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Climate of the Past Discussions

Interactive comment on "ENSO flavors in a tree-ring δ^{18}O record of *Tectona grandis* from Indonesia" *by* K. Schollaen et al.

Anonymous Referee #2

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General comments: In this manuscript, Schollaen and coauthors compare an existing (and published) d18O tree-ring record from teak trees in Java with various ENSO indices. They find a significant –albeit weak – correlation with a Central Pacific ENSO time series, but not with an Eastern Pacific ENSO time series and argue that the d18O time series can thus be used for reconstruction of ENSO flavors. They justify their study based on a presumed influence of ENSO –and it's two flavors – on precipitation on Java and thus on (precipitation sensitive) tree-ring series. However, I believe this is the weak spot of this manuscript. For justification of the ENSO-precipitation relationship, the authors only show one map (Fig. 1) that shows the regression of precipitation against the 2 ENSO flavor time series. They claim that these two maps show a clear difference in the influence of the 2 ENSO flavors on Java precipitation, but frankly I don't see that difference: the regression coefficients in Java seem to be equally weak to me. Moreover,

the authors do not specify which months (of precipitation and of ENSO indices) are used for the calculation of this map. This turns out to be problematic at the very end of the discussion, where they discuss that the influence of ENSO on precipitation on Java is (1) very weak and (2) strongest during the dry season, whereas tree rings primarily record wet season precipitation. They then use these arguments to explain the weak correlations they find between d18OTR and ENSO. As a reader, I felt deceived at this point (at the very end of the discussion) in the paper: the authors do a lot of armwaving in the introduction and Fig. 1 about the influence of ENSO flavors on precipitation in Java, but lack to come up with concrete evidence. It is not until the very end of the paper that they explain that actually there is not really any influence between ENSO and Java precip and one would thus not expect to find a strong ENSO- d18OTR connection. I believe this is the largest caveat of the paper: why write a paper about the connection between d18OTR and various ENSO flavors, when you would not expect there to be a connection based on what we know? I think this problem could be greatly helped if the authors included an analysis in their paper that concretely (not just in a vague map) showed the link between the various ENSO flavors and Java precipitation. Use the Java precip time series as you use the ENSO time series. As a result, it is not surprising that the correlations the authors find between d18OTR are significant but weak and definitely too weak to use for reconstruction purposes. This should be made much more explicit in the text, particularly in the conclusion where they state that 'These results indicate the significant potential for generating reconstructions of different ENSO flavors from the _18OTR records in Indonesian teak.' In my opinion, these results show the exact opposite and the weak relationship as a caveat for reconstruction should be discussed. Finally, I find the description of the different indices used for the ENSO flavors confusing and incomplete. The authors do not describe how the La Nina indices are calculated (only how the extreme LN years are calculated, but these are not used in most analyses). Also, they are inconsistent in their use of CT and WP ENSO vs. El Nino, which is very confusing to the reader. If CT and WP El Nino indices are based on SSTas from certain regions, don't they then reflect El Nino

as well as La Nina conditions? How are they an index of El Ninos alone? I can see how the extreme (>1 stdev) in these time series indicate a certain flavor of El Nino, but in your analysis you use the entire time series, not just the extreme years. Similarly for the La Nina time series, if this is based on SSTas from region NINO4, how is this not an ENSO time series, rather than a La Nina time series alone? Also, given that your La Nina time series and your WP El Nino time series are both based on NINO4 and only differ in years when NINO3NINO4>0 (sic; equation 1), it does not come as a surprise that they are both correlated to d18OTR. Also, to make a statement as you do in the conclusion (P11 L18-20) that 'the conclusions of our study call for caution when doing model-proxy comparisons using ENSO indices that are not able to distinguish between the two flavors (e.g. single standard indices such as NINO3.4)', it would be helpful to also include a general ENSO index such as NINO3.4 in your analysis in addition to the ENSO flavor indices. All in all, how the different ENSO time series are calculated is crucial to your analysis and discussion and needs to be explained in more detail (see also specific comments).

