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Late Pleistocene glacial chronology of the Retezat Mts, Southern Carpathians, using ^{10}Be exposure ages

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Our knowledge on the timing of glacial advances in the Southern Carpathians is limited. Recently, some attempts have been made to develop an improved temporal framework for the glaciations of the region using cosmogenic ^{10}Be exposure dating. However, glacial chronology of the Romanian Carpathians remains contradictory. E.g. the timing of the maximum ice advance appears to be asynchronous within the area and also with other dated glacial events in Europe.

Main objective of our study is to utilize cosmogenic in situ produced ^{10}Be dating to disentangle the contradictions of the Southern Carpathian Late Pleistocene glacial chronology. Firstly, previously published ^{10}Be data are recalculated in accordance with the new half-life, standardization and production rate of ^{10}Be. The recalculated ^{10}Be exposure ages of the second largest (M2) moraines in the Retezat Mts. appear to be ca. 19-24% older than exposure ages calculated by Reuther et al. (2007, Quat. Int. 164-165, 151-169). This contradicts the earlier conclusions suggesting post LGM age of M2 glacial advance and suggests that M2 moraines can be connected to the end of the LGM with final stabilization possibly at the beginning of the Late Glacial. We emphasize that it is ambiguous to correlate directly the exposure-dated glacier chronologies with millennial scale climate changes due to uncertainties in sample collection and in computation of exposure ages from measured nuclide concentrations.

New ^{10}Be samples were collected in order to determine the ^{10}Be exposure age of moraines outside the most prominent generation (M2) including the largest and oldest moraine (M1) and the landforms connected to the smallest ice advances (M4), which remained undated so far. The new exposure ages of M2 moraines are well in harmony with the recalculated ages of Reuther at al. (2007). ^{10}Be exposure age of boulders on the smallest moraine suggest that the last glaciers disappeared in the area during the Late Glacial, indicating no glaciation during the Younger Dryas and Holocene.

Previous works, based on geomorphologic analogies and pedological properties suggested that the M1 ice advance was older than LGM, and possibly occurred during the MIS4. Our ^{10}Be exposure dating provided LGM ages for boulders on the M1 side moraine. It is question of further research whether these ages show the time when the glacier abandoned the moraine or they only indicate an LGM erosional event affecting an older moraine. If we accept the LGM age of maximum ice extent (M1), our ^{10}Be exposure age data enables the calculation of a mean glacier retreat rate of 1.3 m/a for the period between M1 and M4 (21.4 to 13.6ka). Alternatively, considering only the oldest ^{10}Be exposure age of the M2 moraine, the M2 to M4 (20.2–13.6ka) glacier retreat rate was slightly lower: 1.1 m/a.

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