

Interactive comment on “Versatile soil gas concentration and isotope monitoring: optimization and integration of novel soil gas probes with online trace gas detection” by Juliana Gil-Loaiza et al.

Anonymous Referee #1

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The soil gas concentration and isotope composition monitoring device that is presented in this manuscript is really promising. The system is described with a lot of details, which is important. The device has been carefully checked and the first experiments reported show well the potential of this type of approach in the field of soil science and biogeochemistry. I have only few comments, requests or questions below. I have to confess that I am biologist, not physicist.

The importance of storage of gas in the air-filled soil porosity on the link between soil concentration and net surface fluxes, and the dynamics of the air-filled soil porosity, at

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short term (change in water content), long term (e.g. compaction), and also its spatial variation (e.g. local variation in bulk density), are not enough clearly stated and can be highlighted in the first paragraph of the introduction.

Tracing the fate of labelled gas in soil profile is also another promising approach that can be achieved by the development of such integrated monitoring tools. This can be mentioned in the second paragraph of the introduction.

The carrier gas (Ultra Zero Air) contains O₂ which diffuse to the soil. Is there a risk that microbial processes under study are altered by this change in O₂ concentration in the soil? Would it be better to use pure N₂ instead? Would it be possible to use a close loop system rather than an open one? Can you discuss your choice for an open-one?

The control gas that were used for the test using silica-filled column looks a bit low compared to expected soil concentration. Would the results of the test be different with CO₂ or CH₄ concentration of 1% or more?

Can you elaborate a bit more and give a definition of “backgrounds” (L257-261)

You confirm that lower probe sampling flow rates allow more time to equilibrate than do high flow rates. Would it be possible to use the initial ‘pulse’ of high gas concentrations at the beginning of the measurement with high flow rates until the steady state value is reached to recompute the initial concentration in the soil air (peak integration)?

Details

Section 3 title is “results and discussion” but section 4 is “discussion”. Should section 3 be “results” only? Sometime, delta is not well converted in the pdf and become a square instead

Interactive comment on Biogeosciences Discuss., https://doi.org/10.5194/bg-2020-401, 2020.

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