

Interactive comment on “Can oceanic paleothermometers reconstruct the Atlantic Multidecadal Oscillation?” by D. Heslop and A. Paul

Anonymous Referee #2

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In their manuscript "Can oceanic paleothermometers reconstruct the Atlantic Multidecadal Oscillation?" Heslop and Paul present a valuable statistical analysis of various paleoclimate proxies' potential to reconstruct multidecadal climate variability. I feel this manuscript is clearly worthy of publication, but that additions, either here or in future work, would significantly benefit the paleoclimate community.

My only significant concern is the use of an intermediate complexity model as the basis for the analysis. Clearly the model has advantages in its ability to monitor the AMOC and subsurface variability, but its SST pattern (Figure 3) differs significantly from observations. The authors note that their model is appropriate, in part, because

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the variability observed in the instrumental record may not be a unique expression of the AMO. Since the authors' model does not produce AMO-like variability in control runs, is there evidence in other models for an AMO SST pattern similar to the right panel in Figure 3?

This is not a trivial question since the model's SST pattern is central to the author's results. For example, the statement on page 2185 (line 22) that low-latitude proxies require lower standard errors than high latitude proxies relies on the amplitude of the SST anomaly. The statement is certainly true for the model generated SST pattern, but the observed pattern shows that the amplitude of the SST anomaly in parts of the tropics is of equal magnitude to the high latitudes. Although it would not allow a dynamic interpretation, it seems the same analysis could be performed with an infinitely "looped" version observed SST. This exercise would use an SST pattern far more similar to the observed and would allow the author's to test their results.

Furthermore, it would be interesting to investigate the suitability of various proxies with respect to frequency. Can a proxy capture AMO-like variability if it oscillates at an 80-year period, but not capture it if AMO-like variability transitions to a shorter 30-year period? This may be an exercise for future work.

Finally, it would be of great use for paleoceanographers to generate some sort of "look-up" table or map. I envision a tool in which a paleoceanographer could provide the standard error of their proxy and the uncertainty of their age model and be informed if their record is capable of capturing multidecadal variability of a particular frequency at their site.

Minor correction: Page 2187, change "considered" to "considering"

Interactive comment on Clim. Past Discuss., 6, 2177, 2010.

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