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Title: Molecular diffusion of stable water isotopes in polar firn as a proxy for past temperatures

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Dear executive editor,

On behalf of my co-authors, I submit the manuscript "Molecular diffusion of stable water isotopes in polar firn as a proxy for past temperatures" for publication in Geochimica et Cosmochimica Acta. I confirm that this work has not been submitted for publication and has not been published elsewhere. All authors have read and approved the final version before submission and they have agreed to submission in Geochimica et Cosmochimica Acta. The authors have no conflict of interest to declare.

In this work we investigate the applicability of a new type of past climate proxy based on the study of the diffusivities of the water isotopologues $H_2{}^{16}O$, $H_2{}^{17}O$, $H_2{}^{18}O$ and $HD^{16}O$ in ancient polar firn. Such proxies are very important in the study of the past climate as seen through polar ice cores while they provide benchmarks for climate models describing the climate system. Our work presents a unique test of all the possible methods for paleothermometry using the water diffusivities because it applies them on a number of high resolution and high precision ice core data sets from Greenland and Antarctica. We believe that the topic, the content and the style of the manuscript fit the description of Geochimica et Cosmochimica Acta and would appreciate if you would consider the manuscript for publication.

Best regard,

Christian Holme