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The Braunsbach Flashflood of May 29, 2016: A forensic analysis of the meteorological origin and the hydrological development an extreme hydro-meteorological event

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The flash-flood at 29th May 2016 in the vicinity of the village of Braunsbach in Southwestern Germany, State of Baden-Wuerttemberg, has been a particularly concise event of the floods occurring in southern Germany at the end of May / early June 2016. This extreme event was triggered by a convective high intensity rain storm, causing extreme discharge rates and subsequent debris flow in the local creek. This led to severe flooding of the village with immense damages. Besides its extreme nature, the event is characterized by very local and short term scales, i.e. the catchment of the creek covers an area of only six km^2 and the whole event lasted only two hours.
This contribution presents a retrospective analysis with regard to meteorology and hydrology to obtain a quantitative assessment of the governing processes and their development. We term this a "forensic analysis" because due to the very local and sudden feature of this flashflood event, the processes cannot be directly measured during the event and/or at the site. Instead, they need to be reconstructed and estimated after the event from a variety of rather different information sources and "soft" data. Using these types of post event observations and analysis, we aim at obtaining a rather comprehensive picture of the event and its consequences.
Regarding rainfall, both station data from the surroundings of the catchment and radar data from the German Weather Service were analyzed, including the analysis of different errors types and dynamic features of the convective system. The flood hydrograph, including the maximum discharge rate during the event, was estimated by three different approaches, which were compared to obtain an idea of the associated uncertainty.
The overall results of this forensic analysis show that it was a very rare rainfall event with extreme rainfall intensities, e.g. return period exceeding 100 years. Catalyzed by catchment properties, this lead to extreme runoff, severe soil erosion, and subsequent debris flow processes. Due to the complex and interacting processes, the hazard must not be attributed to a single cause, since only the interplay of the different processes and catchment conditions can lead to such an event.
The people in the region say that such an event "has never happened before". However, from some first geomorphological analysis we got some indications that such events, including debris flow, might have happened before during previous times (time scale of millennia). Therefore, it would be more appropriate to state that "nobody can remember of such an event".