Dear Lina,

We apologize for the misunderstanding during our last revisions. We added a discussion section regarding uncertainties caused by climate variability and phenology (Lines 597 – 625):

5.2 The role of climate variability and burrowing cycles

We have found that rainfall plays a key role in triggering burrowing activity, which means that wet seasons experience higher sediment redistribution rates than dry seasons. In the year of investigation (2019), the dry season lasted from January until April, and from September until December (8 months), and the wet season lasted from May until August (4 months). The monitoring period lasted from March until October which covered 3 dry and 4 wet months (7 months in total). A yearly rate of sediment redistribution can be calculated by simply averaging the redistribution rate of the 7 monitored months and multiplying this result by 12 months, which results in an average redistribution rate of 0.4 m^2 ha^{-1} $year^{-1}$ for LC and 0.1 m^2 ha^{-1} $year^{-1}$ for PdA. However, because burrowing activity and rain-driven sediment redistribution is mainly determined by rainfall, this method might have led to an overestimation of the annual redistribution rate based on averaging, because the unmonitored part of the year 2019 was predominantly dry (Übernickel et al. 2021a). This can be accounted for by adding five times the dry month redistribution rate to the monitored 7 months, which leads to a lower annual redistribution rates for LC of 0.3 m^2 ha^{-1} $year^{-1}$ and for PdA of 0.1 m^2 ha^{-1} $year^{-1}$. Our values might thus overestimate sediment redistribution for the year 2019. This difference between both values (0.1 m^2 ha^{-1} $year^{-1}$ for LC and under 0.1 m^2 ha^{-1} $year^{-1}$ for PdA) can be interpreted as the uncertainty range for the year of observation.

However, decadal rainfall variability indicates that the year of monitoring (2019) was among the drier years of the last 30 years (Yáñez et al. 2001; Valdés-Pineda et al. 2016; Garreaud et al. 2002; Wilcox et al. 2016). The amount of precipitation since 1980 ranges from 200 mm until 800 mm per year (https://climatologia.meteochile.gob.cl/application/requerimiento/producto/RE3005) while the amount of precipitation in 2019 was just above 100 mm. This means, our results might underestimate sediment redistribution on a longer time perspective by 2 - 7 times.

Furthermore, the phenology of the burrowing animals is an additional source for uncertainty when calculating annual rates. The most common burrowing animal families in the area are active for three months of the year. The months in which they are active, are between April and September. None of the most common burrowing animal families were reported to be active from November until February. (Eccard und Herde 2013; Jimenez et al. 1992; Katzman et al. 2018; Malizia 1998; Monteverde und Piudo 2011). This is also in line with our observations, because burrowing intensity increased from March until May, reached its peak between May and June and declined until September (Figure 6). By extrapolating from 7 months to one-year period, our estimated excavation was 0.7 m^2 ha^{-1} $year^{-1}$ in LC and 0.8 m^2 ha^{-1} $year^{-1}$ in PdA. By adding five times the low active months to the 7 months of observation, the estimated excavation would be 0.6 m^2 ha^{-1} $year^{-1}$ in LC and 0.6 m^2 ha^{-1} $year^{-1}$ in PdA. Our values might thus overestimate the sediment excavation and the excavation uncertainty range is 0.1 m^2 ha^{-1} $year^{-1}$ for LC and 0.2 m^2 ha^{-1} $year^{-1}$ for PdA.

Following the changes in discussion, we rephrased one of the paragraphs in the introduction (105 – 114).

The reason for this knowledge gap is that previous studies have not provided data on low magnitude but frequently occurring sediment redistribution due to a lack of spatio-temporal high-resolution microtopographic surface monitoring techniques which can also measure continuously in the field. Field experiments with, for example, rainfall simulators can unveil processes but cannot cover the time-dependant natural dynamics of sediment redistribution. When using erosion pins or splash boards, the sites had to be revisited each time and the data were thus obtained only sporadically (Imeson und Kwaad 1976; Hazelhoff et al. 1981; Richards und Humphreys 2010). This limited all previous studies in their explanatory power, because biotic-driven processes are typically characterised by small quantity and a frequent re-occurrence (Larsen et al. 2021). It is hence likely that previous studies based on non-continuously conducted measurements or rainfall experiments underestimated the role of burrowing animals on rates of hillslope sediment flux.

If possible, we would like to change the title from:

Time-Of-Flight based monitoring reveals higher sediment redistribution rates related to burrowing animals than previously assumed

to

Higher sediment redistribution rates related to burrowing animals as revealed by Time-Of-Flight based monitoring

as we feel, that due to the discussion regarding uncertainties, it might be misleading to clearly state in the title that our estimated sediment redistribution is “higher than previously assumed.”

We also enhanced the description of some of our figures explaining positive and negative values, as we thought that the values might be misunderstood by the readers otherwise (Lines 488, 511, 516):

Positive values indicate sediment accumulation. Negative values indicate sediment erosion.

For the same reason, we added the words “excavation” and “erosion” in abstract (Lines 49 – 51):

The animal-caused cumulative sediment excavation was 14.6 $cm^3\ cm^{-2}\ year^{-1}$ in the Mediterranean, and 16.4 $cm^3\ cm^{-2}\ year^{-1}$ in the arid climate zone. The rainfall-caused cumulative sediment erosion within burrows was higher (10.4 $cm^3\ cm^{-2}\ year^{-1}$) in the Mediterranean than the arid climate zone (1.4 $cm^3\ cm^{-2}\ year^{-1}$).

Kind regards

Paulina Grigusova