Title: Vulnerability of U.S. Water Supply Systems to Shortage

Abstract: Changes in climate, land use, and population alter water supply and demand across spatial and temporal scales. This study investigates the vulnerability of U.S. water supply systems to shortage over the range of futures that are forecasted for the 21st century. First, we characterize shifts in regional hydroclimatic conditions across the conterminous United States in response to climate change. The variable infiltration capacity (VIC) model is used to simulated hydrological responses to climate change at 4x4 km grid resolution. Shifts in regional hydroclimatic conditions at the watershed scale is evaluated by the magnitude and direction of movements in the Budyko space aridity and evaporative indices. Similarly, changes in water demand are characterized at the watershed and river basin scales. Monthly water supply and demand time series are used to drive water allocation decisions using the Water Evaluation And Planning System (WEAP) at the river basin scale. Subsequently, we employ a statistically coherent mixture probability model to assess the intensity and frequency of future water shortages with varying durations. The results indicate that hydroclimatic responses vary considerably across ecohydrologic conditions. However, similar movements in the Budyko space are evident for watersheds in the same physiographic region. Furthermore, the presentation discusses changes in the characteristics of sub-annual, multi-year, and decadal water shortages in river basins across the U.S.