Impacts of global warming of 1.5^0C, 2.0^0C and 3.0^0C on hydrologic regimes in the northeastern U.S.

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Abstract

Regional climate change impacts show wide range of variations under different levels of global warming. Watersheds in the northeastern region of United States (NEUS) are projected to undergo most severe impacts from climate change in the forms of extreme precipitation events, floods and drought, sea level rise etc. As such, there is high possibility that hydrologic regimes in the NEUS may get altered in the future which can be absolutely devastating for managing water resources and ecological balance across different watersheds. In this study, therefore, we present a comprehensive impact analysis using different hydrologic indicators across selected watersheds in the NEUS under different thresholds of global temperature increases (1.5^0C, 2.0^0C and 3.0^0C). Precipitation and temperature projections from fourteen downscaled GCMs under RCP8.5 greenhouse gas concentration pathway are used as inputs into a distributed hydrological model to obtain future streamflow conditions. Overall, the results indicate that majority of the selected watersheds will enter into a wetter regime particularly during the months of winter while flow conditions during late summer and fall indicate a dry future under all three thresholds of temperature increases. The estimation of time of emergence of new hydrological regimes show large uncertainties under 1.5^0C and 2.0^0C global temperature increases, however, most of the GCM projections show strong consensus that new hydrological regimes may appear in the NEUS watersheds under 3.0^0C temperature increase.

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