Interactive comment on "Evaluation of shallow landslide triggering scenarios through a physically-based approach: an example of application in the southern Messina area (north-eastern Sicily, Italy)" *by* L. Schilirò et al.

Anonymous Referee #2

Received and published: 29 June 2015

1 Review

1.1 Synopsis

The manuscript describes a strategy of assessing rainfall triggered shallow landslide potential. It proposes an holistic approach combining the pre-processing of historical rainfall data into clusters of similar return period with an application of computational

models (HYDRUS, TRIGRS) to assess their impact on slope stability. The strategy itself is generic in nature and can be applied to arbitrary regions. In this work, it has been used for a case-study in the southern Messina area. One major result states that extreme rainfall events not necessarily increase the hazard potential, as long as they are short in duration (one-hour events).

1.2 General comments

I agree with the comments of referee 1 regarding the discussion of results and don't have to add anything to it. In my review I will concentrate on presentation and structure of the manuscript as well as the description of the modeling process:
Generally, the publication is a valuable contribution to the field. The high-level structure of the paper adequately reflects the different building blocks of the study. In the details of each section and subsection however, the authors could more carefully pay attention to the logical order of introducing facts, e.g. what explanations, abbreviations, parameters, etc. have already, or not yet, been introduced. The paper would benefit from an additional subsection in Chapter 4 'Methodology', which provides a process overview. I am thinking of something like Table 12 referenced in the Discussion, but at an earlier stage of the manuscript and described clearly. Generally, the paper could be written more concisely and language quality could be improved. In addition, I do have the following questions and suggestions:

- p. 2976 line 17: The use of the word calibration (here and elsewhere) seems strange in this context (maybe I am a little picky here). Usually, 'calibration' results in an improved knowledge about the error of a model in comparison to ground truth data. This knowledge is then used to either minimize the error (by adjusting model parameters), or by interpreting later results of that model with this error in mind. In this paper the calibration reduces to a re-analysis of one event. Though differences between model and landslide inventory are observed and discussed,

this 'calibration' is not actually used to adjust model parameters (Or is it? Then please make it clearer). Also, the discussion of model results for other rainfall scenarios does not satisfactorily reflect on the modeling errors observed in the case-study. The authors should consider to speak about 'validation' rather than 'calibration'.

- p. 2982 line 2: the largest → a large?

- p. 2982 line 14-18: How is a significant variable identified?

- p. 2984 line 5: variable from cell to cell → locally variable

- p. 2984 line 12: hydrodynamic parameters: These should either be briefly introduced or at least named (like done later in Section 5.2. on the back-analysis). Alternatively, the author could reference to Table 5 summarizing the TRIGRS input parameters (see also my later comment regarding that table).

- p. 2984 line 18: Gardner (...) hydraulic model → the hydraulic model proposed by Gardner

- p. 2984 line 21: What is theta?

- p. 2985 line 4: How did the constraints enter the model? Simplifying models are omnipresent and not bad if the underlying assumptions are made transparent. In any case it wwould be interesting to discuss, whether this can be used later to quantify uncertainty.

- p. 2988 line 3: Figure 7a-c → Figure 7a,c. Even better: exchange numbering (b → c, c → b) and write Figure 7a-b and Figure7c-d, respectively

- Table 5: Include a column, which explains the variable, e.g. H(z) | soil thickness | spatial map. This makes sense, as you mention the input parameters various

times in the manuscript. Referring to this table adds clarity. Perfect would be yet another column indicating the source of that parameter (HYDRUS-1D, lab tests, etc.).

- Figure 7: Given that the interesting return periods are the short ones, it might make sense to use a logscale on the x-axis. Indicating the lines for different return periods directly in the plot (like in subplot a and c) is quite helpful. I would consider this also for subplot b and d.