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Hydrology and Earth System Sciences
Discussions

Interactive comment on "Greenhouse gas flux studies: An automated online system for gas emission measurements in aquatic environments" *by* Nguyen Thanh Duc et al.

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This is an excellent and timely description of low-costs system allowing to monitor fluxes of CO2 and CH4 in aqautic setting with relatively high precision. I believe that this article/techincal note is suitable for publication but further care must be taken to improve the presentation. The text reads well mostly but at few places the flow should be improved. I think that even a Technical Notes will get more attention if properly streamlined. Also, and most importantly, I strongly suggest that a visual representation of the sampling system is included in the main body of the paper. I found some illustrations in the SI but a compact and clear technical scheme of the described system should be

available in the main ms. After these rather minor issues are resolved I recommend this draft for publication.

In general, and this is a strong recommendation, the graphical side of this work can/should be improved (see figures 4 and 6).

Below please find some detailed suggestions (the list is not exhaustive and probably entire text should be edited for typos and further streamlined)

Introduction

Page1 Line 35: You state that " the flux chamber method which can trap both diffusive and ebullitive (bubble) fluxes, has been demonstrated to not bias gas fluxes at the air-water interface" There is a number of publications (see Vachon et al. 2010 for example) providing evi- dence that chambers themselves can affect turbulence (and thus the flux) at the water- air interface. I also support using chambers as reference direct method for flux estima- tion but you should, at least, acknowledge that there is a potential effect on turbulence from the static chamber.

You later state that (line 1-5, page 2) "these methods are inexpensive in terms of equipment and work well to quantify gas emission in a confined area but they are labor intensive and have low temporal resolution" This is correct if the gas inside of the chamber is somehow homogenized. I understand that this is, in fact, tedious and adds another layer of complexity but I found it better to have a pump connected on the top of the chamber that would mix the gas inside. Otherwise, during longer deployments, CO2 can accumulate inside your chamber and may bias the flux estimates.

(line 30 page 2) Using eddy covariance is well established in lakes – please reword your statement; aside from being costly and logistically complex to install, eddy covariance datasets often require labour intensive re-processing. . . but it is certainly well established.

Methods

Specify what is the sensor in your Panthera (Neodym?), it sounds to me that these three configurations use the same methane sensor. . . "TGS2611-E00 sensor is equipped with a filter to reduce the influence of interference" what filter???? Please specify as this may be important for future use

There seems to be a problem with your bubble counter as limiting your measurements to bubbles are larger than 3-4 ml may bias total flux estimates, would it make sense to use a pre-trapping system for small bubbles?? I do not know how would/if this can be intergated but imagine a system that when CH4 bubble is detected but not quantified because of its low volume then it is directed toward another trap where cumulative volume of such small bubbles can be assessed?

You state that: "If bubbles entered the trap and were large enough to activate the venting mechanism during a non-logging period, it was missed in the logged data file" How often did this happen during your experiments and what was the size of bubbles activating venting.

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