Geophysical Research Abstracts
Vol. 20, EGU2018-10926-1, 2018
EGU General Assembly 2018

Characterizing uncertainty in climate impacts projections for water resource applications

Joseph Hamman (1), Nans Addor (1,2), Naoki Mizukami (1), Martyn Clark (1), and Ethan Gutmann (1)

(1) National Center for Atmospheric Research, Research Applications Laboratory, Boulder, Colorado, United States (jhamman@ucar.edu), (2) Climatic Research Unit, University of East Anglia, Norwich, UK

The characteristics and sources of uncertainty in future climate impacts to water resources systems are not well understood. Contributing to this uncertainty is a combination of natural variability and the methods we use to quantify the impacts of climate change. These methods include the choice of emissions scenario, global climate model (GCM), downscaling method, and hydrological model. While the role of emissions scenarios and GCMs have been widely studied, the impact of other methodological choices in the development of hydrologic projections has not. In an effort to better characterize the relative contribution of each component of the impacts modeling chain, we have developed a large ensemble of hydrologic projections, sourced from a collection of GCMs, downscaling methods, and hydrologic models. In this presentation, we present results from this effort, focusing on the development of new methods for characterizing the uncertainty from each component of the modeling chain. The dataset itself contains an ensemble derived from 2 emission scenarios, 10 GCMs, 13 downscaling approaches, and 3 hydrologic models covering the contiguous United States at a spatial resolution of 1/8th degree. We present results demonstrating the relative uncertainty sourced from each member of the modeling chain. We assess how performance in the historical period is related to the inferred change factors in key variables used by water resource managers, such as temperature, precipitation and streamflow, and how methodological complexity corresponds to sensitivity. Finally, we use hierarchical clustering to evaluate diversity within our ensemble and provide examples of how the use small ensembles can skew the inferences we draw from them.