Anne U. Reuther:

Surface exposure dating of glacial deposits from the last glacial cycle
Evidence from the Eastern Alps, the Bavarian Forest, the Southern Carpathians and the Altai Mountains
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A major research goal in Quaternary sciences today is the reconstruction of past glacial fluctuations. Glacial deposits constitute an important
The actual publication of Reuther is a throughout revised and condensed version of her dissertation connected to a major research project on surface exposure dating between the Alps and the Altai. Consequently, it contains three main parts. The first part, covering about 40 pages, gives an introduction into the methodology, and general information about related calibration and interpretation. The second main part of the work contains the detailed results from the chosen study areas, presented separately in four chapters. Finally, a synthesis about the calculated former ELAs and the conclusions put the regional findings together to gain a more general outline for both, geochronological and methodological aspects. The appendix contains some detailed information about the individual samples and the dating procedure.

Surface exposure dating (SED) using in-situ produced cosmogenic nuclides (TCN), especially 10Be and 26Al, has become an important dating method to improve our knowledge about the Last Glacial Maximum (LGM) and Deglaciation, as well as it has been applied for the dating of Early Holocene and Neoglacial Little Ice Age-type events. A substantial number of samples have been dated in this study, and the methodological chapter starts with a short, but compact and profound description of this method and the necessary steps of sampling strategies, preparation and measurements of the samples taken. The style is appropriate even to those readers yet not familiar to TCN. A good part of the section is dedicated to the problems of calibration and age interpretation of the results. Reuther stresses the possible influence of site-related factors (e.g. topographic shielding, vegetation cover, snow depths) upon the results and discussed the different calibration procedures in use. This allows the reader to make his own opinion about the potential errors and precision of the dates presented, and delivers some practical solutions for those readers applying SED using TCN by themselves. The importance of different glacial environments (e.g. small valley glaciers versus glaciers with ice-disintegration features and widespread dead-ice during the deglaciation process) for the age interpretation of the ages of moraine boulders is highlighted and an important general conclusion.

The chronological findings from the study areas show an overall good agreement with independent climatological evidence. The Würmian ice advances in the Bavarian Forest with LGM moraines formed between ca. 21 and 19 ka BP and ice recession starting around 17 ka BP coincide with the reported cold North Atlantic sea surface temperatures and the chronologies of neighbouring regions as e.g. the Eastern Alps. The results from the Southern Carpathians show some interesting new finding, e.g. a major Late-Glacial advance and a phase of increased aridity during LGM. In the Altai, Early-Würmian glacier advances and related extensive ice-dammed lakes compared to a suggested less dominant Late-Würmian glaciation clearly points towards the need of a more mass budget-based climatological interpretation of the Würmian climate and glaciations, as aridity and lack of precipitation seem to play an much more important role as purely temperature-based approaches might reveal.

In general, a typical German-style PhD thesis published as monograph often just achieves limited interest among potential readers due to its highly specialized subject. That is definitely not the case with Reuther's work as it offers valuable information for both, those readers mainly interested in the methodological aspect of TCND and innovative solutions for the connected problems of calibration, and those readers focussed on the Quaternary itself and expecting new insights into the geochronology of the study areas. A good structure and professional layout make the work very readable and of unquestionable value for a broader audience. Only the price seems to be too high, especially for students and young scientists.

Stefan Winkler
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Die Analysemöglichkeiten für die Bestimmung kosmogener Nuklide sind weltweit nur in wenigen Laboratorien vorhanden, so z. B. an der ETH Zürich, wo die Autorin die meisten ihrer Analysen unter Nutzung der AMS (accelerator mass spectrometry) durchführte. Mit Hilfe der kosmogenen Nuklide kann der Alterszeitraum bestimmt werden, während dessen die Oberflächen kosmogener Strahlung ausgesetzt gewesen sind. Dabei sind eine Reihe von störenden Einflussgrößen zu berücksichtigen wie die topographische Abschattung und die Vegetations- oder Schneebedeckung. Mit der Oberflächenaltersdatierung (surface exposure dating) eröffnet sich eine Möglichkeit der direkten Altersdatierung (10Be) für die landschaftlichen Geomorphologie. Surface exposure dating dating has provided to be an invaluable tool for numerical dating of moraines. However, the surface exposure ages of moraine boulders cannot always be equated to the age of the landform. A detailed review of processes that affect moraine boulders in different glacial environments shows that precise exposure ages are more probably derived from small valley glaciers, whereas exposure ages from moraine boulders deposited in glacial environments where dead ice prevailed after deglaciation show a wide scatter in ages. Different interpretation models for surface exposure ages from moraines are summarized.
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Glacial/interglacial variations in the flux of atmospherically transported diatoms in Taylor Dome ice core. References. Acquisition of borehole temperature measurements from Taylor Dome and the dry valleys for paleoclimate reconstruction. Borehole temperatures. Vertical strain rates at Taylor Dome. 1996. Climate change during the last deglaciation in Antarctica. Science, 272, 1636–1638. Mulvaney, R., and E.W. Wolff. Mass deposited directly on the divide has no component of strain to either side, thus increasing the effective viscosity and creating the slight upwarp. To quantify the slope information for the surface and internal layers, we have made least-squares fits with a first-order polynomial to the radar surface and internal echo-depth data. Surface exposure dating of glacial deposits from the last glacial cycle. Evidence from the Eastern Alps, the Bavarian Forest, the Southern Carpathians and the Altai Mountains. Article. New 10Be ages from the summits of three mountain areas of North Wales reveal a very similar exposure timing as the Welsh Ice Cap thinned after the global Last Glacial Maximum. Eight bedrock and one boulder sample gave a combined arithmetic mean exposure age of 19.08±0.80ka (4.2%, 1σ). Similar exposure ages over a 320m vertical range (824 to 581m altitude) show that ice cap thinning was very rapid and spatially uniform.