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Extent and dynamics of the last glaciation in Kellwassertal, Harz Mountains, central Europe

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During marine oxygen isotope stage (MIS)-2 (29-14 ka), north-western and northern Europe hosted large ice sheets, while a network of valley glaciers and piedmont lobe glaciers covered the Alps and their forelands, respectively. Beryllium-10 cosmic-ray exposure (CRE) ages of glacially transported boulders confirm that ice caps and glaciers temporarily covered the currently ice-free mid-elevation mountainous regions of central Europe, including the Jura, the Vosges, the Black Forest, the Bavarian/Bohemian Forest, and the Giant Mountains. It has been suggested that the Harz Mountains in northern Germany (maximum elevation: 1141 metres above sealevel) were also temporarily glaciated during this period. However, due to the lack of age datasets, the validation of this assumption is still pending. As a pilot study for an upcoming research project on the last glaciation of this mountain range, glacial landforms in Kellwassertal were mapped. The identification of ice-marginal moraines involved both the interpretation of derivates of a high-resolution digital elevation model (x-y resolution: 1 m) and an extensive field survey. Geomorphological mapping confirmed the glacial circular in the uppermost reach of the valley. The mapped ice-marginal moraines point towards the temporary presence of a small cirque glacier in this valley. Ice surface reconstructions were undertaken for each ice-marginal position to calculate equilibrium line altitudes (ELAs). Due to the influence of topoclimatic factors, i.e., shading, snow blow, and avalanching, the reconstructed ELAs likely underestimate the climatic ELA. Future work will have to exposure date the quartzbearing boulders on the mapped landforms to employ the calculated ELAs for precipitation reconstruction. For a comprehensive glacier chronology for the Harz Mountains, moraines at other key sites in the Harz Mountains, including the Kalte Bode valley and the Oder valley, will be revisited.

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