

Sedimentology of the glacial facies within the Deckenschotter of Northern Switzerland

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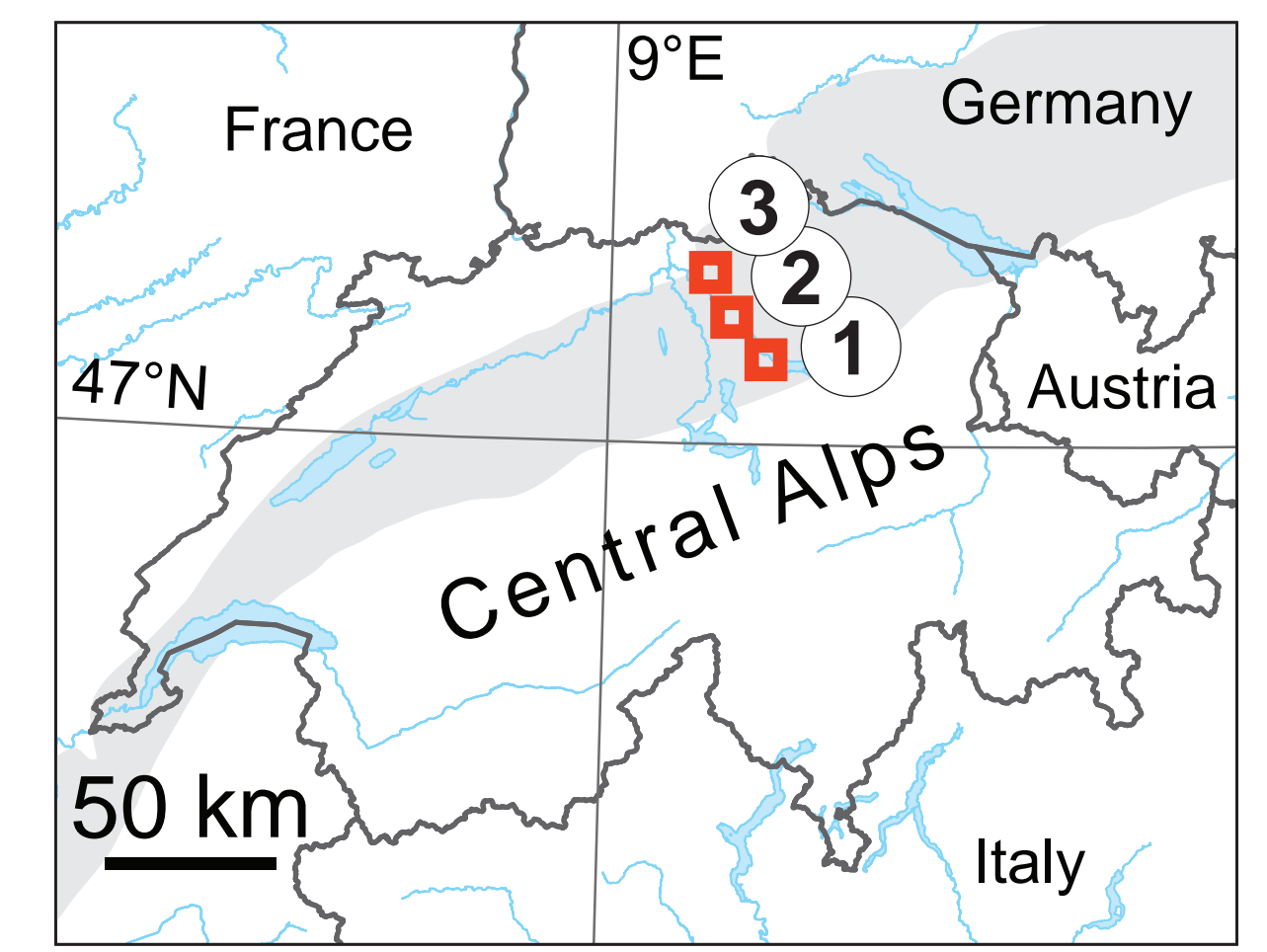
Motivation

- Presumed glacial deposits within the Höhere and Tiefere Deckenschotter Groups (HDS, TDS) – the oldest Quaternary deposits in Switzerland – are important markers of ice-contact during the Early Pleistocene but remain poorly studied.
- Glacial sediments may yield information on glacier geometry, flow and bed characteristics in the Deckenschotter paleo-landscape.

