



ICG2022-698, updated on 29 May 2023

<https://doi.org/10.5194/icg2022-698>

10th International Conference on Geomorphology

© Author(s) 2023. This work is distributed under the Creative Commons Attribution 4.0 License.



Subglacial carbonate deposits - a new source for studying the presence of glaciers in a glaciokarstic environment

Matija Zorn, Matej Lipar, Mateja Ferk, Klemen Cof, and Janko Čretnik

Research Centre of the Slovenian Academy of Sciences and Arts

Subglacial carbonate deposits have been exposed on the lee sides of small protuberances on a bare polished and striated limestone bedrock surface in the immediate vicinity of the disappearing small glaciers in the south-eastern Alps (N Slovenia and NE Italy). The uranium-thorium dating of these carbonates indicates that they were deposited during the Last Glacial Maximum (LGM) and Younger Dryas (YD). The small glaciers in the Slovenian Alps (i.e., the Triglav and Skuta glaciers) are generally considered relicts of the Little Ice Age that were not continuously present due to the warm Holocene Climatic Optimum (HCO). If these glaciers had completely melted during the HCO, the subglacial carbonates of the LGM and YD would have been exposed to frost weathering and would have had little chance of being preserved to the present day. While it has been postulated that subglacial carbonates are not very resistant to such weathering, no direct data have been available to date. Therefore, the objective of our study was to determine the rate of freeze-thaw weathering of subglacial carbonate deposits. Freeze-thaw analysis was performed in a controlled freeze-thaw chamber under dry and wet conditions. Preliminary results after 56 freeze-thaw cycles indicate an average mass loss of 2.13%. According to the high-altitude meteorological station adjacent to the Triglav Glacier, there is an average of 19 freeze and thaw cycles per year when there is no snow cover, indicating an average mass loss of 0.73% per year and a total mass loss in about 2000 years. These laboratory results suggest that the subglacial carbonates would likely have weathered in the absence of glaciers during the HCO and thus can be considered indicative of the recently exposed ice- or glacier-free surface for the first time since their deposition.