

**Evaluation of RegCM4 over the CORDEX South America Domain: Sensitivity analysis to the Land Surface Scheme for the Amazon Basin**

Marta Llopart, Rosmeri da Rocha, Santiago Cuadra

We compared the performance of the RegCM4 (ICTP Regional Climate Model) coupled to the land surface schemes CLM 3.5 (Community Land Model - RegCLM) and BATS (Biosphere Atmosphere Transfer Scheme - RegBATS) in a 30-year simulation (1979-2009) over CORDEX South America domain. In general, the coupling of RegCM4 with the CLM substantially improves the simulated climatology over tropical South America relative to the default version RegBATS. One of the main features is that the RegCLM improves the precipitation climatology and its annual cycle, reducing the RegBATS summer wet bias over the AMZ basin. With respect to the surface energy balance, RegBATS scheme prescribes lower monthly albedos over the AMZ, resulting in higher solar radiation absorption by the surface. Moreover, RegBATS tends to simulate a higher sensible heat flux and lower latent heat fluxes over the AMZ during the dry season, differing from observations. The surface water balance also changes considerably between the two simulations. Compared with RegBATS, RegCLM simulates lower precipitation and runoff, as well as less water into the total soil column. RegCLM improves the water balance along the year, simulating ET (Evapotranspiration) values closer to the observations during the dry season. RegBATS simulates higher sensible heat fluxes and lower ET during this season. The Bowen Ratio based on fluxes tower observations, in the AMZ basin, suggests a practically constant value along the year, pattern better simulated by RegCLM (albeit still poorly represented such a pattern), suggesting a better representation of the net surface energy partitioning. This better representation reduces the biases in the simulated precipitation and air surface temperature in RegCLM. Even though the RegCLM improves the precipitation and air temperature, it is important to note that concerning to the water balance and energy budget improvements are still necessary in both RegCM4 configurations (using CLM and BATS).