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Dear Prof. Risebrobakken,

Thank you very much for reviewing our manuscript entitled "Statistical precursor signals for Dansgaard-Oeschger cooling transitions". We herewith resubmit a new version of our manuscript, which has been revised following the referees' comments. You'll find our point-by-point responses to the comments below. We think that these changes in response to the points raised by the referees have improved the quality and clarity of our manuscript.

Point-by-point reply to the reviewers' comments

In order to improve the readability of our replies we applied a color/type coding to discriminate our replies from the referee's comments.

Color/type coding:

Comments by the reviewers and public comment.

Reply from the authors.

Reply to Referee #2

There is a typo on line 95: "quasi-stadail" should be "quasi-stadial".

Thank you. Corrected.

Reply to Referee #3

• *Line 5: "co-dimension one bifurcation" is far too technical for an abstract, and is not well defined in the manuscript. Please provide more insights for non-experts.*

In the revised manuscript, we explained that the co-dimension-1 bifurcations are, in simple terms, the bifurcations that can be typically encountered by the change of a single control parameter (Thompson and Sieber, 2011).

• *Line 5: "variance and the autocorrelation" of what? Of the time series of a variable representing the system analysed, I assume, but please clarify.*

In the revised manuscript it is written as “the variance and short-lag autocorrelations of the fluctuations increase in a stochastically forced system approaching a critical or bifurcation-induced transition”.

- *Line 54: SPS is not defined here, and its definition only appears later on.*

Thank you for pointing out this. In the revised manuscript, we have noted the SPS as follows. “Thus, the changes in CSD indicators such as the increase of the variance as well as the autocorrelation can be seen as *statistical precursor signals* (SPS) of critical transitions.”

- *Line 75: “with sufficient data length”. Indeed, and in this respect the work of Michel et al. (2022) certainly deserves to be cited on top of Boers (2021) paper...*

Thank you for reminding us of this important work. We have cited Michel et al. (2022) in the introduction and the discussion.

- *Line 84: “20-year resolution” is quite coarse. What might be the implication of this for the utility of those data for present-day? It might be worth to discuss this caveat later on*

In the revised manuscript, we have expressed this caveat as follows “ There is, however, a caveat to this implication because the past DO cooling transitions are different from the presently inferred AMOC changes. The time resolution (mainly 20 years and additionally 5 years) and the length (mainly >1000 years and additionally >300 years) of the interstadial segment data used in this study are coarser and mostly longer than the annual data used for analyzing AMOC fingerprints during the industrial period (Boers, 2021; Ben-Yami et al., 2023; Ditlevsen and Ditlevsen, 2023) and the last millennium (Michel et al., 2022) ...”

- *Line 95: typo on “stadial”*

Corrected.

- *Line 121: “numerical studies” is a bit unclear. Do you mean “studies using numerical climate models”?*

Yes, these are studies analyzing the outputs of numerical climate models. In the revised manuscript, we just write “previous studies” because it is clear from the following context.

Reference:

Michel S., et al. Early warning signal for a tipping point suggested by a millennial Atlantic Multidecadal Variability reconstruction. Nature Communications 13, 5176 (2022).