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PARALLEL SESSION B : FRONTIER DOWNSCALING TOOL
B3: A FOCUS ON ESD SPECIFIC OPPORTUNITIES

Statistical downscaling of daily precipitation in the Argentine Pampas region

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The Pampas region comprises the most productive agricultural lands of Argentina. Grains such as soybean, corn, wheat and sunflower are grown in this region. Together with their byproducts, these crops promote the social and productive system of the region, and are one of the principal sources of fiscal incomes. Since the grains are cultivated extensively without artificial irrigation, the precipitation is one of the climatic variables of main influence for the production. The Pampas region is then particularly vulnerable to precipitation variability and to changes in precipitation regimes. Despite the importance of empirical statistical downscaling for regional climate impact studies, in southern South American regions much work remains to be done. In this context, the exploration and development of statistical downscaling techniques are of special interest for the region.

The objective of this work was to calibrate and validate a statistical method to downscale daily precipitation in the Argentine Pampas region. Daily mean fields of the NCEP-NCAR Reanalysis 2 were used as predictor variables for the period 1979-2010. The predictands were daily precipitation data from 28 meteorological stations. The statistical downscaling was based on the analogue method. Different predictors over different domain sizes were tested, including circulation, temperature and humidity variables.

The accuracy of the method was evaluated by means of several skill measures (bias, RMSE, correlation, indices assessing precipitation occurrence and precipitation amount, etc). Probability density functions were also compared by means of the K-S test. The downscaling performance depended on the season under consideration. The lowest skill was found for summer probably due to small scale processes that leads to precipitation in the region. Zonal and meridional wind components and relative humidity at 850 hPa were found to be the best combination of predictor variables. This could be related to the fact that near the Andes range mountain the wind components perform better in representing circulation and moisture advection at low levels. The results show the great potentialities of the method that is able to reproduce daily precipitation with a high level of accuracy. The performance of the method is very good at estimating seasonal cycles and spatial and temporal variability as well as at representing the transition climate regime over the western area of the region.

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