

INTERCOMPARISON OF STATISTICAL AND DYNAMICAL DOWNSCALING IN SOUTHEASTERN SOUTH AMERICA: FUTURE PROJECTIONS OF EXTREME RAINFALL

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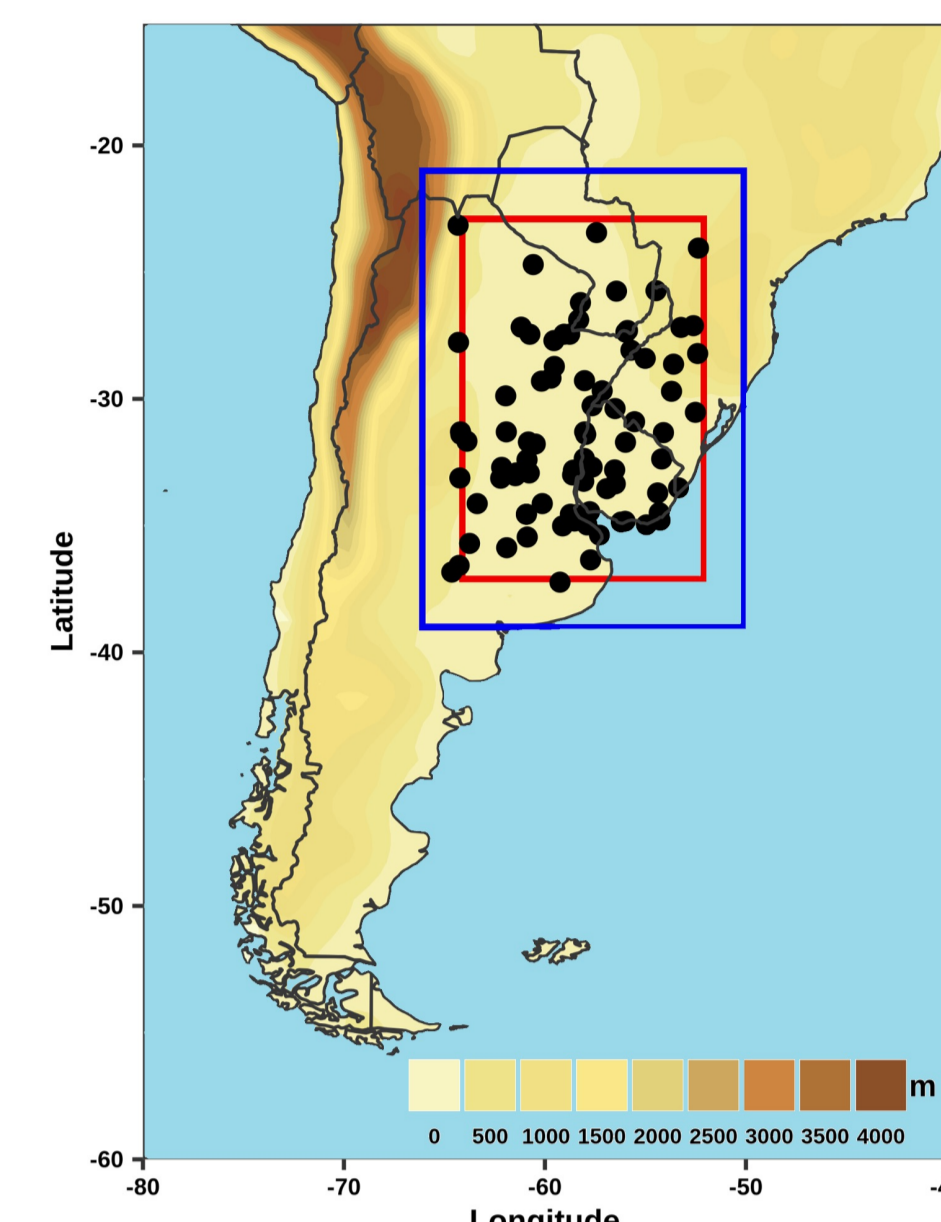
Introduction

EXTREME EVENTS IN SE SOUTH AMERICA (SESA)

- Have several impacts on the different socio-economic activities.
- Presented changes in terms of frequency and intensity during the recent period.
- GCMs cannot simulate them due to misrepresentation of regional-to-local climatic features. There is a need of regional climate data for policy making.

Objectives

Develop future projections of daily rainfall with focus on extreme events by means of statistical downscaling methods (ESD) and to intercompare ESD with CORDEX-CORE RCMs over SESA.



