

Interactive comment on “Automatic high-frequency measurements of full soil greenhouse gas fluxes in a tropical forest” by Elodie Alice Courtois et al.

Anonymous Referee #1

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This manuscript presents a protocol for measuring three greenhouse gases (CO₂, CH₄ and N₂O) at high temporal frequency in a tropical forest soil using a combination of commercially available systems. This is a very timely and relevant manuscript, particularly for measurements of CH₄ and N₂O. Continuous high frequency measurements with clear sampling protocols will help researchers capture and model, transient changes in CH₄ and N₂O fluxes often missed by more infrequent sampling strategies. This looks like a nice, efficient system for measuring these important greenhouse gases. The technical write-up is comprehensive and easy to follow however I do have technical questions regarding their methodology that should be addressed. 1. How did the authors keep moisture from affecting sampling, either within the tubing lines

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or when moving from IRGA to Picarro? Was there any moisture buildup in the tubing lines? 2. Were the instruments kept within operating temperature ranges: specifically the upper end of operating ranges? Where there diel changes in Licor and Picarro instrument temperatures? 3. How often were the instruments calibrated? 4. The authors subsampled from the flow downstream of the Li-8100A-IRGA into the Picarro G2308. What was the flow rate through the Picarro analyzer- was it 2.8L/min or some lower rate? I don't see the flow controller in Figure 1a diagram- is it built into the external pump? 5. What is the sampling volume inside the Picarro G2308? My concern is that if there is subsampling from a high flow rate at the T piece subsampling loop (Figure 1 a) through a secondary instrument, and then flow is re-merged downstream of the external pump and returned to the closed chamber there may be a dilution effect. This might not impact a 2 minute sampling time period but may have a greater impact on a 25minute time period. 6. Did the authors also use their Picarro G2308 to measure CO₂ as well and if so how does that compare to the LI-8150 analyzer? This would provide confidence in running the two systems inline. Specific questions: Pg 2 line 26: are the reference [17,18] in the correct format? This is the only location that lists reference numbers as opposed to first author. Pg 3 line 23: the authors used an external pump, however the LI-8150 has an internal diaphragm pump- was this turned off or was it used inline with the external pump? Pg 3 line 28: the CRDS is not the “only” method that can detect low concentrations of N₂O. Can you change to “one of the only” as opposed to “only”. Pg 4 line 14: the flow rate of 2.8L/min is very high. Was this flow rate tested to determine if pressure within the closed chambers was altered? I assume that the Licor 8100 chamber tops had their patented pressure relief valve installed? Figure 1b) are all the tubing lines from the 16 chambers to the multiplexer 15m (as in the text) in length? A small point but they look like different lengths in the diagram.

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