

**Comments on
'Continuous In Situ Measurement of Dissolved Methane in Lake Kivu
Using a Membrane Inlet Laser Spectrometer' by Grilli et al., GI-2019-29**

Revised submission

I thank the authors for re-submitting their paper considering our comments as well as answering our questions. Most of my comments were addressed, especially the 'results and discussion' section, which is now much easier to read.

I still think this paper is worth a publication as it brings a new in situ technique for the measurements of an important greenhouse gas in aquatic environments. The scarcity of data from these specific systems is clearly a limitation for constraining the budgets and therefore the models, so any advance in the field of sensor development must be encouraged.

However, I have noticed many typos that make the MS difficult to read, which should not happen with a re-submission. Also, some re-phrasing would make the text clearer. I suggest a careful review from the authors to avoid these mistakes.

Here are my detailed comments:

Line 26: 'Methane (CH₄)' ... putting (CH₄) there would avoid to do it line 43

Line 35: costal -> coastal

Line 35-37: 'a better understanding of the processes... ~~are is needed~~ required'. But I'd re-phrase as follows 'Only fast response instrument for in situ dissolved gas measurements and dynamic profiling can provide the data for a better understanding of the processes...'

Line 40: 'water' is too many times used, so I'd suggest: '... makes deep water strongly decoupled from the surface layer because...'

Line 41: delete 'and therefore very different in composition'

Line 43: delete methane '... dissolved carbon dioxide (CO₂) and CH₄...'

Line 45-46: check the brackets '... present in the lake, e.g. Degens et al. (1973), Pasche et al. (2011)...'. Please be careful to the way the references are cited. This should be homogenized throughout the MS.

Line 47: same comment about the citations

Line 53: 'Regarding the stability of the lake, Schmid et al. (2005) raised...'

Line 59: content -> concentration

Line 70: 'highlighted in the discussion section, in comparison with other methods deployed during the same campaign: water sampling followed...'

Line 74-77: Presented this way, this should not be in the introduction but in the discussion section. If the authors want to follow the 2nd reviewer's comments, then this should be higher in the introduction, but I still think this should be given as comparison in the discussion.

Line 85: PDMS is for polydimethylsiloxane. It should read 'using a PolyDiMethylSiloxane (PDMS) membrane...'

Line 92: check the brackets '... can be found in Grilli et al. (2018).'

Line 99: delete polydimethylsiloxane as the acronym is already clarified line 85

Line 102: again, check the brackets for the reference '... Grilli et al. (2018)'

Line 119: dot missing -> 'speed of ~6m.min⁻¹'

Line 120: space missing 'after resolution of 1m.'

Line 126: HydroC is a registered trademark so this should be noted as '... underwater sensor, the CONTROS HydroC[®] HP sensor'. This should be modified throughout the MS.

Line 129: same remark as above regarding the registered trademark. Also, another problem with the brackets, which should be 'in Fietzek et al. (2014), ...'.

Line 181: Sander 2015 cited twice... this should read '... equation 19 from Sander (2015) using...'. Delete (Sander, 2015) at the end.

Line 197: reference cited twice!

Line 203: same remark

Line 219: but not at the same depths!

Line 239: delete (Schmid et al. 2015) at the end (already in the sentence).

Line 241: 'Nitrogen (N₂) mixing ratio...'

Line 251-252: Brackets missing

Line 253: the headspace technique is an extraction technique. The analysis is done using Gas Chromatography.

Line 256: Brackets missing

Line 260: greater instead of larger

Line 265: are the unpublished data from Roland et al.?

Line 266: brackets missing

Line 275: 'O₂ supplied at these depths during the previous dry season ~~was~~ completely vanished'

Line 282: brackets missing

Line 288: I think the amount of CH₄ in the surface layer mainly depends on the biogeochemical processes, especially in presence of oxygen. To name one: bacterial oxidation of methane. Yes there is a dilution of CH₄ from the anoxic layer to the oxic one but methanotrophy is the main process that control the concentration in any kind of aquatic environments.

Line 328: replace 'discrete sampling' by 'discrete measurements' to avoid confusion between the water sampling done with the Niskin bottles and the discrete in situ measurement performed with the sensor. Closing a Niskin bottle takes less than 1 second, so a 410m profile can be done in less than 10 min...