Geophysical Research Abstracts
Vol. 16, EGU2014-12100, 2014
EGU General Assembly 2014


# Step changes in the flood frequency curve - Quantifying effects of catchments storage thresholds

Magdalena Rogger, Alberto Viglione, Julia Derx, and Guenter Bloeschl

Vienna University of Technology, Institute of Hydraulic Engineering and Water Resources Management, Vienna, Austria (rogger@hydro.tuwien.ac.at)

In previous work the authors have shown that non linear catchment response related to a storage threshold may lead to a step change in the flood frequency curve. In the presented study we quantify the impact of temporal and spatial changes in storage properties on the magnitude of the step change. We use the maximum of the second derivative (curvature) of the flood peaks with respect to their return period as a new measure for the magnitude of the step change. The results of the analysis apply to catchments where runoff is generated by the saturation excess mechanism and a clear separation between a permanently saturated region and a variably saturated region with spatially uniform storage deficits exists. A sensitivity analysis with a stochastic rainfall model and a simple rainfall runoff model shows that the magnitude of the step change decreases with increasing temporal variability of antecedent soil storage, and increases with increasing area of the variably saturated region. The return period where the step change occurs is very similar to the return period of the rainfall volume that is needed to exceed the storage threshold. We present diagrams that show the joint effects of spatial and temporal storage variability on the magnitude and return period of the step change. The diagrams may be useful for assessing whether step changes in the flood frequency curve are likely to occur in catchments where the runoff generation characteristics are as examined here and the flood records are too short to indicate a step change.