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Water-balance uncertainty in Honduras: a limits-of-acceptability approach to model evaluation using a time-variant rating curve

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The climate of Central America is highly variable both spatially and temporally; extreme events like floods and droughts are recurrent phenomena posing great challenges to regional water-resources management. Scarce and low-quality hydro-meteorological data complicate hydrological modelling and few previous studies have addressed the water-balance in Honduras. In the alluvial Choluteca River, the river bed changes over time as fill and scour occur in the channel, leading to a fast-changing relation between stage and discharge and difficulties in deriving consistent rating curves. In this application of a four-parameter water-balance model, a limits-of-acceptability approach to model evaluation was used within the General Likelihood Uncertainty Estimation (GLUE) framework. The limits of acceptability were determined for discharge alone for each time step, and ideally a simulated result should always be contained within the limits. A moving-window weighted fuzzy regression of the ratings, based on estimated uncertainties in the rating-curve data, was used to derive the limits. This provided an objective way to determine the limits of acceptability and handle the non-stationarity of the rating curves. The model was then applied within GLUE and evaluated using the derived limits. Preliminary results show that the best simulations are within the limits 75–80% of the time, indicating that precipitation data and other uncertainties like model structure also have a significant effect on predictability.