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Changing precipitation extremes in a warming climate: A basis for design flood estimation

Conrad Wasko and Ashish Sharma
University of New South Wales, School of Civil and Environmental Engineering, Australia

The potential for increasing intensity of future rainfall events has significant implications for flooding and the design of infrastructure. However the questions of how precipitation will change in the future, how important these changes are to flooding, and how engineers incorporate these changes into hydrologic design remain as open questions.

In the absence of reliable point based estimates of how precipitation will change, many studies investigate the historical relationship between rainfall intensity and temperature as a proxy for what may happen in a warmer climate. Much of the research to date has focussed on changing precipitation intensity, however, temporal and spatial patterns of precipitation are just as important. Here we link higher temperatures to changes in temporal and spatial patterns of extreme precipitation events. We show, using observed high quality precipitation records from Australia covering all major climatic zones, that storms are intensifying in both time and space resulting in a greater potential for flooding especially in urban locales around the world.

Given that precipitation and antecedent conditions are changing, and, the impacts to flooding are significant, methods of incorporating these changes in catchment modelling are required. Continuous simulation offers a natural flexibility to incorporate the many correlated changes in precipitation that may occur in a future climate. An argument for such a framework using existing continuous simulation alternatives is articulated in concluding this presentation.