Incorporating multi-model ensemble techniques into a real-time drought monitoring system

Theodore J. Bohn, Francisco Munoz, Shraddanand Shukla, Ben Livneh, and Dennis P. Lettenmaier

Multi-model ensembles have been shown to reduce bias and help characterize model uncertainty in forecast systems. The University of Washington's Surface Water Monitor (SWM) produces daily nowcasts of model-derived soil moisture for the continental U.S. at 0.5 degree spatial resolution. Drought severity and extent information are provided by expressing the model-derived soil moisture in real-time relative to a 1920-2003 climatology, which helps to remove climatalogically-based seasonal and spatial differences. Recently, the SWM has been expanded to include real-time implementations of the Community Land Model (CLM) version 3.5, NCEP NOAH model version 2.7.1, and NWS grid-based Sacramento/Snow-17 model (SAC), in addition to VIC. A multimodel product is formed by averaging the individual models' soil moisture percentiles and re-expressing them as a percentile of the historical distribution of the multi-model average percentiles. We examine the performance of this system in representing events such as the southeastern U.S. drought during the fall and winter of 2007-2008, as well as western U.S. drought conditions over the last year. We also evaluate differences among models in their response to drought-ending hurricane conditions in late summer of 2008.

[a]Department of Civil and Environmental Engineering, University of Washington, Seattle, WA, USA