

Interactive comment on “On the similarity and apparent cycles of isotopic variations in East Antarctic snow-pits” by Thomas Laepple et al.

Anonymous Referee #2

Received and published: 17 October 2017

"On the similarity and apparent cycles of isotopic variations in East Antarctic snow-pits"

This manuscript explores cycles in stable water isotopes in the upper layers of snow across East Antarctica, and their relationship to temperature changes: examining the non-temperature 'noise' signal, and impact of diffusion, on cycle length. I like this paper: the comparison between predicted and observed cycle lengths; the attempt to assess how much of the signal is seasonal/periodic versus white noise; the use of both frequency analysis and layer counting type techniques. The manuscript is thoughtfully put together and well written.

General points:

It is not always clear whether the authors are talking about sub-annual signals when

C1

considering signal-to-noise ratios, or something else – such as annual mean signals.

The sites considered here are 'low-accumulation' sites: low accumulation should be clarified. Further, it would very helpful if the analysis could be extended beyond low-accumulation sites to mid-accumulation (and perhaps high accumulation) Antarctic sites: sub-annual climate/temperature signals have never been retrieved from low accumulation sites. Thus the value of this work might actually be in looking at where and when sub-annual temperature information CAN be gathered from stable water isotope measurements from snow pits. This would imply that the authors should look at the question of what is NOT a low-accumulation (too noisy) site.

It is interesting that the signal to noise ratio is perhaps in the region of 90-10% for low accumulation sites but again, what is it for other higher accumulation sites?

It is less clear what is the impact of this work beyond understanding snow pits / firn cores. Are these findings relevant to the deeper East Antarctic ice cores?

Specific points:

P1 L4 "isotopes in surface snow are supposed. . ." rephrase to make clear that isotopes in snow are really not intrinsically supposed to do anything.

L17 similarpower

L21 clarify what low-accumulation means – e.g. less than 80 mm weq per year. It would be worth clarifying through the introduction.

P4 Figure 2. What are the colours for the stations/core sites? And would it not be more useful to plot accumulation, rather than temperature?

P7 L12, it would intuitively seem more likely that a +16 cm smoothing would lead to a minimum cycle length of 12 cm. Clarify/explain please?

L28 Could condensation temperature be used instead – more common to relate d18O to condensation, rather than surface temperature.

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P9 L17 remove “actually”

Interactive comment on The Cryosphere Discuss., <https://doi.org/10.5194/tc-2017-199>, 2017.