

Interactive comment on “Chemical sensor resolution requirements for near-surface measurements of turbulent fluxes” by M. D. Rowe et al.

Anonymous Referee #2

Received and published: 11 February 2011

Rowe et al. further develop the approach by Businger & Delany (1990) for estimating the sensor resolution required to limit the contribution of the concentration measurement uncertainty to the flux uncertainty to a certain level (10% in this case). This is a very useful and well-written contribution for those planning to conduct flux measurements, in particular if "experimental" or less-proven sensors are used. Having said this there are few other comments I want to make - in my view the paper can be accepted for ACP provided the following minor comments are tackled by the authors.

(1) Title: I am wondering whether the use of "chemical sensors" in the title and elsewhere in the paper is not too restrictive because it would for example exclude particle

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counters used for particle flux measurements. Why not say just "Sensor resolution requirements ..." or "Scalar sensor resolution requirements ..."?

(2) The authors appear somewhat biased towards water-atmosphere flux applications (while I am biased towards land-based studies ...). In order to provide some more balance I suggest to assure that in particular references reflect both fields - this will make the paper more appealing to a wider community. For example on p. 24410 I. 22 I would suggest citing for land-atmosphere eddy covariance CO₂ flux measurements Baldocchi et al. (1988), Baldocchi (2003) and Aubinet et al. (2001).

(3) I find the use of two-letter symbols such as AP and CP in equations awkward - maybe the authors can do with a single letter or a (greek) symbol instead.

(4) The authors cover the eddy covariance, conditional sampling and modified BREB methods. For many compounds virtual disjunct EC is the preferred method and I wonder whether the authors can say something about this method too.

(5) The authors make use of several equations that rely on empirical data - depending on which parameterisation is chosen results will be different. It would be very instructive too indicate the magnitude of systematic uncertainty due to these choices.

References: Aubinet, M., et al. (2000), Estimates of the annual net carbon and water exchange of forest: the EUROFLUX methodology, *Adv. Ecol. Res.*, 30, 113-175.

Baldocchi DD. 2003. Assessing ecosystem carbon balance: problems and prospects of the eddy covariance technique. *Global Change Biology* 9, 479-492

Baldocchi, D.D., B.B., Hicks, and T.P. Meyers (1988), Measuring biosphere atmosphere exchanges of biologically related gases with micrometeorological methods, *Ecology*, 69, 1331-1340.

Interactive comment on Atmos. Chem. Phys. Discuss., 10, 24409, 2010.

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