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Atmospheric Measurement Techniques Discussions

Interactive comment on "Evaluation of a lower-powered analyser and sampling system for eddy-covariance measurements of nitrous oxide fluxes" *by* Shannon E. Brown et al.

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In this paper, the authors described a new N2O flux sensor that has a faster response and uses less power than previous sensors. This new sensors was deployed side-by-side against previous sensors and the fluxes of N2O and CO2 from an agricultural field over a growing season were compared, yielding very favourable results. This is a very well written paper and a useful reference for anyone working with closed-path eddy covariance sensors, especially from the perspective of choosing the optimal flow/cell volume, etc. I think the paper could be published as is but it can be improved further if the authors are able to incorporate my suggestions.

1. Being a method paper, it'd be useful to see some cospectra (in order to be convinced that all of the fluxes are captured). I recognize that small fluxes lead to noisy cospectra, but the authors could look at the brief period(s) when the N2O fluxes were very large. Do all the sensors show agreement?

This would also enable a direct comparison of high frequency flux loss between the frequency response method (which the authors have focused on so far) and the cospectral/ogive method.

2. The authors have reported frequency response times, but what kind of flux loss do they amount to under typical atmospheric conditions? The authors have presented the equations to estimate this but haven't provided any numbers (that I could see). This information would be informative for readers.

3. It would be useful to know what the flux detection limits are. There is a lot of interest now in knowing the emission of N2O from the ocean (especially low-oxygen regions). However per m2 the N2O flux over the ocean is typically orders of magnitude lower than fluxes over land. Would this sensor be able to detect oceanic N2O flux?

There are multiple ways of estimating the flux detection limits. See this paper as an example: https://www.atmos-meas-tech.net/9/5509/2016/

4. That the sensor is sensitive to motion (generated by wind) is a bit concerning. Any idea why and any effort in trying to reduce this sensitivity (rather than just securing the sensor better/in a more sheltered location)?

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