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Landscape evolution and bedrock incision in the northern Alpine Foreland since the last 2 Ma

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The landscape evolution of the Swiss Alpine Foreland since the early Pleistocene is of utmost importance for modelling the long-term safety of deep geological repositories for nuclear waste disposal in the northern Alpine Foreland. The oldest Quaternary sediments in the northern foreland are proximal glaciofluvial sediments lying unconformably on Tertiary Molasse or Mesozoic carbonate bedrock. These deposits form topographically distinct and discontinuous isolated plateaus. Terrace morphostratigraphy has a reversed stratigraphic relationship, i.e. today older sediments are located at higher altitudes and vice versa.

In this study, we focus on the landscape evolution and long-term bedrock incision in the Swiss Alpine Foreland. We reconstruct the terrace chronology in the foreland at six key locations at different altitudes ranging from 433 m a.s.l. to 675 m a.s.l. by applying cosmogenic depth-profile and isochron-burial dating techniques. First results from these sites indicate that the gravels at studied sites were accumulated in the foreland between 1 and 2 Ma. Based on this reconstructed chronology, long-term bedrock incision rates between 0.1 and 0.2 mm/a were calculated. Thus, we inferred a landscape at that time that was most likely characterized by smoother hillslopes than at present. During the Mid-Pleistocene Revolution (ca. 0.95 Ma), a re-organization of the drainage systems occurred in the Alpine Foreland with a significant lowering of the base level of stream channels. Existing data suggest slightly increased incision rates after this drainage network re-organisation compared to our results. The reconstruction of the chronology at the remaining sites may allow quantifying a pronounced incision as well as the exact timing of the acceleration in the incision rates.

REFERENCES

Heuberger, S. & Naef, H. (2014). NAB 12-35: Regionale GIS-Kompilation und -Analyse der Deckenschotter-Vorkommen im nördlichen Alpenvorland. Nagra Arbeitsbericht.

Kuhlemann, J. & Rahn, M. (2013). Plio-Pleistocene landscape evolution in Northern Switzerland. Swiss Journal of Geosciences, 106, 451-467.

Maslin, M.A. & Ridgwell, A.J. (2005). Mid-Pleistocene revolution and the ‘eccentric myth’. Geological Society, London, Sepcial Publications 247, 19-34.