Data

OBSERVED PRECIPITATION FROM METEOROLOGICAL STATIONS 1979-2017

ERA-Interim
1000 850 700 500hPa
Geopotential
Air Temperature
Specific Humidity
Wind (U,V)

- 6 CMIP5 & 6 CMIP6 GCMs: Historical and worst-case scenarios (RCP8.5 and SSP585)
- 4 CORDEX-CORE RCMs (REMO2015 & RegCM4v7)

1979-2100

ESD RCMs

HIGH-RESOLUTION CLIMATE INFORMATION OVER SESA

Methodology

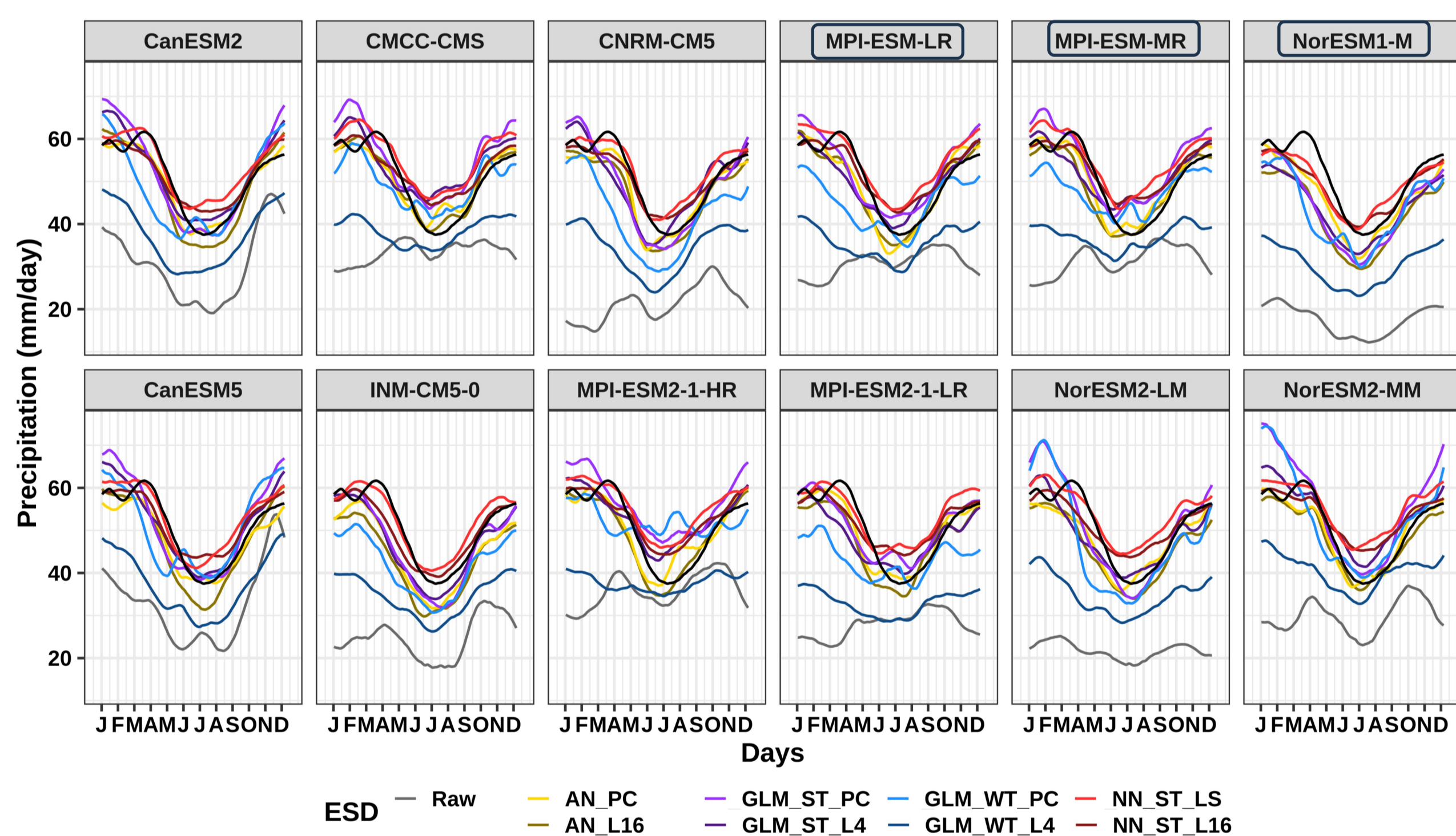
- ESD experiment:** ESD ensemble based on analogs (ANs), stochastic generalized linear models (GLM_ST) and neural network models (NN_STs) and weather-type conditioned GLMs (GLM_WTs).
- Sensitivity analysis to **predictor configuration:** choice of variables and spatial information: local, spatial (PCA) and combinations.
- Analysis of several evaluation metrics during the **historical period** (vs. reference observations).

