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Hydro-geomorphic response of the Arroyo Cabrera 1997 flash flood (Central Spain)

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On December 17, 1997 a flash flood occurred in the Arroyo Cabrera catchment (Central Spain) causing important geomorphic changes, infrastructure damages and economic losses. It was triggered by a heavy rainfall event. Another related process to this event was the accumulation of large woody debris, which caused that a bridge located in the outlet of the catchment was blocked and over flooded. As a consequence, the risk upstream this bridge, where a children summer camp is located, was increased.
Different integrated methods including hydrogeomorphic and rainfall-runoff simulation, as well as post-event observations, enabled to characterize the geomorphic processes that took place and to estimate the hydrologic response.
One important drawback faced in this study is related to the availability of precise hydrometeorological data. It is necessary to outline that there is not subdaily rainfall data available for this event. Therefore, several storm scenarios based on the critical rainfall value for the abovementioned event have been obtained and distributed in time and space. The defined design storm hyetographs were used as input in a semi-distributed hydrological model, previously calibrated by the instrumental network within the catchment.
Furthermore, the hydraulic effect of the woody debris on the hydrological response was analyzed by means of hydraulic simulation.
The results have elucidated the hydrometeorological behavior of this catchment during that extreme event, and can be used for improving the hazard analysis to assess flood risk of the summer camp and other infrastructures.