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Evaluating LSM water budgets in the framework of the LIS-HyMAP system

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Several modeling attempts have been made trying to improve the simulation of water and energy cycles at different time and space scales worldwide. These attempts consider different modeling approaches and meteorological forcings, resulting in contrasting evapotranspiration and runoff rate estimates. Considering the restricted availability of observed data to fully evaluate LSM water balance at large scales, the use of discharge observations at gauging stations is found as a straightforward way to evaluate the water budget within a catchment.
Taking advantage of the recent implementation of the Hydrological Modeling and Analysis Platform (HyMAP; Getirana et al., 2012) in the Land Information System (LIS), this study presents the first results of a land surface model (LSM) intercomparison over the Amazon basin. LSM water budgets are evaluated by means of daily water discharge and monthly variation of total water storage (TWS). Discharges simulated by HyMAP are compared against observations at 146 gauging stations and simulated TWS at different catchments are compared against GRACE TWS estimates.
The meteorological dataset used to force four LSMs (Noah2.7.1, Noah3.2, Mosaic and CLM2.0) is provided by the Princeton University on a 3-hourly time step and at a 1° resolution and the precipitation is corrected monthly with the GPCC Full Data Product V4.
Results show that discharge and TWS simulations can vary significantly as a function of both the LSM used and the geographical location. Overall, both Noah versions provided best Nash-Sutcliffe coefficients and relative errors for simulated discharges.