

Dear editor,

We implemented following changes in our manuscript.

We changed the rates back to units per year instead of 7 months.

We included a broad section about local burrowing animals (Lines 165 – 187):

2.1 Local burrowing animals

We estimated the species of the local burrowing animals by conducting a literature review and using motion-activated wildlife traps. Among the most common vertebrate burrowing animals are in PdA carnivores of the family Canidae (*Lycalopex culpaeus*, *Lycalopex griseus*); rodents of the family Abrocomidae (*Abrocoma bennetti*), Chinchillidae (*Lagidium viscacia*), Cricetidae (*Abrothrix andinus*, *Phyllotis xanthopygus*, *Phyllotis limatus*, *Phyllotis darwini*) and Octogontidae (Cerquiera 1985, Jimenéz et al. 1992, Übernicket et al. 2021). The most common burrowing animals in LC are carnivores of the family Canidae and Methitidae, Lagomorpha of the family Leporidae (*Oryctolagus cuniculus*), and rodents of the families Cricetidae (*Abrothrix longipilis*, *Abrothrix olivaceus*, *Phyllotis darwini*), Muridae (*Mus musculus*) and Octogontidae (*Octogon degus*, *Spalacopus cyanus*) (Munoz-Pedreras et al. 2018, Übernicket et al. 2021). The motion-activated traps recorded several burrowing animals: *Lycalopex culpaeus*, *Oryctolagus cuniculus* and *Abrocoma bennettii* (Figure 2). A list of the most common local burrowing animals is shown in Table 1.

Table 1. Most common local burrowing animals. The list includes data from our motion-activated wildlife traps, and reviewe by Übernicket et al. 2021, Cerquiera 1985, Jimenéz et al. 1992, Munoz-Pedreras et al. 2018). “X” shows at which site the species can be found.

Order	Family	Species	Common name	Site	
				PdA	LC
Carnivora	Canidae	<i>Lycalopex culpaeus</i>	Culpeo	X	X
Carnivora	Canidae	<i>Lycalopex griseus</i>	South-American grey fox	X	X
Carnivora	Methitidae	<i>Conepatus chinga</i>	Molina’s Hog noised skunk		X
Lagomorpha	Leporidae	<i>Oryctolagus cuniculus</i>	European rabbit		X
Rodentia	Abrocomidae	<i>Abrocoma bennetti</i>	Bennett’s chinchilla rat	X	X
Rodentia	Chinchillidae	<i>Lagidium viscacia</i>	Southern mountain vischacha	X	
Rodentia	Cricetidae	<i>Abrothrix andinus</i>	Andean grass mouse	X	
Rodentia	Cricetidae	<i>Abrothrix longipilis</i>	Long-haired mouse	X	X
Rodentia	Cricetidae	<i>Abrothrix olivaceus</i>	Olive grass mouse	X	X
Rodentia	Cricetidae	<i>Phyllotis darwini</i>	Darwin’s leaf-eared mouse	X	X
Rodentia	Cricetidae	<i>Phyllotis xanthopygus</i>	Yellow leaf-eared mouse	X	
Rodentia	Cricetidae	<i>Phyllotis limatus</i>	Lima leaf-eared mouse	X	
Rodentia	Muridae	<i>Mus musculus</i>	Common house mouse	X	X

Rodentia	Octogontidae	<i>Octogon degus</i>	Degu (rat)	X	X
Rodentia	Octogontidae	<i>Spalacopus cyanus</i>	Coruro (rat)	X	X

