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Timing of Early Quaternary Glaciations in the Alps

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Deckenschotter (cover gravels) are Quaternary sediments of the Northern Alpine Foreland, occurring beyond the limit of the Last Glacial Maximum. These sediments are a succession of proximal glaciofluvial gravels, covering Tertiary Molasse or Mesozoic bedrock. Furthermore, the Deckenschotter are topographically distinct and discontinuous archives, having a reverse stratigraphic relationship, i.e. older deposits are located at higher altitudes and vice versa. Our goal is to build the chronostratigraphy of Swiss Deckenschotter in order to reconstruct the timing of Early and Middle Pleistocene glaciations in the Alps, and thus to quantify the magnitude of incision on the foreland.

In this study, we focus on the Deckenschotter at Stadlerberg, located in the canton of Zurich, close to the German border at an elevation of around 600 m. In an abandoned gravel pit, we collected 7 sediment samples for depth-profile dating with cosmogenic 10Be. In addition, 9 quartz clasts were sampled for isochron-burial dating with 10Be and 26Al. Depth-profile dating uses the fact that the build-up of cosmogenic nuclides decreases with depth following the known physical principles, while isochron-burial dating is based on the different pre-burial and same post-burial histories of the quartz clasts stemming from the same time-line. First results from our depth-profile dating yielded a model age of deposition of approximately 1.4 Ma. In addition to the dating with cosmogenic nuclides, we also studied lithostratigraphy in detail at this site. Petrography of the pebbles indicated that this Deckenschotter unit originates from the catchment of the Rhein-Linth Paleoglacier.