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During the Pleistocene, the glaciers advanced several times from the Alps into the Swiss Midland. The extent and exact timing of these advances is still controversial.

The Earth' surface is constantly bombarded by cosmic rays, producing in situ cosmogenic nuclides, such as  $^{10}\text{Be}$ . The production rate exponentially decreases with depth below surface (Hidy et al. 2010), but most importantly the cosmogenic nuclides accumulate over time. This principally provides a quantitative measure for the exposure time of a rock or sediment, for example after retreat of a glacier.  $^{10}\text{Be}$  exposure dating has previously been applied on erratics in the Swiss Midland (Ivy-Ochs et al., 2004), but many boulders have been at least partly destroyed, which makes it difficult to obtain meaningful exposure ages (Akcar et al., 2011).

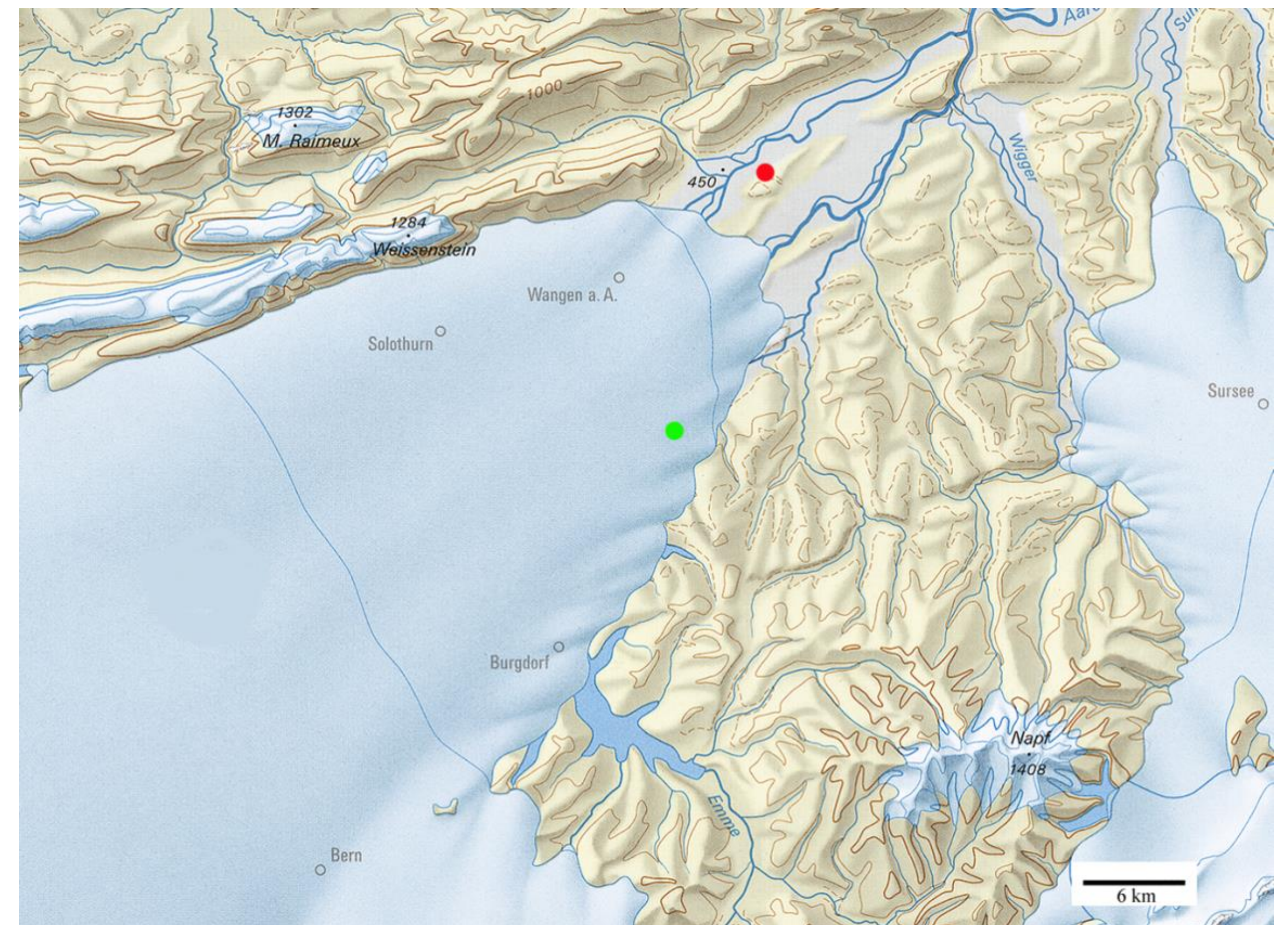


Fig. 1: Maximum ice extent during the LGM after *Bini et al. 2009* (Green: Steinhof, Red: Niederbuchsiten)

→ <sup>10</sup>Be depth profiles (Hidy et al. , 2010) was established for two key sites in the western Swiss Midland, in order to obtain quantitative age control for these glacial deposits.

