

Biogeosciences Discuss., referee comment RC3
<https://doi.org/10.5194/bg-2021-286-RC3>, 2022
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Comment on bg-2021-286

V.M. Maire (Referee)

Referee comment on "Response of vegetation and carbon fluxes to brown lemming herbivory in northern Alaska" by Jessica Plein et al., Biogeosciences Discuss., <https://doi.org/10.5194/bg-2021-286-RC3>, 2022

**Dear managing editor,
2022**

The 23rd of January

Dear authors,

The manuscript, entitled "Response of vegetation and carbon fluxes to brown lemming herbivory in Northern Alaska" by Jessica Plein and coauthors (bg-2021-286) proposes in a research paper to study how brown lemming impacted the short-term response and the recovery of vegetation carbon uptake, NDVI and CO₂ and CH₄ emission to atmosphere. The study shows that the NDVI and carbon uptake by vegetation was immediately impacted by lemming placed in the enclosure, while there was no impact during the next-year recovery for every variables of the tundra functioning.

This manuscript is written with a perfect English and the experimentation has been conducted thoroughly. While only a few studies focus on small herbivore impact on C fluxes in Arctic, I found that the study is not extensive / comprehensive enough to be proposed in a large audience journal like Biogeoscience. Fundamentally, the study focuses on vegetation disturbance, which is due to the introduction of lemming enclosure but it could be any other source of disturbance and the response would have been the same. As such, the response shows nothing specific to lemming. Plant community is totally lacking at the study and the interpretation. This is essential as lemming is quite specific in its plant species diet and CH₄ efflux can be promoted by species characterised by aerenchyma. As such, this could be a way to show the specificity of lemming herbivory. Of secondary importance, there are several parts I found too long and misplaced. Below I present more precisely the different parts that could be improved:

L10 and L25: This is a repetition and I propose to remove the one of the abstract

L182: GPP is the annual flux, while only three instantaneous measurements were recorded. It would be more accurate to use a name that better describes the variable.

L208ff: Can you give details on the distribution of data and the one used in the regression?

Figure 2 should be placed in the appendix or a more concise presentation should be drawn.

L239: It would be important to give the atmospheric concentration of CH₄.

Figure 3 shows primary productivity with negative values, which is totally comprehensive. However, figure 5 shows the same variable with positive value, which is both not comprehensive and standardised with Fig. 3.

L324ff: This paragraph seems to belong to introduction or material and method but not to the discussion.

I read your paper with great interest and I believe it is relevant to arctic ecology readership, providing the consideration of the issues presented here, especially the inclusion of vegetation species and traits. The long-term impact will be very much interesting and I encourage the authors to continue this much valuable and important work.

Hope the comments will be useful.

Vincent