

Interactive comment on “Teleconnection between the climates of the Polar Regions during the last ice age” by Xiao Yang and Jose A. Rial

Anonymous Referee #2

Received and published: 20 July 2018

Review of "Teleconnection between the climates of the Polar Regions during the last ice age" by Yang and Rial. This paper compares three different conceptual models that describe the connection between Greenland and Antarctic isotopic temperature proxies during the last glacial period. The authors favor their "PhaseSync" model, in which the two poles are phase synchronized, over two alternatives: the favored thermal bipolar seesaw model, and an integration/differentiation model. The paper is well written and includes a good amount of detail. The paper is interesting because it offers a contrarian model to the preferred point of view. In principle at least, their model can be tested against paleoclimate evidence and evaluated.

The three models are compared here using a Pearson product-moment correlation coefficient between the derived and real opposite-pole records. Basically, the wiggles

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derived using one model are somewhat better than the wiggles derived using the other models. The paper also discusses other weaknesses of the alternatives, such as parameter sensitivity. By itself, the modest correlation improvement that the authors find in this paper (~ 0.7 versus ~ 0.6) could have a number of explanations that are not pertinent evidence proving superiority of their model. So, by itself, the paper does not present sufficient evidence, no "smoking gun", to justify adopting this model and rejecting the others. The paper does reference arguments in previous papers, e.g. Rial (2012) and Yang et al. (2014), and perhaps these papers are meant to hang together.

The authors mention ice core chronology, but do not delve into the details of how these chronologies are determined, which would seem relevant here. Examination of individual climate events, as opposed to secular records, might provide better discrimination between models. Perhaps there are specific climate change instances where the PhaseSync model clearly outperforms. Perhaps close tracking of the energy in the ocean/atmosphere, using physical evidence, could provide a smoking gun. Without clear evidence, the authors will have an uphill battle overcoming the intransigence of scientists.

Typos:

Pg. 2, line 7: "Such [a] polar synchronization hypothesis..."

Pg. 4, lines 6-7: "...have also been used to [obtain] the first order approximation of Greenland climate history beyond the [extent] of its ice core record."

Pg. 5, line 18: "different studies have different definition of millennial scale variation in terms of what frequency band was to include in the filtered data that would be feed into the models."

Pg. 6, line 24: "...which means that one can implement the model via using polar climate records.."

Pg. 7, line 20: "...when the tau is in the range of hundreds of years..."

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Pg. 8, line 10: "...the implementation of each model was carried out by convolving [each] polar record with each transfer function."

Pg. 11, line 2: "the HT polar synchronization model performs much better than [either] of its main competitors, [the] I/D and TBS models."

Interactive comment on Clim. Past Discuss., <https://doi.org/10.5194/cp-2018-47>, 2018.

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