

21st Century U.S. Climate in CMIP5 Simulations: Implications for Water Yield

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Abstract. We present climate and earth system model simulations of possible future climate and its impacts on the water resources of the US to assess the potential future vulnerability of US water supply. The focus is on the changes in long term mean precipitation and temperature and their impacts on the water yields in the contiguous United States. We first examine the projected change in 21st century climate of the US in the updated state-of-the-art models used in CMIP5, and then simulate the water yields for the 98 Assessment Sub-Regions (ASRs) of the US using the VIC model, a well-validated distributed hydrological model. The upcoming 5th Assessment Report (AR5) of the IPCC will be based on projections with the models of the Fifth Coupled Model Intercomparison Project (CMIP5). Compared to the previous climate and earth system models of CMIP3, CMIP5 includes more comprehensive models and addresses a wider variety of scientific questions. This study will pinpoint the most vulnerable locations (basins or states) where future water shortages are more likely and suggest adaptation strategies (e.g., enlarged trans-basin diversion capacity, increases in storage capacity, intra-basin water transfers and forward-looking reservoir operating rules, conjunctive management of surface reservoir storage and groundwater storage, and enhanced water conservation efforts) to mitigate the negative impacts of increased vulnerability.