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Bidimensional Spatiotemporal analysis of local atmospherically fluxes and regional moisture budgets in river basins

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Many regions in the world are threaten by Climate change, and there is a large global concern on the dependency of water contributions from neighbouring countries. In order to understand more how the water contributions from other region affect a river basin, global spatiotemporal information could be used to obtain budgets balance. This study proposes a methodology to analyse the atmospheric moisture balance around hydrological units (watersheds) using ERA 5 reanalysis data sets, allowing the evaluation of the role of spatiotemporal patterns associated with the transport of regional moisture fluxes and understanding how these components modulate regional water heterogeneity, sources and sinks. This study consists of 3 phases: 1) collection and validation of the required hydrometeorological sets and variables and two-dimensional discretization of the hydrographic domain or unit establishing the boundaries for computational analysis; then, estimation and evaluation of the contribution patterns of transported moisture fluxes based on the Eulerian model developed by Brubaker,1993. Finally, for each region, we proceed to estimate the spatiotemporal variations of the atmospheric water balance by establishing the calculation of the precipitation recycling rate as well as the fractions of horizontal moisture flux contributions from each direction or boundary, as well as their seasonality and interannual variability, magnitudes and concentration rates associated with flux divergence. As a case study, the Pamplonita river basin in Colombia was selected. Here we present these results, that have provided valuable information related to the identification of biases in the estimation of atmospheric water supplies, monitoring strategies and hydrological balance.