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Isochron-burial dating of glacially-driven sediments: first results from the Alps

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The recently introduced method of isochron-burial dating, employs the fact that the samples from a well-defined single bed in a deposit would have the same post-burial but different pre-burial histories. The analysis of cosmogenic 10Be and 26Al in such samples enables the modeling of the post-burial component and the determination of the 26Al/10Be at the time of burial. The isochron-burial age can then be calculated from the initial and the measured ratios.
In this study, we focus on the isochron-burial dating of the oldest Quaternary deposits of the Alpine Foreland. These are called Swiss Deckenschotter (cover gravels) as they build mesa-type hill tops on the Mesozoic or Cenozoic bedrock of the Swiss Alpine forelands. Deckenschotter consists of glaciofluvial gravel layers intercalated with glacial and/or overbank deposits. Although previously morphostratigraphically correlated with Günz and Mindel glaciations of Penck and Brückner, the Swiss Deckenschotter is likely much older, and their chronostratigraphy is not well constrained. In order to reconstruct the chronology of these deposits, we collected more than 30 clasts of different lithology, shape and size from a single stratigraphic horizon in an abandoned gravel pit in Siglistorf (canton Zurich). We processed 19 clasts for cosmogenic 10Be and 26Al. Four samples did not yield successful 26Al measurements and two were unsuccessful for 10Be. Most of the samples have low nuclide concentrations, i.e. <20000 10Be at/g and <150000 26Al at/g. Finally, using the 26Al/10Be ratio of the samples we calculated an isochron-burial age of around 1.5 Ma. Our results from this study indicate that glaciofluvial sediments can well be time-calibrated with isochron-burial dating despite the low cosmogenic nuclide concentrations.