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Interactive comment on "High resolution ^{14}C bomb-peak dating and climate response analyses of subseasonal stable isotope signals in wood of the African baobab – A case study from Oman" *by* Franziska Slotta et al.

Guaciara Santos

gdossant@uci.edu

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I found the article very interesting. However, I have some comments and questions regarding the data and discussions.

The paper begins by pointing out the lack of atmospheric radiocarbon (14C) datasets that defined the inter- and intra- hemispheric division zones closer to the equatorial line (NH3 and SH3; Hua et al . 2013). Therefore, building a new dataset appeared to be the main motivation, which the paper wishes to address or attempt to fill in. But as

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soon as the newly produced 14C data based on the baobab tree rings did not match with the average curve used as benchmark for zone NH3, an alternative explanation was offered. Mixed non-structural carbon (NSC) pools incorporation in the structural ring cellulose fraction - a new tree species functional trait - Maybe (?!).

I appreciate that in view of the perplexing results of the 14C data of the baobab tree rings, an alternative explanation should be considered. But for the mixed NSC-ring cellulose hypothesis works, all other possible bias must be ruled out, and a throughout discussion on the scarcity of the previous records across this zones (NH3 and SH3), and the possibility of multiple sources of air-14CO2 influencing this particular site should be offered. We cannot ignore the fact that the original atmospheric 14C records across NH3 and SH3 are quite incomplete, temporally and spatially.

The stable isotope measurements, although very complex, gave insights of tree water usage. Overall it seems to indicate the tree was not water limited. This brings us to the second issue. Why the baobab tree would incorporate constants amounts of slow turnover NSC into its ring cellulose structural carbon fraction year-after-year, regardless of the environment stress conditions surrounding it? Richardson et al. (2013) stated that even though they found very old pools of starch and sugars in aboveground temperate forest trees, stressed trees would still use up first all available present-day fast cycling carbon pool to support growth and metabolism. This would include even the most recently added starch molecules. Therefore, the usage of “older” NSC reserves was set for times of stress. I think it will be important to make this distinction in the text. Richardson et al. (2013) did not mentioned that ring cellulose 14C results were off from expected values after direct comparison with the northern hemisphere atmospheric record, just the NSCs extracts (sugars and starches) were.

In this article, the baobab tree ring cellulose extracts 14C results are unusually off from its expected zonal averaged record or records (if direct comparisons are done to independent datasets). If a constant slow turnover NSC incorporation to ring cellulose is to blame, is the article implying that this is a functional trait for all parenchyma-

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rich succulent species?! If so, it would be imperative to test other parenchyma-rich succulent trees before even suggesting a physiological effect. Additionally, if a novel physiological effect has been found, it would be important to distinguish it from non-parenchyma-rich succulent species. This trait would not necessarily be mimicked by another tree species elsewhere, so that the use of tree rings as a proxy of atmospheric 14C would still be valid. This point should be made clear, so that the reader(s) can notice the difference. Note that a large percentage of the data in the NH3 and SH3 zones were based on tree ring data.

Regarding reliability of the data produced, the article mentioned that:

1) "To avoid carry-over effects from previous years' NSC into the current year's wood cellulose, the samples for dating were selected from the last third of each growth structure while steering clear of the terminal parenchyma band (TPB) by at least one sample, where possible". While is important do not include material from the neighboring rings, losing material from the actual growing season should also affect the 14C results. So, is the statement in double quotation marks correct?! Just the last fraction of the full growing season per calendar year was selected for 14C measurements?! This is relevant and should be explained.

2) Hollocellulose and alpha-cellulose extractions have been widely used for isolating of the structural carbon fraction of tree rings for 14C analysis, with alpha-cellulose being considered superior then holocellulose in some cases. Here, it is stated that comparisons between hollocellulose vs alpha-cellulose extractions were tested on 10 samples/results, and that they were indistinguishable within 2-3 sigma of each other. Thus, holocellulose was adopted as the main chemical extraction procedure. However, these results were not clearly indicated as well as the calendar years from where they belong. This information is relevant, as the calendar years belonging to the steep slopes of the bomb-peak would be more sensitive to unremoved labile NSC (if any) affecting 14C results. Second, I am sure that the laboratories that performed the analyses run a quality control and quality assurance program based on combustion/graphitization of

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reference materials. However, there is no mentioning on reproducibility and accuracy of any present-day wood-control sample undergoing the holocellulose or alpha-cellulose procedures mentioned here, so that exogenous contamination of any sort from the full procedure could be rejected. Moreover, to corroborate the results found here an interlaboratory crosscheck of fewer tree rings would be crucial.

References cited here and also in the original article:

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