

# SEASONAL PREDICTABILITY AND PREDICTION SKILL OVER SOUTH AMERICA

Marisol Osman<sup>1</sup>, Carolina Vera<sup>1</sup>

[osman@cima.fcen.uba.ar](mailto:osman@cima.fcen.uba.ar)

<sup>1</sup>Centro de Investigaciones del Mar y la Atmósfera, CONICET-UBA, DCAO/FCEN, UMI  
IFAECI/CNRS. Buenos Aires, Argentina

## ABSTRACT

The study documents the predictability of seasonal means of surface air temperature and precipitation in South America during the austral seasons of winter and summer. The study is based on ensembles of lead-1-month climate predictions outputs for DJF and JJA of 15 coupled climate models from the Climate Historical Forecast Project experiment coordinated by WCRP. Total variance ( $V$ ), signal variance ( $S^2$ ) and noise variance ( $N^2$ ) were computed for the multi-model ensemble. Potential predictability was defined as the ratio between the signal variance and the total variance ( $V$ ). Prediction skill, defined as the mean Anomaly Correlation Coefficient (ACC) between models and observations, was also computed. Predictability and skill associated with ENSO events were studied in particular by computing the same indexes but only for ENSO years.

In DJF, highest signal and noise values for temperature are found in northern and northeastern South America being signal higher than noise. In addition, modest values of signal and noise are found at extratropics where noise is maxima over southeastern South America (SESA). In JJA, signal and noise show the same structure, but with lower values than in DJF. Consequently, temperature predictability is highest at tropical latitudes in both seasons, reaching values higher than 0.8 and drops to less than 0.5 at middle latitudes. However, DJF temperature predictability at central Argentina is slightly higher than at the rest of extratropics.

In DJF, precipitation signal is highest at northern South America and peaks in the western coast and in the equatorial Atlantic Ocean. On the other hand, signal is closed to zero at the extratropics, except over SESA and southern Chile. In DJF noise is higher than signal and thus, predictability is highest at tropics, although no higher than 0.5, while at the extratropics only SESA and southern Chile show values close to 0.5 values. In JJA, both signal and noise are highest at northern South America over the oceans and they are also large at central-southern Chile and southern Brazil. Nevertheless, predictability is higher in JJA than in DJF reaching 0.5 at northern South America, SESA, central Chile and southern tip of South America .

Temperature prediction skill in DJF is significant at northern and northwestern South America reaching 0.8 in the Pacific coast. On the other hand, skill drops considerably at

the extratropics being only significant in central Argentina and southern Chile with values around xx. In JJA, most of the continent shows negligible temperature prediction skill. In both seasons precipitation skill is generally lower than that for temperature. In DJF, significant skill is found in northern South America while at extratropics only SESA shows significant skill values of about 0.4. In JJA the skill is somewhat smaller than in DJF. The fact that in general prediction skill values are lower than those of predictability provides some extent for model performance improvement over South America.

**Palabras clave:** Predictability, Skill, Seasonal Forecast.