



Spatial patterns of frequent floods in Switzerland

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Information about the spatial characteristics of high and extreme streamflow is often needed for an accurate analysis of flood risk and effective co-ordination of flood related activities, such as flood defence planning. In this study we analyse the spatial dependence of frequent floods in Switzerland across different scales. Firstly, we determine the average length of high and extreme flow events for 56 runoff time series of Swiss rivers. Secondly, a dependence measure expressing the probability that streamflow peaks are as high as peaks at a conditional site is used to describe and map the spatial extend of joint occurrence of frequent floods across Switzerland. Thirdly, we apply a cluster analysis to identify groups of sites that are likely to react similarly in terms of joint occurrence of high flow events. The results indicate that a time interval with a length of 3 days seems to be most appropriate to characterise the average length of high streamflow events across spatial scales. In the main Swiss basins, high and extreme streamflows were found to be asymptotically independent. In contrast, at the meso-scale distinct flood regions, which react similarly in terms of occurrence of frequent flood, were found. The knowledge about these regions can help to optimise flood defence planning or to estimate regional flood risk properly.