

Dear Editor, dear Authors

The manuscript by Peruccacci et al. highlights how essential reliable landslide datasets are in the elaboration of landslide thresholds, to be used in the development of landslide early warning systems. The authors also emphasize how landslide inventories are important tools in the hazard characterization and assessment and, they provide a very useful and quite up-to-date overview of existing landslide inventories around the world.

Despite some few examples, most of the landslide inventories have been prepared after the year 2000 and were created with the purpose to show where historical landslide events have occurred and the damages they have caused. In the compilation of these inventories, the main concern was mainly the quantity of data rather than the quality, or information about triggering mechanisms. Most of these inventories were prepared as part of specific projects and created during the duration of the project, not always updated, with new entries or improved in their quality, in later years.

The authors highlight quite well the difficulties in the compilation of landslide inventories and the fact that this is a time-consuming task. And this is, in my opinion, the reason why the compilation of landslide inventories is often a forgotten task in the national framework for landslide risk assessment, with very limited resources and personnel assigned, well indicated by Reviewer 1.

We must also remember that in the past many previous authors have prepared landslide thresholds by using separated landslide dataset. It is with the most recent need of operational landslide early warning systems that we demand reliable landslide data to use in thresholds analyses.

The authors described well the existence of other databases in Italy, their limitations and the need for a “separate” dataset for rainfall-induced landslides. This may seem a good solution at the beginning, but in a long run it will create problems for those who manage landslide prevention at national level. Therefore I have some general comments for the authors that I would like to be addressed in the document.

We thank the reviewer for the positive comments and helpful suggestions that significantly improved our paper.

- It is not clear if and how ITALICA communicate with the other existing inventories. If a new rainfall-induced landslide should be registered in ITALICA, will this be send automatically in the other databases and viceversa? How to deal with future updates? Who is responsible for these updates?
R: ITALICA does not communicate with other Italian landslide inventories because it has different characteristics and purposes, as stated in the text (from line 378 et seq.). As explained in the Introduction, it has been more than 15 years that properly trained CNR IRPI staff have been involved in data collection (lines 151-152). The decision to start a new catalog in 2007 was necessary because of the lack of accurate information in the then existing Italian catalogs (AVI and IFFI). ITALICA is continuously being updated and new releases will be released periodically on Zenodo under our responsibility (lines 375-377). To be more clear, we added that the catalogue will be updated “by us”.
- Have you considered the possibility to improve one of the existing databases instead of making a new one? Adding for example a “quality level code” or create a separate module with specific parameters for those landslides that should be used for thresholds?
R: The possibility of improving existing databases was not feasible because the information needed to define a quality level code was not available or could no longer be found at the time of data collection. We added as a final remark in the Concluding remarks the following sentence: “ITALICA can certainly serve as an example for the collection of new accurate data for setting rainfall threshold.”.
- Some operational early warning systems send alert messages also for landslide triggered by snow melt or only for high soil water saturation, what do you suggest based on your experience? do we need to create a separate database for each triggering?
R: Currently, landslides triggered by the combined effects of precipitation and snowmelt have not been included in ITALICA (as stated in line 180). Using this type of data would involve using reliable algorithms and temperature data to derive the water equivalent of snow in mountainous areas. At present, we have not invested time and resources in this topic. In our opinion, it would be better to identify snowmelt triggered events in databases with a flag.
- Many countries have one database, managed by one national institution, with limited resources and personal, and efforts are being made to improve the quality of the registered events, by assigning a quality level to each entry and to provide information about triggering. Based on your experience and take into account the problems with future updates, what do you recommend? To create separate databases or improve the existing inventories?
R: There is no nationally managed database in Italy that simultaneously contains information on landslide cause, time of initiation, and location with sufficient levels of accuracy as in ITALICA. For our

purposes, it was easier to start a new collection than to search for missing information in existing databases, which were not designed to predict the spatial and temporal occurrence of shallow landslides (line 41 et seq.).

- At the end you have created a database with both low and high quality data. Could you explain better if you could use the low quality data in your threshold analyses (maybe for threshold at regional scale requiring low accuracy)? or do you need always high quality data?

Thank you for the comment. In ITALICA the classification of data by quality (from very low to very high) refers only to spatial accuracy. In particular, the percentage of data with low (P_{100}) and very low (P_{300}) spatial accuracy is only 4.5% (lines 307-308). When calculating rainfall thresholds, it is suggested that these data be excluded. In this regard, we added the following sentence after line 361: "For this application, we suggest excluding records with low (P_{100}) and very low (P_{300}) geographic accuracy".

I also agree that the article is quite well structured and written, with adequate length and, with explanations and statements well illustrated.

It can be an important contribution and of interest to the landslide research community working in particular with landslide early warning systems. I would recommend this paper to be accepted for publication, with very minor edits (see supplied comments).

I have just few comments/edits on the text

- Page 2 line 46, "shallow landslides" maybe useful to add what kind of types are in this category
R: We added "(e.g. slides, flows, and falls)".
- Background: In the list of inventories, I have not seen this reference. *Herrera, G., Mateos, R.M., García-Davalillo, J.C. et al. Landslide databases in the Geological Surveys of Europe. Landslides 15, 359–379 (2018). <https://doi.org/10.1007/s10346-017-0902-z>* . Please check if they have mentioned other inventories that are not in your review.
R: Thank you! We added the suggested reference. The text now reads: "Herrera et al. (2018) provided an update of the previous European recognition, collecting 20 national landslide databases including 849,543 landslides of different types (528,903 in Italy)."
- Another reference that is missing is the one that describe the inventory for Norway: Jaedicke, C., Lied, K., and Kronholm, K.: Integrated database for rapid mass movements in Norway, *Nat. Hazards Earth Syst. Sci.*, 9, 469–479, <https://doi.org/10.5194/nhess-9-469-2009>, 2009.
R: Thank you! We added the suggested reference. The text now reads: "In Norway, Jaedicke et al. (2009) collected a database of more than 33,000 rapid mass movements of different types, e.g. including also snow avalanches and subaqueous slides, without detailed temporal information (only the year of occurrence is often now)."