



Dominant flood generating mechanisms – a global analysis

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In this work, we approach the problem of identifying dominant flood generating mechanisms through large sample hydrology, which allows a comparison of catchments around the globe and their system properties related to flooding, thus extending previous studies covering the US and Europe.

River flooding is a common hazard which causes severe damages to people and property. Improved knowledge of the hydrological processes leading to flooding in a catchment has the potential to significantly enhance flood frequency analysis, as it can potentially reduce uncertainty in extreme flood estimation. Despite varying catchment characteristics and climates, flooding can still often be attributed to one of the few dominant flood generating mechanisms which makes the comparison across space particularly interesting: Why are some catchments more influenced by extreme rainfall, whereas in others the antecedent conditions are more relevant? Why are we unable to classify the dominant flood type of some catchments? Is it due to multiple mechanisms interacting or are other system aspects of relevance?

We use the recently published Global Streamflow and Metadata Archive (GSIM) (Do et al, Earth Syst. Sci. Data Discuss., <https://doi.org/10.5194/essd-2017-103>, in review, 2017; Gudmundsson et al, Earth Syst. Sci. Data Discuss., <https://doi.org/10.5194/essd-2017-104>, in review, 2017.), which includes magnitude and date of annual maximum flood for several thousand catchments. In combination with global soil and climate data it was possible to perform a flood type analysis for 9539 catchments. We attempted to infer the dominant flood type by comparing date of flood occurrence vs date of potential flood generating mechanisms.

Extending the flood type analysis to a global scale offers further insight into the variability as well as similarity of flooding in different climates and regions. It also revealed that current methodologies for flood type classification need to be adapted to be applicable to the variety of catchments around the world.