- Intercomparison with in-common RCMs:** use of 4 rainfall indices: mean rainfall (**PPmean**), number of rainy days (**PPfrequency**), extreme rainfall accumulation (**R95**) and number of extreme rainfall events (**R95p**). Estimations for the warm (October to March) and cold (April to September) austral seasons.

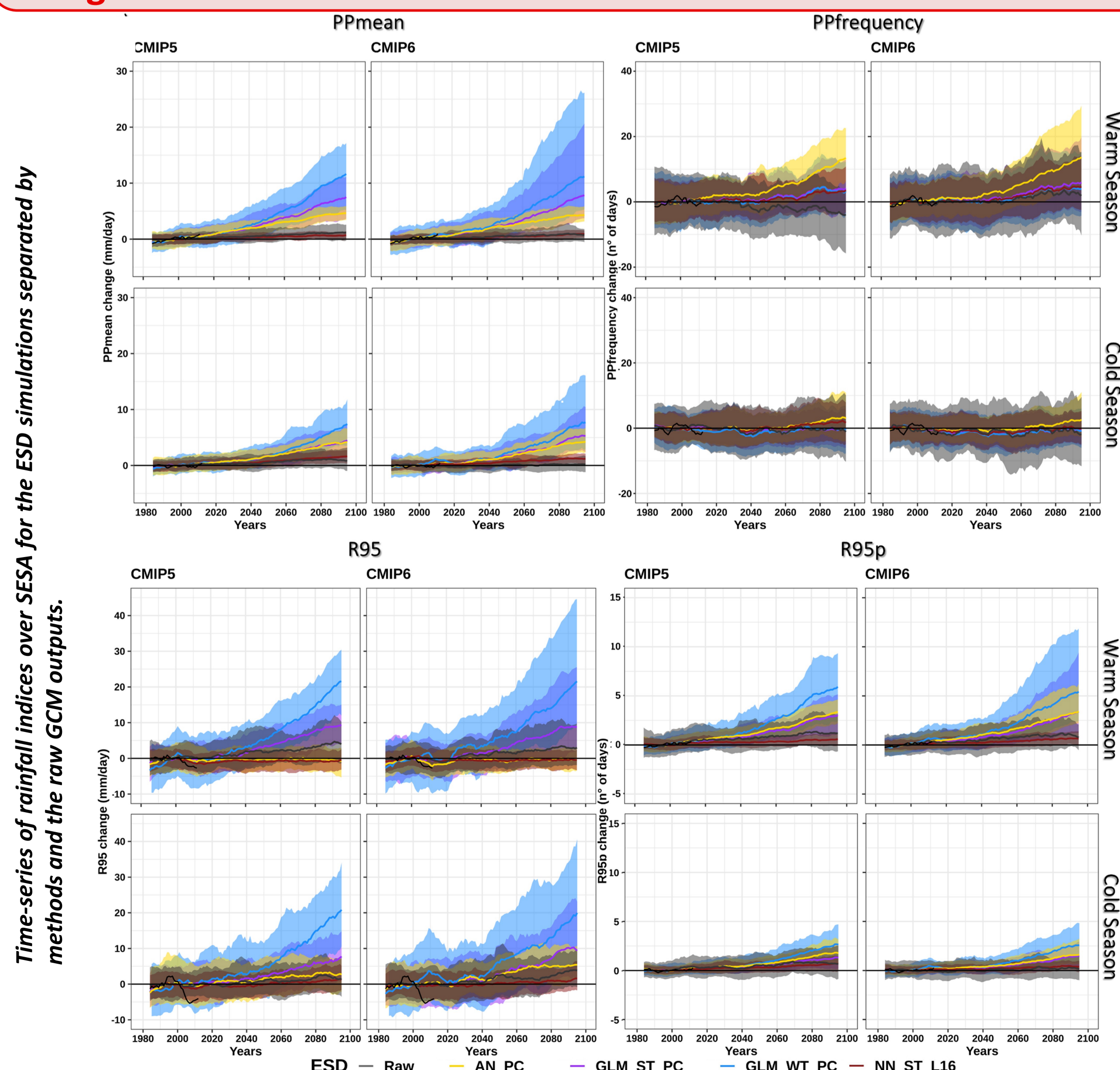
Results and conclusions

ESD experiment

SESA annual cycle of the 95th percentile of daily rainfall for the different ESD models and the raw GCM outputs (Historical).

