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Glacier evolution in the Valsugana (south-eastern European Alps) during the Last Glacial Maximum and the Late Glacial

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The evolution of Late Pleistocene glaciers in the south-eastern part of the Alps is still incompletely understood. This is partly related to the difficulties of establishing chronological control in this region that is dominated by carbonate bedrock. Here, we present new data concerning the Last Glacial Maximum (LGM) extent and the deglaciation history of glaciers in the Valsugana (Trentino, Italy). We report first surface exposure ages for an LGM glacier in the south-eastern Alps and discuss morphological evidence for readvances during the Late Glacial period.

During the LGM, the Valsugana was covered by an extensive glacier network that was fed by transfluence of ice from the Adige Valley and by major tributaries from the Calamento and Cavè valleys. The glacier reached a maximum ice thickness of ca. 1000 m and extended down to the area of Cison del Grappa, where it came to a halt before reaching the foreland plain. In marginal positions, smaller, independent glaciers developed. The reconstruction of these marginal glaciers indicates that the regional Equilibrium Line Altitude (ELA) during the LGM was situated at around 1500 m a.s.l. To constrain the timing of the LGM in the region, three erratic boulders from Monte Lefre, a nunatak within the glacier network, were sampled for ¹⁰Be surface exposure dating. The ages demonstrate that the Valsugana Glacier remained at an elevated lateral position until the very end of the LGM (ca. 19 ka), after which glaciers retreated and the glacier network dissected into smaller tributaries. Morphological evidence in the upper valleys suggests at least three stages of glacier readvance and/or stabilisation during the Late Glacial. A reconstruction of these glaciers and their ELAs allowed to establish a relative deglaciation chronology that will represent a framework for future exposure dating efforts.

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