

Earth Surface Dynamics
PD Dr. Wolfgang Schwanghart,
Dr. Joris Eekhout



Technical University
of Munich



TUM School of Engineering
and Design
Chair of Landslide Research

Benjamin Jacobs
Phone: +49 89 289 25877
Benjamin.jacobs@tum.de

Munich, January 1st, 2026

Author's response (egusphere-2025-2007)

Dear Dr. Wolfgang Schwanghart and Dr. Joris Eekhout,

Thank you very much for the positive evaluation of our revised manuscript (egusphere-2025-2007) initially entitled "*Safeguarding Cultural Heritage: Integrating laser scanning, In-SAR, vibration monitoring and rockfall/granular flow runout modelling at the Temple of Hatshepsut, Egypt*".

We have carefully considered all further comments from reviewer #2. In response to his suggestions, we clarified our definition of LoD, checked terminology, abbreviations and spelling / cross references throughout the manuscript.

We are very grateful for the reviewer's constructive feedback that greatly helped improving the quality of the revised manuscript. As not requested otherwise, we added both of them to the acknowledgements.

Please find the replies to the reviewers below. We are looking forward to hearing from you.

Kind regards,

Benjamin Jacobs (corresponding author on behalf of all co-authors)

Reply to Referee #1

Dear Fritz Schlunegger,

we thank you very much for your willingness to review our revised manuscript, the positive reassessment of the revised manuscript, and for acknowledging the improvements made during the first revision. We are pleased that the manuscript is now considered ready for publication.

Sincerely,

Benjamin Jacobs (corresponding author on behalf of all co-authors)

Dear Editor, dear Authors

The authors have done a good job upon revising the manuscript. I propose to publish this current version.

Kind regards, Fritz Schlunegger

Reply to Referee #2

Dear Jakob,

We thank you very much for the positive reassessment of the revised manuscript and for acknowledging the improvements made during the first revision. We are pleased that the manuscript is now considered almost ready for publication.

In response to the remaining comments, we clarified the definition and calculation of the TLS level of detection (LoD) and moved the corresponding explanation to the TLS Methods section. We also standardized the terminology related to gravitational mass movements and landslides and corrected all remaining typographical errors, abbreviation definitions, figure references, and minor technical inconsistencies noted by the reviewer.

We thank the reviewer for the additional comments, which helped improve the clarity and consistency of the manuscript.

Sincerely,

Benjamin Jacobs (corresponding author on behalf of all co-authors)

Dear Authors and Editors,

in the present manuscript, several geomorphic methods (TLS, InSAR, RAMMS modelling, vibration analysis) are combined to assess rockfall hazards at the archaeological heritage site in the Deir El-Bahari Valley in Egypt.

The authors revised the manuscript according to the first review process in detail and have rewritten large sections of the text. As a result, the introduction in particular is now better structured and the quality of the article in general is higher. They addressed all my points in the previous review round and incorporated most of them well into the text. Therefore, I think the manuscript is almost ready to be published.

After going through the revised manuscript again, only a few minor points should be considered before publishing:

- Still, even after your explanations and your revisions, I cannot fully understand how the LoD of the TLS method was computed. From the text, I gather that the calculation of the LoD is performed by the M3C2 algorithm and, if the formula in Lague et al. 2013 have been used, it is based on a 95% confidence interval approach. I am not entirely sure which parts of the point clouds are included in the calculation of the LoD. All points or certain stable areas or single control points? In addition, I do not understand the statement that the LoD “[...] corresponds to the 95th percentile of model distances [...]” even after reading the cited study.

In general, I think the explanation of the LoD (now in Section 5.1; Lines 422 – 427) should be moved to the first introduction to the LoD in Section 4.1 or even in the method chapter about TLS (Section 3.1)

Thanks for your comment and sorry for the confusion.

We added “*In our analysis, we define the LoD as the threshold for statistically significant change (local 95 % confidence interval) using the M3C2 algorithm (Lague et al., 2013)*” to Section 3.1 and moved the more general statements regarding LoD from 5.1 to 3.1, as suggested (175-179). I hope this clarifies our approach which is very straightforward.

In the discussion (5.1) we rephrased the remaining part on LoD to “*As stated above, we defined the LoD as the threshold for statistically significant change (local 95 % confidence interval) using the M3C2 algorithm (Lague et al., 2013). Throughout the rock face, this threshold, i. e. 3cm, also corresponds well to the 95th percentile of the distribution of all computed model distances, an approach to define LoD in other studies (Abellán et al., 2011).*” Lague et al. (2013) define the LoD at a given confidence level (often 95%) based on uncertainty propagation. Abellán et al. (2011) use percentile-based thresholds, analysing the distribution of computed point cloud distances, which is conceptually similar but methodologically distinct. In our case the value of the M3C2 significant change is almost the same as the 95th percentile (95 % of the computed distances are less than 0.03 m) throughout the rock face. We state both approaches in the discussion to highlight the general robustness of our change detection. We hope this solves possible ambiguity.

- I am a bit confused about the terminology in the manuscript, especially the terms “landslides” and “gravitational mass movements”. For most parts of the paper, the latter is used for describing the analysed processes in the study area. On one occasion, these processes are referred to as “landslides” (Line 136). All other mentions of landslides refer to cited studies. Are the two terms used as synonyms here?

Thanks for your comment. We have aligned the section heading with the rest of the manuscript (2.3. Historic evidence of gravitational mass movement activity). Gravitational mass movements are commonly known as ‘landslides’ (e. g., Cruden, D.M. and Varnes, D.J., 1996, Landslide Types and Processes), however, the term is less technically precise. In the manuscript at hand, we now only use the term ‘landslides’ in the introductory paragraphs of the methods sections, where we refer to a wider field of study rather than specific processes.

- After your revisions, you corrected some of the inconsistencies about the use of abbreviations. However, there are still some remaining. I highly recommend going through the manuscript again to correct the remaining technical inconsistencies. Below, I have listed some of them.

Line 28: Typo: combining ✓

Line 69: Define UAV as uncrewed aerial vehicles ✓

Line 86: Typo: Deir El-Bahari ✓

Figure 1: Maybe think of adding labels for the other temples mentioned in the text as well ✓

Line 124: Typo: Deir El-Bahari ✓

Line 184: Please define DEM ✓

Line 208: Once defined, you can use “DEM” here ✓

Line 244: DEM was already used, you should define it earlier ✓

Line 259: One space too many after “Hatshepsut” ✓

Line 333: Typo: Figure 3b ✓

Line 335: LOS was already defined ✓

Line 355: Please check the text in brackets ✓

Line 382: Please refine the sentence structure ✓

Line 395: technical error ✓

Line 422: LoD was already defined ✓

Line 471: DEM was already defined ✓

Line 471: Too much brackets ✓

Once again, I would like to congratulate the authors of this study, it is a valuable contribution to the preservation of cultural heritage sites.

Jakob

Thank you very much indeed.