
SimABC - Simulation of Atmospheric inputs to Basins respecting Climate - General layout and application to rio Balsas (Mexico)

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Abstract

A river basin’s reaction to rainfall events depends on the initial wetness of the basin, itself the result of antecedent conditions varying at a lower pace and with season. Additionally, larger basins have typically compound hydrological regimes: various sub-basins contribute flow of distinct seasonal pattern given their local climate in precipitation, but also temperature, a key driver to precipitation phase, snow-melt and evapotranspiration ; however, these temporal and spatial variations are not statistically independent, as they are connected by regional weather conditions.

Based on this physical perspective, the precipitation and temperature simulator SimABC is proposed. The design is hierarchical, with first a coarse level running at monthly and sub-basin scale, followed by disaggregation from monthly to daily time steps. Distributions and spatio-temporal structure are estimated and preserved within each level. SimABC was first designed on the Rhone River and further investigated within a project over France. This presentation will summarize SimABC’s structure, including some statistical caveat and their algorithmic handling, and offer an illustration in the case of the rio Balsas basin (~100000 km², Mexico).

Keywords: river basin, hydrology, hierarchical model, precipitation, temperature, disaggregation, Mexico, autoregression, geostatistics, daily, monthly, season

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