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Comment

Interactive comment on “A gas chromatograph system for semi-continuous greenhouse gas measurements at Puy de Dôme station, Central France” by M. Lopez et al.

Anonymous Referee #3

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The authors describe a GC method for quasi-continuous measurements of CO₂ and CH₄ using an FID (for CO₂, after reducing it to CH₄ on a catalyst in the presence of H₂) and N₂O and SF₆ using an ECD at Puy de Dôme, France. The measurement system is, in essence, the same as the one published by Schmidt et al. (AMT, 2014), but without a reduction gas analyzer for CO, operating at Trainou tower. Both papers include a nearly identical, incomplete schematic diagram of the system. The authors include comparisons of the GC measurements with an in situ optical analyzer for CO₂ and CH₄, and with flask air samples collected at Puy de Dôme and measured at their base laboratory, LSCE. They also include estimates of regional fluxes for CO₂, CH₄,

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Interactive Discussion

Discussion Paper

and N₂O based on parallel measurements of Radon-222 combined with estimates of radon fluxes. This is once again similar to results published in Schmidt et al. (2014) for CO₂ only and by others. I question if a separate paper is necessary to describe an analytical system that is nearly-identical to one operating at another site. Based on the lack of novel experimental or data analysis details presented and the absence of new conclusions, the contents of this paper could have easily been incorporated into Schmidt et al. (2014). Therefore, I do not recommend this paper for publication in AMT.

General comments:

1. Much of the text is vague and unclear. Balance on details is lacking; in places there is an abundance of detail, but in others sufficient detail is lacking.
2. While the authors make a point of belonging to GAW, little or none of the data presented in the paper are available from the WMO world data center for GHGs (WD-CGG).
3. Why "flux densities"; why not "fluxes"?
4. Typically, when a noun is used as an adjective to modify another noun, it does not take the plural. In the title, "greenhouse gas measurements" is correct. "greenhouse gases measurements", "flasks analysis", "fluxes uncertainties" (and many other examples) are not.
5. Use consistent units through out.

Specific comments:

p3123,l2: gas measurements.

p3123,l10: show that

p3123,l11-12: what are the WMO recommendations? How could a reader outside the GAW community know what this means?

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p3123,l15: gas measurements

p3124,l10: upper case "P" on Protocol

p3125,l24: If you are going to claim to be part of it, you should know the name: GAW = Global Atmosphere Watch

p3126,l16-17: SF6 does not have the 4th largest RF among anthropogenically-emitted GHGs; it may not be 4th among Kyoto Protocol gases, with HFC-23 slightly ahead of it. A few ODSs (which are also GHGs) have greater RF.

p3131,l1: ..in northern France...

p3131,l4: specify inside or outside diameter.

p3131,l12: It is absurd to claim you "remove the remaining water vapor". What is the dew point of the air exiting the dryer?

p3132,l1: Where are the sample loops? In the room? In the GC oven?

p3132,l10: What is 6.0 quality? It is jargon. Give the purity.

p3132: This description of the chromatographic separation scheme combined with an incomplete schematic diagram is very difficult to comprehend. Show the different valve positions with solid and dashed lines, as done e.g., by Aoki (Tellus, 1992). Show example chromatograms. For an experimental paper in a journal largely dedicated to publication of experimental details, this section is very weak.

p3132,l25: CO2 molecules are not detected by the FID.

p3134,l9: What does it mean that GC system performance is controlled with a graphical application? Do you mean performance is evaluated by looking at graphs of instrument parameters? Do you mean you control the instrument and set instrumental parameters from a graphical interface?

p3136,l27: What are these recommendations for?

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p3137,l20: In places, English units of measure are used and in other places metric. It should be consistent through out and consistent with the journal's policy. Give the alternate common unit in parentheses for clarity. Is the diameter o.d. or i.d.?

p3138,l8: What flows through the reference cell?

p3138,l13-14: It does not seem sufficient to calibrate an NDIR twice per year (or even twice per day). Are the analyzer temperature, the flow rates, and the cell pressures controlled?

p3138,l15: Is 3/8 in the length of the line?

p3138,l17-18: Is gas from the reference cylinder also flowing through the reference cell of the NDIR?

p3139,l27: A filter will not prevent outliers, but it could be used to flag them and omit them from further analysis.

p3141,l21: How were the diurnal cycles computed?

p3142,l14: It is not this simple; sinks at the surface will affect CO₂ and result in lower values at the surface than above the BL.

p3143,l3-4: The amplitude of the diurnal cycle for N₂O in summer looks significant; why do you say it is nearly undetectable? It is difficult to explain.

p3144,l13: What is the value of lambda used?

p3147,l12: These look like absolute uncertainties; what makes them relative?

p3149,l25-26: GCs run without interruption for years on end, and can often be quickly repaired without specialized technical skills when they fail. You mentioned that your picarro CRDS was sent back twice causing gaps, so how will these new technology analyzers result in fewer data gaps?

p3157: How do "on" and "off" positions relate to the valve positions drawn in the

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schematic diagram?

p3160: State in table title that values are 1 sigma.

p3163: If the fluxes are based only night time measurements, the table description should state that. These estimated fluxes are difficult to compare without uncertainties on them.

p3165: The schematic diagram seems incomplete. Some valves have nothing connected to some of their ports. The flow of gas through the catalyst, then to a tee, branching between an FID and a needle valve seems odd. Where is the supply of carrier gas to the ECD channel sample/inject valve?

p3168: What does "detrended based on 1 January 2013" mean?

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