Evidence for a glacial origin in HDS & TDS:

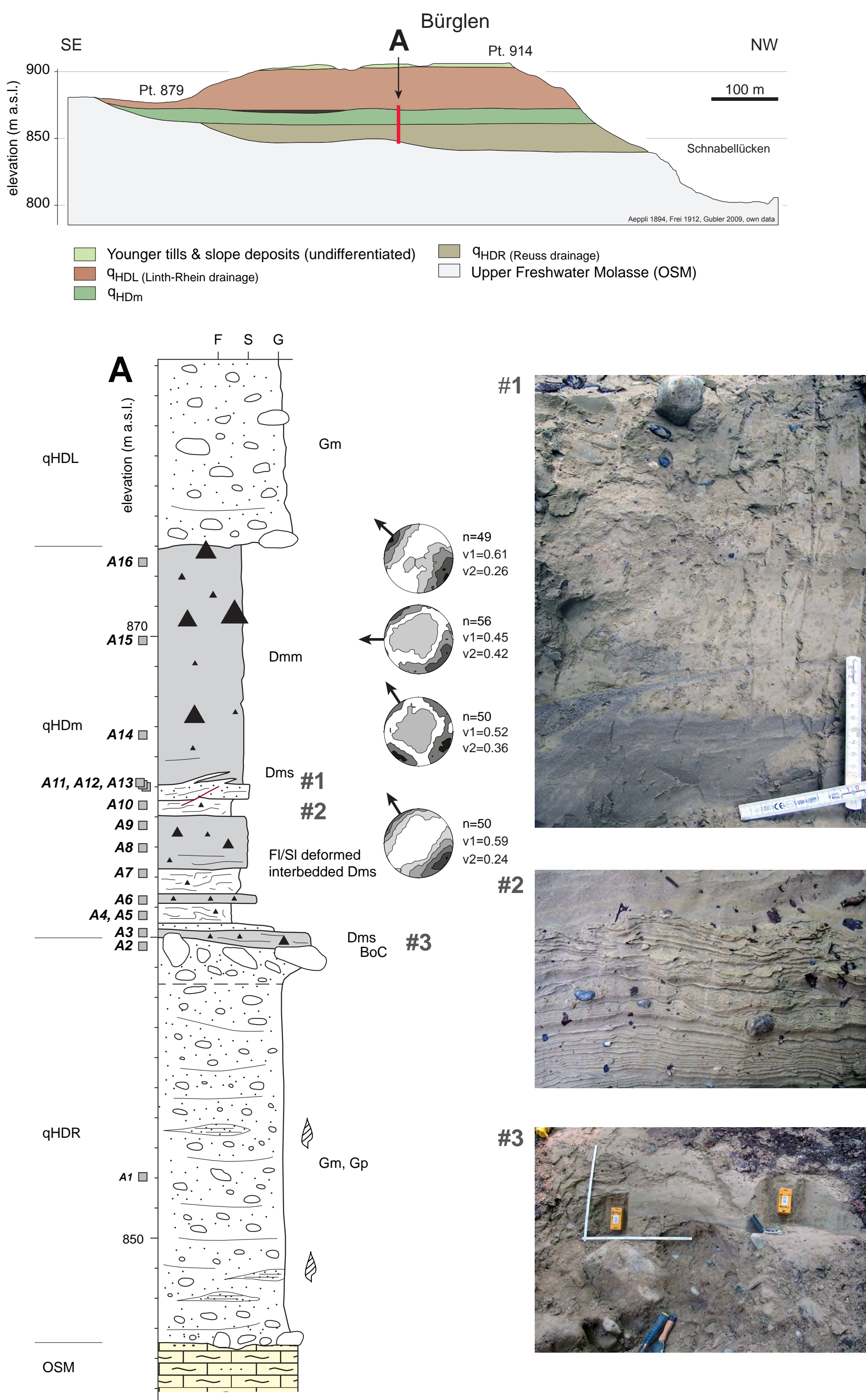
common observations ↑
indirect evidence ↓
rare observations ↓
direct evidence ↑

- Glaciofluvial deposits
- Erratic boulder (glacial lag deposits)
(e.g. TDS: Iberig/Bruggerberg, Rhinsberg; HDS: this study, Dürn, Strengbrunnen)
- **Glacial deposits (this study)**
(e.g. TDS: Iberig, Schienerberg, Stammerberg; HDS: this study, Hagenfirst, Hohrain)
- Glacial basins & fills
(e.g. TDS: Schienerberg, Stammerberg; HDS: Uetliberg?, Bürglen?)



