

## Reply on RC1

Giuseppe Esposito and Fabio Matano

---

Author comment on "A geodatabase of historical landslide events occurring in the highly urbanized volcanic area of Campi Flegrei, Italy" by Giuseppe Esposito and Fabio Matano, Earth Syst. Sci. Data Discuss., <https://doi.org/10.5194/essd-2022-267-AC1>, 2022

---

### General comments

**Reviewer comment:** In your study entitled 'A geodatabase of historical landslide events occurred in the highly urbanized volcanic area of Campi Flegrei, Italy' is an interesting work that tries to share data on historical landslide events. The data are deposited at 4TU.ResearchData in the form of shpfile and kml. The data are relevant for a community of landslide hazard research, and principally this is a work that justifies publication in ESSD. However, there is some weakness in the way the data are organized and presented. After carefully reading the MS and exploring the attached dataset, I concluded that the way this dataset is presented is insufficient for ESSD in its present form, following the main comments and the specific comments listed below.

**Author response:** We are grateful to the Reviewer #1 for his/her comments and suggestions aimed at improving our manuscript. Point-by-point responses to all the comments are outlined below.

**Reviewer comment:** The MS does not fit well into the scope of ESSD in its present form. It lacks to interconnect the data it shares and to show how it is valuable in relation to the Earth's system.

**Author response:** Thanks to the comments and suggestions provided by the two Reviewers, we have deeply revised the present form of the manuscript for making it suitable to be published, hopefully, in ESSD.

**Reviewer comment:** The title says '...historical landslide events...' yet It seems to me that sections 4.1 and 4.3 are the ones that truly reflect the title of the MS. Sadly, the other valuable information that was presented in the earlier sections is not tied into the main logical thread of the MS, nor it is demonstrated how vital those may be to be used with historical landslide events.

**Author response:** The title in the current form provides information on the main topic addressed by the article, and responds to the ESSD request, such as to be concise and informative. We suggest to do not modify it, and to do not extend its length. Information associated to the landslide events are strictly related to them, since they consist of data explaining the impact and relationships with geological and geomorphological properties of the affected sites (i.e. predisposing factors). In the light of this, the term "historical

landslide events" in the title should be considered in its broadest meaning.

**Reviewer comment:** The presentation of the dataset is poor. I am missing at least one table/figure that really gives an overview on the whole dataset that is presented in the MS from the variables side. After all that is in the focus according to the title. The information provided in Sect. 2 is relevant, yet insufficient. The reader must get an overview on the dataset that is presented, before any detail on the measurements is discussed.

**Author response:** It seems to us that all the Reviewer's requests included in this comment can be satisfied with contents already available within the Section 2 of the article, including a detailed table explaining all the attributes associated to each record.

**Reviewer comment:** The study lacks to show how the data it shares is relevant in geological hazard research as one would expect based on the introduction.

**Author response:** In the revised version of the manuscript, we have added more information on how the CAFLAG geodatabase could be exploited by both broad and local geoscience research community. In particular, within the "summary and conclusions" section we have pointed out that the CAFLAG dataset could be used to: i) enhance scientific knowledge about the role played by landslides in the geomorphic evolution of volcanic landscapes, and on processes that lead to slope failures and control their spatial variations; ii) calibrate and validate statistically-based landslide susceptibility models; iii) assess risk conditions and support the planning of mitigation measures.

## Specific comments

### Abstract

**Reviewer comment:** The penultimate sentence tries to describe how the dataset could be utilized. This should be much more elaborated on and should be one of the main messages of the abstract.

**Author response:** Please, see the response to the previous comment. In addition, we would like to remark that we have provided some suggestions on the possible uses of this geodatabase according to our knowledge and experience, highlighting also the related potentialities and limitations in the new section 4.5. Besides this, we are confident that this geodatabase can be exploited by the geoscience research community for more possible uses and in further different ways with respect to the proposed ones. We suggest to do not focus the abstract on the possible use of the geodatabase, since this theme has been already remarked in the first part of the abstract (lines 2-3).

**Reviewer comment:** Line 9-10: It would be better to give concrete examples.

**Author response:** The highlighted sentence aims to introduce the Campi Flegrei case study, representing a concrete example of "urban settlements exposed to multi-hazard conditions", since both volcanic, seismic, flash flood, landslides, and densely population occur.

**Reviewer comment:** Line 14: Why is it from 1828 and not earlier? It's already 2022. Why is there no update? Where does the data from? Is it reliable? How to check the quality?

**Author response:** The CAFLAG geodatabase includes events occurred since 1828 and not earlier because previous data were not considered reliable for further scientific analyses, that is the scope of the geodatabase and hence of this article. There are no updates after 2017 because, in the successive years, the research efforts were concentrated on coastal

landslides, as documented by works cited also in this article.

