Reviewer 1

Dear reviewer #1,

Thank you very much for your comments. We addressed all of your comments below and adjusted the manuscript accordingly.

A main concern from the previous round is that they speak of burrowed and not affected areas. The non-affected areas can be seen as controls. They should be spatially independent. I cannot imagine that this is the case within 3m2. Even with only one burrow in the 3m2, the area surrounding it, is probably not unaffected. Put another way, the sediment that moved outside of the burrow-affected area, should be sediment that also would have moved if there were no burrows, but at this spatial scale, I don't think you can draw a line beyond which the burrows don't affect sediment movement. The appropriate scale would have been a whole burrowed slope, compared to a slope with no burrows.

Thank you for raising this point. We now refer to the previously described "affected areas" as "burrows and to the previously "not affected areas" as "burrow embedding areas". We explained the definition of terms at Lines 288-290:

The remaining surface within the camera's FOV was burrow embedding area. Please note, that this area may still be affected by the burrowing activity of the animal and is not completely unaffected by the animal.

We rewrote the terms in the manuscript altogether 84 times all of which are marked green. We changed the description of figures 4, 5, 6, 7, A4, A5, A7, A8 and A9. We added your suggestion to compare hillslopes with and without burrows in the conclusion.

I also wanted to warn against circular logic in terms of distinguishing burrow affected sites. The response variable is changes in topography, but they also use topography to some extent to delineate burrows and non-burrows. This is similar to looking at the effects of invertebrates on soil nutrients and picking the invertebrate sites based on high nutrients. Again, having a whole slope of burrows and no burrows would negate this.

Thank you raising this point. Before any analysis, we delineated the areas roof, entrance, mound and adjusting areas. The delineation was based solely on the first saved frame of every camera. Each voxel was assigned to an area. The same voxel was part of the firstly assigned area in all of the remaining frames. For example, if parts of the mound eroded over time, the corresponding voxels were still parts of the area mound – thus, the amount of eroded sediment from mound could be calculated.

My biggest concern, however, is still the temporal upscaling to a year. I understand that other studies did not monitor continuously, but with biological organisms, which have phenological cycles, you need snapshots throughout the year. Animals go into hibernation in winter or torpor in summer, where they basically become completely inactive. There is nothing included here on the biology of these species (in fact, I am still not sure who the burrowers on these specific slopes are – is it all of the animals listed in the intro?). It is similar to measuring flowering rates in spring and then upscaling that to a whole year. Plants generally flower in spring, so you would greatly be diluting the rate by upscaling. Similarly, here, almost half of the year has not been included. I am not convinced that the animals carried on digging at the same rate.

We removed the temporal upscaling from the manuscript. Now, whenever we talk about absolute data, we use the amount of redistributed sediment for the time period of 7 months. The changes mainly affected abstract, lines 382-405, Table 1 and Figure 7. By discussing our results to the previous studies, we compare the relative changes and not the absolute changes.

Lines 49-52:

Abstract: The animal-caused cumulative sediment redistribution was 8.52 $cm^3\ cm^{-2}\ 7\ months^{-1}$ in the mediterranean and 9.57 $cm^3\ cm^{-2}\ 7\ months^{-1}$ in the arid climate zone. The rainfall-caused cumulative sediment redistribution within burrow was higher (-6.09 $cm^3\ cm^{-2}\ 7\ months^{-1}$) in the mediterranean than the arid climate zone (-0.82 $cm^3\ cm^{-2}\ 7\ months^{-1}$).

Lines 510-514:

Table 1. Summary of the volume of redistributed sediment, according to area and disturbance type. Volexc describes volume of the sediment excavated by the animals. Volburrow describes volume of the sediment redistributed during rainfall events within burrows. Voladd describes the difference in redistributed sediment volume within burrows and burrow embedding areas during rainfall.

Disturbance	Area	PdA	LC
Volexc	Burrow	9.57 cm3 cm-2 7 months-1	8.53 cm3 cm-2 7 months-1
	Per burrow	874.22 cm3 burrow-1 7 months-1	715.52 cm3 burrow-1 7 months-1
	Hillslope-wide	0.11 m3 ha-1 7 months-1	0.39 m3 ha-1 7 months-1
Volburrow	Burrow	-1.15 cm3 cm-2 7 months-1	-6.09 cm3 cm-2 7 months-1
	Per burrow	-73.71 cm3 burrow-1 7 months-1	-511.22 cm3 burrow-1 7 months-1
	Hillslope-wide	-0.03 m3 ha-1 7 months-1	-0.28 m3 ha-1 7 months-1
Voladd	Burrow	-0.69 cm3 cm -2 7 months-1	-4.30 cm3 cm-2 7 months-1
	Per burrow	-28.21 cm3 burrow-1 7 months-1	-361.20 cm3 burrow-1 7 months-1
	Hillslope-wide	-0.01 m3 ha-1 7 months-1	-0.2 m3 ha-1 7 months-1

