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Atmospheric Measurement Techniques Discussions

Interactive comment on "Evaluation of the Airborne Quantum Cascade Laser Spectrometer (QCLS) measurements of the carbon and greenhouse gas suite – CO_2, CH_4, N_2O, and CO – during the CalNex and HIPPO campaigns" *by* G. W. Santoni et al.

Anonymous Referee #2

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Santoni et al. 2012 carefully and extensively evaluated airborne Quantum Cascade Laser Spectrometer (QCLS) measurements of CO2, CH4, N2O, and CO during two aircraft campaigns, CalNex and HIPPO. Many of their practices for QA/QC data are useful for other applications as well, especially those for the traceability of calibration scales. The paper is clearly written and well organized. I recommend publication after addressing a number of concerns below.

With a small time shift, the reference/zero signals shown in Fig 8 seem to be anti-correlated with the ambient pressure. This is not a problem as long as the reference/zero frequency is high enough to capture the features. However, the question is whether every 15 minutes is frequent enough (when a profile takes about 15 minutes as well). Clearly the frequency is not high enough, as the zero/reference signals reached different maximums and minimums during each pressure cycle (assuming that pressure variations cause the zero/reference fluctuations), and thus a bias may have been introduced. What are the uncertainties related with this type of bias, and for each species? Furthermore, can the authors explain why the zero/reference signals are anti-correlated with the ambient pressure?

P9693/L21-25, the CO2 external absorption path is flushed with pure nitrogen. How about the external absorptions of CH4, N2O, and CO? How large is the influence of external absorptions on CH4, N2O, and CO measurements?

P9695/L2-9, were the measurements made during ascending/descending or during constant ambient pressure? This may be a place to demonstrate whether ambient pressure has an impact or not on the measurements.

P9699/L14-16, what are the mean and standard deviation of the differences between gasdeck calibrations and assigned values? This will give readers an idea about possible discrepancies, at least for the gasdeck that has a chance to be calibrated.

P9700/L22, I do not see an advantage of the normalized range here. Why not show the difference in real ppb directly?

P9710/L2-8, what are the differences between "airborne measurement compatibilities" and "long-term compatibility" reported here? Are they derived from the same dataset?

Interactive comment on Atmos. Meas. Tech. Discuss., 6, 9689, 2013.