

Interactive comment on “Rainfall leads to increased $p\text{CO}_2$ in Brazilian Coastal Lakes” by H. Marotta et al.

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Received and published: 31 January 2010

General comments: It is a pleasure to review this interesting manuscript that adds to the growing literature indicating the global importance of continental waters (e.g., lakes, streams, rivers, wetlands) in the global C cycle. This manuscript is a highly interesting account of the relationship of rainfall, mediated probably by groundwater, in supplying substantial CO_2 to coastal lakes. The implications are that changes in rainfall amounts in the future would alter the supply of CO_2 to the atmosphere and change the dynamics of the storage and transport of C via groundwater and soil. Further, this manuscript elucidates a new pathway through which lakes perform an active role in C processing – until recently (e.g., Cole et al. 2007), such waters were thought to be neutral pipes that passively transported C downstream to the sea. Interestingly, this manuscript indicates

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that this conduit can be short-circuited even right up to the edge of the continents.

Specific comments: My main concern is that I would like the authors to evaluate the likelihood that correlations such as those seen in Fig. 3 are the result of an overall temporal coincident trend. That is, for example, Fig. 2 shows that in Carapebus that pH and salinity decrease while DOC and $p\text{CO}_2$ increase as one passes from a dry to rainy season. If this is generally the source of correlations interpreted here as causally linked, one needs to evaluate other potentially causal factors that also may show correlated temporal trends. One needs to eliminate the possible influence of other variables that may have been varying over the same time-course. For example, if the rainy season is warm while the dry season is cool, the increases in CO_2 emission could result from respiration and decomposition. This is one example, but I think it would strengthen the authors' argument if they could emphasize an exploration of other possible seasonal correlates.

Exploration of the link between rain, groundwater, lakes, and the atmosphere is an interesting pathway. It would be useful if the authors could provide more direct measurements of $p\text{CO}_2$ in the groundwater that show them to be high and a likely source of supply. It would also be interesting, from the perspective of anthropogenic influences on the global C cycle, to hear what the ultimate source of the CO_2 (and DOC) in the groundwater might be.

Technical corrections: Some of the figures are difficult to read without magnification. Although understandable throughout, the language could benefit from some editorial attention as it is awkward in places. The Downing et al. (2006) reference, cited in the first paragraph of the introduction, appears to be missing from the reference list.

Interactive comment on Biogeosciences Discuss., 6, 11521, 2009.

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