

Interactive comment on “In situ observations of greenhouse gases over Europe during the CoMet 1.0 campaign aboard the HALO aircraft” by Michał Gałkowski et al.

Anonymous Referee #1

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This paper presents a nice overview and synthesis of the two kinds of measurements made on the CoMet Aircraft, in-situ continuous and flask measurements, including isotopes. It also presents some analysis of the data, which in my view stretches a bit the goals for this journal, although I have definitely seen this type of thing before in AMT. The conclusion did a nice job of tying things together when really the results cover a lot of different topics, ranging from how well a global model reproduces vertical gradients to the isotopic value of the USCB. Very broad! Other than that, it is well-written so I have very few editorial remarks below, and a few requests for more explanation of some of the measurement techniques, such as if and how water vapor was removed for the in-situ system.

C1

Details:

L69 ref to Varon is a satellite paper - this sentence reads as if it is a study using aircraft measurements.

L94 should read "instruments" L115 tolerance

L117 remove "so-called". I think working tanks is fine on its own.

L121, were these two cylinders at different values?

L 128, to be clear, the data itself was not adjusted for these in-flight calibration runs? Drift was assessed, was any drift found? If so, was it corrected? Why/why not? Were these in-flight calibrations noisier than expected so they were not used (see Karion et al., Long-Term Measurements of GHSs from Aircraft, AMT, 2013, for example)?

Was the sample dried prior to measurement by the Picarro? If so, does the calibration gas also pass through the drying system? If not, how was the effect of water vapor removed?

Somewhere in Sec 2 should be mentioned the quantity being measured, i.e. the dry air mole fraction of the species, with the definition that it is the moles of the species per mole of dry air, and define ppm as parts per million, or micromoles of CO₂ per mole of dry air... etc. These are formalities but they are useful so we keep the work accessible and clear.

L145-155, and throughout. Units should all be in metric, I see a lot of inches (") here. Inches I believe should be abbreviated as in. Perhaps give in cm with inches in parentheses?

L169- how was this drift discovered, was it by comparing the flask analyzed value from the lab with the in-situ system during flight? How big is "significant" (curious)?

L258: first time a broken mounting is mentioned, earlier it is referred to a roll-out malfunction. Perhaps either give a little detail or keep referring to it as a malfunction? I

C2

think a sentence would be nice as to what happened exactly?

L289 and elsewhere, I would think approximately should be spelled out.

L300 and Section 3.4: I am starting to wonder if AMT is the appropriate forum for this extensive model-data comparison, as we are moving well beyond measurement techniques here.

Fig 8 These are impressive 3D renderings - this kind of data is difficult to visualize. But I am a little lost - if the plots on the right correspond with the flights on the left, then why are there more points in the Miller-Tans plots than on the left (i.e. the lower should only have 4 points then correct?). Something I am missing here?

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