

## ***Interactive comment on “Simultaneous high C fixation and high C emissions in *Sphagnum* mires” by S. F. Harpenslager et al.***

**Anonymous Referee #2**

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These authors grew different kinds of *Sphagnum* in the lab under conditions of rather high alkalinity. They tested 4 different types of *Sphagnum*. Only one type grew well, one did quite poorly, and two grew a bit. The one that grew well produced significant acidity resulting in the titration of the bicarbonate in the media water and subsequent release of CO<sub>2</sub>. The authors make the point that even with growth and organic matter formation, such a system may serve as a CO<sub>2</sub> emitter. They suggest that the conditions under which they grew the moss represent a pioneering stage for *Sphagnum* and that when this acid producing moss moves into an environment with high alkalinity similar results may occur. They cite examples from the literature when CO<sub>2</sub> emission from mires has been detected. In general, I think that these results are important, as many researchers probably have not considered such a mechanism. I do have a couple of suggestions for the authors. 1. Please right away in your introduction where you cite the CO<sub>2</sub> fluxes

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in the literature, say what convention you are using. Do negative fluxes indicate CO<sub>2</sub> uptake by the surface? Or emission. 2. could you explore the relationship between biomass production and acid production a bit more? Is this a linear relationship or what? How does this work? I don't mean to suggest doing more experiments, but just see if you can find more on this in the Literature. 3. All the acid produced by mosses, where does this end up? If mosses grow and grow, they continue to produce H<sup>+</sup> right? Eventually does this acid migrate some place, to some more alkaline surface water and result in more CO<sub>2</sub> emission, thus canceling out the carbon sequestration of mosses? 4. so is the carbon that is fixed into moss tissue from the water? The Total inorganic carbon? Or is it from the air? If the former, and the groundwater has ancient CO<sub>2</sub>, say from limestone dissolution, could this result in ancient appearing moss? 14C –wise? 5. I note that the tables contain CO<sub>2</sub> concentration and HCO<sub>3</sub> concentration. Please give total inorganic carbon too, just for ease of comparison, in the table. 6. Interesting in the moss porewater, why was the pH higher in the porewater without the moss? How are the moss values in Table 2 obtained, when the 4 mosses used behaved so differently?

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