

Interactive comment on “Field intercomparison of two optical analyzers for CH₄ eddy covariance flux measurements” by B. Tuzson et al.

Anonymous Referee #1

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General comment This is an excellent paper that explores a topic of increasing importance in trace gas research, viz., the use of eddy covariance for trace gas flux measurements. In this case the trace gas is methane. The authors explore requirements for precision, accuracy, response time and sensitivity to environmental variables such as temperature and humidity and compare how well these are met by two commercially available instruments which are reasonably new on the market. The section of the paper dealing with the response to water vapour is done very thoroughly and very well and raises issues not usually considered in this context such as the effects of water vapour on spectral shape, pressure broadening, and the absorption and residence time of water molecules in sampling tubes. Overall, this is a worthwhile and topical paper, fully deserving of publication. Some relatively minor comments follow.

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Specific comments p.3, line 4: I think eddy covariance is usually employed to measure fluxes over areas with lateral dimensions of 100 m and areas of thousands of m² rather than tens

p.7, lines 12-19: The bLs model of atmospheric dispersion (Flesch et al.,2004. Deducing ground to air emissions from observed trace gas concentrations: a field trial. J. Appl. Meteorol. 48: 487-502) could give a more accurate estimate of the surface flux than footprinting, although I have to say that Fig. 7 indicates that the footprint-corrected fluxes were very close to reality

p.8, line 6: A separation of 0.7 m between the sonic anemometer and the air intakes seems rather large and could warrant corrections for sensor separation as described by Moore 1986 (Boundary-Layer Meteorol. 37:17-35). These can be as much as 10%.

p.8, line 10: I wonder too about the height of the sonic anemometer. Fig.1 indicates that what it “sees” is about 60% source area and 40% grassland. Again, the bls technique could be useful here

p.13, line 1: It is also very likely that water vapour concentration is correlated with the direction of the vertical wind; up drafts from a moist surface are higher in water vapour, down drafts bring down drier air

”p.17, Section 3.1.4: It would be useful to have a concluding sentence or two for this section. Do temperature and pressure effects present problems or not?

p.17-18: The same comment as for temperature and pressure

p.21, line 1: I wouldn’t say that a correction of 7 or 8% is small. In mitigation studies or greenhouse gas inventories, a real difference of that magnitude is very important; yet we might not be able to measure it

p.33, Fig. 7, top panel: According to the units on the right hand axis, the flux is of water vapour, not of latent heat

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Technical corrections p.3, line 25: suggest “at the surface of” for “above” - p.13, line 9: “levels” for “level”

p.13, line 19: suggest move “linearly” to after “depend

p.20, line 25: Insert “to” between “according” and “the”

p.33, Fig. 7, bottom panel: It is difficult to see the separate lines and dotted lines clearly. Can a bigger scale be used?

p.33, Fig. 7, caption, line 2: delete “of”

Interactive comment on Atmos. Meas. Tech. Discuss., 3, 2961, 2010.