

TITLE:

Hydrologic Modeling to Quantify Water Resources across the United States

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VENUE:

Distinguished Seminar Series, The Center for Water, Earth Science and Technology

ABSTRACT:

Through a National Water Census, the U.S. Geological Survey seeks to provide nationally-consistent, locally-informed, and stakeholder-relevant information on the hydrologic cycle at continuous spatial and temporal resolutions to improve our understanding of water availability. This program has resulted in the development of a blend of statistical and physical models that simulate a historical range of hydrologic conditions across the Nation. We seek to improve retrospective hydrologic simulation, future forecasts and process investigations by considering how a suite of different models and observational products quantify the water cycle. While significant advances have been made in the estimation and prediction of unmonitored water resources, including streamflow and other components of the hydrologic cycle, we further investigate the question of consistency of simulated and observed data across the entire hydrologic cycle. Given estimates of each component of the hydrologic cycle, e.g. streamflow, evapotranspiration, and precipitation, at what spatial and temporal scales and in what domains or regions can we balance the water budget? Tools like the National Hydrologic Modeling Infrastructure, the National Water Model, other continental-domain models and a suite of statistical models are used to gauge our ability to consistently quantify hydrologic processes across models. We compare several simulated and observed products of different hydrologic processes across different spatial and temporal scales across the country to understand how well we can quantify the hydrologic cycle. Though not a radically new idea, we present this water-budget perspective as a revisited perspective with which to simulate, evaluate and integrate our hydrologic models and our understanding of hydrological processes across the United States. With these results and this dialogue, we can place technical information and tools in the hands of stakeholders, allowing them to answer questions about water availability and resources management in the United States.