Geophysical Research Abstracts
Vol. 15, EGU2013-3557-1, 2013
EGU General Assembly 2013

Changes in Drought Characteristics of the 21st Century CMIP5 Climate Projection

Danielle Touma (1), Munir Nayak (2), Shih-Chieh Kao (3), and Moetasim Ashfaq (3)

(1) Oak Ridge National Laboratory, Oak Ridge, TN, United States (danielletouma@gmail.com), (2) Cornell University, Ithaca, NY, United States, (3) Oak Ridge National Laboratory, Oak Ridge, TN, United States

Drought has been a major economic and social driver in the past and will continue to be in the future. Using four drought indices, the Standardized Precipitation Index (SPI), the Standardized Runoff Index (SRI), the Standardized Precipitation-Evapotranspiration Index (SPEI) and the Supply-Demand Drought Index (SDDI), and multiple Global Climate Models (GCMs) output from the fifth phase of the Coupled Model Intercomparison Project (CMIP5), we study the effects of climate change on hydrological and meteorological drought in the 21st century. SPI and SRI are based on monthly precipitation and runoff data, respectively, whereas SPEI and SDDI are based on monthly temperature and precipitation data. Our study covers 1960-2005 in the historical period and 2010-2100 in the future period under the Representative Concentration Pathway (RCP) 8.5. We analyze changes in drought characteristics over the globe by comparing future variations in duration, intensity and frequency with those in the historic period using regions defined by Giorgi and Bi (GRL, 2005). Our results show that drought indices that take into account the direct effect of temperature show stronger changes in the future period. We find that the strongest changes occur over the tropical and subtropical regions, which are generally robust across all the indices. However, projected changes are less certain over the higher latitudes across the GCMs, as well as across the indices. Overall, these results have important implications for regions that are already water-stressed. Moreover, uncertainty across the drought indices informs the effort to further develop robust methodologies for drought projections.