

Interactive comment on “Characterisation of interferences to in-situ observations of $\delta^{13}\text{CH}_4$ and C_2H_6 when using a Cavity Ring Down Spectrometer at industrial sites” by Sabina Assan et al.

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[Assan et al.] We would like to thank Referee #2 for the valuable comments and his/her time to review the manuscript. Our replies are below.

[Referee #2] My overall impression is that this paper talks around the subject too much, resulting in a paper that is too wordy.

[Assan et al.] We thank the referee for this very useful comment. We have reduced the word count by $\sim 10\%$ and removed 2 figures from the main text. We aimed to reduce duplicate explanations, background information and wordy sentences. We are aware,

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however, that some readers may want extra clarification, therefore we have added a number of Figures and explanations into the Supplementary material.

[Referee #2] In essence these authors have demonstrated that by measuring the interferences between three analyte gases in a CRDS instrument, they can correct the concentration measurements of the ^{13}C isotopologue of methane, as well as the unphysically negative concentrations (reported by the instrument) of ethane, to produce improved measurements of both concentrations. The abstract needs to say little more than this; perhaps giving just the magnitude of the corrections and a sentence announcing the field tests. An abstract does not serve to introduce a subject as this one does. This notwithstanding, the work as a whole is quite well done and is likely to prove useful to others using these instruments.

[Assan et al.] We agree that the abstract focussed too much on the introduction to the subject. We have reduced the abstract to include only the key elements of the article.

[Referee #2] I would however like to point out some ambiguities in the language used; in the abstract the sentence that begins "Here we present ..." is actually ambiguous. It reads as if there might be cross-sensitivities between the instruments rather than the measurements of concentrations of two molecular species.

[Assan et al.] OK, this phrase has been removed.

[Referee #2] The last sentence of the first paragraph of section 4.1.2 is also ambiguous - beside the time stamped measurements as well as beside one another?

[Assan et al.] We have removed this statement as it is explained further in Section 4.3.

[Referee #2] In the second paragraph of section 3.5, do you really mean a correction factor of the square root of two?

[Assan et al.] Yes indeed, corrected.

[Referee #2] I found the second sentence of section 3.1.4 to be unclear.

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[Assan et al.] We agree, this has been reworded to: 'Due to the non-linearity of the discontinuity in reported C₂H₆ at 0.16% H₂O and its subsequent slope we choose to report correction coefficients for the two found linear regimes, i.e. for continuous measurements with sample humidities below 0.16% and sample humidities above 0.16%.'

[Referee #2] In the last sentence of section 3.1.2, one number doesn't constitute a range! The ends of the range should be specified or you should say "at a level near 400 ppm".

[Assan et al.] We thank the Referee for pointing this out; we have changed the phrase as suggested.

[Referee #2] In section 4.2, the reader needs some extra evidence that there were cattle in the vicinity. Where were they in relation to the inlets, and what was the wind direction?

[Assan et al.] We have added extra information on the location of the ruminant farm, and wind direction at the time of measuring. Section 4.1.1: 'Other possible methane sources in the nearby region were identified as traffic and agriculture, including a live-stock holding situated less than 500m southwest of the site.' And Section 4.2: 'Such a signature suggests a biogenic source and, due to the south-westerly wind direction throughout the event (where the livestock holding is located), suggests the source is likely to originate from livestock, either as ruminant or manure emissions.'

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