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Water budget in the Amazon basin and impacts on flood modeling

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Although recent modelling and observational efforts have been performed to better understand the hydrological processes at the global scale, estimates of the water budget over the continents are still inaccurate. Several modeling attempts have been conducted trying to improve the simulation of water and energy cycles at different temporal and spatial scales worldwide. These attempts are based on numerous modeling approaches and meteorological forcings, resulting in contrasting water balance estimates. Considering the restricted availability of observed data to fully evaluate simulated water balances at large scales, remote sensing is revealed as an important source of information for model evaluation. The objective of this study is to assess the water budget in the Amazon basin simulated by land surface models (LSMs) and impacts on flood modeling. For that purpose, outputs of 14 LSMs were considered. LSMs were run for the 1980-2008 period using Princeton's meteorological forcings on a 3-hourly time step and at a 1° resolution. The precipitation was rescaled to match the daily ORE-HYBAM dataset. Flood modeling is evaluated in this study by means of water levels, floodplain extent and water storage change simulated by the Hydrological Modeling and Analysis Platform (HyMAP) river routing scheme (RRS) using simulated surface runoff and baseflow as forcings. Results show that impacts of the water budget on surface water dynamics can be significant in some regions but RRS parameter uncertainties are the main source of errors in large scale flood modelling.