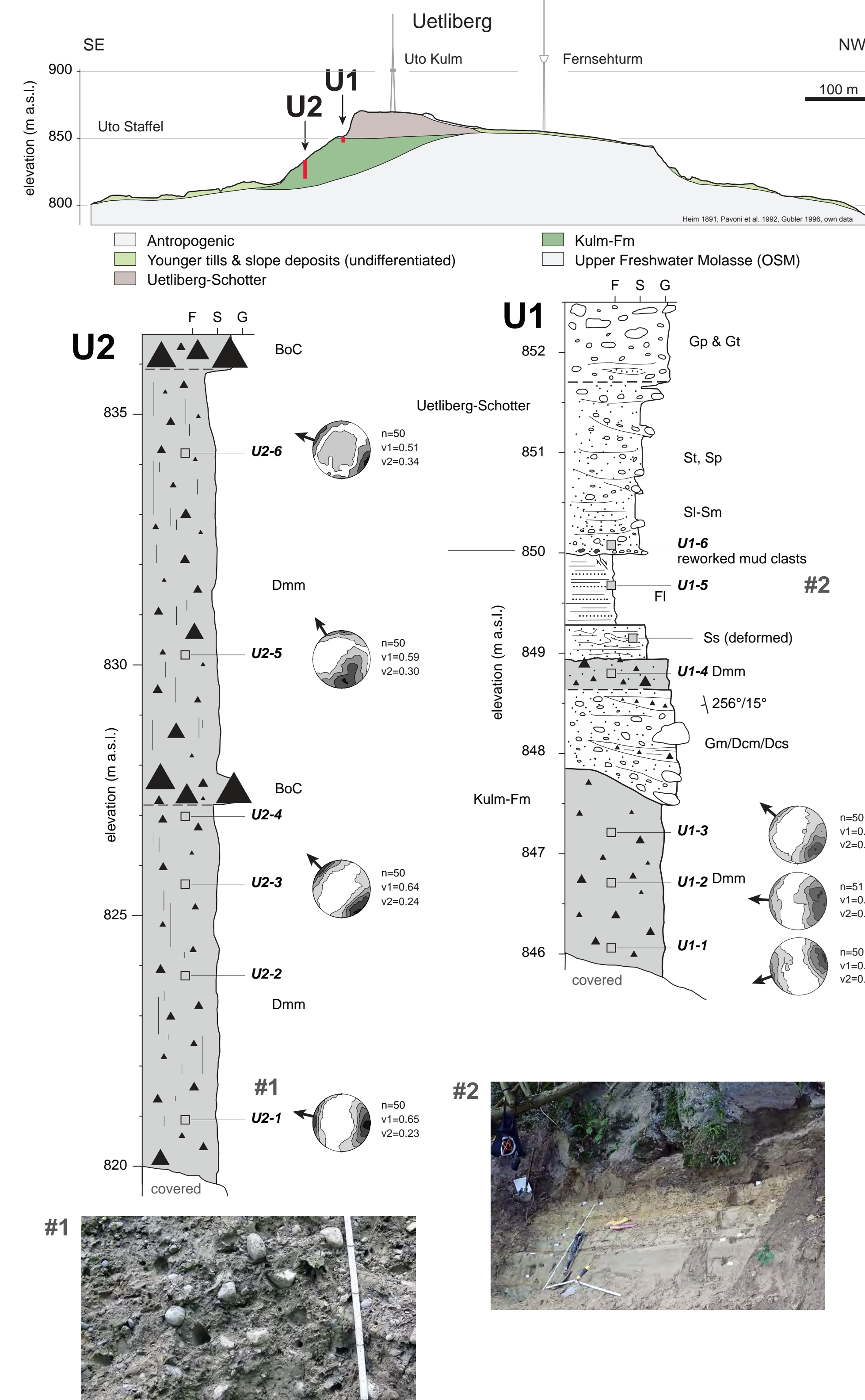
First tills and slope results for three Höhere Deckenschotter sites

