

Biogeosciences Discuss., referee comment RC2
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Comment on bg-2021-308

Anonymous Referee #2

Referee comment on "CO₂ and CH₄ exchanges between moist moss tundra and atmosphere on Kapp Linné, Svalbard" by Anders Lindroth et al., Biogeosciences Discuss., <https://doi.org/10.5194/bg-2021-308-RC2>, 2022

The study by Lindroth et al. characterises growing season net CO₂ and CH₄ fluxes in a tundra environment on Svalbard and attempts to extrapolate the growing season measurements to estimate annual fluxes. The manuscript certainly addresses an important research question related to possible climate change effects on greenhouse gas fluxes in the Arctic and provides important direct measurements of these fluxes. However, in my opinion, the methodology used in this study is not appropriate to answer these research questions. Extrapolating growing season fluxes to winter fluxes using a universal functional relationship with temperature risks causing major biases in annual fluxes. Ecosystem respiration function parameters can be expected to change between seasons and should not be assumed to be constant. Therefore, in my opinion, the main results (estimates of annual fluxes) of this study are not robust. Additionally, the use of a global warming potential to compare climate impacts of net CH₄ and CO₂ emissions is not justified for continuous greenhouse gas emissions in ecosystems. Other approaches should be considered in this case (see Neubauer, *Ecosystems*, 2021 or Neubauer & Megonigal, *Ecosystems*, 2015).