The sturzstrom event of Feld (Matrei/Eastern Tyrol/Austria): A forgotten disaster during early human settlement in the Alps?

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As sturzstrom (rock avalanche) events in the Alps have been rare within human history, they are widely underestimated regarding their possible impact. Understanding the process – the geological and geomorphological boundary conditions, the triggering mechanism (e.g. climate, earthquakes) and dynamics – is crucial for the identification of Alpine areas that are at risk.

The sturzstrom deposit of Feld (min. 0.7 km^2) lies within the narrow part of the Isel valley, a major S-N running Alpine lifeline. The outcrops show a matrix-supported diamictic facies with angular boulders of amphibolite and gneiss with a diameter of up to 1m "swimming" in a matrix of sand to fine gravel size. The maximum block size on the surface ranges from 5 to 20 m^3. The lithology of the rocks pinpoints to a provenance from the steep backwall of the northern part of the cirque of the Rotenkofel (2762 m a.s.l.) (Linner, 2003). Considering the minimum travel distance and the lowest occurrence of the deposits (~ 930 m a.s.l.) the former sturzstrom is characterised by an overall slope angle (Fahrböschung; β) of ~ 18-19°. Based on the diagrams (tanβ versus volume) by Erismann & Abele (2001) and on first field estimates a volume of the sturzstrom event of ~ 0.01–0.02 km^3 seems to be a realistic assumption.

According to a first model of event reconstruction the failure was preceded by creep deformation. Immediately within the first phase of the sturzstrom a total disintegration of the collapsed mass and thus a fluidisation occurred. Funnelled by a tributary valley the downward moving mass collided with the opposite flank of the Isel valley and split in two branches, up and downstream of the Isel valley. The sturzstrom blocked the Isel resulting in impounding a lake in the Matrei Basin upstream of the sturzstrom deposit. Nothing has yet been known regarding the timing of the event as well as the duration of the damming. On the basis of geomorphological investigations Veit (1988) argued for a lateglacial event. In order to address this open question we followed two dating approaches: (i) Surface

exposure dating (SED) of sturzstrom boulders. (ii) Radiocarbon dating on organic material found in a 20 m long sediment core in the backwater area.
The first SED-results of 4 boulders date consistently within Roman to early medieval times and thus imply a historic sturzstrom event. Radiocarbon dating from lake deposits is in progress. It has to be emphasised, that this part of the Isel valley belonged to the major Alpine traverse via the Felber Tauern since the Roman times and before. It is therefore surprising that no documents or myths exist about this event. According to our first hypotheses this natural disaster happened during the "Migration Period" following the end of Roman authority, when a severe change of population occurred within the Alpine valleys (Stadler, 2006). As a result the written documentation related to the Alpine region ceased for hundreds of years.
Our first results of this investigation fill a gap in the history of human settlement of Eastern Tyrol. However, a combination of geoscientific and historian investigation methods is needed to further constrain the timing sturzstrom event and its impact on ancient society and traffic.

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