



## **Joint decadal and regional flood response to climate drivers**

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Floods are known to be influenced by factors of diverse nature, ranging from climate-related drivers such as precipitation and temperature, changes on land use, land cover, soil properties and overall catchment properties affected by natural and anthropogenic factors, just to mention a few.

Climate and their spatially extended coherence patterns are often more relevant at regional scales, whereas relevance at local scales comes mainly from such factors as catchment attributes, land cover and use. These factors control the flood behaviour in terms of frequency, severity and spatial extent. The way that that control is expressed on floods is a matter of active research and underlies the main motivation for the present work.

The present study addresses the flood response to climate-related drivers on regional and decadal scales. For that purpose, a joint space-time sensitivity analysis is performed whereby the flood response is determined with respect to both spatial and temporal variability in precipitation and temperature. The statistical response is further explored by assessing the mutual dependency between floods and corresponding drivers, using entropy-based measures such as Mutual Information. Since this measure requires no assumptions on linearity and normality, it allows for the full statistical dependency between floods and drivers to be assessed beyond the fraction of information brought out by correlation measures. In doing so, additional features of the joint space-time flood response are brought out and discussed in terms of potential underlying mechanisms that might shed some light on how and why floods change at regional and decadal scales.