RC 2

Citation: https://doi.org/10.5194/essd-2025-684-RC2

The manuscript presents a multi-temporal landslide inventory for an area in central Italy (Collazzone). The study is very well conceived and structured. In particular, the temporal analysis is carried out by integrating a large amount of information derived from aerial photographs, satellite imagery, field checks, and the interpretation of Google Earth images, resulting in the identification of more than 3,500 landslides within the investigated area. I have only few comments:

MAIN COMMENTS:

1. Despite the Italian reference database for landslides is the IdroGEO inventory, it is neither cited in the manuscript nor used for comparison with the mapped events. I consider this aspect necessary, as such a comparison could significantly enhance the scientific value and reliability of the proposed inventory.

   Italian Landslide Inventory (IFFI), available through the IdroGEO platform, represents the most important national database for information on landslide distribution, hazard, and risk in Italy. Furthermore, ISPRA has devoted considerable effort over the years to developing and continuously updating a landslide inventory that is as homogeneous and comprehensive as possible across the entire national territory. However, in my opinion, a comparison between the multi-temporal landslide inventory presented in this study and the IFFI inventory would not be entirely appropriate for two main reasons. First, the comparison would involve two fundamentally different types of inventories. The inventory presented in this study is multi-temporal and explicitly accounts for the temporal evolution of the landscape, whereas the IFFI inventory is essentially a geomorphological inventory that does not systematically incorporate temporal information on landslide occurrence and evolution. As demonstrated by multi-temporal analyses, improvements in investigation methods, remote sensing data, and mapping techniques over time have progressively increased the ability to detect and map smaller landslides. Consequently, comparisons between inventories compiled with different objectives and methodologies may be misleading. In addition, the IFFI inventory is affected by a minimum mapping size threshold, which further limits its comparability with a multi-temporal inventory. Second, the IFFI inventory for the entire Umbria region is largely based on the geomorphological inventory produced by some of the authors of the present paper (Galli et al., 2008). Therefore, a direct comparison between the two datasets would not provide a fully independent validation of the results and could introduce a degree of circularity in the assessment.

2. The manuscript only refers to rainfall-induced triggering mechanisms; however, considering the study area, I would also have expected the mapping of landslides triggered or remobilized by seismic events, such as those associated with the 1997 and 2016 Central Italy earthquakes. Furthermore, it is not sufficiently clear how the rainfall trigger was associated with the mapped events. This aspect should be described and discussed in greater detail.

   Rows 101-108: Landslides are abundant and are caused primarily by meteorological triggers, including prolonged rainfall and rapid snowmelt (January 1997), no historical information of earthquake-induced landslides exists for the study area (https://sici.irpi.cnr.it/). Appendix B presents a histogram of the cumulative monthly rainfall and mean monthly precipitation recorded at the Todi rain gauge (location shown in Fig. 1A) for the period 1940–2023. The mean annual rainfall during this period is approximately 849 mm. The histogram also displays, as black dots, the dates corresponding to the landslide inventory layers (Table 1). Ardizzone et al., 2007, 2013; Fiorucci et al., 2011 investigated the rainfall conditions associated with landslides triggered by precipitation events occurring after 2000, whereas examined the snowmelt event that affected the Umbria Region in 1997 and triggered numerous landslides, including several within the study area (E_2 in Table 1).

MINOR COMMENTS:

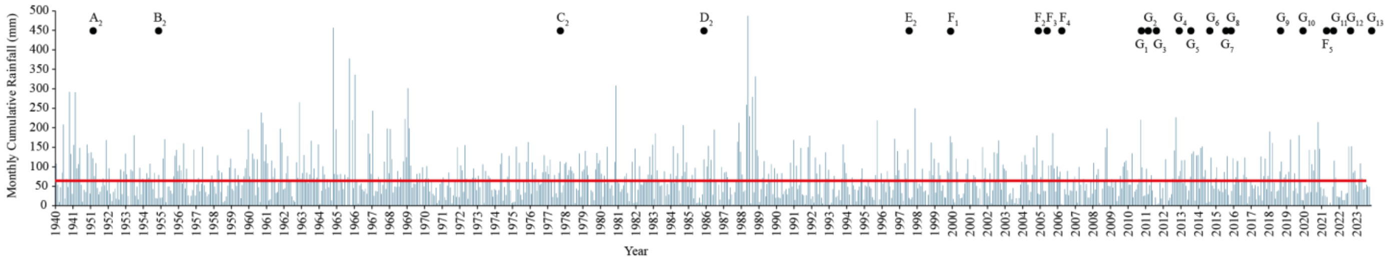
3. Figure 1A: the shaded relief should be replaced with the DTM in order to provide a clearer representation of the elevation variability within the investigated area.

   I have done it.

4. Figure 10 is not sufficiently clear, particularly with regard to the enlarged views, where many polygons are not clearly visible. The figure requires substantial improvement.

   I have done it.

APPENDIX-B



The graph shows the monthly cumulative rainfall (mm) measured at Todi rain gauge (Fig. 1A) from 1940 to 2023. The red line indicates the average annual rainfall equal to 72 mm. The black dots A_2, B_2, C_2, D_2, and E_2 show the date of the stereophotographs. The black dots F_1, F_2, F_3, F_4 and F_5 show the date of the field surveys. The black dots G_1, G_2, G_5 and G_6 show the date of the very high-resolution satellite images. The black dots G_3, G_4, G_7, G_8, G_9, G_{10}, G_{11}, G_{12} and G_{13}, show the date of the Google Earth Pro images.