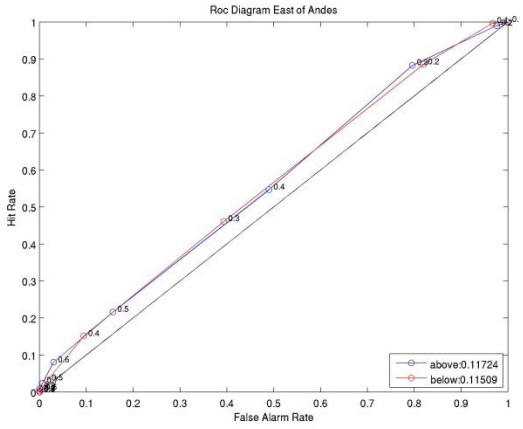
## Simple MME



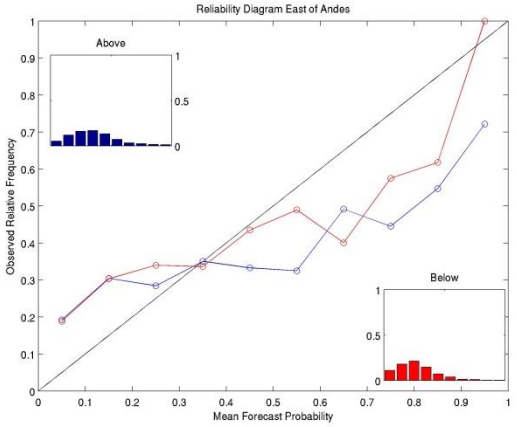



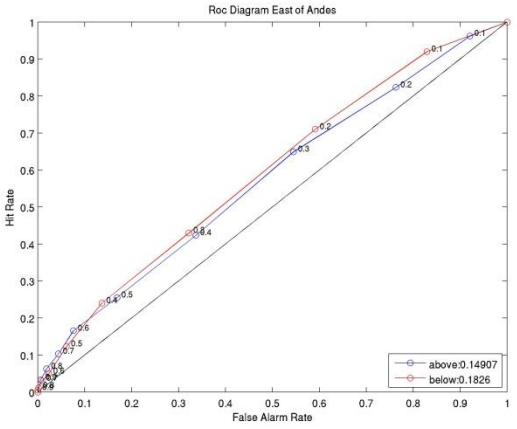

## WKERNELS



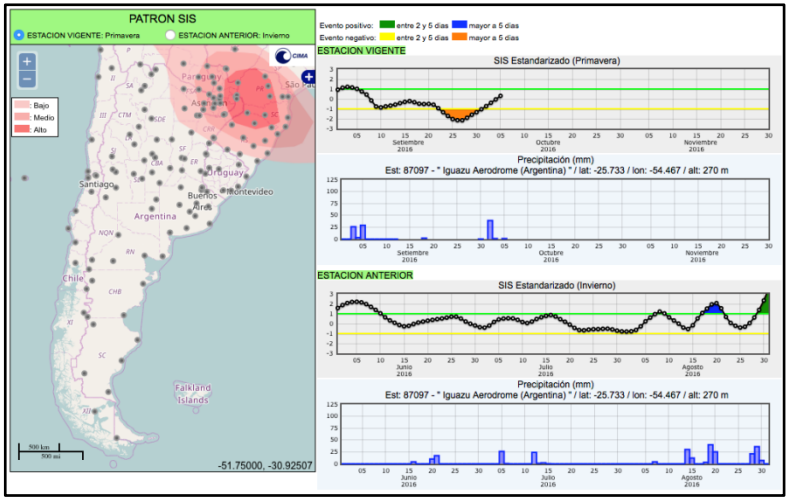

## WSEREG



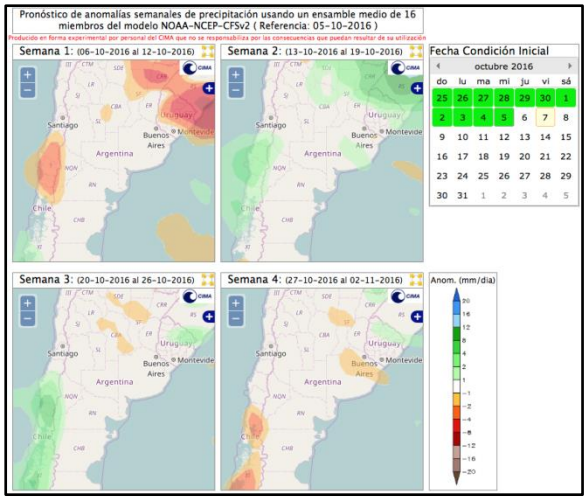



# Web-based tools of climate monitoring and prediction (Alfredo Rolla)

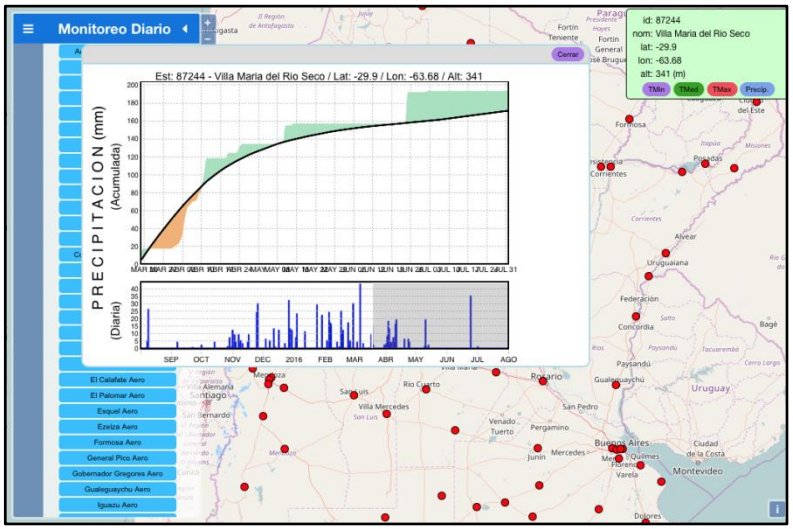
- SIS web implementation




- 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.)

# Calibrated probabilistic climate predictions on subseasonal timescales (Alfredo Rolla)

Weekly Climate Forecasts

