Climate change impact on precipitation for the Amazon and La Plata basins

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We analyze the local and remote impacts of climate change on the hydroclimate of South America (SA) in an ensemble of four 21st century projections (1970-2100, RCP8.5 scenario) with the regional climate model (RCM) RegCM4 driven by the HadGEM, GFDL and MPI global climate models (GCMs) over the SA CORDEX domain. Two RegCM4 configurations are used, one employing the CLM land surface and the Emanuel convective schemes, and one using the BATS land surface and Grell (over land) convection schemes. First, we find considerable sensitivity of the precipitation change signal to both the driving GCM and the RCM land surface scheme, highlighting the pronounced uncertainty of regional projections over the region. However, some improvements in the simulation of the annual cycle of precipitation over the Amazon and La Plata basins is found when using the RegCM4, and some consistent change signals across the experiments are simulated. One is a tendency towards the extension of the dry season over central SA deriving from a late onset and an early retreat of the SA monsoon. The second is a dipolar response consisting of reduced precipitation over the broad Amazon region and increased precipitation over the La Plata basin and central Argentina. An analysis of the relative influence on the change signal of local soil-moisture feedbacks and remote effects of Sea Surface Temperature (SST) over the Niño 3.4 region indicates that the former is prevalent over the Amazon basin while the latter dominates over the La Plata Basin. Also, the soil moisture feedback has a larger role in the RegCM4 than the GCMs, especially when using the BATS scheme. The data from these experiments is available for use in impact models, and we plan to increasingly populate the ensemble with further simulations driven by different GCMs as a contribution to the CORDEX program.