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Hydrology and Earth System Sciences
Discussions

Interactive comment on "Mobile open dynamic chamber measurement of methane macroseeps in lakes" *by* Frederic Thalasso et al.

Frederic Thalasso et al.

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The manuscript introduces a mobile open dynamic chamber to determine the methane flux from lakes, ebullitive or diffusive. The Ms is well written and is clear and concise. However, there are some aspect which I found difficult to follow:

Our answer: Thank you for this kind appreciation of our work.

The design of the MOD is a bit difficult to grasp. More photos could be helpful here. Figure 1 should be improved, why is the top of the chamber open? What sort of purge ventil is used?

Our answer: We appreciate this comment. It is important to ensure the reader clearly understands the MOD chamber design. We attended this comment by including an

additional cross-section in Figure 1, which indicates that the chamber is closed in its upper part. We also included two more pictures of the chamber in the supporting information, as new Figure S3. Please note that the purge design is described around L190.

I found the indices for the different parameters a bit confusing. D- for detector and C for chamber, ok, but I and O ??

Our answer: Thank you for this comment, we agree. We changed subscript i for P (standing for purge) and subscript 0 to B (standing for bubbles/ebullition). We also included a new Table of notation in supporting information. We hope this is clearer now.

I was wondering, when the detector is sucking gas from the chamber and there is no ebullition, the purge ventil would let air into the chamber. I do not understand how you correct for this dilution and how you realize when there is more ebullition or more dilution? Ok, I read now the details on the purge ventil. But still, did you correct your measured data for a possible dilution?

Our answer: Yes indeed, our mass balance equations consider the flow rate that is entering the chamber when ebullition is low (Eq. 4). However, we also indicate that the input of CH4 through the purge is negligible, compared to the CH4 emitted by the lake (Eq. 5 and text related).

Why did you divide your measurements into segments? The nice thing about your MOD is that you have continuous measurements on the whole lake. . .

Our answer: This is correct, we divided our transects into segments, and for each of them we determined a mean emission. The main reason for this approach is the stochastic nature of ebullitive events, generating instantaneous flux varying several orders of magnitude in matter of seconds (Figure 5 and new Figure S5). The interpolation of instantaneous fluxes would be extremely difficult to perform and, in our opinion, of

moderate interest as being a representation of a very specific instant. On the contrary, the mean emission measured during each segment (typically 10 m long), gives the mean emission in the corresponding region of the lake that can be easily interpolated.

Some more examples for the measured data and calculated fluxes would be appreciated.

Our answer: We agree. We have included a second example of measurement observed during a transect, presented in Supporting information as new Figure S5.

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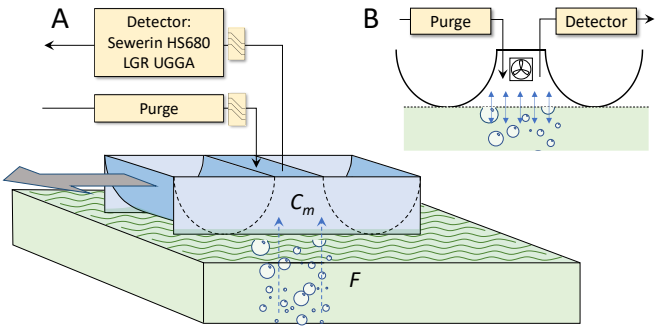

Fig. 1. Fig. 1. Conceptual sketch of the mobile open dynamic (MOD) chamber, shown at the surface of the lake, passing over an intense seep (A); Cross section of the chamber cavity (B).

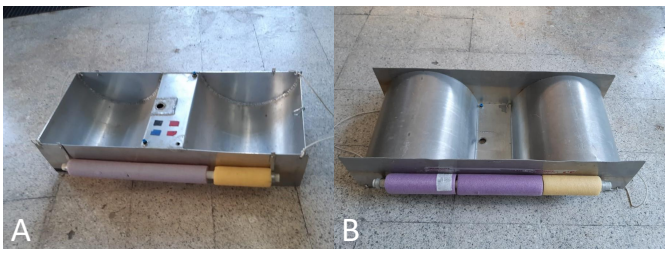

Fig. 2. Fig. S3. Superior (A) and inferior (B) view of the chamber hull with lateral floats added for improved stability.

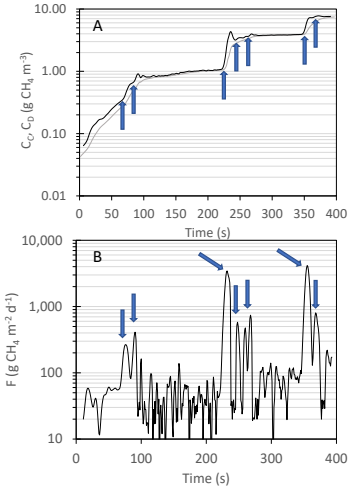

Fig. 3. Fig. S5. Additional example of; (A) CD (grey solid line) and CC (black solid line) measured during a transect, and (B) instantaneous flux computed from these concentrations.