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Brief communication: On-site data collection of damage caused by flash floods: Experiences from Braunsbach, Germany, in May/June 2016

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At the end of May and beginning of June 2016, several municipalities in Southern Germany suffered from severe flash floods and debris flows which have been triggered by intense rainfall in Central Europe. Overall, the insured losses of these events amounted to EUR 1.2 billion in Germany. Especially the strong and unexpected flash flood on May 29th in Braunsbach (Baden Wurttemberg) – a small village counting about 1,000 residents – attracted media and policymakers due to its devastating character. The understanding of damage caused by flash floods requires ex-post collection of relevant but yet sparsely available information, linking process intensities to damage by using adequate methods of data gathering. Thus, on-site data collection was carried out after the flash flood event in Braunsbach, using open source software as helpful and efficient tool for data acquisition and evaluation. A digital survey was designed and conducted by a team of five researchers who investigated all buildings affected by water and debris flows. The collected data includes an estimation of a particular damage class, the inundation depth, and other relevant information. A post - hoc data analysis was done with R 3.3.1 and QGIS 2.14.3, performing both, a Random Forest Model (RF) and Random Generalized Linear Model (RGLM) as well as preparing a Spearman's rank correlation matrix. For visual interpretation and better overview of the study area and analysis results, a "process intensity" map was created, revealing important links of damage driving factors. We find that not only the water depth, which is often considered as only damage driving factor in riverine flood loss modelling, but also the exposition of a building to the flow direction and susceptible building parts like e.g. shop windows seem to be risk factors in flash-flood prone regions. Although no significant correlations were found, the analyses indicate that also building material (i.e. half-timbered or masonry) and structural precaution could play a role on the extent of damage and therefore offer options of damage mitigation. It is revealed that the damage driving as well as damage reducing factors are complex, contingent upon the surrounding and remarkably different from riverine floods. Further, it can be concluded that open source data collection software for mobile use has great potential as a scientific tool to generate extensive valuable data under challenging conditions.