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Biogeosciences Discussions

Interactive comment on "Turning sunlight into stone: the oxalate-carbonate pathway in a tropical tree ecosystem" *by* G. Cailleau et al.

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Review of Caillot et al., Turning sunlight into stone: the oxalate-carbonate pathway in a tropical tree ecosystem, for Biogeosciences.

This is a very interesting paper, certainly worthy of publication in Biogeosciences with only minor modifications. The study is elegant, straight forward and enlightening. Below I have some minor suggestions and a few questions which I hope might help improve the final version of this article.

Very little mention is made of the 'normal' model for soil carbonate precipitation, through equilibration of the 12C-rich high pCO2 soil atmosphere with the less 12C-rich lower pCO2 atmosphere (e.g. Cerling, 1984; Cerling and Quade, 1993). In this

(physicochemical) scenario, one would expect carbonates in the soils around these C3 plants to have δ13C of around -9 to -12 per mil. This reflects the soil zone and atmospheric CO2 contributions to the carbonate. Indeed, the soil carbonates around the plants do have such values. However in the upper 20 cm of the soil zone, one normally expects slightly more 13C rich compositions than lower down, due to a greater contribution to the soil carbonates from atmospheric CO2. Perhaps the authors could comment on this in their paper, to strengthen their argument.

One weakness in the model (Fig 7) is the absence of data on soil zone DIC. Can the authors elaborate on the reason for this? No samples taken? Samples too small?

Presumably the authors also have δ18O data for the carbonates? Does this δ18O reflect the composition of the meteoric water in the studied areas, or show any effects of evaporation which might have influenced carbonate precipitation? Does δ18O correlate with δ13C? It would be interesting to know.

The authors make much of the carbon-trapping potential of these ecosystems. What is the justification for 1) the assumption that the calcium comes from a silicate source, not a carbonate source (line 18), which (although depending on timescale) could be important for long-term CO2 sequestration, and 2) can the authors estimate how much CO2 these ecosystems might remove from the atmosphere over a given period of time? How important are they to the modern and ancient global carbon cycles?

The conclusions could also be made much stronger.

My other minor suggestions are as follows:

P.1078 Line 19: what sort of fungi? L 21: agents? L23: can then start

p.1079 L4: defined by ecological L15: delete comma after process L20: perhaps also make reference to one of several Berner papers L23: delete with, add the word in after only

p.1080 L1: we used microscopic L14: do you mean involving when you say 'through

the'? And what sort of fungi? L17: replace pulverulent with powdery?

P.1081 L9: do you mean major when you say important? L18: replace have been with were L19: using a binocular microscope (binoculars are more like a telescope in common English)

P1082 L6: binocular microscope L8: replace possibly with any possible L13: centrifuged L20: replace have been with were L22: replace have been with were L24: replace have been with were L26: replace have been with were

p.1083 L1: replace have been with were L2: Replace Next to with After L6: replace has been with was L11: replace not supposed to with does not L13: replace the only way to get with a good way to obtain L14: replace have been with were L16 replace have been performed with were measured L18: V-PDB?

P1084 L2: by important do you mean large? Many? Perhaps replace 'a lot' with several. L6: replace meaning with reflecting L8: feeders/borers L19: binocular microscope. L21: replace have been with were

p.1086 L15: rhombohedron L21: replace have been with were

p.1087 L1: replace have been with were L7: replace to the data with with the data L10: replace has been with was L11: replace have been with were L12; replace have been with were L24: replace on the twenty first. . . with only the top twenty. . .

p.1088 L7: experiments L8: up to 600 L16: incineration at over 500

p.1089 L21: Consequently, this flux (not measured in this study) should lead to a related under-estimation

p.1092 L13: at the Biga site L14: could happen, instead of should happen? L18: replace wounds with wounding L22: starts building up rather than constituting? L25: replace clue with evidence L26: these two phases. . .are these silicification and calcification? Please make this clearer. L28: delete implication of the

p.1093 L4: pseudomorphoses L6: based on field and petrographic observations (then you can delete the un-necessary words) L13: delete the before Fig. 5 L18: binocular microscope. Also, replace twenty-first with top twenty

p.1094 L2: I think you should add a comment here about the 'normal' situation for soil carbonates formed in the top 20 cm of the soil (relatively 13C rich).

p.1095 L2: delete important L3: replace has to with can L17: delete the

p.1096 The conclusions can be strengthened to reflect the rest of the manuscript.

L.15: not otherwise expected.

Figures: increase the font size in Fig. 7.

Interactive comment on Biogeosciences Discuss., 8, 1077, 2011.