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Climate of the Past Discussions

# *Interactive comment on* "Re-evaluating the link between the Laacher See volcanic eruption and the Younger Dryas" *by* James U. L. Baldini et al.

**Anonymous Referee #4**

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The subject of the Younger Dryas cooling is one of considerable interest and fascination in the scientific community. Here, most research has been dominated by one theme - that the cooling was triggered by a freshwater flood, or rerouting of meltwater, to the North Atlantic ocean. The idea that the YD cooling might have been triggered by a volcanic eruption has received much less attention and is very interesting.

Overall, I really enjoyed the paper. It's very well written, easy to follow, and provides a nice break from the more typical meltwater-trigger hypothesis. Indeed, I found the discussion about the sensitive of climate to intermediate ice volume conditions, and the alignment of this 'ideal' configuration, to the timing of the YD very enlightening. But whether a volcano actually triggered the YD is hard to tell from this paper. Yes, there was an eruption around the time of the YD cooling, but did it really produce a 1000-yr



cooling? As such, the manuscript would have been vastly improved if the authors had done their own climate modeling. I think it would have been fantastic to try and see whether a volcano could have triggered a YD-like cooling. Indeed, the authors note that previous studies (fig 2) released 10-time LESS SO2 to the atmosphere than what is estimated here. Whether these experiments should be undertaken, I will leave that up to the authors, but I'm not going to rejecting this paper simply because they were not carried out.

Finally, I wasn't sure if the MWP-1b discussion was really needed. The existence of this period of rapid sea level rise is still very much debated, as is its source, with various camps arguing back-and-forth over an Antarctic or Laurentide contribution.

Anyway, my overall opinion is that this is a very interesting paper and it should be published with minor corrections/edits.

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