Biogeosciences Discuss.,
https://doi.org/10.5194/bg-2019-50-AC2, 2019

Biogeosciences Discussions
Open Access
EGU

Interactive comment on "Reviews and syntheses: How do abiotic and biotic processes respond to climatic variations at the Nam Co catchment (Tibetan Plateau)?" *by* Sten Anslan et al.

Sten Anslan et al.

f.nieberding@tu-braunschweig.de

Received and published: 11 December 2019

We highly appreciated the critical but extremely constructive reviewer comments and their thoughtful suggestions. Based on these comments we carefully revised our manuscript. Below you will find our point-by-point response to the reviewer's comments and suggestions.

In the name of all co-authors,

Johannes Buckel and Felix Nieberding

Reviewer 2 (Anonymous Referee):

Printer-friendly version

Discussion paper

Comment 1:

P2 L28: “Please consider to write either Yellow river or, as with the other rivers the native name: Huang He.”

Author’s response: Thank you very much for your helpful suggestion. We changed the name from “Yellow” to “Yellow River”

Author’s changes in manuscript: See author’s response to this comment.

Comment 2:

P4 Fig. 1C: “Please provide for the salinity also the ppt value for ease of cross-comparison to other literature references.”

Author’s response: Thank you very much, we agree with the reviewer’s suggestion.

Author’s changes in manuscript: The salinity is now provided in ppt to allow for easy comparison with other literature references.

Comment 3:

P8 L6: “It would be worth mentioning that ammonia oxidizing archaea are autotrophic microorganisms that contribute to CO2 fixation primarily in the aphotic zones of lakes and thus contribute to (dark) primary production - especially of deep and oligotrophic lakes. As an example, have a look at the following references: Callieri et al., 2014 (J. of Limnology), Callieri et al., 2016 (Aquatic Sciences), Herber et al., 2019 (Environ Microbiol).“

Author’s response: We appreciate your comment and added a paragraph to chapter 2.3 to emphasize and explain the archaea group and especially their role in fixing ammonium and CO2. Moreover, we use the correct terminology that refers to lake systems.

Author’s changes in manuscript: In chapter 2.3 we added the following section: “Stud-

ies demonstrated that ammonia-oxidizing archaea (autotrophic microorganisms) are key contributors to ammonia oxidation in deep and oligotrophic lakes (Callieri et al., 2016). This has implications for CO2 fixation in the hypolimnion or the benthic zone, where there is insufficient irradiance to support photosynthesis, implying that archaea would perform the final step in the decay of organic matter via methanogenesis, resulting in carbon dioxide accumulation (e.g. when they decrease during winter). Although nitriïňĄcation does not directly change the inventory of inorganic Nitrogen in freshwater ecosystems, it constitutes the only known biological source of nitrate and as such represents a critical link between mineralization of organic N and its eventual loss as N2 by denitriïňĄcation or anaerobic ammonia oxidation to the atmosphere (Herber et al., 2019)."

Comment 4:

P13 L24: "Change "anaerobic" conditions to "anoxic" conditions. Anoxic refers to a physicochemical condition, anaerobic refers to the ability of an organisms to live w/o oxygen or its respective metabolism."

Author's response: Thank you for your suggestion! We changed the terminology in order to avoid ambiguities.

Author's changes in manuscript: We changed the term from "anaerobic" to "anoxic" on P13 L24 and P19 L2.

Comment 5:

P13 L25: "for methanogenic activity, which results in increasing CH4 emissions to the atmosphere"

Author's response: We changed the text as proposed by the reviewer comment.

Author's changes in manuscript: The sentence now reads: "Large amounts of SOC in combination with anoxic conditions are the main precursors for methanogen activity, which results in increasing CH4 emissions to the atmosphere (Kato et al., 2013)."

Comment 6:

P14 L4: “It might be worth to include a short paragraph on N2O emission to the atmosphere from soils, if such literature exists for the TP. N2O is, in addition to CH4, a very potent greenhouse gas and may be released in areas of intense livestock farming.”

Author′s response: We agree with the importance of N2O emission to the atmosphere. Unfortunately, there is no study measuring N2O emissions in the Nam Co basin. But we added the topic to the manuscript based on the small number of experimental studies in other regions of the TP.

Author′s changes in manuscript: The following text was added to the chapter 2.5: “Overgrazing, along with the increase of burrowing pikas in the Tibetan grasslands may increase the Nitrous Oxide (N2O) emissions (Zhou et al., 2018), an important greenhouse gas with 297-times larger warming potential compared to CO2 (IPCC, 2013). Despite several studies focusing on greenhouse gas emissions on the TP, the magnitude of the N2O emissions in different ecosystems has not yet been estimated. Experimental studies on the eastern TP demonstrated that the rate of N2O emission may increase with increasing soil temperature and soil moisture under a future climate change scenario (Yan et al., 2018; Yingfang et al., 2018).”

Comment 7:

P19 L2: “anoxic conditions”

Author′s response: The sentence was deleted for consistency.

Author′s changes in manuscript: The sentence was deleted.

References

Callieri, C., Hernández-Avilés, S., Salcher, M. M., Fontaneto, D., and Bertoni, R.: Distribution patterns and environmental correlates of Thaumarchaeota abundance in six deep subalpine lakes, Aquatic Sciences, 78, 215–225, doi:10.1007/s00027-015-0418-

3, 2016.

Herber, J., Klotz, F., Frommeyer, B., Weis, S., Straile, D., Kolar, A., Sikorski, J., Egert, M., Dannenmann, M., and Pester, M.: A single Thaumarchaeon drives nitrification in deep oligotrophic Lake Constance, Environmental microbiology, doi:10.1111/1462-2920.14840, 2019.

IPCC: Climate change 2013: The physical science basis ; Working Group I contribution to the fifth assessment report of the Intergovernmental Panel on Climate Change [Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)], [Elektronische Ressource], Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 1535 pp., 2013.

Kato, T., Yamada, K., Tang, Y., Yoshida, N., and Wada, E.: Stable carbon isotopic evidence of methane consumption and production in three alpine ecosystems on the Qinghai–Tibetan Plateau, Atmospheric Environment, 77, 338–347, doi:10.1016/j.atmosenv.2013.05.010, 2013.

Yan, Y., Ganjurjav, H., Hu, G., Liang, Y., Li, Y., He, S., Danjiu, L., Yang, J., and Gao, Q.: Nitrogen deposition induced significant increase of N2O emissions in an dry alpine meadow on the central Qinghai–Tibetan Plateau, Agriculture, Ecosystems & Environment, 265, 45–53, doi:10.1016/j.agee.2018.05.031, 2018.

Yingfang, C., Xun, K., Xiaowei, G., Guangmin, C., and Du Yangong: Nitrous Oxide Emission Rates over 10 Years in an Alpine Meadow on the Tibetan Plateau, Pol. J. Environ. Stud., 27, 1353–1358, doi:10.15244/pjoes/76795, 2018.

Zhou, Y., Jiao, S., Li, N., Grace, J., Yang, M., Lu, C., Geng, X., Zhu, X., Zhang, L., and Lei, G.: Impact of plateau pikas (Ochotona curzoniae) on soil properties and nitrous oxide fluxes on the Qinghai-Tibetan Plateau, PloS one, 13, e0203691, doi:10.1371/journal.pone.0203691, 2018.

Interactive comment on Biogeosciences Discuss., https://doi.org/10.5194/bg-2019-50, 2019.