CORDEX Central America and South America Training Workshop on Downscaling Techniques

ASSESSING THE ANALOG METHOD TO DOWNSCALE DAILY PRECIPITATION IN THE PAMPAS REGION

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Introduction

GLOBAL CIRCULATION MODELS (GCMs)

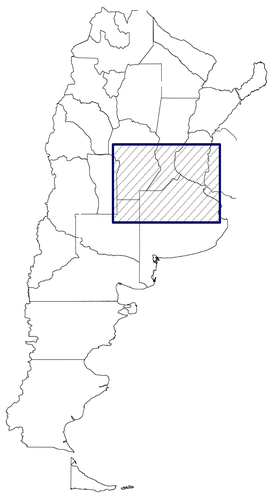
- ❖ Fundamental tools when making **climate change** projections.
- ❖ Manage to simulate the global climate system responses to variations in the forcings.
- ❖ Not reliable at regional or local scales.

→ **EMPIRICAL STATISTICAL DOWNSCALING TECHNIQUES (ESD)**

Objetive and methodology

Calibrate and validate the **analog method** to downscale **daily precipitation in the south of the Southeastern South America region**.

→ Region exposed to extreme events of precipitation with high impacts. Populated area where agricultural, livestock, port, hydrological and tourist activities are developed.



Data

OBSERVED DAILY PRECIPITATION OF 28 METEOROLOGICAL STATIONS FROM 1979-2014

REANALYSIS AND GCMs

Raw reanalysis and GCMs daily precipitation outputs

- ❖ Sea level pressure
- ❖ Air temperature at 850 hPa
- ❖ Specific humidity at 850 hPa

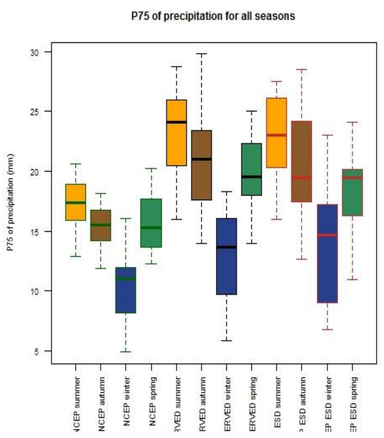
→ PREDICTORS for **ESD**

- ❖ NCEP **ESD**
- ❖ FGOALS-g2 **ESD**
- ❖ GFDL-ESM2G **ESD**
- ❖ IPSL-CM5A-LR **ESD**
- ❖ MIROC-ESM-CHEM **ESD**
- ❖ MPI-ESM-LR **ESD**
- ❖ NorESM1-M **ESD**
- ❖ BCC-CSM1-1 **ESD**
- ❖ CSIRO-Mk3-6-0 **ESD**