1 Bürglen (Albis)



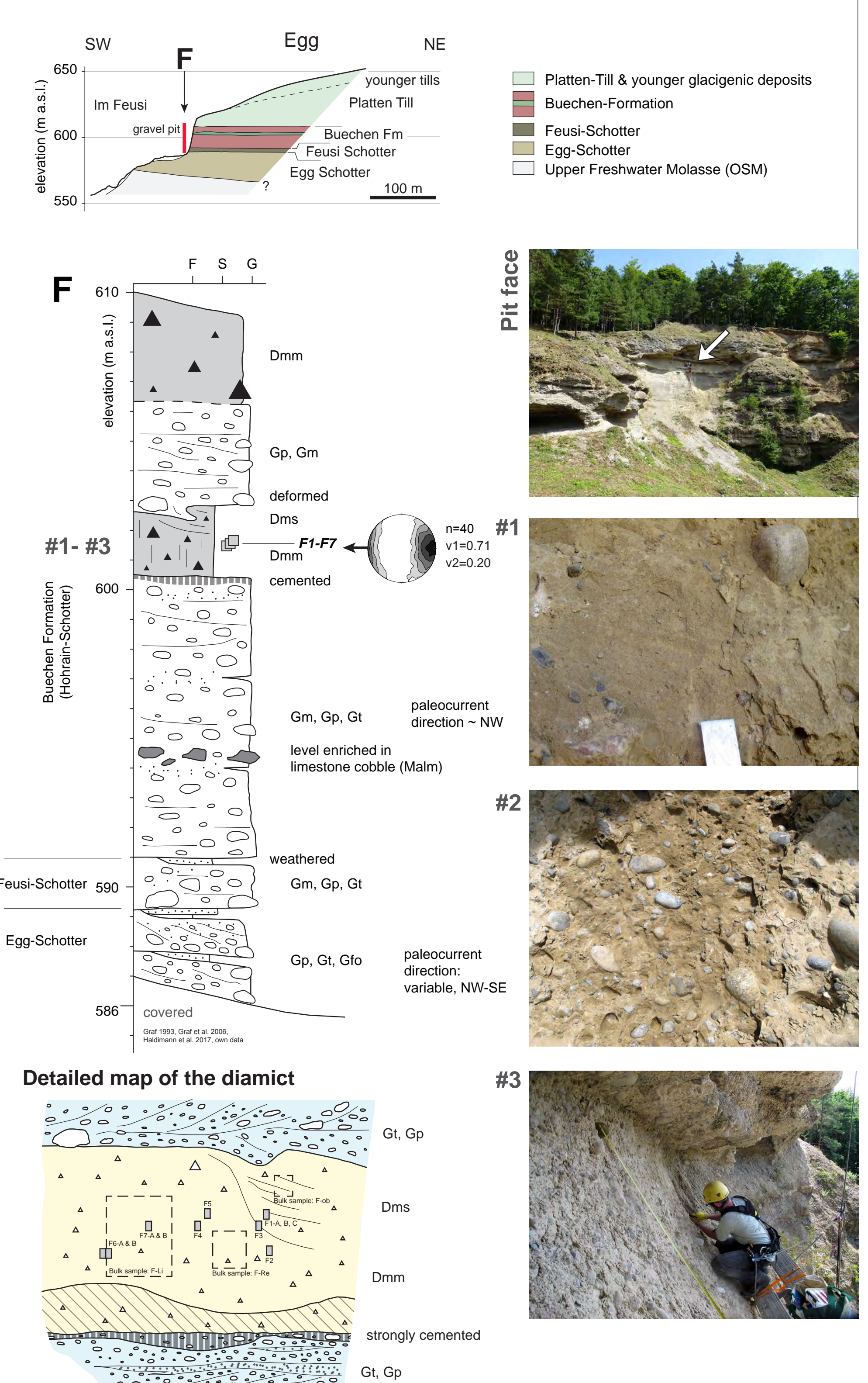
- Section with fluvial (bottom) and glaciofluvial (top) gravel
- Interbed of glaciolacustrine deposits with variable degree of deformation (silt & sands interbedded with stratified diamicts from subaqueous debris flows)
- Interbed of matrix-supported glaciogenic diamicts (~10 m thick)

