Diagnosing Scaling Behavior of Groundwater with a Fully-Integrated, High Resolution Hydrologic Model Simulated over the Continental US: Watersheds to Continents

Reed Maxwell (rmaxwell@mines.edu) - Colorado School of Mines.

Groundwater is an important component of the hydrologic cycle yet its importance is often overlooked. Aquifers are a critical water resource, particularly in irrigation, but also participates in moderating the land-energy balance over the so-called critical zone of 2-10m in water table depth. Yet,the scaling behavior of groundwater is not well known. Here, we present the results of a fully-integrated hydrologic model run over a 6.3M km2 domain that covers much of North America focused on the continental United States. This model encompasses both the Mississippi and Colorado River watersheds in their entirety at 1km resolution and is constructed using the fully-integrated groundwater-vadose zone-surface water-land surface model, ParFlow. Results from this work are compared to observations (both of surface water flow and groundwater depths) and approaches are presented for observing of these integrated systems. Furthermore, results are used to understand the scaling behavior of groundwater over the continent at high resolution. Implications for understanding dominant hydrological processes at large scales will be discussed.