

Interactive comment on “Possible source of ancient carbon in phytolith concentrates from harvested grasses” by G. M. Santos et al.

Anonymous Referee #1

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This manuscript represents a significant contribution on the problems encountered to use the occluded carbon of phytoliths for 14C dating. The authors list in a comprehensive way, the possible causes, rejected or not by the same authors, for explaining the anomalous 14C dates obtained in some of the samples studied.

Nevertheless it worries me the fact that this is not an original paper, and that the results had already been published elsewhere, a fact that I had not been aware of before. In this previous paper, the authors present the material studied, the methods used and the results. In the discussion section, they reject some of the possible causes for explaining these unexpected results (the use of solvents, air contamination, etc.). This new manuscript, according to the authors, is a revision of previous literature with some new questions raised to explain the older 14C dates in some of the samples.

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Despite the fact that I have enjoyed myself reading this general overview, which I find most interesting, I would have preferred that these reasonings had been accompanied by new results and more experimental work, to offer more conclusive data.

Personally I'm looking forward to see the continuation of the research; particularly the one dealing with the possibility for elucidating if the carbon of the phytoliths comes from photosynthetic pathways or root uptake. This is a critical question which until it is not solved, will pose a series doubts when trying to use the occluded carbon of phytoliths for 14C dating with a minimum reliability.

Some specific comments: Keeping in mind that this an overview paper, the authors should add the reference where the original work comes from (Santos et al., 2010a) at the end of the paragraph 15 in page 332.

I had problems with the amount of abbreviations used throughout the paper, I know they are necessary, but sometimes it looks a little too much. For example I could not find the meaning for MN.

Questions How can the authors control the age of the carbon present in the soils? May this vary in the same stratigraphic sequence?

The results by McClaran and Umlauf (2000) showed that 14C results on the occluded carbon of phytoliths from modern soils were much older than the dates obtained for the same Modern Soil Organic samples. If the authors sustain that the older dates obtained in the occluded carbon of phytoliths are due to the acquisition of carbon from SOM samples, how do they explain the differences encountered by the previous authors?

If, once finalized, the experimental work supports the author's hypothesis that the carbon comes from the Soil Organic Matter acquired by plants during nutrition, how do the authors think they could control these differences when applying to archaeological sediments? Due to the porosity of the phytoliths, would it be possible that part of this occluded carbon was acquired after their deposition in soils?

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Some previous results suggest that the silica uptake by plants may come from the dissolution of phytoliths (Alexandre et al., 1997; Blecker et al., 2006; Borrelli et al., 2010; Wilding and Dress, 1974). Could this be related somehow to this presence of older carbon in modern plants?

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