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Atmospheric Measurement Techniques Discussions

Interactive comment on "Technical note: A closed chamber method to measure greenhouse gas fluxes from dry sediments" *by* Lukas Lesmeister and Matthias Koschorreck

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"The technical note addresses the problem of sealing a chamber to a stony ground for performing flux measurements. Getting chambers gas-tight under such environmental conditions is indeed a problem. The note describes the testing of different sealing materials on the flux of CO2 and found that potting clay was a reliable sealing material. The study addressed inertness and tightness of the sealing materials in the lab and applied the sealing techniques under field conditions. I found this paper a nice short story on a technical problem of wide interest to people working with chamber techniques to measure gas fluxes. The study is well done and well described. I assume it will be of interest to many readers. General comments: 1.Chamber measurement

on soil ground also have the problem of tightness and gas diffusion through the soil between inside and outside the chamber. These general problems are only much stronger when the ground consists of gravel or stones instead of soil. The authors may wish referring to older literature on diffusion through soil below the chamber walls, e.g. G. P. Livingston and G. L. Hutchinson. Enclosure-based measurement of trace gas exchange: applications and sources of error. edited by P. A. Matson and R. C. Harriss, Oxford:Blackwell, 1995, p. 14-51; or, G. L. Hutchinson, G. P. Livingston, R. W. Healy, and R. G. Striegl. Chamber measurement of surface-atmosphere trace gas exchange: Numerical evaluation of dependence on soil, interfacial layer, and source/sink properties. J.Geophys.Res. 105:8865-8875, 2000."

We added some references dealing with methodological aspects of chamber measurements on soils – especially to the second paragraph. The Livingston and Hutchinson 1995 was already cited – but originally we did cite the whole book (Matson and Harriss), not just the chapter. We now cite the chapter. We also added a paragraph about lateral diffusion to the discussion.

"2.The lab tests of the sealing material were all done with CO2. CO2 is a water soluble gas, which may behave differently than other atmospheric gases that are not well soluble, like H2, CH4, CO."

Our idea was to proof tightness, it is sufficient to proof that with one gas. We can assume that if the chamber is tight for one gas, the same should be true for other gases. H2 diffuses faster than the other gases, but we do not think that diffusion is fast enough to affect our measurements. The solubility of CO2 affects the link between CO2 production (by microbial processes) and the CO2 flux. The relation between CO2 production and emission, however, is not part of our study. To follow the reviewers idea and to include a less soluble gas, we added the CH4 data to Figure 1 and discuss them in the text: "Similar to CO2 also CH4 initially increased in all experiments (Figure 1b). For clay the mixing ratio levelled off at about 1 ppm, well below the atmospheric concentration. This confirms that clay provided a tight sealing also for less water solu-

ble gasses and shows that clay did not produce CH4. With the other sealing materials CH4 did not reach the atmospheric concentration during the experiment except with river mud which clearly produced CH4."

"Some gases may also undergo chemical reactions, e.g. CO, NO, sulfur compounds." This is true, but our study focuses on greenhouse gases.

"The field test addressed CH4 and N2O in addition to CO2. However, the tests for inertness were not done with gases other than CO2. I think this problem should be addressed in the discussion."

We actually measured CH4 in our laboratory experiments. We added the methane data to Figure 1 and discuss them in the text as explained above. In our inertness experiments we did not detect a significant production of CH4. We added this information to the text: "We did not detect a significant production of CH4 in our inertness experiments (data not shown)".

"3. The data shown in the bar graph (Fig.2) should be tested for statistically significant difference. "

Difference was checked by a t-test after checking for normality and homogeneity of variance. We add this information to the manuscript and also indicate it in the figure.

Technical correction:

"4. L.7: the dynamic nature of the habitat is not subject of the study." Yes – that is right. But it is a reason why permanent collars cannot be used. "5. L.14: give the companies which supplied the materials." We added the companies.

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