**Uncertainties in regional coastal flood assessments associated with the variability of hydrographs of extreme events**

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**Abstract**

Currently, coastal flooding is the major hazard for coastal regions worldwide. Impacts of coastal flooding are expected to increase mainly as a consequence of climate change and increasing population and assets in coastal zones. For this reason, broad-scale and/or national-scale flood assessments are needed to identify locations that require prioritizing adapatation actions in order to reduce future flood damages.

The choice of extreme value methods, input data, and flood models can result in large uncertainties. In recent years, the use of simplified hydrodynamic flood models at broad scales has considerably increased as these models can decrease the bias of the common “bath-tub” model at reduced computational requirements. However, simplified flood hydrodynamic models require a hydrograph of extreme events as boundary conditions and hydrographs of extreme events are commonly neglected in the extreme value analysis. In order to overcome this limitation, simplifications such as using a design or constant hydrograph are commonly used, introducing, therefore, uncertainties related to the temporal evolution of the extreme event.

Here, we assess the uncertainties due to the variability of extreme event hydrographs along the entire coast of South Africa. We use the LISFLOOD-FP model for simulating flooding from events of the same return water level peak (including wave setup), but different hydrographs, based on the variability of observed extreme events. Preliminary results show that the variability of the 1-in100y event hydrograph can produce an average increase of up to 8% in flood extent along the entire coast of South Africa. However, we find flood extent increases up to 20% in low-lying areas. We further observe changes in flood depths due to changes in the hydrograph and find an average increase of maximum flood depths of 1.6 meters along the entire coast, while maximum depth increases can be up to 2.5-3 meters due to increases in flood extent.

Although our results cannot be directly extrapolated to other regions, we expect larger uncertainties in flood characteristics in other regions with larger low-lying coastal floodplains; and higher variability of storm surges.