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Interactive comment on "How precipitation intermittency sets an optimal sampling distance for temperature reconstructions from Antarctic ice cores" *by* Thomas Münch et al.

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Dear Authors,

First of all let us congratulate you on this very concise and precisely documented study which was highly interesting to read.

In the following we would like to comment on two key results.

We agree that ambient temperature of precipitation events should be expected to show a stronger correlation to precipitation d18O than annual mean temperature due to the intermittency of precipitation. We also agree that

the data calculated from the simulation results reflect this theoretical relationship, however we would like to note that in a more experimental approach (http://journals.pan.pl/dlibra/publication/116059/edition/100870/content) we tested this idea and an opposite result was obtained. We found that amount weighting is incapable of ameliorating the signal replication between the stations and the ice cores, while arithmetic means gave the stronger linear relationships. The explanation is thought to be isotopic exchange between vapor and surface snow. In the present paper this may open an additional perspective from which the contrast seen in Figure 3 and Sects. 3.1 and 4 can be viewed from.

We also agree with the concept that the signal can be enhanced by averaging isotope records across space, however it is quite strange that "...the optimal sampling strategy is to combine a local ice core with a more distant coreâĹij500–1000km away. A similarly large distance between cores is also optimal for reconstructions that average more than two isotope records." In this paper http://dx.doi.org/10.1016/j.polar.2017.04.001 we performed geostatistical analysis of 60 ice core derived d18O time series in Antarctica to determine their spatial autocorrelation structure and to find the area yet unrepresented by the assessed set of records. The spatial autocorrelation (varography; Matheron 1963) is not equivalent to decorrelation (Appendix B1-2) but also measures the spatial similarity of the studied parameter. For instance, we obtained a 350km spatial "influence" range of the assessed ice core d18O records via semivariogram analysis, which would be interesting to be compared with your results regarding the question: Why are the original ice core d18O data spatially correlated within 250km and the modeled ones in your study above 500 km to simplify the question...

These experimental findings based on real life data might worth consideration when your model results are evaluated and may also serve as a good addition to the discussion.

Best regards, Zoltán Kern & István Hatvani

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