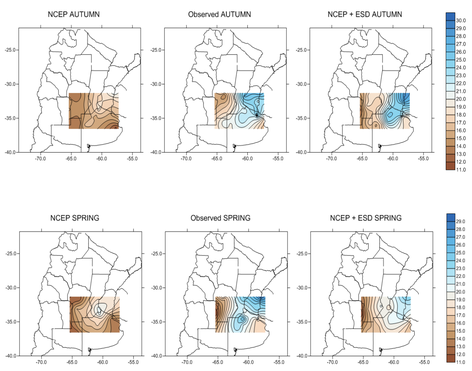
Results and conclusions

REANALYSIS

FOR VALIDATION PERIOD: 2001-2014



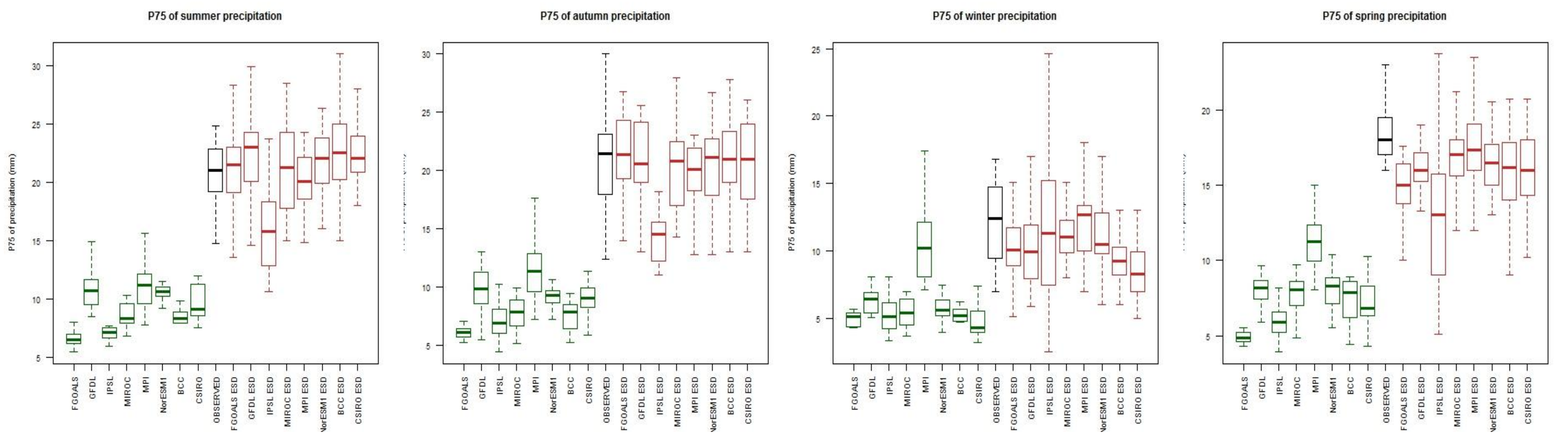
Boxplots of the 75th percentiles of precipitation greater than 1mm for the raw output of NCEP, the observed data and the NCEP ESD output, for the four seasons.



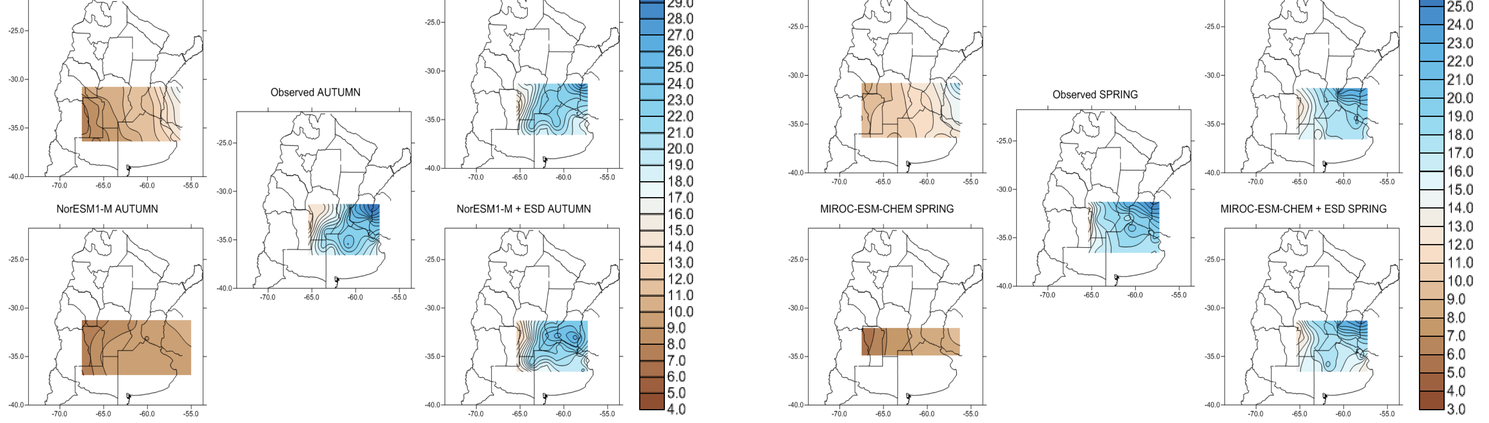
Spatial distribution of the 75thpercentiles of precipitation greater than 1mm for the raw output of NCEP, the observed data and of the NCEP ESD output, for autumn (above) and spring (below).

GCMs

FOR HISTORICAL RUN - PERIOD: 1979-2005



Boxplots of the 75th percentiles of precipitation greater than 1mm for the raw outputs of the eight GCMs (in green), the observed data (in black) and the GCMs ESD outputs (in red), for the summer (left), autumn (center left), winter (center right) and spring (right).



Spatial distribution of the 75th percentiles of precipitation greater than 1mm for the raw outputs of two selected GCMs, the observed data and the two GCMs ESD outputs, for autumn (left) and spring (right).

- ❖ **The downscaling performance depended on the season under consideration. The highest skill was found for winter probably due to winter precipitation is mostly controlled by large-scale mechanisms that are well captured by the AN.**
- ❖ **The downscaled precipitation series showed considerably better agreement with the observed precipitation statistical aspects, stressing the added value of the ESD.**

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