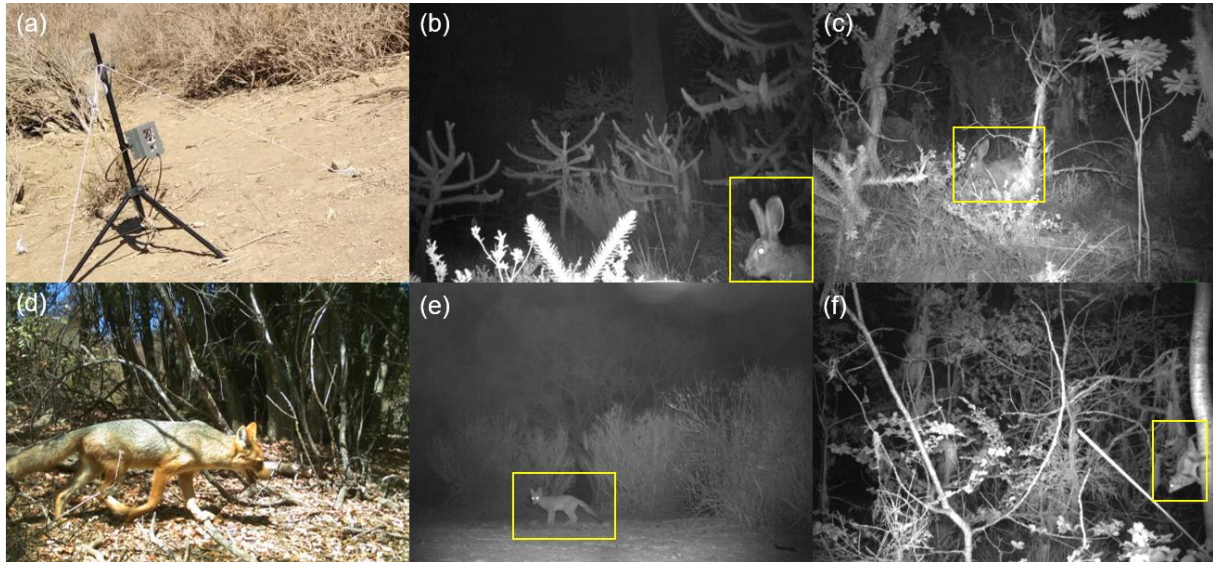


Figure 2. Examples of local burrowing animals obtained by motion-activated traps. (a) Motion-activated camera trap. (b) and (c) European rabbit (*Oryctolagus cuniculus*). (d) and (e) Culpeo (*Lycalopex culpaeus*). (f) Bennett's chinchilla rat (*Abrocoma bennettii*). The yellow circle indicates the position of the animal on the photo. Photos by Diana Kraus.

We added a discussion about seasonal burrowing activity of the most common bioturbators (Lines 588 – 597):

Our monitoring covered a time period from March 2019 until October 2019. To use our temporally limited data on an annual basis, it is important to consider the annual course of burrowing. The burrowing activity of the animals varies between the families. The most common burrowing families within our study area are Canidae, Cricetidae and Octogontidae (Tab 1). Highest burrowing activity of the family Canidae was observed during breeding time between August until October (Monteverde und Piudo 2011). The peak of the burrowing activity of the family Cricetidae is in austral winter from June to August (Vargas Cademartori 2003). The burrowing activity of the rodents of the family Octogontidae depends largely on the habitat productivity. They tend to be most active from March to July (Malizia 1998). The time span, in which the most common burrowing families within our study area are active, March until October, was fully covered by our dataset. We therefore didn't miss any burrowing activity within the current year.

We added discussion about climate variability (Lines 598 – 615):

Our monitoring period lasts from March until October. In 2019, March and April were dry season; May until August were rain season; and September i again dry season. Our monitoring time period is

thus approximately evenly covered by dry and rain season. Furthermore, the annual variability and the variability within our monitoring time period are similar. In LC, the variance in year 2019 was 3.2 mm with a standard deviation (SD) of 1.8 mm. The variance between March 2019 and October 2019 (e.g. our monitored time period) was 3.3 mm and the SD was as well 1.8 mm. The annual variance in PdA was 0.3 mm with an SD of 0.5 mm. The variance between March 2019 and October 2019 was 0.1 mm and the SD was as well 0.4 mm. We can therefore upscale our values to the time period of one year.