Depth (cm)

Concentration (atoms/g)  $\times 10^4$

1.71 (+/- 0.19)

2.09 (+/- 0.23)

2.51 (+/- 0.30)

2.67 (+/- 0.27)

3.53 (+/- 0.34)

6.33 (+/- 0.39)

7.69 (+/- 0.39)

**10.7<sup>+2.1</sup><sub>-1.2</sub> ka**  
No erosion

**14.1<sup>+77.4</sup><sub>-3.1</sub> ka**  
No constraints

**6.78<sup>+0.9</sup><sub>-6.78</sub> cm/ka**

Fig. 2: Depth profile in Steinhof

- Does not seem to be older than LGM
- Age without erosion dates the stabilization of the surface
- Age without constraints is influenced by anthropogenic erosion in the late Holocene

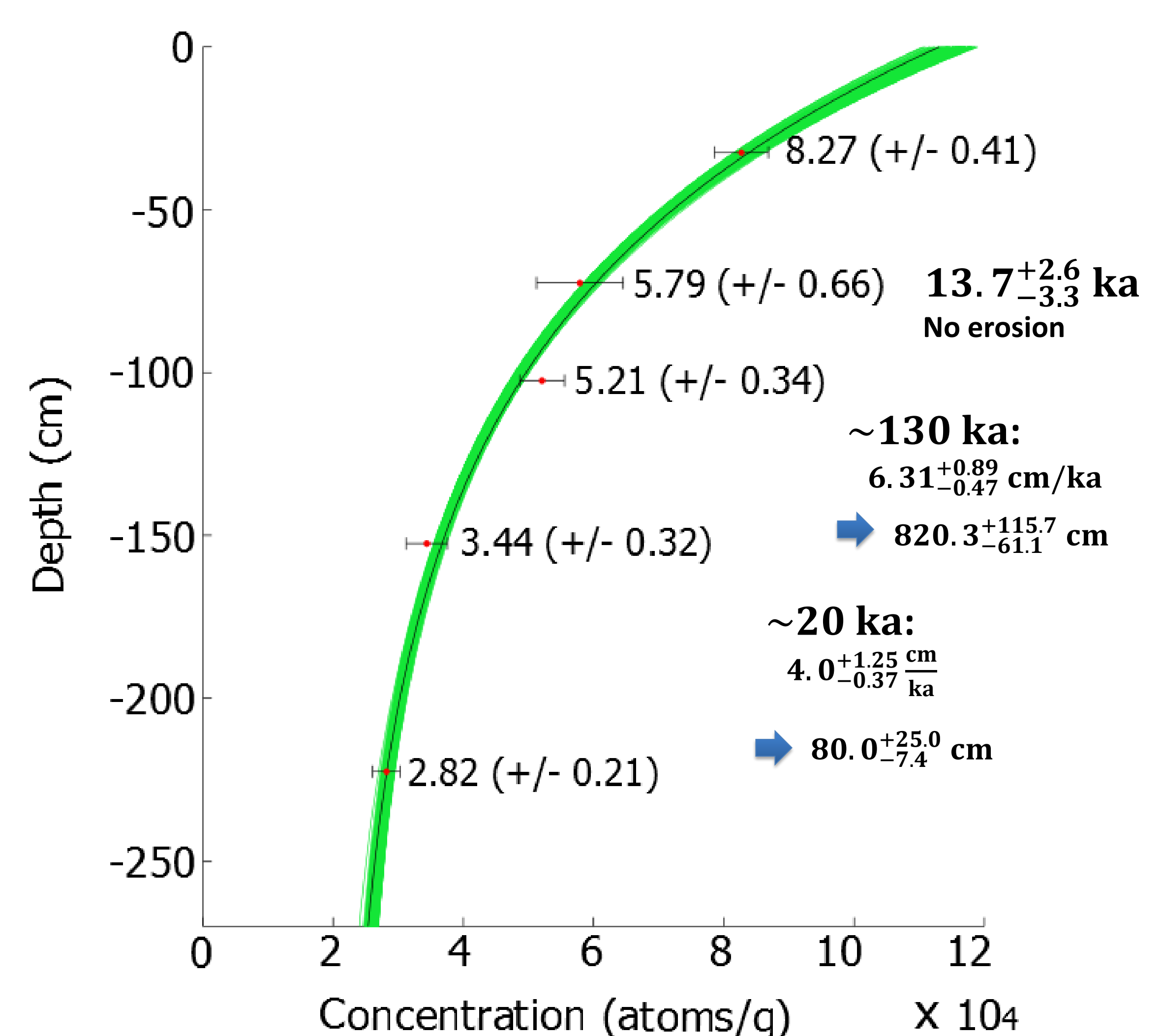


Fig. 3: Depth profile in Niederbuchsiten

- Age without erosion dates the stabilization of the surface
- An age of 130 ka would imply a total erosion of +/- 8 m
- An age of 20 ka would be much younger than hitherto assumed

The presented method is possibly not applicable in such a dynamic environment as the Swiss Lowlands. The reason is the erosion rate, which is not constant due to climate change in the past, anthropogenic influence and possibly extreme events.

-N. Akcar, S et al. «Post- depositional impactson "Findlinge" (erratic boulders) and their implications for surface exposedating» In: Swiss Journal of Geosciences 104 (2011).

-A. Bini et al. Die Schweiz während des letzteiszeitlichen Maximums (LGM) 1:500'000. Bundesamt für Landestopographie (Swisstopo), 2009.

-A.J. Hidy et al. «A geologically constrained Monte Carlo approach to modeling exposure ages from profiles of cosmogenic nuclides: An example from Lees Ferry, Arizona». In: Geochemistry Geophysics Geosystems 11 (2010).

-S. Ivj-Ochs et al. «Timing of deglaciation on the northern Alpine foreland». In: *Eclogae geologicae Helveticae* 97 (2004).