

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

**James U. L. Baldini et al.**

james.baldini@durham.ac.uk

Received and published: 15 January 2018

We thank the reviewer for their supportive and helpful comments. The reviewer has summarised our message very well in their comments.

We will include more discussion regarding the individual points raised in the revised submission. Briefly here, the reviewer is correct that Pausata et al (2015) found that an eruption would strengthen AMOC. Other modelling studies based on historical data also suggest that eruptions may strengthen AMOC (Ottera et al., 2010; Swingedouw et al., 2014; Ding et al., 2014). Other models suggest that AMOC may intensify initially, but then weaken after about a decade (Mignot et al., 2011). A modelling study by Schleussner and Feulner (2013) suggested that volcanic eruptions occurring during

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the last millennium triggered increased Nordic Sea sea ice extent which weakened AMOC and eventually cooled the entire North Atlantic Basin. Other research finds that North Atlantic sea ice growth following a negative forcing weakened oceanic convection and northward heat export during the Little Ice Age (Lehner et al., 2013). These are all studies focussing on eruptions that occurred over the last 1000 years, and they are still yielding contradictory results. Therefore, we feel that how an eruption might affect AMOC at  $\sim$ 12.9 ka BP is still essentially unknown.

We thank the reviewer for raising this point, as well as for the other references and points raised, which will strengthen our discussion and improve the manuscript overall.

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Interactive comment on Clim. Past Discuss., <https://doi.org/10.5194/cp-2017-147>, 2017.

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