

Improved seasonal hydrologic prediction in the North American monsoon region: Results from field experimentation, remote sensing and modeling in the Rio Sonora basin.

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Seasonal hydrologic predictions in the North American monsoon (NAM) region are challenging due to significant uncertainties in the spatiotemporal distribution of precipitation and the evolving land surface conditions. In this study, we present an overview on regional studies conducted in the Río Sonora river basin, Mexico, which experiences a dramatic hydrologic response to NAM precipitation. We highlight summer field experiments focused on: (1) installation of two hydrometeorological networks (at the catchment and regional scales), (2) deployment of a high-elevation eddy covariance tower, and (3) estimation of soil and vegetation properties at the tower and catchment scales. These field observations are then related to remotely-sensed land surface characteristics to infer seasonal and interannual relations between precipitation, soil moisture, vegetation greenness and streamflow. Subsequently, the field and remote sensing data are used to test the improvements in hydrologic predictions achieved with two distributed hydrologic models operating at the point and catchment scales. We quantify the value added of improved characterizations of precipitation and land surface states on the seasonal hydrologic predictability. In future work, the advanced hydrologic models and their parameterization in the Rio Sonora basin will be useful to improve seasonal forecasts expanded to the broader NAM region.