

Biogeosciences Discuss., author comment AC1
<https://doi.org/10.5194/bg-2022-98-AC1>, 2022
© Author(s) 2022. This work is distributed under
the Creative Commons Attribution 4.0 License.



Reply on RC1

Sylvain Monteux et al.

Author comment on "Dispersal of bacteria and stimulation of permafrost decomposition by Collembola" by Sylvain Monteux et al., Biogeosciences Discuss.,
<https://doi.org/10.5194/bg-2022-98-AC1>, 2022

Response to referee on comment BG-2022-98-RC1

General comments

The paper addresses the impact of Collembola presence on bacterial communities in permafrost soils, and its impact on CO₂ production, which is a relevant topic for publication in BG. Overall this is a well-written manuscript, with that is easy to follow, and the Authors do a good job in keeping a focussed approach on the main research hypothesis. I see a few aspects which need to be explained or clarified, and have provided my comments on these as well as some other suggested changes to improve clarity, see below.

We thank the referee for their appreciation of our manuscript and for their comments which helped us improve the text. We provide answers to the comments in bold font below, and cite updated or added text in italics.

Specific comments

ABSTRACT

Line 20-23: this sentence is unclear. What do you mean with different treatments? Do you mean growth substrate / spraying? Also, it is not clear what it means "a number of introduced bacteria were found". Do you mean presence/ absence?

We indeed refer to the distinct growth substrate and spraying manipulation when mentioning treatments, and to the higher number of bacterial ASVs when collembola were present. We have now clarified this section as follows.

The presence of collembola did not affect bacterial community composition as a whole (accounting for relative abundances, weighted UniFrac metrics), regardless of whether collembola had been subjected to microbiome manipulation. However, when focusing on presence-absence metrics (species richness and unweighted UniFrac), collembola introduced bacterial ASVs absent

in the no-collembola control – regardless of their microbiome manipulation.

Line 25: how was estimated that 13.22% of CO₂ production was a result of priming effect by collembolan? Shortly explain it here.

We now explain this point in the previous sentence:

CO₂ production was increased by 25.85% in the presence of collembola, about half of which could be attributed to collembola respiration based on respiration rates measured in absence of soil.

Moreover, it is not clear if there is a different effect of collembola on permafrost vs. topsoil, both in terms of CO₂ production and bacterial community.

Testing for the effects of collembola on CO₂ production or bacterial community on the topsoil, where collembola assemblages are natively present in high abundances, was beyond the scope of our study and such results are therefore not presented. While most studies on the impact of collembola on CO₂ production have focused on litter rather than soil, we refer to several studies on soil in the Discussion at lines 336-345.

INTRODUCTION

- Line 36: can you add reference for this sentence?

This sentence builds up on a) the scarcity or absence of macro-invertebrate decomposers such as millipedes, woodlice or earthworms, b) the high abundances of microbivorous fauna in arctic systems (collembola and nematodes), and c) the relation between abundance of microbivorous fauna and microbial decomposition. We understand that this implicit reasoning was not obvious in the current phrasing, and have now clarified and referenced these points as follows.

In arctic soils, the scarcity of macrofaunal decomposers (e.g. earthworms, Blume-Werry et al., 2020) coupled to the high abundance of microbivorous microarthropods such as collembola (Potapov et al., 2022), results in a particularly strong impact of collembola on decomposition through microbial population control (Koltz et al., 2018, Crowther et al., 2012, Seastedt 1984).

- Line 74: The research gap you are trying to fill should be more clearly addressed, in order to better link this paragraph with the next one (from line 75-80). Here you write "To our best knowledge, this has not been explored yet". However, it is not clear what exactly has not been explored. Could you clarify it here?

The research gap was indeed not clear enough, and has now been rephrased as follows.

To our best knowledge, whether collembola affect the biogeochemical functioning of newly-thawed permafrost, and whether and how they can serve as a vector for microbial colonization has not been explored yet.

- Line 75: it would be useful to clarify where the Yedoma domain is located

We have now added this information.

- Line 81: At point 1, I would specify the collembola presence in permafrost/topsoils

We have now clarified this point according to the referee's suggestion.

RESULTS

- Figure 2: write out in the figure caption the full meaning of the abbreviation ASVs

We now explain the abbreviation ASV throughout the figures.

- Line 264-266: where are the results shown? Add reference to Figure or Table in main text or Appendix

We have now clarified the text so that this sentence and the following both refer to Appendixes A2 and A3.

- Appendix A1: clarify that "RM-ANOVA" means repeated-measures ANOVA

We have clarified this point according to the referee's suggestion, by removing the abbreviation altogether.

DISCUSSION

- Line 340-343: unclear sentence, which could be shortened (e.g. three studies)

We have now streamlined this sentence.

Technical corrections

We have now improved the following sentences:

- 31: "soil fauna are" to "soil fauna is"
- 32: "this decomposition" to "organic matter decomposition"
- 40: "they" to "collembola"
- 43: consider about shortening the sentence "often considered from the perspective of the huge...."
- 45: "such organisms such as" to "organisms such as"
- 47: consider about shortening the sentence : "Despite this particularity, in the very active field of permafrost research the absence"
- 65. "In active layer deepening" to "with the deepening of active layer"
- 289: "It may be that ..." to e.g. "this could be attributed..."
- 340: "their effect"? Could you check this, it is unclear to what the effect it is referred to.