2 Uetliberg



- Matrix-supported glaciogenic diamicts, up to ~40 m thick (?) resting on inclined bedrock surface
- Top erosionally cut, infilled with deltaic to lacustrine deposits
- Overlain by upward-coarsening glaciofluvial gravels (Uetliberg-Schotter, HDS)

3 Gravel pit Feusi

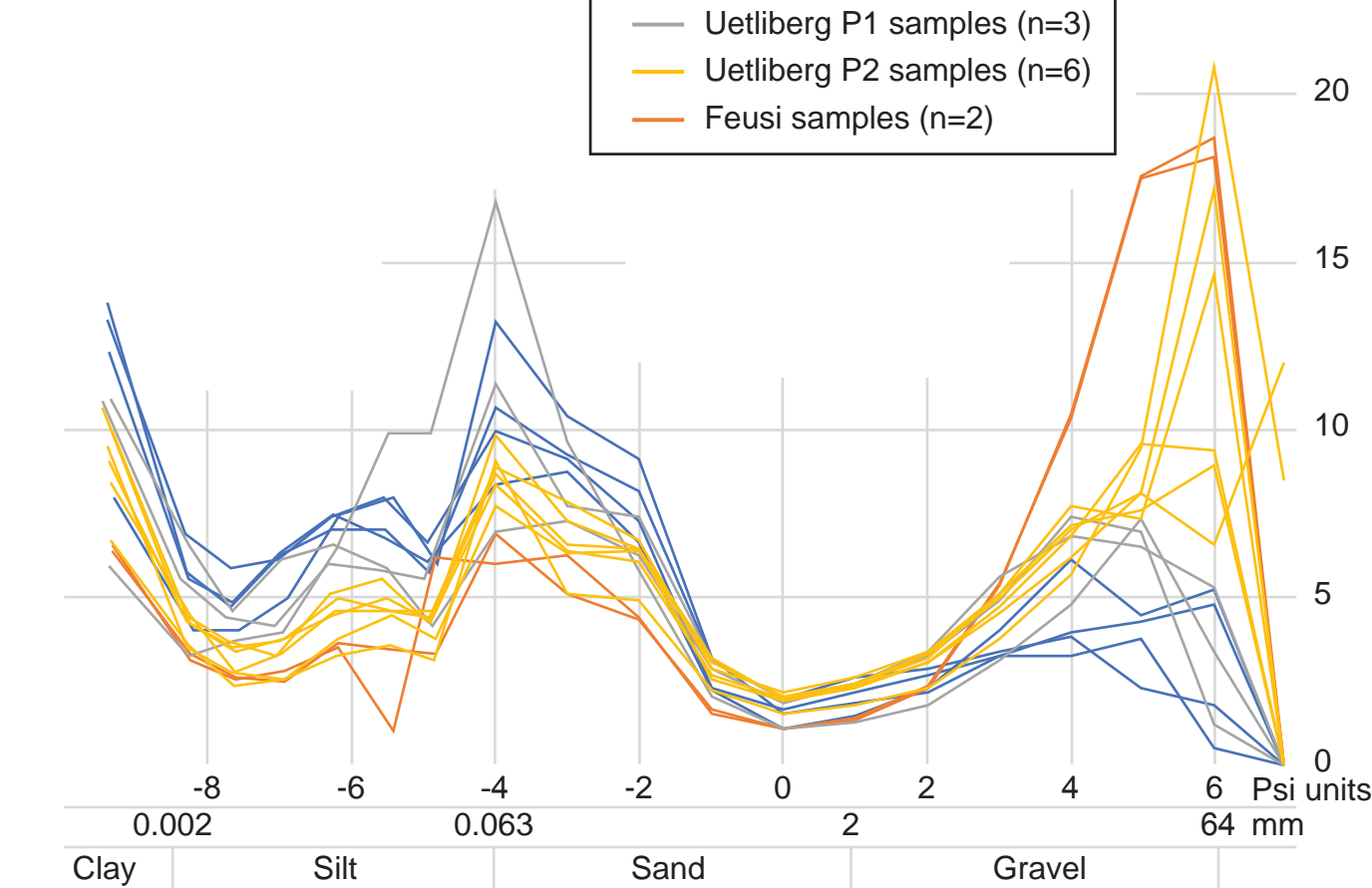


- Glaciogenic diamict, clast-rich, laterally thinning
- Diamict is massive at base and crudely stratified and convoluted with hanging gravel
- Diamict likely from an outrunning glaciogenic debris-flow