Lines 574-576: Sediment redistribution within burrow areas was 40% higher at the arid research site, and at the mediterranean research site, it was 338% higher when compared to burrow embedding area

Lines 601-603: Our results indicate an up to 338% increase in the sediment volume redistributed during rainfall events measured within burrows when compared to burrow embedding areas. In contrast to our result, the maximum increase estimated in previous studies was 208%.

Lines 615-617: These studies estimated an increase in the volume of sediment redistributed during rainfall events, measured within burrows when compared to burrow embedding areas, to be between 205% and 473%.

Reviewer 2

The authors answered most of my comments very satisfactorily and changed the manuscript accordingly. However, three comments (two by myself and one by the editor) remain to which I think, some more explanation should be given:

Thank you very much for your comments and the positive feedback. We answered all of your remaining comments below.

Comment to [R2R2]: You might also add that ToF exhibits lower spatial resolution and areal coverage compared to time-lapse photogrammetry, but therefore can also be used at night as it is an active remote sensing tool and that the processing is less complex compared to photogrammetry because you immediately receive distance values in a local coordinate system.

We added the requested sentence to the manuscript:

Lines 123-126: In contrast, The Time-of-Flight (ToF) technology exhibits lower spatial resolution and aerial coverage compared to time-lapse photogrammetry. However, as an active remote sensing tool it can also be used at night. Additionally, the processing is less complex compared to photogrammetry because the distance values are immediately received in a local coordinate system.

I am afraid that I am then still not understanding the processing entirely because according to point [R2R10] you perform your analysis in a XY-plane with a height value for each pixel (which would be 2.5D). Why is a rigid body transformation not possible in your case? How is your approach different from the rigid body transformation?

Thank you for the inquiry. Rigid transformation describes rotations and reflections of objects which preserve the Euclidean space between every pair of points. We, however, had to correct the frames due

to errors caused by hillslope inclination and the inclination of the camera. Due to hillslope and camera inclination, the distance between points increased with increasing distance from the camera in the uncorrected dataset, Thus, we couldn't only rotate the object. If we would have only rotate the object, the parts of the burrow located farer from the camera would incorrectly be larger than in reality.

Comment to response to editor comment L346-348 (These sentences were added as a response to R2C22; however, I do not think that this completely answer the reviewer's question. The reviewer requested information on how you handled sediment redistribution caused by different processes, but the added text only describes how you may notice if there are several processes occurring. Please elaborate how you are able to parse out effects of different processes. I am still not able to understand, how the authors are able to ensure that sediment in the entrance moved due to animal activity and not rainfall:

We apologize for the misunderstanding. We extended the part explaining the calculations:

Lines 354-365: To attribute sediment redistribution to rainfall event, three preconditions had to be met: (i) A rainfall event occurred; (ii) sediment is eroded from burrow roof, mound and the embedding area; (iii) sediment is accumulated within the burrow entrance.

To attribute sediment redistribution to a combination of animal activity and rainfall, four preconditions had to be met: (i) A rainfall event occurred; (ii) sediment is eroded from embedding area; (iii) the height of burrow roof and mound decreased or increased; (iv) the depth of burrow entrance increased.

The animal-caused sediment redistribution was calculated as the sediment volume excavated from the entrance. Animal excavation always increased depth of the burrow entrance. The rainfall-caused sediment redistribution was calculated as the sediment volume which eroded from the burrow roof and mound. During a rainfall event, sediment eroding from burrow roof might accumulate within burrow entrances. In this case, the depth of the burrow entrance decreased. No sediment could erode from the entrance during a rainfall event. Decreased depth of a burrow entrance always points to sediment redistribution caused by rainfall, increased depth of burrow entrance always means redistribution by animals. Rainfall-caused redistribution always occurred before animal-caused redistribution, as without erosion caused by rainfall, the animals did not need to reconstruct their burrows.

Line 124: "which can be achieved by a simple installation of one devise in the field is missing" – is missing should be removed.

We removed "is missing" from the sentence.

Lines 126-128: ToF offers here a new possibility for surface monitoring, as a technique for a cost-effective high-resolution monitoring of sediment redistribution (Eitel et al., 2011; Hänsel et al., 2016) which can be achieved by a simple installation of one device in the field.