The data sources are described in detail within the section 2.1.

Most of the used data come from international scientific publications and official landslide databases and inventories developed by Italian research institutions and public agencies (ISPRA, CNR, Basin Authorities), guaranteeing proper and independent validation procedures leading to high quality and reliable information. Data related to the most recent events (2013-2018) collected from newspapers and websites were validated with field observations.

**Reviewer comment:** Line 20: What do you want to say? What do we get out of this?

**Author response:** In accordance with suggestions of the Reviewer #3, we have removed this sentence.

**Reviewer comment:** Line 21-25: I think the purpose of collecting this data should be briefly described in the abstract, and what can we do with this data? Instead of just saying landslides have a significant impact on humans, we need to use the knowledge to deal with them, so what do we get from your data set? Is it just simple data?

**Author response:** In accordance with the Reviewer's suggestion, we have modified this part of the abstract by providing some brief suggestions about the possible use of landslide fatality data.

## **Introduction**

**Reviewer comment:** The Introduction seems as if it was written to another paper. The introduction correctly addresses issues that the dataset at hand could be used to solve. However, when the dataset is presented its values and possible applications are not presented in light of the Introduction.

**Author response:** The main purpose of the current manuscript is to describe research data included within the CAFLAG geodatabase, as recommended within the ESSD aims and scope section for data description papers. In addition, instructions for authors clarify that "extensive interpretations of data remain outside the scope of this data journal". The possible applications that, according to the Reviewer, we should suggest into the article are not recommended to the authors. Therefore, it seems to us that such suggestions represent a kind of interpretation, since each researcher can use datasets according to its knowledge and necessity, and there is not a prefixed scheme to use landslide datasets that we have to remark. Besides this, we agree with the Reviewer that some recommendations can be provided, by taking also into account the quality of data. For this reason, we have improved the final part of the manuscript providing more information on these issues.

**Reviewer comment:** Line 38: What additional risks?

**Author response:** We mean that landslides pose a risk that is additional to those posed by volcanic and seismic processes in the area. We have modified the sentence to be more clear.

**Reviewer comment:** Line 41: The importance of the region should be explained internationally, otherwise, there is no comparison, only regional characteristics cannot be promoted globally.

**Author response:** As stated into the text, the Campi Flegrei volcanic area corresponds to an active volcanic caldera considered among those with the highest volcanic risk in the world. This is well known within the scientific community dealing with geohazards. To

support this statement, we had already inserted the reference to the work of De Natale et al. (2006). To meet the Reviewer's request, we have provided further information highlighting the importance of the region at global scale, together with a new reference to the valuable and recent study of Troise et al. (2019) focusing on this topic.

**Reviewer comment:** Line 52-53: And then what? What are you trying to say? What can we learn from these deaths?

**Author response:** This sentence has been eliminated because considered redundant with respect to the previous text. Besides this, such deaths highlight that landslides in the area can lead to serious human consequences posing a relevant societal risk, as also remarked in previous studies (e.g., Calcaterra et al., 2003a,b; Cascini et al., 2008, cited in the manuscript).

**Reviewer comment:** Figure 1: Its global location is unknown. It is recommended to add latitude and longitude to add elevation data, now do not know the region's topography, topographic conditions, and the water system's distribution.

**Author response:** The Figure 1 has been modified in accordance with the Reviewer's suggestions.

## **Data and methods**

**Reviewer comment:** Line 111: Why do you choose this time period? What about other times?

**Author response:** This time period depends on the data availability. We have not found more recent datasets.

**Reviewer comment:** Line 127: Why is there no comparison with other categories? Would it be accidental to use this category? Then how do we control the quality of data?

**Author response:** The use of this category was not accidental. We decided to refer to the most used landslide classification among the used data sources, avoiding to modify original information with other classification schemes. About the data quality control, please see our reply to the previous comment related to the line 14. In addition, we would like to remark that we have added the new section 4.5 describing the main limitations of the CAFLAG geodatabase.

**Reviewer comment:** Line 138: I don't think this is very good statistical software. Why not use R, Python, and Matlab for analysis? How is your significance tested in EXCEL? This leads me to question the availability of data quality.

**Author response:** Statistical analyses that we have performed in this study are very basic (i.e. descriptive), as requested by ESSD. Therefore, we have decided to use a simple software like Excel that, however, allows powerful data visualization and analysis tools for uses like the current one. The cited software packages are undoubtedly better than Excel, but we do not believe that the use of a specific software can be a valid reason to question the data quality.

**Reviewer comment:** Table 1: It is suggested that the author upload the disaster on that day and year in the form of documents to facilitate readers' visualization.

