

Reviewer's opinion on the manuscript of Lopez et al. entitled „ A gas chromatograph system for semi-continuous greenhouse gas measurements at Puy de Dôme station, Central France”

The authors describe their GC system suitable for the measurement of a few important greenhouse gases and its operation. They analyze the performance of the system and the measurements are compared with data obtained by independent methods. Three years of ambient measurements are presented and evaluated. Using the radon tracer method CO₂, CH₄ and N₂O fluxes are calculated for the footprint area of the monitoring station. Although the GC technique is not new but the specificity of the GC system and the data analyses may make the paper publishable in Atmospheric Measurement Techniques after considering the reviewers comments.

General comment:

I cannot fully agree with the title of the paper because its main value is not the GC system, similar to which has already been described elsewhere, but the results of the analyses of the measurement data.

I feel as if the paper would be consisted of separate independent parts. One of them, the first part of the manuscript (description of the GC system, comparison with other analyzers), is a detailed, purely technical paper, while the last part is a modeling work. The middle part could be an illustration to the operation of the measurement system but it may also be considered as an independent data analysis. Some sort of smooth logical connection among the parts would be desirable to get a consistent paper.

The authors compare the calculated fluxes to the official emission inventory of Auvergne region. However, they do not discuss how much the catchment area of the monitoring site overlaps with Auvergne region, how much the data are comparable at all.

Specific comments:

Page 3123, line 8: Units to all numbers should be given.

Page 3123, line 9-11: The sentence is not clear. Do you mean the accuracy/repeatability criteria? To check its fulfillment you do not need to compare instruments.

Page 3124, line 9: UNFCCC was signed in 1992 and entered into force in 1994.

Page 3124, line 12: 'six main long lived GHGs' – in fact, significantly more than six, because HFCs and PFCs are groups of several gases. Usage of past tense ('aimed') might be better because the commitment period (2008-2012) is already in the past.

Page 3125, line 24: The correct name of the program is 'Global Atmosphere Watch'.

Page 3126, line 3: Fourier (capital F), in my opinion, because Fourier is a name.

Page 3126, line 6-7: 'on the order of Hertz' is not clear. Hertz is a unit, not a number. Do you mean the order of 1 Hertz?

Page 3127, line 19: What is the region for which these land cover data refers to? Is it a circle of a certain radius around the station?

Page 3128, line 12: I would prefer 'aerosol particles' to 'aerosols' because the first one is the correct term.

Page 3128, line 24-25: Is there any reason while PBL data were not evaluated for 2013 when the GC system was also operational? Why do you chose 575 m altitude if the station is located at 1465 m?

Page 3129, line 3-4: Such a correction is rather questionable. Did you distinguish between the situations concerning the correction method when both 575 m asl and 1465 m asl are within the PBL and when 575 m asl are within the PBL but 1465 m asl is above it?

Page 3129, line 8-10: Are these data derived from the ECMWF data at 575 m asl, from the original Puy de Dome measurements at 1465 m asl or from the PUY corrected ECMWF data?

Page 3129, line 25-29: Are you mean only those days/trajectories when the station was within the PBL between 14:00 and 16:00 UTC (above the PBL between 22:00 and 06:00 UTC) or all days/trajectories independently form the actual PBL elevation during the periods? Separation of the situations (if it has not done) may give a clearer picture. (The question also regards to page 3141, line 12-14.)

Page 3130, line 1: Why do not you use your own trajectory analysis presented in this paragraph, why do you refer to another work in this case?

Page 3132, line 28-29: I suggest reformulating the sentences because CO₂ itself cannot be detected by FID.

Page 3133, line 6-7: Numbering of the valves and EPCs are not consequent for this paper. In the paper you cannot use a numbering scheme compiled for another purpose, which is not logical in the given context.

Page 3133, line 25: What does 'over several days' means? How long was the measurement sequence and what followed its end? Restart of the whole system? Some sort of maintenance of the system?

Page 3137, line 20: ...a 6 m LONG strait metal tube...

Page 3138, line 13-14: Usually, you need to calibrate an NDIR analyzers much more frequently. Is there any documents on the temporal shift of the scale traced e.g. by target gas measurements? How long was the analyzer flushed before starting the signal integration? (It is the same question concerning page 3138 line 17-18.) For me the order of words 'analyzing for 10 minutes for 30 times' seems less misunderstandable than 'analyzing 30 times for 10 minutes' but it may be a question of taste.

Page 3139, line 25 and onward: How the measurements of the different instruments producing data of different temporal resolution were compared?

Page 3141, line 20-22 and page 3168: Presentation of the diurnal variations relative to the daily averages may be more logical supposing you do not want to present/discuss the seasonal variations.

Page 3145, line 4-5: Schauinsland is significantly farther from the ocean than Puy de Dome. I would suppose that there are less air masses at Puy de Dome spending 3 days over the continent than in the case of Schauinsland.

Page 3147, line 19 and onward: What is the size of the catchment area for which these flux values are representative? How much is it comparable with the extension of Auvergne region for which the CITEPA data are given? During the night, when the station is above the PBL, the region in the immediate vicinity of the station but within the PBL (small/big (?) part of Auvergne region) may have only limited influence on the measured mixing ratios.