Response to referee #1 comments

Dear referee #1,

Thank you very much for your constructive comments and suggestions. We did our best to address every feedback and integrate the different suggestions. We are certain, that the manuscript highly profits from the valuable comments. This is gratefully acknowledged. Please find our detailed point-by-point responses to all your comments below.

Kind regards,

All authors

Referee#1

This is very nice data set and it good to see the team making it available for the research community. I support the intention to publish it, but I think manuscript needs some significant work to make it suitable for publication.

Most of my recommendations are minor, but there are a lot of them. These are marked on the accompanying PDF, mostly they surround improving the clarity of the manuscript and improving the descriptions of the data and the experimental set-up. Paragraphs often jump around between subjects and it is not always clear what the subject of a particular sentence is. I would recommend some thorough editing and proof reading during the revision.

I have three **substantive comments**:

Comment 1: Additional rainfall simulator sites are mentioned, almost in passing. These are not fully described in the manuscript. If you want to retain them then they need to be.

Answer: Thank you for this comment. We made a few adaptions in this regard. We refer the reader to the information in Figure 3 which is summarising all experimental sites. Furthermore, we decided to also point towards the data publication itself, were a summarising table gives thorough information on all rainfall simulation sites. As this manuscript should only accompany the data publication, a description on all experimental sites would be well beyond its scope.

Comment 2: You need to be clear what the data is useful for. You focus on soil erosion modelling, but in some places, you state it is useful for model testing and in others for model development. I can see the argument for testing and calibration, but the argument for model development is less clear and needs to be expanded. In a similar vein you mention upscaling, but don't expand on how this data set helps with this problem.

Answer: Thank you for pointing out the lack in detail regarding these aspects. To offer more clarity please find changes in lines 62 and 103-104,

Comment 3: The description of the catchment data is weak in comparison to the other data sets. No erosion statistics are given. Is it just a DEM of a catchment? If so, it isn't very interesting and perhaps needs to be removed from the paper.

Answer: We see the critic, as the description of the catchment is quite short. Nevertheless, the catchment data is an important part of the nested approach and should therefore be part of the publication, as the dataset is for once useful as model input as well as data base for upscaling approaches. We added this at the end of section 3.

Minor in-text comments:

Line 9: English

Answer: We have rephrased the entire sentence in the hope that the message is now clearer.

Line 10: what does today's data availability mean?

Answer: Data with high spatial and temporal resolutions, available due to developments in e.g. remote sensing methods. We restructured and rephrased the according sentence.

Line 10: isn't this what BPMs are good at?

Answer: Thank you for pointing out the lack in clarity. We adapted the sentence to make the message more clearly.

Line 14: English

Answer: We changed the phrasing.

Line 30: of what?

Answer: Of the models. We changed the phrasing.

Line 33: to what?

Answer: Model improvement. We changed the phrasing.

Lines 39-41: I don't follow the argument here

Answer: Thank you for pointing this out. We changed the phrasing and strengthened the argument.

Line 42: with SfM?

Answer: To provide more clarity, the SfM part was moved to the beginning of the sentence.

Lines 43-44: Doesn't make sense.

Answer: Shortened the sentence to make the message, what SfM has been used for in the context of soil erosion more clearly.

Line 47: This paragraph is a bit messy. Needs to stick to one theme and be clear about the subject of each sentence.

Answer: Thank you for pointing this out, the paragraph has been restructured.

Line 50: Opening sentence doesn't make sense.

Answer: Thank you for pointing this out. We rephrased the paragraph for more clarity.

Line 54: At what interval?

Answer: We are not entirely sure, what 'interval' is meant by this question. As we changed the sentence structure this question might have become obsolete.

Line 58: d

Answer: Corrected, thank you.

Line 62: I think you are conflating monitoring and modelling in this paragraph. Best to split and have a paragraph on each.

Answer: Thank you for this feedback, we corrected it accordingly.

Line 68: was the data really captured by rainfall simulation? Surely by SfM

Answer: A valid point, we added this information.

Table 1: Frequency? Trigger?

Answer: We included the (at least) yearly frequency in the table.

Line 73: Is this strictly true? I thought the dense point clouds had to be converted to a DEM.

Answer: Yes you are correct. We added the convertion of the DEM in line 82-84.

Line 79: Given that you work from plot to catchment in Table 1 and in the text, I would reorder these to match.