As for the precipitation, in the years 2017, 2018 and 2019, strong inter-annual climate variability and strongly declining precipitation rate was detected. In LC, the precipitation amounted 351 mm in 2017, 245 mm in 2018 and 72 mm in 2019. The inter – annual variance was 16.5 mm with an SD of 4.1 mm. In PdA, the precipitation amounted 16.2 mm in 2017, 8 mm in 2018 and 15 mm in 2019. The inter – annual variance was 0.2 mm with an SD of 0.4 mm. Compared with previous years, our results might on average underestimate rainfall-induced erosion rates. However, the relative erosion rate compared between burrow area and burrow embedding area would stay the same.

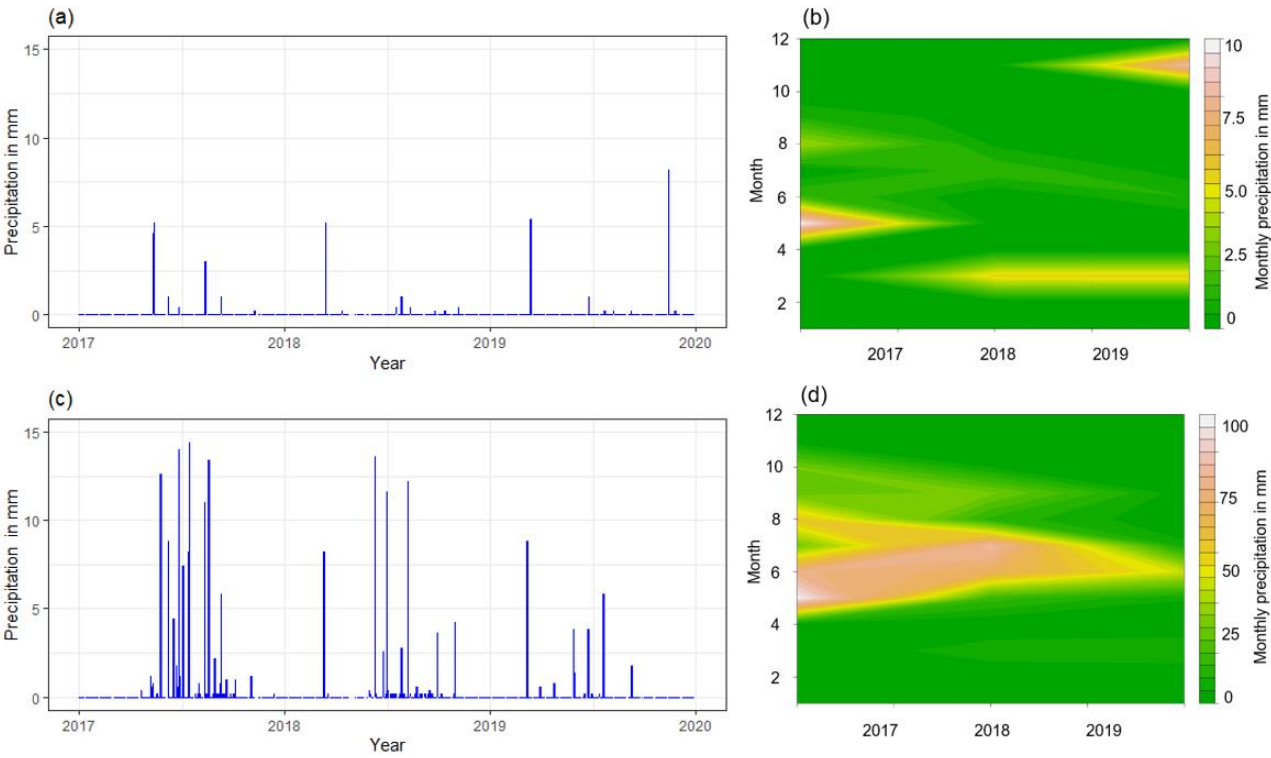


Figure 9. Climate variability. (a) Daily precipitation in PdA. (b) Monthly precipitation in PdA. (c) Daily precipitation in LC. (d) Monthly precipitation in LC.