



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 #3

Received and published: 18 March 2021

1. Does the paper address relevant scientific questions within the scope of BG?

Without any doubt reliable protocols for diffusive soil-gas sampling combined with multi-component concentration and isotopic analysis are issues in soil ecological research. Indeed, progress in field research about soil-gas exchange requires reduced impact diffusive sampling with good temporal and spatial resolution. Another point are costs, that allow installation with sufficient spatial repetition. Therefore the topic of the paper adress clearly aims and scope of BG. My problem with the paper is, that in the study itself the critical issues are not treated

C1

critically and in comparison to existing solutions. The paper lacks a well defined scientific question. It seems to me more than an advertisement for a specific technical solution.

2. Does the paper present novel concepts, ideas, tools, or data?

Neither diffusive gas sampling, nor the use of hydrophobic porous tubes are novel concepts. The authors use an obviously sophisticated assembly of gas analyzers covering a wide range of isotopic and concentration responses. However, I miss a comparative discussion about the novelty and the advantages of the used equipment. An interesting concept is presented in figure 12-b, where the isotopic signatures of N₂O are plotted in a 3-D coordinate system and assigned to specific processes. However, this process analysis is not further discussed and the background of the interpretations are not reported with exception of a literature overview in the supplementary material.

3. Are substantial conclusions reached?

No.

4. Are the scientific methods and assumptions valid and clearly outlined?

The description of the sampling and analysis system is difficult to read and full of technical details that do, however, not focus on critical issues. I clearly miss a list of the requirements that are expected from “a versatile soil-gas concentration and isotope monitoring”. Insofar the reader does not really learn, what the authors expect from their equipment with regard to quantification limits, system disturbance, usability in the field, or costs.

5. Are the results sufficient to support the interpretations and conclusions?

I miss specific scientific interpretations and conclusions with regard to a reference. The extensive report of results is somewhat anecdotal.

C2

6. Is the description of experiments and calculations sufficiently complete and precise to allow their reproduction by fellow scientists (traceability of results)?

The technical descriptions are very detailed but not in such way, that it could be used to build up a system for measurement in soil columns or even in the field. One of several issues not addressed are power requirements and external conditions to work with the assembly of gas analyzers under field conditions. Neither I found suggestions for low-impact installation of the novel gas samplers or dead volume of the system.. So I have to answer with no.

7. Do the authors give proper credit to related work and clearly indicate their own new/original contribution? The paper is more a technical description or even an advertisement of a specific setup but not mainly a scientific paper. It is not fully clear what is new (the use of PTFE instead of PE porous tubing?) or the use of an assembly of different laser-gas analyzers? Several literature references seem to more be an enumeration than a than a critical review.
8. Does the title clearly reflect the contents of the paper?
In principle yes.
9. Does the abstract provide a concise and complete summary?
Yes, including the weaknesses of the scientific substance.
10. Is the overall presentation well structured and clear?
Too extensive, too complex, lacking structure and conciseness.
11. Is the language fluent and precise?
Yes.
12. Are mathematical formulae, symbols, abbreviations, and units correctly defined and used?

C3

Yes.

13. Should any parts of the paper (text, formulae, figures, tables) be clarified, reduced, combined, or eliminated? For publication the whole paper should be focused, shortened and reorganized including the formulation of a clear scientific question that can be discussed based on hypotheses. I would suggest to split up the paper into a physically based sampling optimization part and another, multi component (isotopic) analysis part and possibly the process study of the process interpretation by isotopic signatures.
14. Are the number and quality of references appropriate?
Yes.
15. Is the amount and quality of supplementary material appropriate?
Some parts of the supplementary material should be used in the main text. I miss in both, the paper and the supplementary material a listing of quantification limits of the equipment.

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

C4