Answer: Thank you for the feedback. As later in the text our order is clearly catchment, slope, plot. We adapted the table and the introduction to this chapter to make it uniform.

Line 82: Maybe better to define the catchment area precisely on a plan view aerial photo. (i.e. Figure 1d) The Fish eye view is quite confusing.

Answer: As mentioned, an aerial photo was already used in Figure 1. We would like to offer different perspectives on our experimental sites and therefore decided to also use this view. Added to the information in the paper, the published data offer also different perspectives on the different experimental sites.

Line 86: plot? Stick with the terms you have already introduced

Answer: We added the term plot as well.

Line 88: So is Fig. 2 superfluous if you are visualising the same information again?

Answer: We deleted the 'again', as Figure 2 definitely offers different information to Figure 1.

Line 99: What is this? Raw images?

Answer: Thank you for pointing out the ambiguity. We are referring to images in raw data format. We have made this clearer in the text.

Line 101: How does it provide the basis for soil erosion models? Surely it provides data for testing/calibration soil erosion models?

Answer: As this was not clear. We adapted it, thank you.

Line 102: Not sure what this means. How do you envisage this upscaling to take place?

Answer: We we have parametrisation information on the plot and slope scale, we would like to encourage modellers to calibrate models on the plot scale. This parameter information can be taken one scale up to the slope scale and tested on real rainfall events. As a last step, we offer also DEMs on the whole catchment to take this information again one step up to the catchment scale. The question hereby should be how well plot scale parameterisation and calibration work on larger scales. Our data offer the possibilities to test this on very high spatial and temporal resolutions.

Line 103: Why not say this earlier? Not sure why you wouldn't want to use it as testing data.

Answer: Thank you for pointing this out. We adapted this in the manuscript. The catchment scale is valuable as high-resolution model input on the next scale and for model testing.

Line 106: You gave the dimensions in table 1. Don't repeat them.

Answer: We deleted this part and just referred to Table 1.

Line 106: Not sure what grubbing means. Ploughing? Harrowing?

Answer: We changed it to cultivating.

Line 107: Was it monitored by the posts or by cameras mounted on posts. These needed to be described earlier.

Answer: Thank you for point this out, we included the cameras as well as the total number of cameras. Furthermore, we refer the reader to the manuscript Grothum et al. (2025) where an in-depth description of this setup can be found.

Line 110: OK. This explains it. Why not end the previous sentence after the bracket? I would suggest changing the overall description from 'monitoring post' to 'monitoring station'. Post suggests a single pole.

Answer: We rearranged parts of this paragraph to make it clearer to follow. As the word station is also now and then used for other descriptions, it would get quite confusing with just this phrase. We decided on using both as synonyms and further described the traverse on which the cameras are installed on. This way it should become clear that its not just a single pole (which is also presented in the figures). An in-depth description of the whole setup is to be found in Grothum et al. (2025), which we now emphasized on more clearly in the manuscript.

Line 116: Face what?

Answer: The missing word is downwards and has been added.

Line 117: bottom of the slope

Answer: Changed accordingly.

Line 119: But Figure 3 suggests only one UAV flight.

Answer: It is correct, that only one flight is suggested for the catchment area (grey flag), as only one processed dataset is available here. With this sentence in line 119 we refer to the green flag, where it says 'event-triggered monitoring system, event- & tillage-based UAV SfM'.

Line 126: Delete.

Answer: Adapted.

Lines 128-129: You either have to detail these sites or delete the reference to them and their data.

Answer: We would like to point out that more information on these sites can be found in Figure 3. As a thorough description of each site would exceed the scope of this brief introduction to our data, we instead decided to refer the reader to the data publication itself, which provides an overview table summarising the most important information on each site.

Line 134: Can you give some basic information? Intensity? Drop size?

Answer: Basic information on the plots is summarised in Table 3. For more information, we refer the reader to the published data itself, where summaries can be found as well.

Line 138: Not 5 B. Needs to be clear that you are referring to B in the timeline.

Answer: Thank you, we adapted this accordingly.

Line 139: What is this? I don't recall it being described.

Answer: We added information.

Line 142: English unclear.

Answer: For more clarity, we adapted the sentence.

Line 142: in full.

Answer: Changed the phrasing.

Line 144: Why are you describing the 2020 experiment after the 2021 experiment. It needs to be the other way around.

