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Flash flood magnitude evaluation : case study from Southern Italy

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Flash floods are a frequent natural hazard in many parts of Europe, including Italy. Such floods are of limited areal extent and may occur in small catchments drained by torrential streams that feed alluvial fans. They may display highly variable magnitudes due to the size of the basins, the concentration times and extent of possible channel filling. These phenomena induce highly erosive flows and impact forces due to the mix of water, soil, boulders, trees and debris, but they also have a very high rate of aggradation due to the deposition of large particles. These events are strongly different from flow-like landslides, in terms of rainfall, triggering conditions, solid concentration, flow velocity and heights and consequently the damages. In this study, a methodology for the assessment of the magnitude in a torrential-flooding event is proposed. In particular, the event of the 14th–15th October 2015 in Solopaca – Paupisi area (Benevento) is adopted as relevant case study. The proposed approach is based on both classical and modern field survey technologies. UAV images permitted to map the affected area, coupled with geotagged pictures for the description of the eroded and deposited thickness, materials grain-size, flow heights and occurred damages. All these parameters were collected in a DB and summarized into thematic maps. The area of the event and the thickness of the deposits were adopted to assess the magnitude of the event in terms of solid transported volume. The collected data and their elaborations provided useful information, which can be adopted to calibrate physical-based models aimed at simulating future scenario in watersheds characterized by similar geologic and geomorphologic setting. Furthermore, the assessment of the magnitude of the event is relevant in the design of the most appropriate works for the hydraulic risk mitigation, while the damage distribution represents a valuable tool in order to quantify the vulnerability of both structures and infrastructures to these kind of phenomena.