

The authors have followed the reviewer's recommendations closely. All major and minor comments have been adequately addressed and the authors have made some significant changes to the manuscript to further improve the paper. In my opinion, the paper is now ready for publication and I look forward to its publication.

I only found three minor language issues and a formatting problem that may need to be changed before the paper is finalized (depends on the editor's opinion).

Minor changes:

Lines 390ff:

"For example, if a sample coincidentally includes a thin (e.g., 1-mm-thick) layer with  $\delta\text{O}_2/\text{N}_2$  of +1000 ‰ at the top or bottom of a 10-cm-long ice, an anomaly of ~10 ‰ from the average  $\delta\text{O}_2/\text{N}_2$  (excluding the anomalous layer) should result."

I think that sentence is confusing.

Line 482ff:

"We thus disfavor the possibility that calls for a failure of the recording mechanism of insolation variations during the past firn-ice transition to generate the high scatters of  $\delta\text{O}_2/\text{N}_2$  and  $\delta\text{Ar}/\text{N}_2$  in and below the BCTZ."

I think that sentence is confusing. Please remove double negative phrase.

Line 594:

"More observational and theoretical works are still needed for advancing our understanding of the mechanisms of gas movements in different zones in the ice sheet."

Change "works are" to "work is"

Eq. A9 to A12: There is something wrong with the indices in the brackets, the brackets do not line up with the indices.