

Clim. Past Discuss., referee comment RC1
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Comment on cp-2021-170

Mukund Palat Rao (Referee)

Referee comment on "The 852/3 CE Mount Churchill eruption: examining the potential climatic and societal impacts and the timing of the Medieval Climate Anomaly in the North Atlantic region" by Helen Mackay et al., Clim. Past Discuss.,
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January 19, 2022

Dear Dr. LeGrande,

I have completed reviewing the manuscript "The 852/3 CE Mount Churchill eruption: examining the potential climatic and societal impacts and the timing of the Medieval Climate Anomaly in the North Atlantic Region" by Mackay et al. The 852/3 Churchill eruption was one of the largest eruptions in the first millennium in terms of its explosivity (but not aerosol loading). 853 CE also consistently shows up as an unusually cold year in northern hemisphere temperature reconstructions using tree-rings. In their study the authors first examine the timing of the eruption using two Greenland ice-cores and conclude that the eruption likely occurred in the winter of 852/853. They then reconstruct the stratospheric aerosol optical depth for the eruption. Next, they compare tree-ring reconstructed and climate model simulated post-eruptive cooling and hydroclimate change over parts of the Northern Hemisphere. The find that climate model simulated cooling is lower than tree-ring reconstructed cooling. Further, the authors use North American and European peat cores and find no consistent low-frequency hydroclimate change post-eruption leading into the Medieval Climate Anomaly period. Finally, the authors highlight the difficulties in attributing any historical evidence of subsistence crisis to the Churchill eruption. The manuscript is well-written, scientifically sound, extremely thorough, contributes significantly to our understanding of the Churchill eruption. It is also well-suited for publication in the the Climate of the Past Volcanic Impacts to Climate and Society Special Issue. Therefore, in my opinion I cannot offer much advice to the authors and do not have any requests to make in terms of revisions. I look forward to seeing the manuscript published soon.

Sincerely,

Mukund Palat Rao