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10-Be chronology of the last Scandinavian Ice Sheet retreat in Poland

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Surface exposure dating with in-situ produced cosmogenic nuclides is a strong geochronological technique enabling to constrain absolute chronology of glacial episodes and to better understand their interactions with paleoclimate. Here we present new results of erratic boulders dating with in-situ 10-Be from the southern sector of the last Scandinavian Ice Sheet (SIS). A total number of 53 large erratics located in-situ on glacial landforms in north Poland were sampled and dated. Our sampling sites are situated on the ice-marginal belts along the limits of the last SIS glacial phases and between the limits of particular glacial phases - on moraine plateaux. This allows us to document the deglaciation chronology in detail, i.e. to date ice-sheet limits and to estimate timing of the ice-sheet retreat along broad north-south transects. Samples were taken with a manual jackhammer from the upper surface of stable, massive boulders of quartz-rich lithologies and were subjected to the standard laboratory procedure of quartz purification and 10-Be measurements used in surface exposure dating with in-situ produced cosmogenic nuclides.

Our results consist of exposure ages for 12 erratics located in the vicinity of the last SIS maximum limit. They range between 18.1 $\pm$ 1.9 and 72.2 $\pm$ 7.8 ka. The distribution of the population reveals two significantly different subsets: a younger subset including ages ranging between 18.1 $\pm$ 1.9 and 26.0 $\pm$ 2.8 ka and an older subset consisting of ages ranging between 36.1 $\pm$ 4.0 and 72.2 $\pm$ 7.8 ka. We argue that the younger subset (18.1 $\pm$ 1.9 to 26.0 $\pm$ 2.8 ka) represents the reliable age of the Local Last Glacial Maximum (LLGM) in Poland which may be correlated with the Brandenburg and Frankfurt Phases of the last glaciation in Europe. Exposure ages for the remaining 41 erratics, located further to the north, in the vicinity of the ice margin limits correlated with Frankfurt and Pomeranian Phases of the last glaciation, range between 13.6 $\pm$ 1.7 and 86.9 $\pm$ 9.7 ka. The distribution of this population reveals also two significantly different subsets: an older subset including two ages of 47.9 $\pm$ 7.0 ka and 86.9 $\pm$ 9.7 ka, and a younger subset consisting of 39 ages ranging between 13.6 $\pm$ 1.6 and 33.6 $\pm$ 3.8 ka. We argue that the younger subset corresponds to the reliable age of the last SIS retreat after the LLGM in north Poland, although more statistical analyses and correlations with independent age constraints (14-C, OSL) is essential to adequately interpret our results.