

Response to Reviewer #1

We thank the reviewer for the positive review of our manuscript and for the constructive comments and suggestions.

Main remark

AC: We thank the reviewer for this important comment and for pointing us to Nicolussi et al. (2026). We agree that the basal age should be discussed in the context of Early Holocene glacier evolution.

The ~10 ka basal age shows that Early Holocene ice is preserved directly above bedrock at Tödi. However, from the chronology alone we cannot determine whether the summit was completely ice-free immediately before this ice accumulated. The absence of older ice could reflect complete deglaciation or later removal of previously existing ice (outflow due to basal sliding during a later warm period). But with layers just a few centimeters above bedrock being so heavily thinned, we can also not exclude older ages in the very bottom due to limitations in achievable sampling resolution. We therefore prefer to remain cautious on this point.

The chronology of Nicolussi et al. (2026) is nevertheless highly relevant. Their evidence for strong glacier retreat between 10.8 and 10.3 ka, followed by glacier advance around 10.2 ka, is consistent with the timing of the oldest preserved Tödi ice. We have therefore added this study and now discuss the possibility that strong Early Holocene mass loss substantially reduced, or potentially removed, the summit ice before new build-up of the ice cap.

A more detailed paleoclimatic interpretation of the Tödi record will be presented in a companion paper. There, we also consider the $\delta^{18}\text{O}$ record, which in the basal section does not show the pronounced depletion expected for Last Glacial Maximum ice as observed in polar ice cores. We therefore keep the paleoclimatic interpretation limited in the present manuscript and focus here mainly on the chronological evidence.

Title

AC: We agree that the previous wording could suggest that we derive a new age–altitude relationship, which is not our intention. The main point is rather that the Tödi chronology deviates substantially from the previously proposed empirical relationship and therefore highlights its limitations. We have revised the title accordingly.

Line 21 – “confirming the persistence of early Holocene ice”

AC: We agree that “confirming” is too strong and that “persistence” could be interpreted as implying continuous ice cover before ~10 ka. We have therefore rephrased this sentence to state more directly that the basal ages indicate the preservation of Early Holocene ice.

As discussed above, the basal age alone does not allow us to determine whether the summit was completely ice-free immediately before the oldest preserved ice accumulated.

Line 37 – geomorphological imprint

AC: We agree that this statement was too general. At high elevations, possible evidence could include small morainic deposits, trimline-like features, or weathered bedrock surfaces, although their

preservation is highly site-dependent and such features may later be buried, modified, or eroded by renewed glacier advance.

We have revised the sentence to make this point more cautiously and to avoid implying that a clear geomorphological record should necessarily be preserved at such sites.

Suggested Reference

AC: Thank you for bringing this recent study to our attention. We have added Nicolussi et al. (2026) to both the introduction and discussion and now discuss its Early Holocene glacier chronology in relation to the basal age at Tödi.