**Author response:** We have not understood this comment and, specifically, to what document the Reviewer refers.

## **Study area**

**Reviewer comment:** I miss a description of the area's water system, vegetation, soil, and population distribution, as described in the abstract.

**Author response:** The suggested information has been added within the section 3 describing the study area.

**Reviewer comment:** Line 175: Lack of references.

**Author response:** The reference had already been indicated in the next sentence (i.e., Ducci and Tranfaglia, 2005)

## **Results**

**Reviewer comment:** Figure 3: Can we get more information by discussing the seasons?

**Author response:** We thank the Reviewer for this question. Seasonal information is available for a limited number of events (482 out of 2302 events) and, in our knowledge, this is not sufficient to analyse statistical relationships between the movement types and seasonality.

**Reviewer comment:** Figure 4: I don't see any buildings. Instead, I think it was taken far away from where people live.

**Author response:** In the study area, many buildings are located close to the cliff tops (in the inland part) that in these pictures are not visible. We have modified the related sentence to clarify this.

**Reviewer comment:** Figure 5: It is recommended to take the photo from the same angle, choosing the same reference object for easy comparison.

**Author response:** We thank the Reviewer for this suggestion. In this case, photos refer to different sites (see Figure 1) and, for this reason, a common reference object could not have been identified.

**Reviewer comment:** Line 210-213: What do we learn from these statistics?

**Author response:** These statistics can help the reader in understanding the relationships between the spatial distribution of the catalogued landslides and lithological properties of the study area. The main finding highlighted by these statistics is that failures have affected mostly the rocky cliffs. This information can help local decision-makers to plan effective strategies for hazard and risk mitigation.

**Reviewer comment:** Line 249: From what? On what basis?

**Author response:** In order to support this statement, two suitable references have been added.

**Reviewer comment:** Section 4.3: So, what useful information can we draw from this? In addition, the content order of the result part needs to be modified, and there is no logic among the four results.

**Author response:** We thank the Reviewer for this suggestion. We have modified the order of contents included within the results section, in a way to present information on landslides and their impact first, and data related to the affected sites later. The new

section 4.2 summarizes temporal information available for 517 out of the 2302 inventoried events. As highlighted also by Reviewer #3, this is a weak point of the CAFLAG geodatabase depending on the used data sources. In fact, most of them consisted of geomorphological inventories developed mostly by means of photo interpretation and field work (e.g., IFFI, inventory map of the AdB, CARG project) which do not allow to determine accurate temporal information on the occurrence of landslides. This limitation has been described in the new section 4.5. In the "Temporal distribution" section, instead, we have outlined the available information which can be also useful to evidence this bias.

**Reviewer comment:** Figure 10: I suggest adding a trend line for intuitive analysis.

**Author response:** As highlighted also by the Reviewer #3, this plot is affected by a bias towards more recent landslides depending on the increasing availability of documental sources over time, rather than a real rise in mass movements. This has been pointed out in the new section 4.5. Therefore, we suggest to do not add further information, such as a trend line.

**Reviewer comment:** Line 277: What do we get from the F-N curve?

**Author response:** The F-N curves show the annual frequency  $F$  of events causing  $N$  or more fatalities against the number  $N$  of fatalities. The F-N plots can be considered as representative of the current societal risk (Christian, 2004), whose concept is based on society's aversion to high-fatality incidents. The curve obtained for the study area can be of particular support for public authorities in charge of landslide risk mitigation by emergency plans and warning systems, also in order to define acceptable and tolerable landslide risk thresholds by society.

**Reviewer comment:** Line 279: Why choose this time period? It's not in the scope of your dataset.

**Author response:** The time span 1640-2006 is referred to the historical landslide database and F-N curve developed by Cascini et al. (2008) that has been cited for comparison.

## Summary and conclusions

**Reviewer comment:** Line 293: This should be in the introduction.

**Author response:** We have preferred to delete this sentence because it has been considered not useful within the introduction section.

**Reviewer comment:** Line 312: How do you reach this conclusion? It is suggested to add the circulation system and the distribution map of sea level pressure in the article.

**Author response:** This conclusion is inferred from the findings published by Saviano et al. (2019) and Fortelli et al. (2021) cited in the manuscript, which are based on valuable data collected by weather stations and buoys of local monitoring networks. Given that the reader can find all the related information within these articles, we suggest to do not include data on the circulation system and maps of sea level pressure here.

**Reviewer comment:** Line 317: How is this conclusion known? Urban maps of people killed by landslides should be added.

**Author response:** This conclusion has been derived from the analysis of the used data sources listed in the section 2.1. We believe that urban maps of people killed by landslides represent a degree of detail that is out of the aim of this article, since this is not focused

on the analysis of the human consequences of landslides. Fatalities data that we have provided in the geodatabase can be useful to perform future analyses.