RC1, Referee #1 (Remarks to the Author):

This manuscript presents a protocol for measuring three greenhouse gases (CO_2,CH_4 and N_2O) 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 CH_4 and N_2O. Continuous high frequency measurements with clear sampling protocols will help researchers capture and model, transient changes in CH_4 and N_2O fluxes often missed by more infrequent sampling strategies. This looks like a nice, efficient system for measuring these important greenhouse gases.

Response: *We thank the reviewer for the positive comments and constructive inputs.*

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 or when moving from IRGA to Picarro? Was there any moisture buildup in the tubing lines?

Response: *We also worried about moisture problems prior to our experiment, but such problems never occurred. No significant condensation occurred in our system, we assume because temperature variations were typically small below the canopy, varying from 22°C in the night to 28°C during the day (see Figure attached). We regularly checked that no liquid water accumulation occurred in the sampling tubes. Moreover, both analysers measure water vapor and account for its effect on concentration of CO_2, CH_4 and N_2O .*

Changes in the manuscript*: Temperature variations are typically small below the canopy due to the shadowing by dense canopy crown and microclimatic conditions. During the study period, temperature at 2m height varies during the day from 22 °C in the night to 28 °C during the day. The presence of water condensation inside the tubing lines was carefully checked every week and never occurred during the study period.*

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?

Response: *In our study site, all the systems were operating below dense understory vegetation and canopy cover, which naturally create a buffer maintaining air temperature relatively constant over the year (i.e. at daily and seasonally time scale). There were no diel changes in Licor and Picarro inside operating temperature: Picarro temperature was monitored and remained between 44.99 °C and 45.01 °C and Licor temperature at 51.7 °C.*

3. How often were the instruments calibrated?

Response: *All the systems used at this time, i.e. from June to September 2016, were new and received from the manufacturers. We therefore did not re-calibrate them during the study period. We are confident that the data of the gas concentrations recorded by our analysers were robust.*

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 lowerrate? I don't see the flow controller in Figure 1a diagram- is it built into the external pump?

Response: *The flow rate of 2.8L/min corresponds to the flow between the chambers and the multiplexer which cannot be adjusted. This high rate inside the chamber allows to achieve a sufficient air mixing in the chamber headspace during the measurements. Flow rates in the subsampling lines (Li8100 and Picarro) were lower and set between 1.5 and 1.7L/min as recommended by the manufacturers.*

Changes in the manuscript*: Flow rates in the subsampling lines (Li8100 and Picarro) were lower and set between 1.5 and 1.7 L min-1 as recommended by the companies.*

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 (Figure1 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 25 minute time period.

Response: *The volume of the PICARRO analyser together with tubing from the subsampling loop represents 130 cm^3. It represents only 2% of the total volume (6088 cm^3) and the dilution effect was therefore limited.*

6. Did the authors also use their Picarro G2308 to measure CO_2 as well and if so how does that compare to the LI-8150 analyzer? This would provide confidence in running the two systems inline.

Response: *One step of our data quality check / quality control consisted in comparing the soil CO_2 effluxes measured by the PICARRO with the soil CO_2 effluxes measured by the Li-8100A. This method was also used to control that there were no leaks. Overall, both systems agreed very well. However, while the PICARRO G2308 analyser automatically reports dry mol fraction of CH_4 and N_2O, it only reports CO_2 uncorrected by H_2O concentration. As the precision of measurement was better for CO_2 using the Li8100 and as it also automatically reports dry mol fraction for this gas, we decided to use Picarro estimation for CH_4 and N_2O and Li8100 estimation for CO_2.*

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.

Response: *This has been corrected*

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 in line with the external pump?

Response: *The system was always operating with the two pumps, the internal diaphragm pump of the Li-8150 and the external pump of the PICARRO, turned on, which limited the risk of water condensation inside the tubing line.*

Pg 3 line 28: the CRDS is not the “only” method that can detect low concentrations of N_2O. Can you change to “one of the only” as opposed to “only”.

Response: *This has been corrected.*

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 value installed?

Response: *The flow rate of 2.8L/min corresponds to the flow between the chambers and the multiplexer which cannot be adjusted. This high rate inside the chamber allows to achieve a sufficient air mixing in the chamber headspace during the measurements. Flow rates in the subsampling lines (Li8100 and Picarro) were lower and set between 1.5 and 1.7L/min as recommended by the manufacturers.*

Figure1b) 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.

Response: *Yes the length of tubing was 15 m for all chambers but as chambers are installed in a grid around the instruments, they are not all 15m away from the instruments. The length of the tubing lines (15 m) is cited in the caption.*