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3-D structural modelling of normal faults in unconsolidated sediments (SW Vienna Basin, Austria)

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Fault mapping and ground penetrating radar (GPR) measurements were carried out near a gravel pit located at St. Margarethen, Burgenland, Austria. The investigated area is located at the eastern margin of the Eisenstadt Basin, a subbasin of the Vienna Basin. In the gravel pit a Middle Miocene succession consisting of layers of conglomerates, sandy conglomerates, fine-grained sands and silts with variable thicknesses between 1 and 4 meters are exceptionally well exposed along a $\sim$10m high W-E striking wall. The unconsolidated sediments are cut by numerous roughly N-S striking high angle normal faults, offsetting, dragging and tilting the sedimentary layering.

The mapped normal faults occur either as isolated segments, as sets of high-angle faults dipping in the same direction or as conjugate fault sets. Displacements magnitude (from centimetres up to several meters) varies significantly between the different fault sets, but also along the individual fault traces. Three different types of host rock deformation can be observed: (i) Normal drag along sets of normal faults dipping into the same direction. (ii) Reverse drag of horizontal layers cut by isolated high-angle normal faults and (iii) tilting of blocks between closely spaced normal faults or conjugate sets of normal faults.

Several sections parallel to the outcrop wall and perpendicular to the faults were investigated with GPR applying centre frequencies ranging from 20 MHz to 80 MHz. Structural and lithological observations from the quarry walls support the interpretation of the radargramms.

Three-dimensional fault models were constructed from the results of fault mapping

and from georeferenced two-dimensional radargrams using the structural modelling software GOCAD. Line based fault and horizon mapping was applied in order to generate triangulated fault planes and sedimentary horizons. The three-dimensional structural fault models can be further investigated calculating and contouring geometric parameters like curvature of fault planes and marker horizons, fault dip or displacement magnitude of faulted horizons.