Member 1

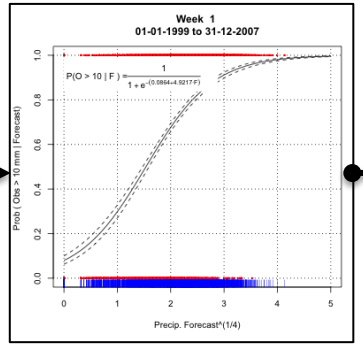
Member 2

Member 3

Member

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

Calibrated regional statitical models of logistic regression




CFSv2
40 models / region
GEFV2
20 models / region

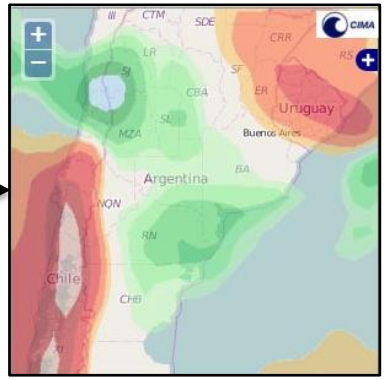
**P**[ O > Tr | F ]

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

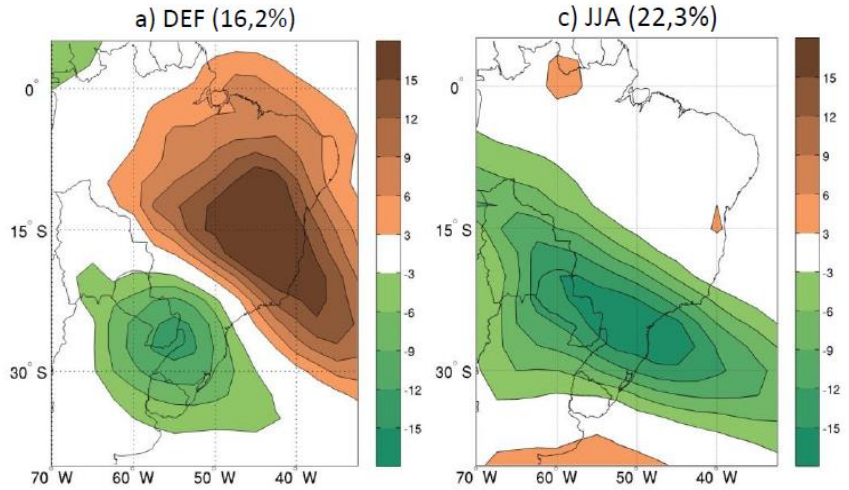
Expected result




CFSV2 n:16 (4 weeks)
GEFSv2 n:11 (2 wekks)

