

***Interactive comment on* “Reliable reference for the methane concentrations in Lake Kivu at the beginning of industrial exploitation” by Bertram Boehrer et al.**

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Received and published: 11 July 2019

Reply to <https://doi.org/10.5194/hess-2019-228-RC1> Interactive comment on Lake Kivu paper by Minoru Kusakabe.

REPLY: We appreciate very much receiving a written comment by an expert on limnic gas loads as Prof. M. Kusakabe, who was a leading scientist during the investigations and the remediation activities at Lake Nyos and Lake Monoun.

COMMENT: This is a technically important paper for the study of Lake Kivu, since the lake contains a large amount of CH₄ and CO₂ dissolved in the deep water. The local

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community is anxious about a possible limnic eruption as happened in Lakes Nyos and Monoun in Cameroon in mid-80s. Regular and frequent monitoring of CH₄ and CO₂ concentrations in the lake is the only way to assess the possibility of limnic eruption in the future. For this reason, this manuscript supplies a reliable method for the gas measurement.

REPLY: We thank for the kind words on the relevance of this investigation.

COMMENT: Since the lake is located in a remote area of Africa, regular and frequent monitoring of CH₄ and CO₂ concentrations in the lake has to be carried out by local scientists. I hope parts of the equipment are easily available and not too expensive for the local scientists.

REPLY: Other than in Lake Nyos, Lake Kivu contains a precious gas, and hence there is commercial interest also from public authorities to purchase equipment for the survey.

COMMENT: The authors say that the possibility of limnic eruption at Lake Kivu is not high, because the CH₄ profiles obtained by the authors do not show appreciable change when compared with those in the literatures. This view needs to be confirmed by further measurements, hopefully performed by the local scientists.

REPLY: Right, the measurements of 2018 do not indicate an imminent endangerment through limnic eruptions. However, the further observation is mandatory to guarantee safety also in future in particular during and because of the industrial exploitation. Besides the documentation of the current situation, the supply of measurement strategies for the survey was one of the central objectives of this investigation.

COMMENT: The manuscript contains analyses of trace elements in lake water. Unfortunately, such data do not play an important role in the current manuscript. The reviewer feels that the section for trace elements is not necessary, and suggests to delete it from the manuscript. Probably this is the way to make the manuscript more impressive and effective for the authors' main objective.

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REPLY: We agree fully; the gas story does not rely on the measurements of trace elements. Removing this section would shorten the paper. We also like compact and concise papers. However, as we want to document the situation at the start of industrial exploitation, we feel the chemical situation should remain part of the manuscript. Previous publications deviated from our measurements in several cases “noticeably” (as written in our manuscript). As we are convinced of the quality (reliability) of our measurements, we see the need to have them published in a respected journal. We would much rather refer to chemical measurements in HESS than in HESS-discussions. Other authors may not even appreciate our chemical measurements as much as previously published measurements. We hope the editor can follow our arguments and opts for retaining the chemical measurements.

COMMENT: The reviewer’s comments were embedded in the manuscript using PDF’s annotation function.

REPLY: We thank for the detailed comments embedded in the manuscript. We have checked them and we are confident to include most of them or find a compromise that is acceptable for the reviewer. We will do this, as soon as the second review is available towards the end of the discussion period.

for all authors Bertram Boehrer

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., <https://doi.org/10.5194/hess-2019-228>, 2019.

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