



EGUsphere, author comment AC1
<https://doi.org/10.5194/egusphere-2022-1153-AC1>, 2022
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Reply on RC1

Federico Fabisik et al.

Author comment on "Nitrous oxide (N₂O) synthesis by the freshwater cyanobacterium *Microcystis aeruginosa*" by Federico Fabisik et al., EGU Sphere,
<https://doi.org/10.5194/egusphere-2022-1153-AC1>, 2022

We thank Referee#1 for his/her review.

We fully agree our results cannot be used to suggest *Microcystis aeruginosa* synthesise nitrous oxide (N₂O) in natural environments, but we also argue we cannot infer that they do not: Significant N₂O emissions were indeed reported from outdoor cultures of *C. vulgaris* fed nitrate (NO₃⁻, Guieysse et al., 2013; Plouviez et al., 2017), despite this alga also producing much more N₂O when fed nitrite (NO₂⁻, Guieysse et al., 2013). We believe this was caused by NO₂⁻ intracellular accumulation under varying light, as this condition is known to have different impacts on the rate of NO₃⁻ reduction into NO₂⁻ by NR and the rate of NO₂⁻ reduction into NH₄⁺ by NiR (Plouviez et al., 2017). We also respectfully note that N₂O emissions under NO₃⁻ supply were low, but not negligible. We will clarify this potential for emissions under NO₃⁻ supply in the final manuscript.

Therefore, without evidence from field measurements, we cannot conclude that *M. aeruginosa* is or is not a major N₂O producer in lakes. As mentioned by us (Abstract, Section 2.4 and Conclusions) and the referee, further research is needed.

With regards to NirK, *M. aeruginosa* possess a nitrate reductase (NiR) (Chen et al., 2009; Chen et al., 2015) but no homologs of *Chlamydomonas reinhardtii* NirK copper-containing nitrite reductase was found. Further research is needed to determine if NiR in *M. aeruginosa* can also catalyse the reduction of NO₂⁻ into NO.

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