

Interactive comment on “Autonomous Airborne Mid-IR Spectrometer for High Precision Measurements of Ethane during the NASA ACT-America Studies” by Petter Weibring et al.

Anonymous Referee #2

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General comments

The paper “Autonomous Airborne Mid-IR Spectrometer for High Precision Measurements of Ethane during the NASA ACT-America Studies” by Weibring et al. discussed recent results from development and deployment of an airborne laser spectrometer measuring Ethane with high precision. The paper is very well written. The results are excellent and well worth publishing. A few minor comments follow below.

Specific comments

P. 14 L. 444: It is true that changes in the background may lead to uncorrelated
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Ethane/Methane changes. But it is hard to tell what causes the changes in the ratio unless one permanently measures zero air. In practice a change in Ethane/Methane ratio could also point to a different Methane source. The uncertainty estimation later in the manuscript is very good in this regard as it uses frequent airborne zero air measurements to identify and quantify instrument drift.

P. 17 L. 529: I would write out the formula.

P. 19 L. 587 and Fig. 9: Figure 9 shows 5 data points between 0..5 ppm Ethane that are clearly below the regression line, but they have a very similar slope. Are these from the same flight? Perhaps a systematic offset?

Also in Figure 9 you excluded the 10 ppm Ethane data point. Please explain why. The error bars are just slightly larger than another point at 5 ppm, and the bias from the fit is very similar to the other 5 points mentioned above.

Technical corrections

P. 7 L. 210: I would rephrase to: "A sample flow rate of ... yields a cell response time of"

P. 14 L.427: should be take off

Fig. 11: The small labels and wind speed are not readable. Neither the legend for EPA emission rates.

Fig. 12a: Increase fonts of inset to same size as major axes.