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From kinematics to dating - the sturzstrom deposit of Feld (Matrei/Eastern Tyrol/Austria)

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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 and thus resulting provisions.

The sturzstrom deposit of Feld with its minimum area of 0.7 km^2 lies within the narrow part of the Isel valley, a major S-N running Alpine lifeline, a pipeline and important power supply lines. It shows a rudimentary fan-like morphology with a maximum thickness of 80-100 m in the center. According to outcrops along the Isel river the main sediment body shows a matrix-supported diamictic facies with angularboulders of amphibolite and gneiss with an 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). Thus according to the minimum travel distance and the occurrence of the deposits at the lowest elevation ($\sim$ 930 m a.s.l.) the former sturzstrom is characterised by an overall slope angle (Fahrböschung; β) of $\sim 19^{\circ}$. According to the diagrams (tanβ versus volume) of Erismann & Abele (2001) this data indicates a volume of the sturzstrom event of $\sim$ 0.01 – 0.02 km^3, a dimension which seems to be reliable on the basis of first field estimations.

According to a first model the failure was preceded by creep deformation accompanied

by tension gaps along tectonic structures which are still visible in the cirque. Immediately within the first phase of the sturzstrom, which was characterised by a more or less falling motion, a total disintegration of the collapsed mass and thus a fluidisation occurred. Funneled 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 is yet known regarding the timing of the event as well and 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 that was found in a 20 m long sediment core in the backwater area as low as 18 m below the surface. This will allow testing the surface exposure dating results. The organic material we found indicates a Holocene occurrence of this rapid mass movement. First SED and ^{14}C results will be presented at the meeting.

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Linner, M., 2003: Bericht 2001 über geologische Aufnahmen in den Deferregger Alpen und in der Granatspitzgruppe auf Blatt 179 Lienz. Jahrbuch Geologische Bundesanstalt, 143, 444-453, Vienna.