A large scale European database to identify dominant drivers of flood seasonality

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The study of the seasonality of various hydrological processes and their spatial properties has recently attracted renewed interest, especially in connection with floods, low flows and water resources management and studies on the climatic influence on hydrological processes.

Hydrological data across Europe from various sources is combined into a large database with over 7000 stations. The database is a result of existing datasets of European coverage amended by a collaborative effort as part of a joint European flood research agreement based on the exchange of data, models, staff and expertise.

With the help of this database, maximum annual floods and the dominant processes influencing observed flood seasonality in Europe are analysed. The seasonality analysis is based on directional statistics, which represent an effective method for defining similarity measures on the basis of the temporal consistency of hydrological extreme events within a year. Spatial variability and distinct patterns of mean flood seasonality are found in many catchments across a large range of different climatic and physiographic conditions.

The role of driving processes of flood generation and their interconnections is investigated within a linear and non-linear statistical framework to disentangle signatures of different mechanisms and process interactions at play. For instance, the results show that signatures of atmospheric and land-related driving processes can be identified such as the effect of topography (e.g. the Alps or the Carpathians), and their individual and combined role on flood seasonality is discussed.