

## ***Interactive comment on “Impact of rainfall spatial aggregation on the identification of debris flow occurrence thresholds” by Francesco Marra et al.***

**Anonymous Referee #1**

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### General comments

Consistently with its title, the paper analyses how the spatial scale of aggregation of rainfall can influence the determination of intensity-duration debris flow occurrence thresholds. It distinguishes between the two cases of (i) regular grids, and (hypothetical) (ii) rain gauge networks. It capitalizes on a data set of 1 km/5 min radar rainfall and 99 debris flow events. The paper fits within the scope of HESS, it is well written, scientific questions are clear and relevant, and conclusions are supported by the results. Nevertheless, the paper may benefit from a more in-depth analysis regarding the available methods for threshold determination, as I describe in the first point of the “specific comments”. For this reason, I suggest moderate revisions for the manuscript to be finally published in HESS.

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### Specific comments

Section 3: The so-called frequentist method for threshold determination originally proposed by Brunetti et al. (2010), involves only triggering events. Relatively recent research has highlighted the importance to take into account also non-triggering events. To consider only triggering events generally brings to thresholds that are lower than many non-triggering events, and thus a high number of false alarms, which may generate a disbelief in the early warning system (e.g. Berti et al., 2013 doi:10.1029/2012JF002367). The authors should at least discuss the drawbacks of the method proposed by Brunetti et al. (2010). Possibly, the authors should add to the paper the same analysis they have conducted, but for the case that threshold determination is conducted by taking into account both triggering and non-triggering events.

P5 L4: Few details are given about the method for generating the synthetic rainfall fields. Since the method may affect the results, please provide these details.

P3 L23-24: “The severity of debris flow events was classified as mild ( $T \leq 2y$ , 21 debris flows), moderate ( $2 < T < 50y$ , 41 debris flows) ...”. The authors should mention that return period of a debris flow depends in general from both initial conditions and triggering rainfall, and not only from the latter (Peres and Cancelliere, 2016; <http://dx.doi.org/10.1016/j.jhydrol.2016.03.036>). Furthermore, intra-event rainfall intensity variability, which also affects return period, may not be properly taken into account with depth-duration-frequency curves (see D’Odorico et al., 2005; doi:10.1029/2004JF000127).

### Technical corrections

P2 L8. Perhaps “variability” is more appropriate than “non-stationary”

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