



The relationship between peaks of maximum annual floods and their volumes in Austria

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We present an analysis of the dependence between annual maximum flood peaks and the corresponding flood volumes in Austria. The paper extends the former analysis focused on the flood peak-volume relationships in Austria (Gaál et al., 2012), where we have demonstrated that response times of catchments are related to the respective flood processes. Here in the focus of interest lies the question, which flood types are regionally represented in the dataset of annual maximum floods in Austria and in consequence, how consistent are the relationships of flood peaks and their volumes for the respective flood types.

The hypothesis is that the character and strength of the dependence between flood peaks and volumes is related to proportions of various flood types in the dataset of annual maximum floods. For example, for flash floods we will expect slim volumes corresponding to larger peaks, and for long duration floods (e.g. rain on snow or snowmelt floods) one would expect larger volumes related to smaller peaks. Therefore the particular mix of processes in the dataset of annual maximum floods should demonstrate itself in the type and strength of the relationship between the two variables. The study is based on 331 Austrian catchments with catchment area not exceeding 500 km². Peculiarities of the flood peak-volume relationships are further presented in the case of 6 pilot catchments from different hydro-climatological regions of the country.

The strength of the flood peaks vs. volumes relationship is expressed by the Spearman correlation coefficient, which shows a considerable altitudinal zonality in Austria: the highest values appear in the Northern Lowlands and Eastern Lowlands (i.e. at low and moderate elevations), while the lowest correlation can be observed in the Alps. This implies that the snowmelt processes act as an important discriminating factor for the strength of the correlation. This finding is also supported by further hydrological characteristics, e.g. the strength of the flood seasonality (Burn, 1997). It also shows approximately a reciprocal relationship with the Spearman correlation coefficient: the highest values of flood seasonality (observed predominantly in the case of the highest snow to precipitation ratio) are related to the loosest dependence between the flood peaks and volumes and vice versa.

References:

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