



Changing Flood Seasonality and Its Causes Across the Contiguous United States

Xiuyuan Li (1), Tara Troy (1), Julia Hall (2), and Rui A. P. Perdigão (2)

(1) Civil and Environmental Engineering, Lehigh University, Bethlehem, United States, (2) Institute of Hydraulic Engineering and Water Resources Management, Vienna University of Technology, Vienna, Austria

Under climate change and human alterations of the land surface and river, floods would be expected to be nonstationary in their magnitude and timing. To quantify if this is indeed occurring, this study focuses on the changes in the seasonality and its timing of floods across the United States. We use 3250 USGS gages and 690 HCDN gages (unaffected by anthropogenic alterations) to detect changes in in-season and out-of-season flood events from 1950 to 2010. We quantify the regime of flood seasonality across the US, including those areas with unimodal and bimodal seasonality. After doing this, we calculate trends in flood timing during the flood-rich seasons and trends in the probability of out-of-season flooding. We find many regions with strong seasonality in flooding are experiencing earlier floods, and we hypothesize warming temperatures are driving earlier snowmelt. For out-of-season floods, we find many areas are experiencing increased flooding outside of the dominant flood season. This study holistically documents the changing seasonality of the flood regime over the United States and linked it to the possible hydrological and climatological processes driving the flood regime to explore causality.