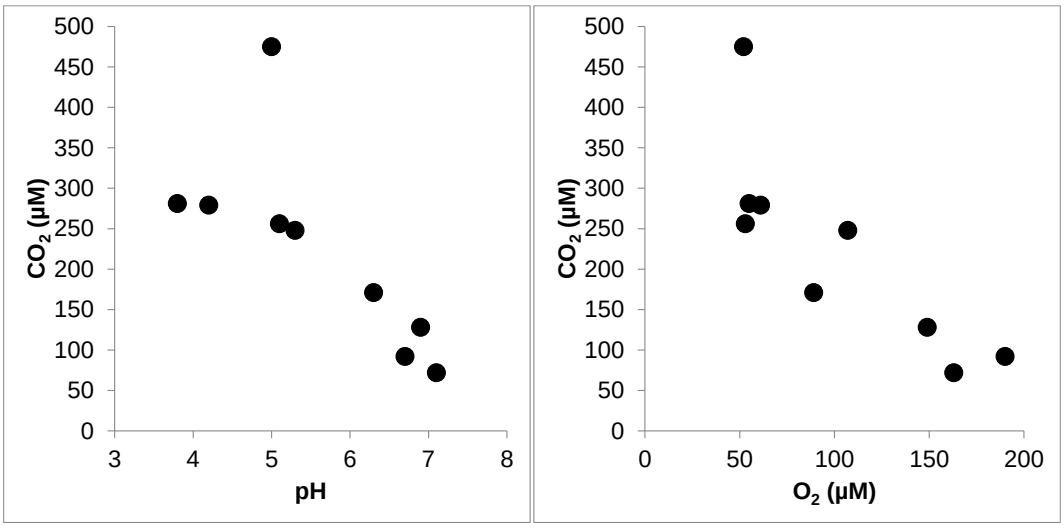
Major comments

The contextualization and general justification of the paper could be revised. The authors justify their research to explain the discrepancy between estimates of CO_2 evasion by "global models" and those based on field measurements by their own group (for example Wit et al. 2015). The "global models" of Raymond et al. (2013) and Lauerwald et al. (2015) are not and not mechanistic models but in fact extrapolations of pCO_2 data calculated from pH and alkalinity measurements of unverified quality, that usually give results that are incorrect (Abril et al. 2015), and with a very coarse and extremely irregular spatial coverage. If you look at the maps of data point distribution of those two papers (in the supplements), for SE Asia there a handful of points in Thailand in the Raymond paper, and these data points did not meet the selection criteria of Lauerwald. In the Lauewarld paper that are in fact no data points at all for SE Asia.

In conclusion, the mismatch between field measurements and those predicted by Raymond et al. (2013) and Lauewarld et al. (2015) only shows that these "global models" are extremely unreliable, and does not reveal a hidden mechanism that lowers CO_2 emissions.

Conversely, the pCO_2 values reported for SE Asian peatland rivers, ranging between 2000 and 8000 ppm according to figure 2 of Wit et al. (2015) are within the range of pCO_2 reported in African tropical rivers (Borges et al. 2015) and also in rivers and streams of the Amazon River network (Abril et al. 2014). So the pCO_2 values in SE Asian peatland rivers seem relatively "normal" for tropical rivers, and not abnormally low.

The core topic of the paper is to look into the limitation of organic matter degradation (and subsequent CO_2 production) by low pH and low O_2. While it is intuitive that low O_2 and low pH might not be optimal to microbial growth, micro-organisms tend still to growth in sub-optimal conditions if there are substrates to metabolize. The correlations of CO_2 concentrations and pH/O_2 based on the data in Table 1 of the ms (see below) indicate on the contrary that the high CO_2 were associated to low pH and low O_2. And even if the conditions of pH and O_2 were sub-optimal, the micro-organisms were still able to degrade enough organic matter to produce large quantities of CO_2.



Minor comments

P1 L20: there could be a need to revise this statement in light of the work of Dargie et al. (2017).

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