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

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

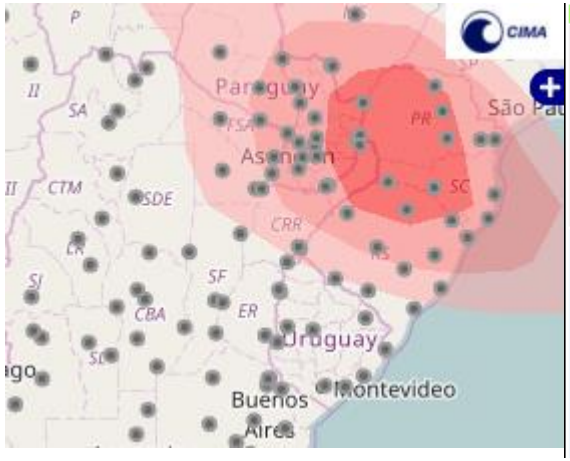


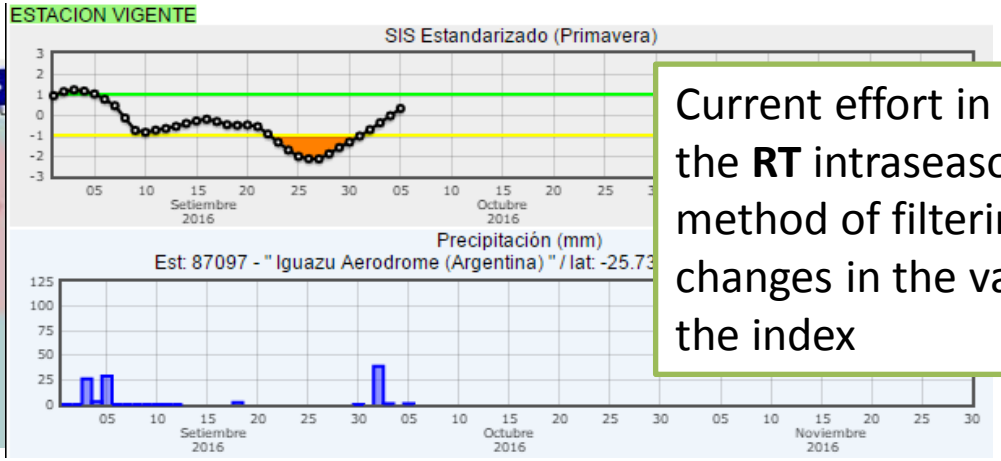

SIS index = PC1. Describes activity of SIS pattern

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

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

***SIS index monitoring*** Uses quasi-RT OLR obtained from NOAA. With A. Rolla

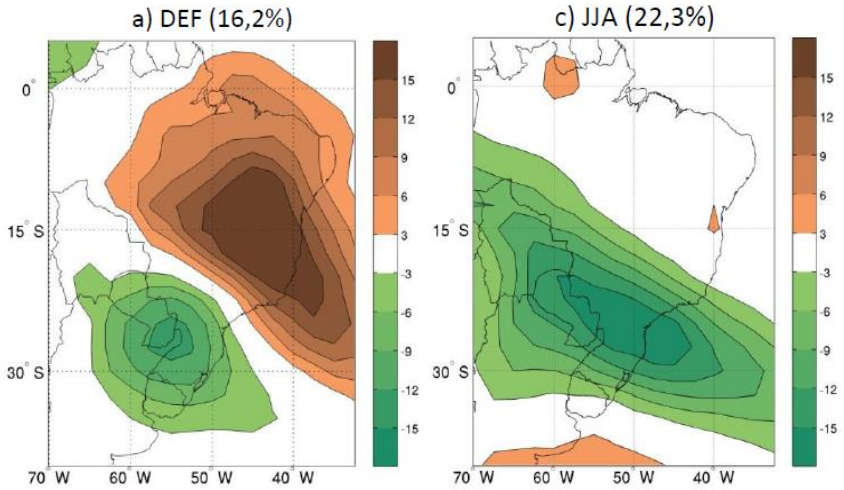


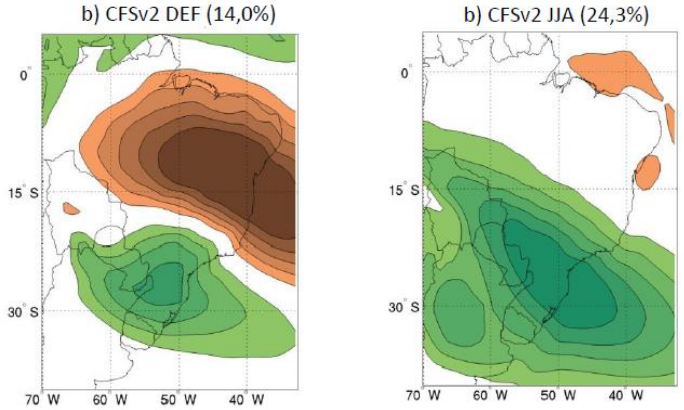

Current effort in improving the **RT** intraseasonal method of filtering to avoid changes in the values of the index

