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Sensitivity to the land surface schemes coupled in the RegCM4 over the Amazon Basin: An analysis using high resolution simulations

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Regional climate models (RCMs) has been largely used as a downscaling technique in the last decades to better capture regional and local feedback processes. Efforts are being made to increase the resolution of these models. Climate models require the calculation of energy, water, and momentum fluxes across the land-atmosphere interface. A poor representation of these processes can affect climate variables such as surface air temperature and precipitation. It is critical to assess the role of land-atmosphere interactions in modulating the regional climatology. The goal of this work was to analyse the simulated land-surface variables (evapotranspiration-ET and sensible heat flux- H) and its impacts in the precipitation and air temperature over the Amazon Basin (AMZ) using two different land surface schemes. In this work we used the Regional Climate Model (RegCM4) over CORDEX South America domain driven by EraInterim reanalysis. Simulations are from 2005 to 2014 using 25 km of horizontal resolution, Emanuel as a convective scheme and BATS and CLM4.5 as surface schemes, hereafter: RegBATS and RegCLM4.5,respectively. The simulated climatologies were compared against CRU data. The results show that RegBATS simulated higher ET than RegCLM4.5, mainly from July to October when the positive differences reach 1 mm day-1. Concerning the precipitation, RegCLM4.5 simulated the annual cycle with values a slightly higher than RegBATS, except from February to April. It means that the higher values of ET simulated by RegBATS are not driven the rainfall intensity over the AMZ. In comparison with CRU data, both simulations underestimated the precipitation, but in RegCLM4.5 the underestimation is smaller than RegBATS, except in February and March. In both simulations, the sensible heat flux values are lower than that from the literature, RegBATS simulated higher values than RegCLM4.5 from January to May and the opposite occurs from June to December. RegCLM4.5 simulated air temperature with higher values than RegBATS throughout the year. By comparison with the CRU data, RegCLM4.5 presents small biases than RegBATS. Over the Amazon Basin, RegCLM4.5 simulates, in general, the meteorological variables closer to the observations than RegBATS. The simulated land surface fluxes are not clearly influencing the precipitation and air temperature over the AMZ Basin.