

Interactive comment on “Volcanic imprint in the North Atlantic climate variability as recorded by stable water isotopes of Greenland ice cores” by Hera Guðlaugsdóttir et al.

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Dear editor,

We are thankful for your guidance concerning the next steps in our response. We are also grateful for the reviewer’s comments, and taking them into account will certainly improve our study. Looking at the reviewer’s comments, it is obvious to us that a revision of the text as well as more analysis is needed to support our study.

We propose to conduct the following analysis and tests:

Extend the analysis of stable isotope data further back and use more volcanic erup-

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tions. Although our decision to use the period of 1241-1979 within the ice cores is to have the results comparable to the results for the atmospheric circulation reconstruction, which covers the period 1241-1970, it will be beneficial to look at more eruptions as an assessment of our results. In the manuscript we will furthermore explain the reason for choosing the reference period better since it seems to cause confusion.

Perform sensitivity tests including and excluding eruptions not found in Sigl et al. 2015, but documented in other sources, such as historical data, other climate proxies like sediment cores and/or Zielinski et al., 1994, to test the dependency of the choice of eruptions. Our argument is that the signal detected in Greenland ice cores is dependent on wind direction, dispersion and deposition of the plume at the time of, and after, the eruption. If the volcanic eruption is not detected as a sulfate peak in the core itself it could still have an impact on the atmospheric circulation (both short and long-term impact) that can be identified in the ice cores as stable isotope anomalies.

Use bootstrapping method and compare with our results using Monte Carlo method, to further test the significance of the isotopic response to volcanic eruptions.

Re-assess the pre-eruption baseline used.

Re-assess figure graphics and use of color schemes to make the figures easier to read.

There are also several important factors that were not clear enough in the manuscript that have caused confusion and need to be clarified. This is e.g. that we are not using model runs, we use a model-data atmospheric circulation reconstruction to compare with the ice core data. Reviewer #2 seems to have misunderstood this important point. We will carefully reply to all reviewer comments and go through the manuscript to clarify the writing.

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