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

Anonymous Referee #3

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This paper gives a novel insight in the neoformation of calcite in acid soils in the tropics. It is therefore of interest for a large international audience, and contributes to the understanding of soil processes. The methodology is suitable and conclusions are supported by data. The paper is well written, clearly structured and sufficiently illustrated, and referencing is up-to-date and accessible. As such the paper is worthy to be published, but could be improved by adding a few minor corrections. A "sink" is not timeless, but one has in mind that materials "disappear" from the system for a period of time. Therefore it would be interesting to know how long these carbonate features remain in the (acid) soil after decay of the tree. Is this a question of months, years or decades? Some information on climate, especially precipitation, vegetation, etc. would help to evaluate this. There remains also the question in how far new carbonates are formed in this cycle. The authors mention as source of calcium weathering of silicates, rain and

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dust (§5.2.2). In Ferralsols the amount of Ca++ contributed by weathering is practically negligible (are it really Ferralsols/Oxisols? No real information is given). Moreover the dust might in many cases contain carbonates (any information on the composition of the dust in this region?). So the real "sink" is probably extremely limited. This comment does not diminish the quality of the paper as a process study. A few editorial remarks. Page 1079, line 4: defined. Page 1084, line 12: underlying soil. Generally the tem underlying is used for a soil covered by colluvium, constructions, etc., not a soil below a tree. Page 1085, it would be most useful if an estimation of the size of the oxalate and carbonate crystals was given. For carbonates the table mentions that they form mostly micritic fabrics. Are it pure or impregnative nodules, with sharp or diffuse boundary? If other fabrics are present, please describe them, as this might be useful to recognise such accumulations in other soils. Although this is not the aim of the paper, it could be an important contribution to pedology. Page 1089, line 11: underlying? Page 1090, the aqueous soil solution does not only contain carbonate ions from oxalate oxidation, but also from rain, dust, and microbial and root action. Page 1093, First Fig. 6 is mentioned, only later Fig. 5. This is not logic. Page 1098, Dambrine et al.: seems not mentioned in the text. Fig. 2: the sharp peaks for amorphous constituents need some explanation. Fig. 4A: a higher magnification would be more suitable. Fig. 6: caption not clear. The drawing contains 3 phases (I, II and III) which are not explained in the caption.

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