Effects of uncertainty in soil properties on semi-arid hydrologic forecasting: Initial results from a soil moisture field campaign during NAME

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The North American Monsoon Experiment (NAME) yielded hydrological observations in a region in northern Sonora, Mexico, characterized by complex terrain and seasonal vegetation cover. In this study, the spatiotemporal variability of hydrological conditions in a mid-sized (100 km^2) semi-arid basin is assessed using a distributed hydrological model. The initial investigation performed here with the TIN-based Real-time Integrated Basin Simulator (tRIBS) is part of a long-term effort to improve semi-arid hydrological forecasting in the southwest United States and northwestern Mexico. Soil properties and their spatial distribution play a critical role in simulation of many hydrological processes, in particular for regions dominated by the infiltration-excess mechanism. Uncertainty in surface soil texture classification used to derive thermal and hydraulic properties in the tRIBS model propagates into uncertainty of the forecasted hydrologic fluxes and states. Distributed soil moisture state estimations in the tRIBS model are conditioned here on corresponding distributed observations of soil moisture at 25 manual measurement sites and two continuous stations within the Sierra Los Locos basin. The uncertainty in the distributed hydrologic predictions, such as soil moisture state, runoff production and streamflow, are analyzed here to give an insight into the soil parameter sensitivity and effective means to constrain these based on on-going field observations.

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