

Review of the manuscript „Automatic high-frequency measurements of full soil greenhouse gas fluxes in a tropical forest”

The authors measured *in situ* soil fluxes of CO₂, CH₄ and N₂O continuously with a commercially available automated chamber system coupled with a CRDS analyser in a tropical forest for four months. The manuscript is focused entirely on the methodological aspect of these measurements, stressing the importance of adjusting chamber closure times for the different gases for reliable flux calculations. The effect of closure times on flux calculation results were studied by trying different chamber closure times in the field and by adjusting the number of data points used for the actual flux calculation.

This is a well-designed study, and overall, the manuscript is well written and structured. Also choosing appropriate chamber closure times and the operation of automated chamber systems are important topics for the soil flux community. However, I recommend publication of this manuscript after major revision because I have some general concerns with this manuscript.

General comments:

- Soil Flux Pro provides for each chamber measurement linear and non-linear flux calculations. Why did you choose to use only the linear flux calculation results? The underestimation of fluxes with linear regression due to saturation effects is well-known. That’s why numerous non-linear calculation schemes have been developed. Could you have significantly reduced the chamber closure time for the N₂O flux calculation if you had used non-linear flux calculation? The selection of the flux calculation scheme can change the MDF at least for chamber measurements with only few gas samples over time. Does this effect disappear with high-frequency analysers, i.e. selection of the flux calculation scheme becomes less crucial in that regard? Would there still be a significant difference between the SHORT and LONG flux calculation for the different gases when using non-linear flux estimates?
- You write about high-frequency measurements only as sampling measurement plots more frequently over time. However, you could also address the high-frequency sampling during a chamber closure since you use high-frequency gas analysers and work with MDF in your data analysis. There are several automated chamber systems which do not employ high-frequency analysers, but still collect discrete gas samples which have to be analysed with a GC. Especially for N₂O it is very interesting to see what fluxes we can capture with CRDS in comparison to GC analysis.
- You only write how the SHORT and LONG measurements affected the flux estimates. But how did they affect the uncertainty of the single flux estimates? How large/small were the error bars for the flux estimates?
- Could you have just used one, namely the LONG, closure time for all chambers and only choose for the flux calculation between SHORT and LONG calculation times? This would be more practical than rotating closure times between chambers.
- In section 3, the results are clearly presented, but the discussion part is very limited.

Specific comments:

- Page 2, line 26: numbers instead of author names for references
- You are not always consistent in how you write company names (capital versus small letters). Also often you write ‘minute’ when you could just use ‘min’.

- Page 3, line 23: What are the pump specifications? Was it the pump supplied by Picarro with the instrument or did you use another pump?
- Page 4, lines 9ff.: The soil temperature and soil moisture probes, were those the ones which can be directly attached to the chambers?
- Page 5, line 5ff.: Did you use the analytical accuracy specified on the technical datasheets of the analysers or did you perform measurements yourself? Where there significant air pressure and ambient temperature changes at your site over the four months? If yes, did you test how different temperature and pressure values could change the MDF estimate? Is n incl. or excl. the deadband?
- Page 6, line 6: What CO₂ concentrations were reached during LONG closure times (and for CH₄)?
- Page 6, line 7: I find that confusing in comparison to section 2.5. So considering the deadband, the chambers were closed for 3 and 26 minutes, respectively?
- Page 6, line 20: Why did you consider these fluxes as unreliable when the chamber quality check using the R² for CO₂ was passed? Are you not unnecessarily filtering out fluxes which are not significantly different from zero, and thus introducing a bias in your data? Because this often happens when using R² as a filter criterion for low fluxes.
- Page 6, first paragraph of section 3: You had no problems with humidity and the automated chamber system at your site?
- Page 7, line 3: The conclusion about the 2 min sampling time sounds absolute, but it is only valid for your small chambers. Except for the necessary descriptions in the method section, you completely disregard the role of chamber volume for choosing the right chamber closure time.
- Page 7, lines 20/21: That sentence does not make any sense to me. 85.6 % of the fluxes were above or below?
- Page 8, line 4: You didn't show the diurnal variation in your data. This is more a point for the discussion than a conclusion from your presented data.
- The references are not well formatted.
- Table 1: Use superscript for the units.
- Table 2: Include n for each chamber.
- Check how the units are written on the y-axis of the figures.