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A climate analysis using CORDEX simulations in a cooperation framework: the case of Paraguay

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In recent years, changes in climate have entailed variations in surface temperature and precipitation patterns in various countries of the South America, among which Paraguay. Climate change-attributed effects on weather impacts, such as river and urban floods, droughts and heat waves could severely affect the actual conditions of the country. In fact, Paraguay exhibits significant vulnerabilities to climate changes, especially because of its dependence on commodities production (e.g. agriculture, livestock, etc.) and its infrastructural and logistic asset not yet fully formed. In this context, climate change analysis can be an important technical support for practitioners to assist - under uncertainty - national/regional planning, financial resources managing and development (e.g. land-use practices, population growth, economic and community behavior, health, etc.). Moreover, actions in adaptation, disaster risk reduction (DRR), social protection and impacts mitigation may involve high costs if not properly contextualized.
The assessment of 21st century climate change and development of whatever response strategies requires climate scenarios at high resolution, including an accurate evaluation of projection uncertainties (i.e. robustness of the analysis). This should ensure adequate insights into the potential impacts of climate change and allow practitioners, usually ill equipped to consider uncertain climate outputs into a broader context (e.g. planning, designing, managing), to make appropriate choices.
In the framework of CORDEX initiative, Paraguay is included into the SOUTH-AMERICA-CORDEX one. Three climate simulations over this area are available at the spatial resolution of 0.44° (about 50km), obtained with RCM SMHI-RCA4 (forced by GCMs ICHEC-EC-EARTH and MPI-M-MPI-ESM-LR) and RCM MPI-CSC-REMO$_2$009 (forced by MPI-M-MPI-ESM-LR). Simulations over the 21st century have been performed according with IPCC RCP2.6, RCP4.5 and RCP8.5 scenarios. The plausibility of the acquired climate simulations has been determined by comparison with different observational datasets over the baseline period. Three future periods have been selected for the analysis: 2011-2040, 2041-2070 and 2071-2100. The analysis is carried out in order to address the mean changes in seasonal mean temperature and total precipitation, and of some indicators suitable to quantify the impact of climate extreme events.
The analysis is performed in the framework of the Chake Ou project “Strengthening of institutional and community preparedness and coordination capacities for disaster risk reduction in Paraguay” funded by the European Commission’s Humanitarian Aid and Civil Protection Department (ECHO), in the context of the Disaster Preparedness Action Plan (DIPECHO) (code ECHO/-SM/BUD/2015/91028). The partners of the project are COOPI (a humanitarian, no-confessional and independent organization that works to support civil, economic and social development of populations struck by emergencies (disasters and conflicts), PLAN International (a child-centered community development organization) and CMCC Foundation (Euro-Mediterranean Center on Climate Change). The consortium works in close collaboration with the local institutions such as the Secretaria de Emergencia Nacional (SEN) and the Dirección de Meteorología e Hidrología (DMH – DINAC).