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Forensic analysis of flash flood response: documenting hydro-geomorphological and social response to extreme storms

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We provide a review of recent methods for the documentation of hydrological, geomorphological and social response to flash floods by means of post-flood surveys – an approach termed "flash flood forensic analysis". Effective documentation of flash floods requires post-flood survey strategies encompassing (i) accurate radar estimation of rainfall, (ii) field and remote-sensing observations of the geomorphic processes, (iii) indirect reconstruction of peak discharges by means of intensive post-event surveys, (iv) verification of the estimates by means of hydrological models, and (iv) eyewitness interviews concerning individual and collective perception and response to flood risk.
We show how forensic analysis of flash flood response may provide valuable insights for flash flood risk management. Observations from forensic analysis may improve estimation of low-frequency floods at spatial scales which usually are not covered well by stream gauge networks. Interdisciplinary collaborations between natural and social scientists in the frame of forensic analysis may help to better understand the relationship between flood dynamics and behavioral response in the context of fast space-time changes of flooding and risk conditions and advance towards the prediction of high-impact flash floods. Finally, forensic analyses may have a role in enhancing the quality of public debate in post-flood contexts, when reconstruction decisions are being made and disaster policies being revisited.