Responses to Reviewer #2:

Comment 1: *It is not instantly clear how the transient change in concentration in the chamber was actually measured. In Eq. (2), what are the measured variables?*

Reply 1: Thank you for your comment. In the transient experiment, after closing the chamber, a standard gas bag is injected inside, gradually increasing the CO_2 concentration within the chamber. Both low-cost and commercial gas analyzers measure this increase over time. Therefore, the change in CO_2 concentration is determined by the difference in its levels over time. In equation 2, the term refers to the modeled CO_2 gas concentration in the chamber from this experiment, expressed in terms of CO_2 gas mass rather than concentration.

Comment 2: *Figure 7. I don't understand why D[CO2] is shown here instead of the actual [CO2] with Y-axis starting from e.g. 400ppm?*

Reply 2: In figure 7a, we used ΔCO_2 instead of the actual CO_2 levels, considering the atmospheric CO_2 fluctuations from the Atmosphere Thematic Centre (Jungfraujoch) rather than an arbitrary CO_2 concentration. Thank you for your question.

Comment 3: *258-261: Or the measurement length could be shortened.*

Reply 3: We agree that an alternative is to change the measurement length. However, it is important to ensure the measurement duration remains long enough for accurate flux calculation. Thank you for your suggestion; we will include this in the text.

Comment 4: *283-285: Another option would be to introduce constant air mixing. As long se the conditions do not change, there should not be gas accumulation/release (storage change) effects.*

Reply 4: Our current low-cost design depends on the lid of the opening and closing chamber to initiate the measurement. Therefore, we believe that the option of constant air mixing, which is ideal for a static chamber, is not suitable for our setup. Thank you for your suggestion.

Comment 5: *290: of a any -> remove "a"*

Reply 5: Thank you.

Comment 6: *297: Please specify here what you mean by high-frequency. Spatial, temporal or spatiotemporal?*

Reply 6: We referred to high spatiotemporal measurements because they enable automatic measurements without user interaction. Their low cost allows for increased spatial coverage and scalability of monitoring capacity. Thank you.

Comment 7: *309: The link seems to be wrong here. It is possible to navigate to the correct page (https://github.com/alexnaoki/SoilGasFlux; I assume) from the link in the references, though. Opening*

the chamber schematic requires an OnShape account that I did not want to create, and I will not comment on that.

Reply 7: We fixed the link and updated the GitHub repository.