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Title: Hydrologic predictability over the United States using the National Multi Model Ensemble

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Abstract:

We analyzed the skill of seasonal soil moisture and runoff forecasts performed by driving the Variable Infiltration Capacity (VIC) hydrologic model with forcings derived from the National Multi-Model Ensemble hindcasts (NMME\_VIC). The NMME\_VIC forecasts are compared to Ensemble Streamflow Prediction (ESP) forecasts derived from the VIC model forced by resampling of historical observations during the forecast period (ESP\_VIC), using the same initial conditions as NMME\_VIC. The forecast period is from 1982 to 2010 with forecast initiations on January 1, April 1, July 5 and October 3. We find that 1) all forecast initiation dates, the initial conditions play a dominant role at 1-month lead; at longer lead times, skill in forecasts of the forcings starts to contribute; 2) For a dry climate regime defined as having low mean precipitation and precipitation variations, and covering the western interior states for all seasons, and the North Central part of the country for forecasts initialized in January, forecast skill for both methods is high even at 3-month lead. For this regime, forecast skill is dominated by contributions from the initial conditions, and ESP\_VIC is just about as skillful as NMME\_VIC for short leads. In contrast, a wet regime covers the a region from the Gulf States to the Tennessee and Ohio Valleys for forecasts initialized in January and April and the Southwest monsoon region in July. In this dynamically active region, forecast skill is low, skillful precipitation forecasts have the potential to improve SM and runoff forecast skill, but we find that this mostly is not the case for the NMME models.

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