

# ***Interactive comment on “Inter-annual tropical Pacific climate variability in an isotope-enabled CGCM: implications for interpreting coral stable oxygen isotope records of ENSO” by T. Russon et al.***

**M. Berkelhammer**

Max.Berkelhammer@colorado.edu

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I found this to manuscript to provide an extremely careful and considerate discussion in providing a framework to consider how a climate model (in this case one with isotope tracers) can be used to inform us on the sources of uncertainty in proxy transfer functions. I actually have very few substantive comments because, as far as I can assert, the authors addressed all pressing issues. Of course, the major issue with this approach is that if the model does not adequately represent the climate system than the conclusions drawn from the analysis are not pertinent. The authors openly

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acknowledge this issue however, it begs the question of how do we move forward from taking the “framework” or methodology presented here and allow it to be operationalized towards proxy interpretation. While I realize this is an issue that expands WELL beyond the scope of this paper, it would be valuable if in the “Conclusions” the authors were to discuss the next steps towards making this analysis directly applicable to proxy interpretation. Some things to consider might be using models that are “nudged” or assimilate data, which, while problematic in certain respects, at least have realistic climates that overlap with proxy records. Along these lines, I would like to have seen more discussion in the Conclusions on specific ways this analysis could be used. For example, there is perhaps an interesting possibility to use this approach towards looking at convective parameterization schemes in different climate models such as the slope of the relationship between SST and precipitation amounts and whether recent coral records could be informative of this slope. Furthermore, I wonder if there is a way the approach here could assist in efforts that attempt to assimilate many coral records from distinct locations. I haven’t thought about these issues in any detail, but my general suggestion is dedicating a paragraph at the end of the paper to “next steps” and direct application of this specific analysis or more generally this methodology. The only other significant comment I have is, I believe the paper would benefit from an additional figure that is a sort of schematic flow chart showing lines of reasoning. For example 1) start with derived climate fields 2) assess Fsw 3) if Fsw is greater than x than you do this. . .etc. . . Basically a “how-to” guide or pictorial summary of the technique.

Minor comments: 1) There were a number of times the authors mixed up “then” and “than”. Please review this. 2) The authors wrote isotopes as O18 while technically they should be 18O. 3) The color bars on the figures could be compressed in some way to avoid the very washed out “white” regions. Namely 4a and 2b. . . 4) Line 5, pg. 743. What is this “quadratic term”? Is it ok to neglect? 5) Line 19, pg 743 “from from” 6) Line 25, pg 743 remove “also” 7) Line 9, pg 744 “be” to “by” 8) Line 11, pg 744 “resolved”, should be “solved”, I think. . . 9) Line 11, pg 745 “model-based” 10) Line 11, pg 746 “analyzes” 11) Line 10, pg 747 I presume the choice of 10m does not influence

the results? 12) Line 5, pg 755 change “less strongly non-linear” to “more linear” 13) Line 7, pg 756 really fascinating discussion here in light of assumptions about the (a)symmetrical nature of La Nina and El Nino and whether this can be resolved in the proxy domain. 14) Line 16, pg 759 should be “not sufficiently” 15) Line 14, pg 760 “are” to “all” 16) Line 26, pg 758 “20th century” 17) Line 3, pg 762 “climate,”

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