Geophysical Research Abstracts
Vol. 18, EGU2016-10575, 2016
EGU General Assembly 2016

The tele-connections of long duration floods and their implications for dynamically updating the Flood Control Pool

Naresh Devineni (1), Nasser Najibi (1), and Upmanu Lall (2)

(1) The City College of New York, Civil Engineering, NY, United States (ndevineni@ccny.cuny.edu), (2) Columbia University, Columbia Water Center, NY

Traditional approaches to flood risk assessment are typically indexed to an instantaneous peak flow event at a specific recording gage on a river, and then extrapolated through hydraulic modeling of that peak flow to the potential area that is likely to be inundated. However, property losses tend to be determined as much by the duration and volume of flooding as by the depth and velocity of inundation. We argue that the existing notion of a flood risk assessment and consequent reservoir flood control operations needs to be revisited, especially for floods due to persistent rainfall (>30 day duration). Our interest lies in explicitly understanding the dependence of the likelihood or frequency and intensity of extreme regional floods on a causal chain of ocean-atmosphere processes whose slow variation and regime-like changes translate into significant and persistent changes in the probability of major floods in the large river basins. An understanding and mapping of these factors into a dynamic risk framework is important for establishing a process by which flood risk for large basins could be systematically updated reflecting changing climate conditions, whether due to human influence, or as part of the natural cycles of climate variation. In this study, we developed an inference system for climate informed flood risk assessment using an integrated statistical modeling approach. We first develop multivariate flood attributes and classify their characteristic spatial variability using the hierarchical clustering approach. Depending on the flood event type, different rainfall inducing mechanisms (e.g. tropical storm, local convection, frontal system, recurrent tropical waves) may be involved with characteristic spatial scales and statistical properties. Hence, we identify the antecedent rainfall conditions for the flood types and map their corresponding specific atmospheric circulation patterns using compositing of the NCEP/NCAR reanalysis data and the storm tracks using NOAA's storm track database. We choose the MRB for the implementation of the framework given it is one of the longest rivers draining approximately one sixth of the contiguous US.