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

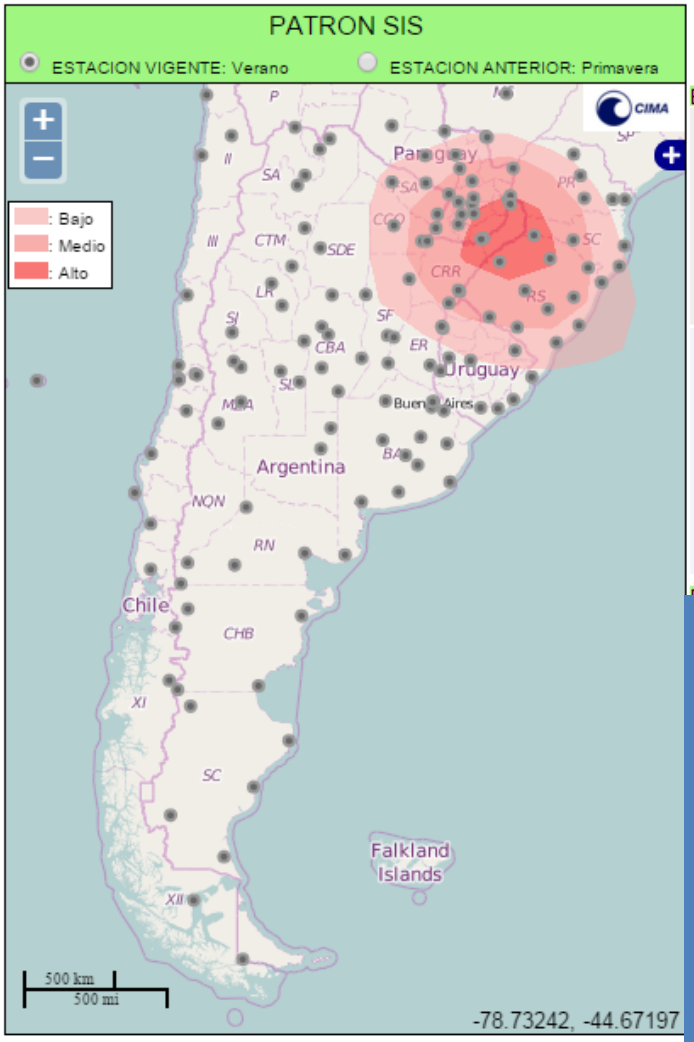
***SIS pattern: EOF1 of IS-filtered OLR' (10-90 days)***

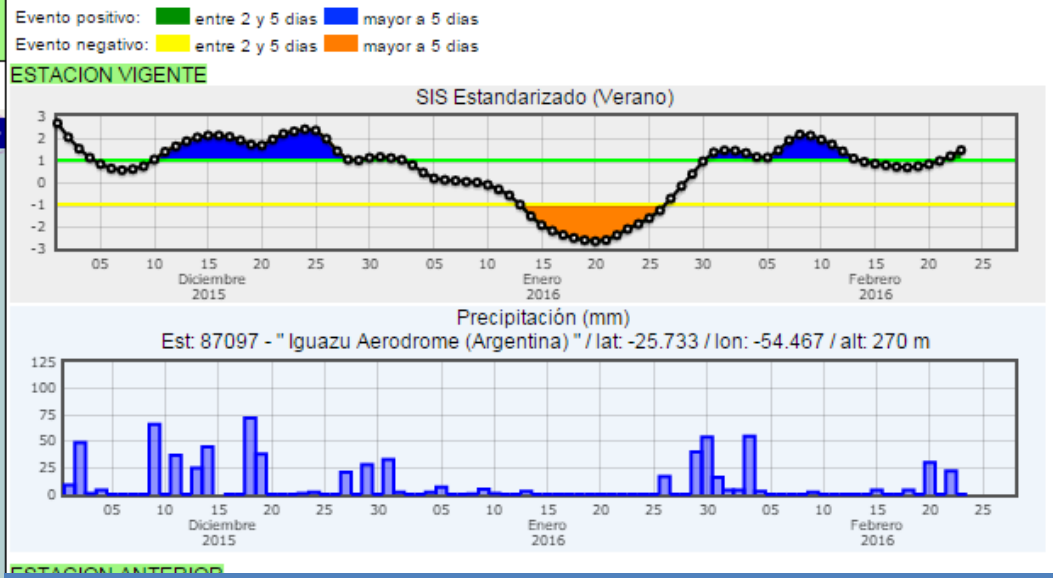



Well represented by the CFSv2 model, which runs operationally




***SIS index predictability is to be assessed using the 45-day runs of the CFSv2, from week 1 to week 4***




# Evolution of the SIS index during December-January-February 2016