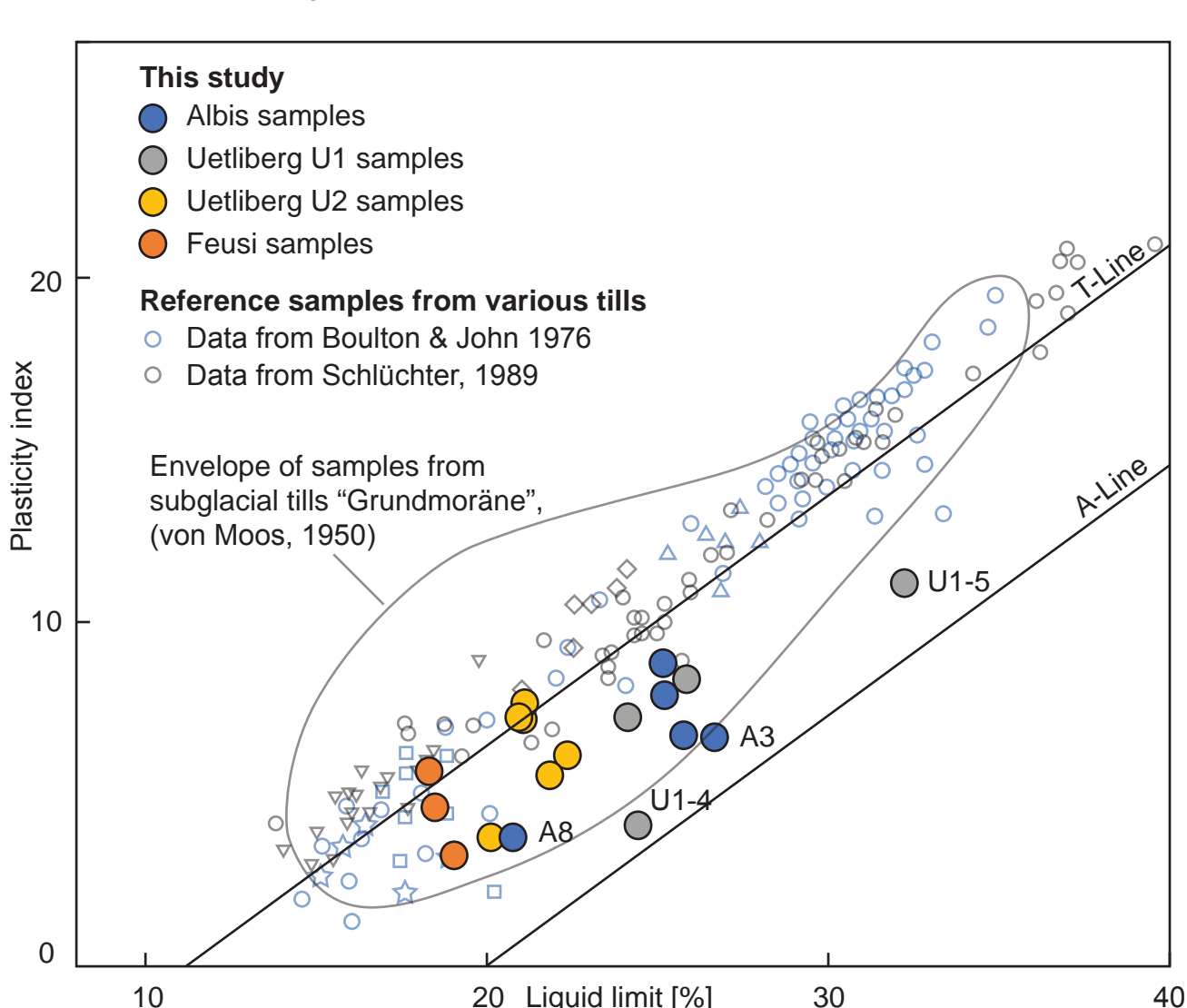
Ongoing analysis

Geotechnical characterisation

Grain size analysis



Consistency limits



Clast & provenance analysis

Striations, faceted shape, break-outs indicative for glacial transport prior to deposition