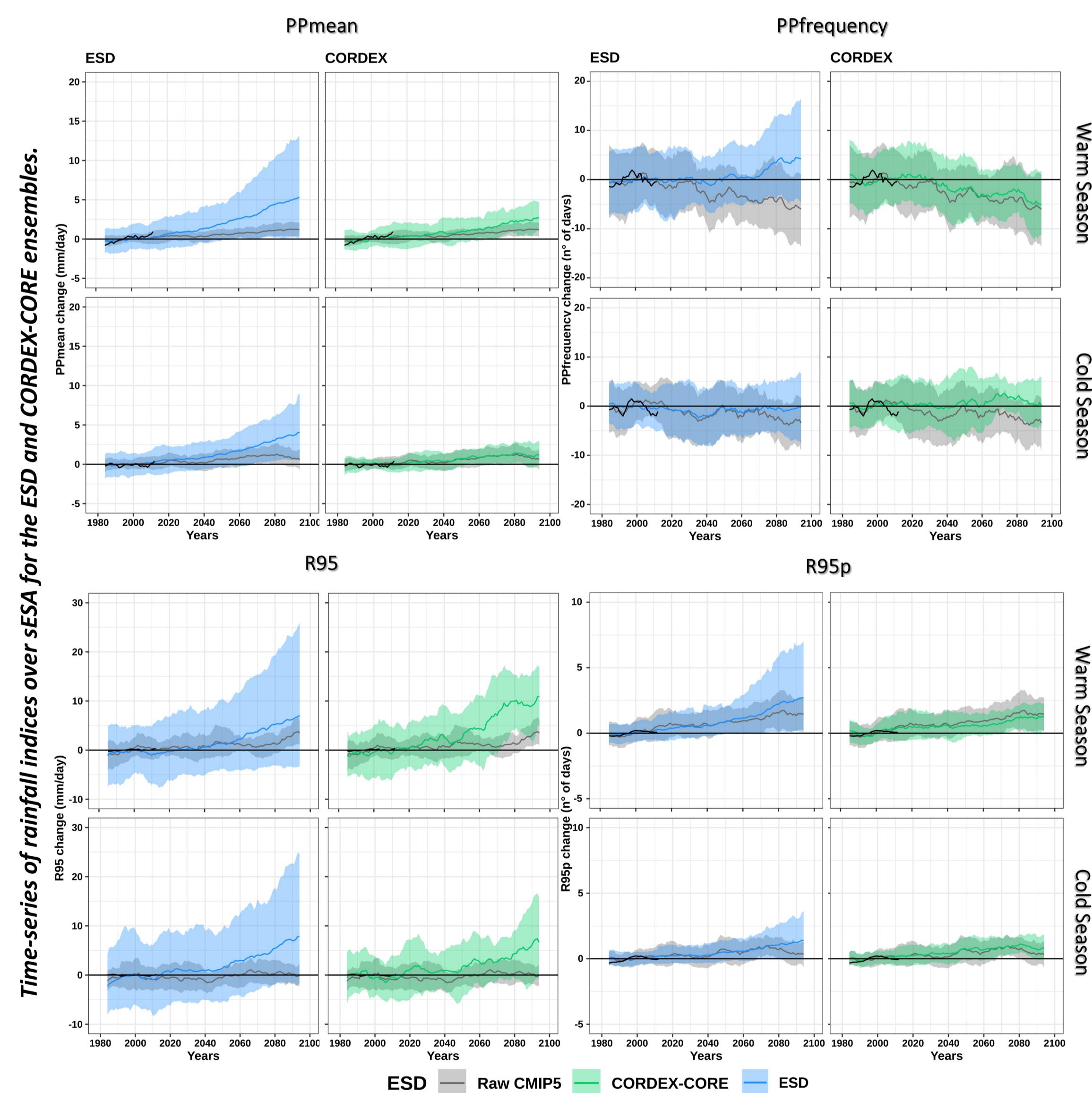


- ESD methods added value on the representation of extreme rainfall over SESA, especially the analogs and the stochastic regression-based simulations.**



Time-series of rainfall indices over SESA for the ESD simulations separated by methods and the raw GCM outputs.

Intercomparison with in-common RCMs

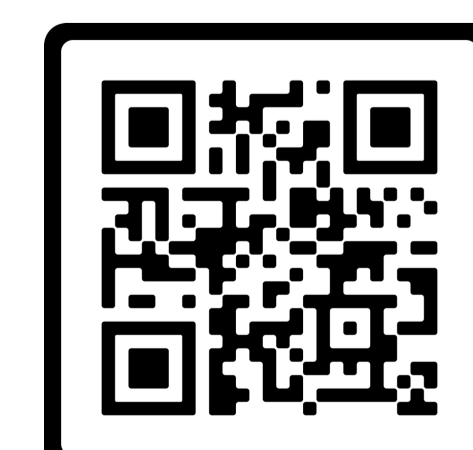


- Agreement in increased mean precipitation and frequency of extreme events over the region, with larger model spread in the mid-21st century.**
- The ESD ensemble presented larger spread and more intense positive changes in mean precipitation than the CORDEX ensemble, especially during the warm season.**
- This was due to the inclusion of GLM_WTs.**

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