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Interactive comment on "Calculations of automatic chamber flux measurements of methane and carbon dioxide using short time series of concentrations" *by* N. Pirk et al.

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I have only now realized that the comment C5638 contained a Supplement, and therefore beg the forgiveness of the authors for this lapse of attention on my part. It is now clear to me that we have been misunderstanding each other all along.

The dilution effect to which I refer is that which the authors have termed in the Supplement as "dynamic", and is due to evaporation changing humidity in the chamber headspace. The authors' hypothetical example "assumes no change in the water vapor concentration", and thereby implicitly neglects this effect. Their justification for this assumption - saturation of the chamber with water vapor - represents an extreme case

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of what other authors characterize as an undesirable “chamber disturbance”. Such chamber disturbances can cause physiological and physical behavior that is different from that outside the chamber. Specifically, chamber disturbances cause flux underestimation: just as the chamber can approach 100% relative humidity and thereby block water vapor exchange, its CO2 concentration can approach that of the subsurface and so nullify CO2 exchange. In such disturbed circumstances, there would be no increment in the chamber CO2 concentration and no flux into the chamber, whatever the flux of the undisturbed case outside the chamber. The authors’ relying on such an “observer effect” to argue against the importance of “dynamic dilution” is inconsistent with the philosophy of scientific observation, particularly including chamber measurements as applied by various authors.

It may well be that, for arctic wetland ecosystems, the dilution effect due to evaporation is of secondary importance compared with other sources of error. If so, then this is certainly specific to such ecosystems and the methods described by the authors (with no accounting for chamber humidification by evaporation) cannot be applied universally. More generally, neglecting the dilution effect is a significant source of systematic error (Pérez-Priego et al., 2015, Plant and Soil, DOI 10.1007/s11104-015-2481-x), and so gas analyzers that do not track water vapor cannot be used for purposes of assessing soil CO2 emissions unless sample air is first desiccated.

Interactive comment on Biogeosciences Discuss., 12, 14593, 2015.