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Interactive comment on "Gas chromatography vs. quantum cascade laser-based N_2O flux measurements using a novel chamber design" *by* Christian Brümmer et al.

Anonymous Referee #1

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Brümmer et al. present a study analyzing linear and non-linear flux calculation methods under high and low flux rates of nitrous oxide and different scenarios of closure time. They use both traditional gas chromatography (GC) (low sampling number during closure time) and high-resolution quantum cascade laser (QCL) sampling. They find that non linear concentration changes are more clearly detectable during high emission scenarios and long chamber closure. Shortening of closure time results in a reasonable agreement between linear (3min) and non-linear (60min) flux estimates, but can only be applied when using the QCL set up. While under low flux conditions, GC measurements result in more scattered flux estimates, in both campaigns mean flux estimates of GC and QCL agreed well. Rare negative fluxes detected by GC mea-

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surements seem to be arbitrary and not caused by actual N2O uptake. The paper is well written and a good fit for the journal. However, I could not help thinking that most of the results were as to be expected from literature and not 'radically' new. Ultimately, the high temporal resolution of measurements possible with QCL (which do provide more sophisticated ways of flux data processing) and the fact that the concentration measurements are instantaneous, make these measurements desirable for exactly the long-term applications, the authors are suggesting. It is not clear to me, what the accessibility of the described instrumentation is. Is there a plan to make it available for other users, i.e. to 'rent' it out or to make it available within the ICOS project? If that is the case, it should be pointed out more clearly. Overall, the most interesting aspect to me is the possibility to study ecological processes in a new way, as shown for the possible net N2O uptake and diurnal variability in emission rates. Interestingly, the study they compare their results to (Shurpali et al. 2016) is mostly an eddy covariance study. It would be interesting if the authors could comment on possible advantages of this automatic chamber against eddy covariance and whether other gases can be sampled in parallel to N2O (I am thinking mostly of CO2, considering the possible coupling of plant activity and N2O emission rates).

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