Dear Editorial Board,

Please find enclosed the revised version of our manuscript, "Is higher resolution always better? A comparison of open-access DEMs for optimized Slope Unit delineation and regional landslide prediction"

We sincerely appreciate the constructive feedback provided by the reviewers. We have carefully addressed all comments and incorporated the necessary revisions into the manuscript. We hope that any previously unclear points have now been clarified.

Below, we provide specific responses to the first and second reviewers, including detailed replies to each of their suggestions. If deemed relevant, we kindly ask you to forward these responses to them. Please note that we have slightly modified the title.

We are confident that these improvements have enhanced our work to meet the expected standards, and we sincerely hope it will now be favourably considered for publication.

Please do not hesitate to contact me for any further information or queries regarding the manuscript.

I look forward to hearing from you soon.

Sincerely,
Giacomo Titti

Reviewer #1

The manuscript presents results of a study aimed to analyze and compare different public-domain Digital Elevation Models (DEMs) to identify the most suitable for landslide susceptibility mapping. The presented approach was tested for the Marche region (Central Italy) allowing 1) to reach the optimal discretization of the terrain into Slope Units (SUs) thus, 2) to map the landslide susceptibility of the study area.

I really appreciated the representativeness and the quality of the presented research. The manuscript generally appears well structured and both approach and results are well presented and commented. Thus I consider it as ready for possible publication on Natural Hazards and Earth System Sciences after some minor changes. Specific comments and suggestions are detailed as follows:

Thank you for your comments and suggestions. We appreciate the time and changes you have advised for this manuscript. We have tried our best to integrate your comments. They are highlighted in red in the manuscript. Furthermore, we have responded to specific comments below.

Lines 16-19: consider to revise the sentence because too long and a bit confused due to repeating words (e.g. DEM);

The sentence has been restructured for a better understanding and the use of DEM has been reconsidered.

Line 28: the acronym DEM was already introduced in the Abstract. Check for similar issues ahead in the manuscript:

Line 46: the acronym ALOS was introduced first but it was indicated later at Line 56. Check for similar issues ahead in the manuscript;

Line 76: the acronym SUs was already indicated in the Abstract section;

Line 82: the acronym DTM was already indicated at Line 46;

Line 282: the acronym SUs was already indicated in the Abstract section;

Line 162: the acronym DTM was already indicated at Line 46;

For all the above comments, the specified lines were fixed, and the manuscript was checked to avoid repetition for acronym introduction.

Line 38: check the sentence for a possible colon that should be used;

Line 240: check for a possible missing of a comma "Ranging from 0, signifying no similarity, to 1 that…"

Line 527: "…than in the S-worst case. This…";

Line 128: "…in the first phase…";

Line 100: consider to replace "…have been characterized by…" with ""is characterized" or "is

As per the requirement, minor changes were made as recommended for the above comments.

Lines 113-115: consider to use "inventoried landslides"; furthermore, I strongly suggest to indicate the worldwide classification adopted to indicate the type of landslides (e.g. Cruden & Varnes 1996 or Hungr et al., 2014);

Lines 439-440: consider to improve the definition of a landslide reported in this sentence according to more recent landslide classifications (e.g. Cruden & Varnes 1996 or Hungr et al., 2014);

For lines 116-120, the indication of landslide classifications was cited.

Lines 225-226: consider to revise the sentence because it is not clear its meaning;

The sentence was revised to better clarify the intended meaning (updated line 233-234).

Line 572: check the reference section for possible issues in terms of formatting indicated by Journal's guidelines;

The reference style is set in Copernicus publication style.

Figure 1: this figure could be improved 1) preferring a geological map in background to the satellite one, with the DEM overlapped with a trasparency, for the AOIa and b; 2) reporting the landslide inventory classified for different types (if possible); 3) using lecters for frames (e.g.: A, B, C) also indicating them in the caption; 4) defining a single legend for all frames.

Figure 1 has been modified with a simplified geological map along with the legend. The study areas are labelled accordingly (AOIa and AOIb). Thus, adding further labels and a corresponding legend will make the figure congested with text.

Figures 3-4-5: this figure could be improved graphically 1) improving readability of axes; 2) adding primary grids of axes 3) removing the external boudary of frames also reorganizing them;

Figures 3-4-5 have been edited. The axes width has been increased, colored and the external frames removed.

