

Interactive comment on “Using near-surface atmospheric measurements as a proxy for quantifying field-scale soil gas flux” by Andrew Barkwith et al.

Anonymous Referee #2

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General Comments The authors describe a new approach to measure soil-atmosphere fluxes on the field scale which might overcome the limitations of traditional chamber techniques (precise, but only laborious repeated measurements allow to get map an area) and traditional micrometeorological measurements (fixed location, no spatial resolution of the footprint). The approach is interesting, but it lacks many details that would be necessary to get a better idea if this approach really holds the potential to fill the gap of field scale measurements. The idea is intriguing to put a kind of Eddy -Covariance system on a small cart in order to get more spatial resolution and map a larger area. The final result, however, is a bit disappointing in the way it has been analyzed so far. On the field scale the mean flux rates match, but there is hardly any correlation be-

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tween the measurements at the local points using the new system and using chamber systems. A reasonable fit of mean values could also be expected for the same chamber measurements and a traditional EC system mounted at a 10 m high tower, so that the foot print more or less matches (although the footprint depends on wind direction etc). I miss details on how the measurements and calculations are really done. They look a bit different from traditional EC calculation – what does it mean? Is the vertical wind speed used in both directions in the calculation, i. e. plus and minus? How was the background concentration determined? The authors mention that vertical wind flow was measured mounted either with the gas analysers (as I would expect in a modified EC approach) or at a fixed point in the field – how do the authors then combine the latter vertical wind speed at the fixed point to the changes in concentration somewhere else? Did the authors test if the vertical wind speeds or exchange rates were the same in the same moment all over the field?.

But I generally like the idea to develop and test this new idea, so I recommend to revise the manuscript, and add more details about the ideas and routines used for this new approach.

Specific comments:

Maybe the authors could explicitly define in the abstract and intro a name for their methods, like they implicitly did.

L33. The description about how chamber measurements work is correct, but I recommend to add a reference. Unfortunately there are different names for the systems, like open or closed chambers, steady state or non-steady state chamber etc. Open or closed loop seems clear as terminology, but I haven't read it yet, so it might add to this confusion.

L45 but a certain minimum turbulence is always need for the EC method.

L49, not 100% correct; a certain minimum turbulence is always need for the EC

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method.

Eq.2 How do you know/ measure/ calculate the background

L114/15 please see my comments in the main comments

References: please check the formatting of CO₂ and CH₄ and other subscript letters

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<https://doi.org/10.5194/gi-2020-8>, 2020.

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