

Characterisation of Pan-European flood trends over the period 1965-2005

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Numerous extreme flood events have recently been recorded across the European continent. These events are perceived to be unprecedented and, therefore, there is a growing concern that flooding has become more frequent and severe. This study addresses this concern by detecting flood trends across Europe over the period 1965-2005.

Daily discharge data provided by the Global Runoff Data Centre are considered at 629 gauging stations and series of independent discharge peaks are identified by means of a digital filter, baseflow based. Flood series are compiled using the Peak Over Threshold (POT) approach and the sensitivity of flood trend results to 6 different thresholds is investigated. In order to support the description and interpretation of flood trends, the study area is divided into five regions: Alpine, Atlantic, Central, Mediterranean and Scandinavian Europe.

The results show a spatially coherent pattern of significant trends in flood magnitude and frequency across Europe. The Atlantic region exhibits consistently positive trends in magnitude and frequency of floods for all selected thresholds.

Decreasing magnitude and increasing frequency of floods are found in both the Scandinavian region and the high-elevation watersheds in the Alpine region. The similarity in observed flood trends could be explained by a reduced snow accumulation and an increasing number of rainfall generated floods.

The highest percentage of positive trends in flood magnitude is detected in the Central region when analysing the highest POT threshold, which indicates that the discharge of extreme floods is increasing in that area. With lower thresholds, smaller floods are included in the analysis and decreasing trends in frequency of floods can be detected, especially in the Elbe river basin.

Finally, in the Mediterranean region decreasing trends in magnitude and frequency of floods are widespread over the study period. Positive trends in magnitude are detected in low-elevation catchments that have a higher mean annual temperature and a lower mean annual precipitation than the mean of these characteristics in this region.