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Land surface feedbacks and climate change over South America as projected by RegCM4

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The hydroclimatic regime variability over the Amazon and La Plata Basin, the two main basins of South America (SA), are affect by local climate feedbacks and climate patterns associated with SST anomalies. The local and remote impacts of climate change over SA are evaluated using the regional model RegCM4 driven by HadGEM, GFDL and MPI global climate models (RegHad_CLM, RegGFDL, and RegMPI, respectively).
All simulations used CLM (Community Land Model) land surface scheme and Emanuel convective scheme, with 50 km of horizontal resolution; except for one simulation driven by HadGEM that used the BATS (RegHad_BATS) as a land surface scheme and a mixed convection scheme (Grell over land and Emanuel over ocean). Climate changes were evaluated by comparing the future (2070-2098) with the present climate (1975-2004) during the rainy season (December to April).
For the present day climate, the regional simulations reproduce reasonably well the precipitation annual cycle over Amazon and La Plata Basin. In particular the RegCM4 runs driven by MPI and GFDL are quite good over the Amazon and RegCM4 runs driven by HadGEM for La Plata Basin.
For the future climate projections, all the global models show a precipitation decrease over the central Amazon Basin, northeast Brazil, and northern of SA (ranging from -5 to -25%) for the end of century, except the GFDL. Over the La Plata Basin, mainly over northern Argentina, and western of Amazon Basin simulations indicate an increase of precipitation (ranging from 25 to 50%). These patterns are intensified in the RegCM4-CLM simulations. The exceptions are the RegHad_BATS results that shows a general precipitation reduction over almost all Amazon basin. Over the La Plata Basin all regional models presented a positive coupling between sea surface temperature (SST) in Niño 3.4 region and precipitation. With exception of RegHad_CLM, all simulations show a negative SST/Precipitation regression over the central and northeastern Brazil.
The soil moisture feedback on precipitation is evaluated too by mean of a statistical approach. The RegCM-CLM simulations have a common feature and they show a similar behavior when the future changes are investigated. The RegCM-BATS shows a different soil moisture feedback picture. Of course this can be explained by the differences in the two land-surface schemes and in the precipitation change signal that comes out from the two sets of simulations.