Answer: If all rainfall simulations in 2020 would follow this scheme we would agree. Since this is merely an exception, regarding only a few rainfall simulations, we decided to mention it after describing the experimental procedure. Nevertheless, we understand, that it has not been clear that this only concerns a few simulations, we therefore describe it now clearly as an exception.

Lines 144-147: This needs to be more clearly explained. Is it because you need a surface without water on it and without the problems associated with acquiring images in rainfall?

Answer: During the rainfall simulations 3D models are generated based on eight cameras (and perspectives) at the most, a walk-around SfM offers a totally different dimension of point density. The resulting DEMs can be e.g. very valuable as model input, while the data generated during the rainfall simulation can be used for constant model validation.

Figure 5: Could you illustrate the differences between the 2020 and 2021 timelines?

Answer: As explained in the answer to line-comment 144, there is no general difference between the years 2020 and 2021, as most simulations were conducted as described in Fig. 5 and the figure is already quite complex, we would like to avoid further complexity and instead are more clear in our explanation within the text.

Lines 172-174: Not clear. Better to separate out the difference scales and the problems and solutions associated with them rather than trying to combine them.

Answer: Thank you for this feedback, we separated the two scales.

Line 177: which can

Answer: Adapted.

Line 178: Using a tape measure

Answer: Changed.

Line 179: delete also

Answer: Deleted.

Lines 179-183: This seems quite technical. I would explain this to provide a fuller explanation.

Answer: Thank you for this advice. As the article should be only a short description on the data, we decided to refer the curious reader to the corresponding article – Grothum et al. (2025).

Line 186: using

Answer: Changed to 'by'.

Line 205: and

Answer: Changed to 'in this context'.

Line 215: Example, **Line 215:** for

Answer: We restructured the sentence.

Line 224: in addition…

Answer: Changed

Line 227: Do you mean this or do you mean that you can see compaction and/or consolidation in the data set?

Answer: Thank you for pointing out the lack of clarity. We have made adaptations to make our message clearer.

Line 234: Seems to lack detail when compared to the other scales.

Answer: As is pointed out correctly, we do not offer much on data processing and results regarding the catchment scale. Regarding this scale we do not offer such high frequency data, nevertheless the DEM and (unprocessed data of eight other days) offer the upscaling of the plot calibrated and slope validated parameters to the catchment scale, for further testing, and therefore complete the nested data set. We have adapted this part to make this clear.

Line 253: Table

Answer: We are not sure, what this comment is refereeing to.

Line 265: Which do you prefer. They both mean the same thing!

Answer: Changed it to novel only.

Response to referee #2 comments

Dear referee #2,

Thank you very much for your constructive comments and suggestions. We did our best to address the feedback. We are certain, that the manuscript highly profits from the valuable comments. This is gratefully acknowledged. Please find our detailed responses to your comments below.

Kind regards,

All authors

Referee#2

This is a useful, interesting and well-structured piece of work. Its aim of overcoming the limitations of current soil erosion models by creating a high-resolution spatio-temporal nested dataset is very necessary. However, with regard to its originality, the authors state that this is an unprecedented piece of work. This shows a lack of in-depth literature review, as there are previous studies on olive groves in which similar technology is applied with similar objectives. Some of these are:

1. Applying a simple methodology to assess historical soil erosion in olive orchards
2. Quantifying the effect of historical soil management on soil erosion rates in Mediterranean olive orchardsMound measurements — quantifying medium-term soil erosion under olive trees in Northern Jordan
3. Mapping and quantifying medium-term soil loss rates in mountain olive groves using unmanned aerial vehicle technology
4. Reconstruction of historical soil surfaces and estimation of soil erosion rates with mound measurements and UAV photogrammetry in Mediterranean olive groves
5. Height Estimation of Soil Erosion in Olive Groves Using a Time-of-Flight Sensor;

Answer: Thank you for giving us an overview on literature regarding soil erosion in olive groves and medium-term soil loss quantification in this context. As our approach and our scale differ and we have focused on soil erosion on bare agricultural soils, we are certain we created a novel and very valuable dataset.

Firstly, our dataset has not worked on historical soil erosion. We monitored soil erosion and soil erosion processes on cultivated agricultural land with a very high temporal and spatial resolution during real and artificial rainfall events.

While referee#2 refers to medium-term soil erosion, we offer information on very high-resolution soil surface changes every 20-60 s/ 0.02 mm of rainfall. Overall, we present an

almost constant monitoring over 3.5 years with high resolution surface change detection during rainfall events.