Clast with glacial striations and pressure solution pits indicating Molasse origin

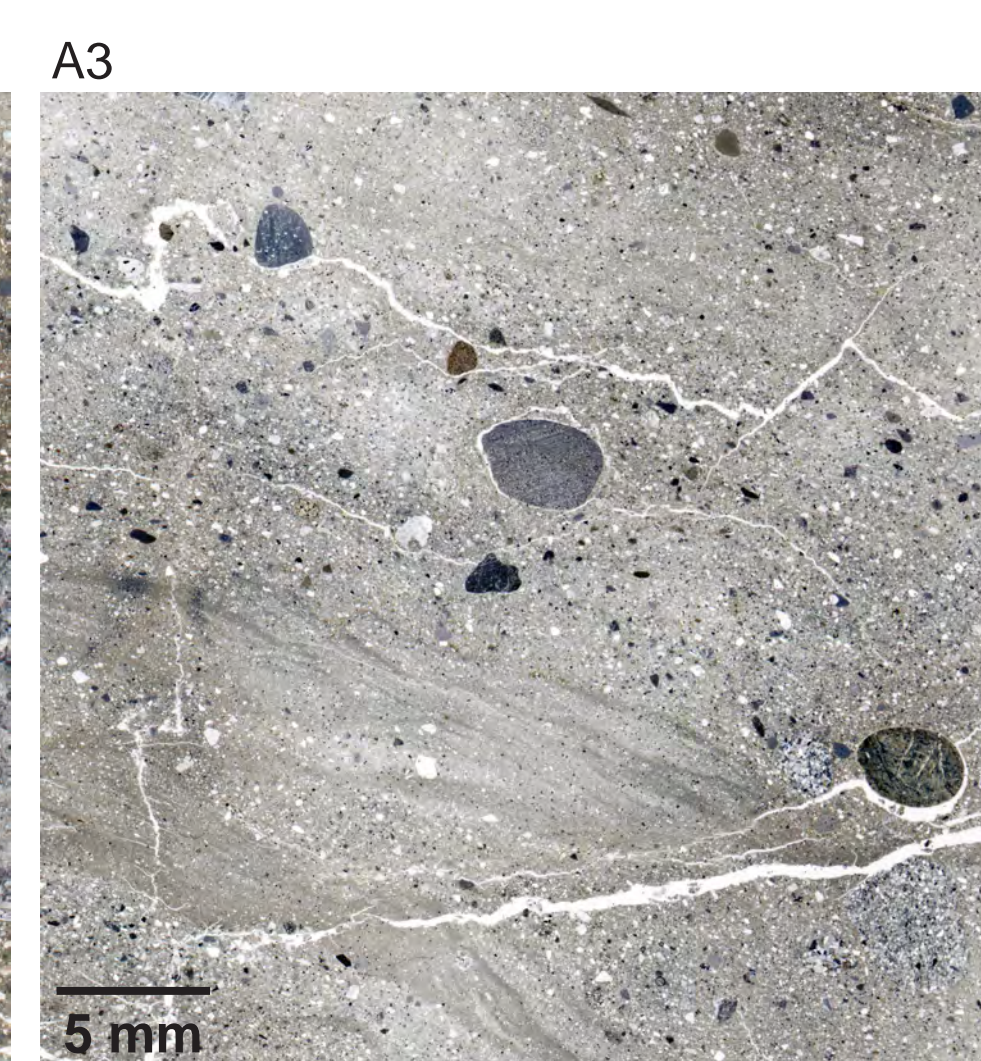


Thin-section analysis

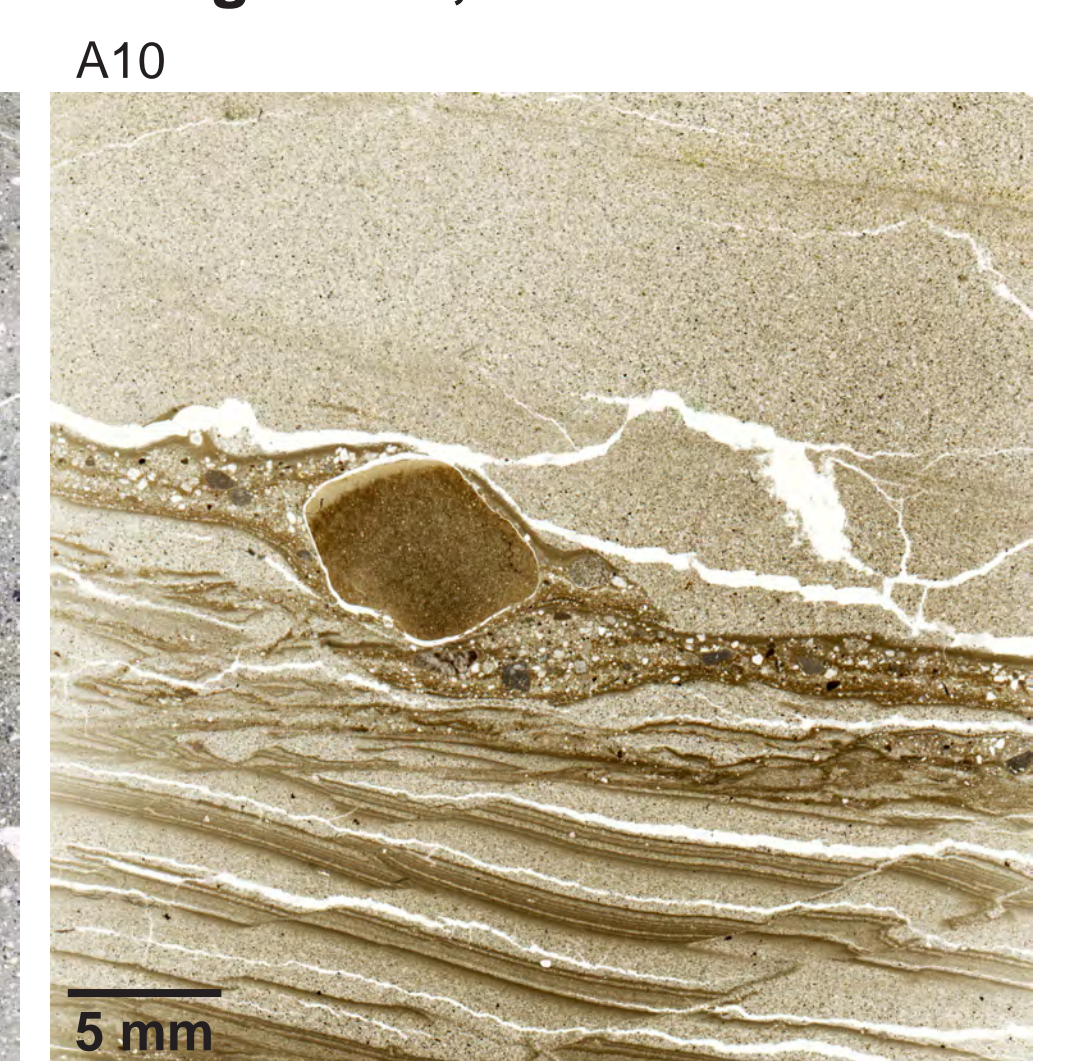
Massive diamict facies



Stratified diamict facies



Fine-grained, laminated facies



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The Höhere and Tiefere Deckenschotter Groups of Northern Switzerland are dominated by fluvial to fluvio-glacial sediments. In some outcrops, the gravelly facies is associated with diamictites interpreted as glacial tills (e.g. Heim 1891, Frei 1912, Graf 1993). Despite the importance of these presumed glacial deposits as markers of ice-contact during the Early Pleistocene, they remain relatively poorly studied. We present results from an ongoing project to better constrain the depositional environment of these diamictites at selected key sites using detailed macro- to microscale sedimentology, fabric and geotechnical analyses. Our analyses will help to better constrain the extent and characteristics of glacier advances related to the first extensive glaciations of the Alps.

REFERENCES

Heim, A. 1891: Die Geschichte des Zürichsees. Neujahrsblatt der Naturforschenden Gesellschaft Zürich 93, 1-16.

Frei, R. 1912: Monographie des Schweizerischen Deckenschotter. Beiträge zur geologischen Karte der Schweiz 37 (N.F.).

Graf, H. R. 1993: Die Deckenschotter der zentralen Nordschweiz. PhD Thesis, Diss. ETH Nr. 10205.