

Comment on gchron-2022-26

Anonymous Referee #1

Referee comment on "Multiple Early Holocene eruptions of Katla produced tephra layers with similar composition to the Vedde Ash" by David Harning et al., Geochronology Discuss., <https://doi.org/10.5194/gchron-2022-26-RC1>, 2022

I recently reviewed a similar manuscript by the same authors for another journal. I had raised several critical comments, and based on my review, the editor decided to reject the ms. I was happy to see that the authors decided to submit the ms again to GChron, but my main criticism remains after reading through the text. I summarise my main critical comments here. See also graphs in the supplement.

1) It is feasible that several eruptions of Katla occurred in the early Holocene, producing Vedde-type tephtras. The results presented here, however, do not support this conclusion. The age-depth model is based on radiocarbon dates performed more than 30 years ago with standard deviations of several hundred years. Age-depth modelling of such old dates cannot give reliable ages and new samples for radiocarbon dating should have been submitted. The second lowest date (Ua-1888) is potentially an outlier, and by removing it from the model, all depths would get older ages in line with the interpretation of Björck et al. (1992)

2) There is no discussion about the possibility of reworking of Vedde shards in the early Holocene. There are many examples from western Norway of reworking many thousand years into the Holocene. I agree with Mangerud's comments that a tephra count graph would be helpful here.

3) The lowest tephra layer, Tv-1 has a Hekla-like geochemistry and is believed to be one of the oldest basaltic layers from Hekla. The authors, however, do not mention that Tv-1 has been correlated with a tephra found in the NGRIP ice-core, NGRIP1519-1, dated to c 12,646 b2k (Mortensen et al., 2005; JQS). New data from NGRIP and GRIP confirms this correlation and firmly places the Tv-1/NGRIP1519-1 in the early part of Younger Dryas/GS-1 (Cook et al., 2022; QSR). The attached graph (Fig. 1 in the supplement) shows an alternative age model for the Torfdalsvatn core based on ice-core ages of the Tv-1 and Tv-4 tephtras (Mortensen et al. 2005; Cook et al. 2022). It suggests that the Tv-2 layer (Vedde in Björck et al's paper) is firmly placed in the YD and not in early

Preboreal. Biplots (Fig. 2 in the supplement) show that there is a generally good agreement between the Tv-1 tephra from Torfdalsvatn and the NGRIP1519.1/GRIP1654.05 layer from Greenland ice. There is more spread in the ice core samples which might be due to smaller shards that were analysed, but all major elements overlap.

4) Previous investigations at Torfdalsvatn by Rundgren (1995, QR) are mentioned in the text, but rather surprisingly, are not discussed in any detail. The pollen- and lithostratigraphy presented by Rundgren suggest an YD age for Tv-2 and an early YD age for Tv-1, in agreement Björck's paper, see also Fig. 3 in the supplement file.

Please also note the supplement to this comment:

<https://gchron.copernicus.org/preprints/gchron-2022-26/gchron-2022-26-RC1-supplement.pdf>