

CO₂ and CH₄ budgets and global warming potential modifications in *Sphagnum*-dominated peat mesocosms invaded by *Molinia caerulea*

by Fabien Leroy *et al.*

Generally, the topic of the manuscript is of interest for readers of Biogeosciences.

Unfortunately, I think the paper should be rejected for the following reasons:

- The methane (CH₄) and ecosystem respiration (ER) data has already been published here: Leroy *et al.* (2017): Vegetation composition controls temperature sensitivity of CO₂ and CH₄ emissions and DOC concentration in peatlands, *Soil Biology and Biochemistry* 107, 164-167, <https://doi.org/10.1016/j.soilbio.2017.01.005>
- The general approach and the results of the annual model for ER and gross primary production (GPP) has recently been published in this paper: Leroy *et al.* (2019): Response of C and N cycles to N fertilization in *Sphagnum* and *Molinia*-dominated peat mesocosms, *Journal of Environmental Sciences* 77, 264-272, <https://doi.org/10.1016/j.jes.2018.08.003>

Therefore, I do not see any reasons why this manuscript should additionally be published, especially as the authors fail to mention that the data has already been published elsewhere. Most aspects of the discussion are of course similar (change of methanogenic pathways, temperature sensitivity).

The only aspect which has been additionally done is discussing the approach to derive the annual values in more detail and giving actual numbers of annual CH₄ fluxes. The approach to model annual balances of CH₄ has, however, already been described in the second paper. Although the results are not given there, this does in my opinion not justify an additional publication as the important aspects (mean values, temperature dependency, and correlation with other variables) are already published.

Further, the approach of using temperature (and water table or biomass proxies) for ER and photon flux density for GPP is fairly common when working with manual chamber. Therefore, there are no new aspects compared to the papers quoted by the authors (e.g. Kandel *et al.* 2013) and others using similar approaches which would justify publication.