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A retrospective analysis of the flash flood in Braunsbach on May 29th, 2016

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At the end of May and early June 2016 several rainstorms caused severe surface water flooding and flash floods, partly accompanied by mud and debris flows, in Central Europe, and especially in southern Germany. On the evening of May 29, 2016, a flood outburst with massive amounts of rubble and muddy sediments hit the town of Braunsbach, Baden-Württemberg, damaging numerous buildings, cars, and town facilities.
The DFG Graduate School “Natural hazards and risks in a changing world” (NatRiskChange) at the University of Potsdam investigated the Braunsbach "flash flood" as an exemplary catastrophic event triggered by severe weather. Bringing together scientists from the fields of meteorology, hydrology, geomorphology, flood risk, natural hazards, and mathematics the research team was especially interested in the interplay of causes and triggers leading to the event. Accordingly, the team focused on the entire process chain from heavy precipitation to runoff and flood generation and the geomorphic aftermath.
The steep slopes in the catchment area promote the episodic supply of gravel, debris and organic material, which remains stored for decades to millennia, only to be remobilized during rare and extreme runoff events such as in 2016. Field mapping revealed at least 48 landslides as sources of high sediment loads. Nonetheless, numerous scars of river erosion along the tributary creeks into Braunsbach indicate that most of the material carried by the flash flood was due to bank undercutting. The flow also entrained more rubble, trees, cars, and other anthropogenic sediments further downstream. This enhanced solids load increased the physical impact, and hence damage, to buildings. Local effects of flow depth, flow velocity, and exposition of buildings into the advancing non-steady and non-uniform flow caused the damage to exceed that of a clearwater flood with comparable return period. We conclude that, to meaningfully inform the implementation of precautionary measures, a quantitative hazard assessment of similarly extreme flash floods may include more explicitly the effects of high sediment loads and flow-roughness elements.