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Interactive comment on "Invited perspectives. A hydrological look to precipitation intensity duration thresholds for landslide initiation: proposing hydro-meteorological thresholds" *by* Thom Bogaard and Roberto Greco

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The authors analyze the concept of precipitation intensity-duration (ID) thresholds for shallow landslides and debris flows from a hydro-meteorological perspective to propose a new approach to the problem. The contribution is largely welcome since it suggests new approaches and perspectives to overcome important, but sometimes neglected, limitations of the commonly used methods.

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Discussion paper

Within the interesting analysis of the relationship between ID thresholds and IDF curves, the discussion so far neglects the impact of rainfall estimation uncertainty and its possible dependence on rainfall duration and return period (e.g., Krajewski et al., 2003, www.dx.doi.org/10.1623/hysj.48.2.151.44694; Ciach and Krajewski, 2006, www.dx.doi.org/10.1016/j.advwatres.2005.11.003).

Recently, rainfall estimation uncertainty caused by the use of rain gauge measurements (still the most common source of rainfall estimates in this field) was shown to significantly affect the derived ID thresholds causing systematic bias (Nikolopoulos et al., 2014, www.dx.doi.org/10.1016/j.geomorph.2014.06.015). This systematic bias is caused by (i) systematic rainfall patterns observed around the triggering locations and (ii) the use of log-transformations within the derivation of the ID (Marra et al., 2016, www.dx.doi.org/10.1016/j.jhydrol.2015.10.010). At least for durations ≤ 2 days, these rainfall patterns were observed to be related to the return period of the triggering rainfall (Destro et al., 2017, www.dx.doi.org/10.1016/j.geomorph.2016.11.019). Consequently, the 'slope' of the ID threshold is affected by rain gauge sampling, and this potentially undermines the comparison between the slope of ID thresholds and IDF curves reported in the manuscript. In particular, I think this aspect should be discussed when the authors say [line 157 and following]: *"On the other hand, for longer precipitation durations, ID thresholds have smaller slopes than IDF curves. This means that landslide initiation on the right side of the graph (lower precipitation intensity with longer duration) would occur with rapidly increasing return periods of precipitation events"*. In fact, the observed pattern could be caused/emphasized by the sampling issues discussed by Marra et al., (2016) and Destro et al. (2017).

To conclude, IDF curves are expected to vary within the examined region (generally a regional, if not global, scale); it is thus unclear to me how the idealized IDF curves in Fig. 3 have been drawn. The 'slope' of the curves (i.e. the dependence of I with D) at the regional scale may change so that the curves should be better represented as a shaded area – such as done for the ID thresholds.

This was a technical comment on an introductory aspect of the study; this being said, I repeat my compliments to the authors for the manuscript and the new proposed perspective.

With kind regards,
Francesco Marra

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