Specific comments: -P3 L8: I am confused as to whether these are El Niño flavors or ENSO flavors. You only discuss El Niño flavors (positive ENSO phases), yet you keep calling them ENSO flavors. If they were ENSO flavors, shouldn't there be a La Niña equivalent? -P3 L10-11: Fig. 2 does not show an increased frequency in WP ENSO events. How do you explain this? -P3 L17: dampened instead of damped? - P3 L25: I don't think Fig. 1 demonstrates this well: Fig. 1 shows that the precipitation in Java (red square) is approximately equally strongly regressed against WP El Niño as it is against CT El Niño. In general, you are going to have to make a much stronger case for differential influences of WP vs. CT ENSOs on Java's precipitation to make the case you want to make. - P5 L10-11: it would be good to mention what time period is covered by the TRW chronology, so that the reader has an idea of how far a potential ENSO reconstruction based on d18O could extend back in time. - P5 L21-P6 L9: it would be nice to see this demonstrated in a more convincing way: what is the concrete correlation between Java precip and ENSO in general and WP and CT

ENSO in particular? Again, I find Fig. 1 not very convincing in that respect and I don't see the 'nodal line of influence' that you are talking about. - P6 L20: - Please give a reference for the 'alternative indices' that you are talking about - It is unclear to me what you mean by 'since the NINO3-NINO4 SST anomalies are so closely associated with rainfall anomalies in the Java region': - It is exactly these correlations that you are failing to show in this paper. Writing that they are closely correlated is not sufficient. - I also don't understand how this presumed close correlation influences the calculation of CT and WP ENSO indices? - P6 equation 1: - What are NCT and NWP and N3 and N4? I assume SSTas in zone NINO3 and NINO4, but this has not been defined. - What do you mean by N3N4>0? I'm assuming this should be NINO3 – NINO4 >0? - If NCT and NWP are based on SSTas of NINO3 and NINO4 regions, do they not reflect both positive (El Niño) and negative (La Niña) conditions? How come this is considered an index of El Niño alone? Please explain. - P6 L25-26: This is not the case for Table 2, which shows correlation with indices over various combinations of months. - P7 L3-5: please also mention what La Nina index you used to calculate the La Nina time series you used in Figs. 2, 3, 4 and Table 2. - P7 L7-10: this would be a much stronger statement if you showed this for Precip in Java or in a Fig. similar to your Fig. 1, rather than just making a general statement based on the literature. - P7 L20-22: - How were neutral conditions defined here? - It would be nice to also show this for general El Nino conditions (not separate flavors) - P8 L2-11: all of the reported correlation coefficients are statistically significant, but none of them are strong enough for reconstruction purposes. These are really rather low correlation coefficients that weaken the potential of teak d18O for ENSO reconstruction purposes. The results of this study are still of interest, but the weak correlations and what that implies for reconstruction need to at least be discussed in the discussion section. - P8 L19: until in stead of till - P8 L20 and L28: please define the time period for which this 'overall r' is calculated. - P9 L26: what do you mean here by 'in cases with no strong signal'? what signal are you talking about? - P10 L1: dampened in stead of damped? - P10 L8-9: this discussion would be greatly helped by showing the seasonality of the influence of

WP and CT ENSO on Java precipitation. - P10 L16-18: it wouldn't be too hard to test this: add an IOP time series to your analysis and see if you find a stronger correlation with d18OTR in the earlier period. Why not do this? - P10 L20: space missing between thed18OTR - P10 L23-29: I find it interesting that you don't mention this until the very end of your discussion. This should be mentioned in your introduction! Also, this begs the question for which months Fig. 1 was calculated then? And also, again, this should be supported by showing correlations between the different ENSO indices and Java precipitation. - P11 L15-18: given what you describe in the last paragraph of the discussion, the predominantly wet season signal in d18OTR vs. the predominantly dry season teleconnection between Precip and ENSO, and the resulting low correlation coefficients between d18OTR and ENSO, I think this statement is not justified. I don't think, based on your results, that whole-ring d18OTR has potential for ENSO (flavor) reconstructions. I think you've just demonstrated that. - P11 L18-20: you would have a stronger argument for this statement if you had actually compared d18OTR to e.g. NINO3.4 and found weaker correlations than WP ENSO. - Table 2: also here, it would be good to see results for a general El Nino index (e.g. SOI, Nino3.4) for comparison. Does divvying the El Nino up in flavors increase your correlation coefficients? - Fig. 1: What months (precipitation and ENSO indices) are these maps calculated for? - Fig. 2 caption: - 75% confidence level: that seems fairly irrelevant to me, why not show 95% as usual? - L6: analysis in stead of anaylsis - Fig. 4: - Why not also show for CT El Nino? - To me, Fig. 4B and C don't mean/show much. The fact that you don't really interpret the results (P9 L13-16) confirms this to me. I suggest leaving these panels out.

Interactive comment on Clim. Past Discuss., 10, 3965, 2014.