Jan Mangerud

We kindly thank Jan Mangerud for taking the time to consider and comment on our manuscript. Below we provide a response to each individual comment.

Very interesting manuscript. But:

- I would like to see counting of glass chards between and below the Vedde-like ash layers in order to better evaluate the possibility of redeposition. In western Norway we find a tail of redeposited Vedde ash well into the Holocene.

We thank Dr. Mangerud for raising this point and allowing us to clarify our rationale for why these tephra layers are primary deposits. As outlined in the manuscript, our primary argument relies on the fact that all the layers contain pristine and non-abraded glass shards with the inclusion of minimal lithics, and that each tephra layer features sharp upper and lower contacts with the interstitial organic sediment.

In addition to the above, it is also near impossible to get bulk reworking of a tephra layer as required by the presence of three discrete layers, taking place decades to centuries after its deposition, let alone two times in a row. Moreover, given that Torfdalsvatn's catchment is low relief with minimal topography, the bulk of the reworking would be wind derived, which primarily mobilizes sub-50-micron grains and hence the reworked tephra would be very fine ash and each storm input would be expected to be normally size graded due to settling through the water column (i.e., Stoke's Law).

Finally, tephra grain counting between layers would not be useful to discern tephra redeposition in Iceland where tephra comprises the background. Given that it is a volcanic island, the parent material of all soils is volcanic (Arnalds, 2004). While glass shard counting can be useful for distal locations in Norway, where Icelandic tephra shards are either primary or secondary deposits, we always find various glass grains present in Icelandic lake sediment due to the constant mobilization of the soil into lakes from the surrounding catchment.

- I am surprised that they did not obtain new radiocarbon ages.

We thank Dr. Mangerud for raising this point and allowing us to clarify our rationale for not obtaining new radiocarbon dates. The dates that we calibrated were indeed generated several decades ago, but there is no reason to believe that they are any less reliable than ones generated today. The Björck et al. (1992) samples were dated with high-precision AMS techniques that remain the primary method used. While the uncertainty can be larger in samples dated several decades ago, the median ages of the original dates and those today remain similar. As an example, we compare 14C ages from the original Torfdalsvatn study (Björck et al., 1992) and another from the mid-late 2000s (Axford et al., 2007) – see Table below. Both samples were taken near the base of

the G10ka Series tephra, and we recalibrated them using IntCal20 to make them directly comparable (Reimer et al., 2020). Given their similar stratigraphic location with respect the overlying tephra layers, the similar median age of the two samples is expected. The older sample from Björck et al. (1992) simply has a larger range of uncertainty, but the median age itself is not substantially different from a more recently dated sample (Axford et al., 2007).

In the revised manuscript, we will be sure to emphasize the higher uncertainty of our age estimates due to the old 14C dates, but that the median ages should be reliable. Ultimately, our results provide a baseline for future studies to improve age estimates and correlations to other localities.

Lab ID	Depth below G10ka Series	Material	Conventional ^{14}C age ± σ	Calibrated age BP ± σ	Reference
Ua-1890	8 cm	Moss macrofossil	9180 ± 210	10330 ± 370	Björck et al. (1992)
NSRL-14518	1.4 cm	Bulk sediment	9100 ± 25	10240 ± 10	Axford et al. (2007)

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