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Present climate (1989-2008) evaluation of an ensemble of RCMs driven by ERAinterim reanalysis over the South American CORDEX domain

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Results from an ensemble of seven regional climate models (RCMs) forced with ERAinterim reanalysis (1989-2008) over the South American CORDEX domain are presented. These RCMs simulations are part of the Project "A Europe-South America Network for Climate Change Assessment and Impact Studies in La Plata Basin (CLARIS-LPB)" with funds of the FP7 EU (2008-2012). The ensemble fields of the RCMs are evaluated against several observational gridded databases. A first overview of the spatial patterns of seasonal temperature and precipitation indicates that models are able to reproduce all main features of the observations: The Amazonian maximum during the austral summer season, LPB seasonal patterns, the conditions over Northeast Brazil and the South Atlantic Convergence Zone (SACZ), or the large spread on annual temperature winter-to-summer patterns from tropical to subtropical regions. Nevertheless, some shortcomings are also found, such as an underestimation of precipitation during JJA over Uruguay and during JFM over the Lower-Parana River basin or the overestimation of mean daily temperature over the Amanzonian and Lower-Parana regions on DJF The lower atmosphere moisture flux convergence was examined in order to understand the reasons for the precipitation deficiencies. To this end, four sub-basins within LPB and three other regions in Brazil (the Northeast, the Amazon basin and the SACZ) are selected as examples of different climate regimes. The mean annual cycles and monthly precipitation PDFs are again compared against the available observational databases. Good agreement is found in most regions, although some systematic biases are also found in the distribution of precipitation in intensity classes (e.g. overestimation of light precipitation and underestimation of medium precipitation amounts in southern LPB). This study emphasizes the usefulness of performing multi-model ensembles with state-of-the-art RCMs for quantifying uncertainties in the simulation of the regional climate. Finally, our results suggest the urgent need to address the reasons behind the precipitation biases and the main uncertainties in the representation of atmospheric processes controlling the South American monsoon system and the climate of the southern part of the continent.