Figure 8: this figure could be improved 1) changing size and colour of the scale text because ureadable actually; 2) it should be interesting to show results also through a zoomed frames coinciding with the AOIb.

The scale text of Figure 8 has been changed to make it more visible and the zoomed frames to the AOIb have been added.

Figure 9: consider to remove the external boudary of frames;

Figure 9 has been improved by removing the frame and reducing the legend size according to the comment of the Reviewer 2.

Figure 10: consider 1) to reduce the extension of the area showed in the frames, thus allowing "readability" of differences; 2) to change the scale unit in km thus uniforming it with the other maps; 3) to relocate/indicate the north and the scale in each frame;

Figure 10 has been updated by reducing the area extension, the scale unit is in km. The scale and direction (north arrow) have been repeated to each figure.

Figures 11 and 13: the LIPs are not clear. Consider 1) to change the type of representation (e.g. colour); 2) to overlap the SU layer on the landslide inventory one; 3) to indicate landslides inventoried for types; 4) eventually to use a unique simplified legend for all frames;

Figure 11 and 13 have been updated. As suggested, we increased the size of the LIPs and chose a more visible color, we inverse the order of the SU with the landslide layers, we increased the width of the SU boundary line, and we added the metric values and type in the titles and legends. Unfortunately, we cannot unify the legends due to the presence of metric values and SU coefficient in the same layer which differ in each figure.

Figure 14: this figure could be improved graphically adding primary grids of axes.

Figure 14 has been updated completely. The axis lines, the trend line and the points size have been increased.

Reviewer #2

The manuscript presents a comparison of the available Digital Elevation Models (DEMs) and their application in Slope Unit (SU) delineation, emphasizing the importance of selecting the most suitable DEM for landslide susceptibility mapping. The study is clear, well-structured, and offers valuable insights for readers of NHESS. My recommendation is for minor revisions focusing on the following aspects:

Thank you for your comments and suggestions. We appreciate the time and changes you have advised for this manuscript. We have tried our best to integrate your comments, and they are highlighted in blue in the manuscript. Furthermore, we have responded to specific comments below.

1) I recommend explicitly stating in the abstract that the overarching objective of this research is to contribute to landslide susceptibility studies.

Line 26-28 in the abstract is updated to: These combinations were evaluated using both existing and newly integrated metrics alongside mapped landslide inventories to optimize terrain delineation and contribute to landslide susceptibility studies. Moreover, to enhance that, we are proposing an update to the manuscript title.

2) Consider including a simplified geological map to accompany the description of the geology of the case study. This will enhance the clarity and context for readers.

Thanks for the suggestion, we updated Figure 1 adding a simplified geological map.

3) Ensure all DEM acronyms are fully defined when introduced for the first time.

The acronyms were revised across the manuscript.

4) I suggest providing the download links for the DEMs used in this study, either at the point where they are first cited or in the concluding section of the manuscript.

The download links for freely available DEMs were provided at the end of the manuscript under the section of 'Data availability'

5) It might be helpful to include additional comments on the resampling of TINITALY to 30 m resolution, specifically discussing how this impacts the results of the study.

The significance of using TINITALY 30m and its impacts on the results are discussed mainly from row 422. In addition we added in the new version at lines 224-226, that the aggregation reduces some of the characteristic artefacts of TINITALY, like triangular patterns and artificial terraces. This kind of artefacts can affect the computation of relevant geomorphometric derivatives (e.g., slope) also from the perspective of slope units derivation. Anyway, the resampling to 30m has been necessary also to consider an homogeneous resolution with the tested DEMs

6) (Lines 362–367): Presenting this data in a table or a plot could significantly improve its clarity and reader comprehension.

Table 2, in line 377, was added to summarize the content in a table as recommended.

7) Figure 9: Adjust the legend so that it does not obscure the plot.

Figure 9 has been improved by removing the frame and reducing the legend size according to the comment of the Reviewer 2.

8) Please ensure thorough English proofreading. Below are a few examples of typos or language suggestions identified:

Line 38: Replace ; with :.

Line 58: Consider whether "popularized" is the best choice of term.

Lines 60–61: Rephrase "Considerations to be considered" to avoid redundancy.

Line 113: Remove "click [...] text."

The specified comments were adjusted, and the manuscript was checked again for typos and language errors.