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Pleistocene structures and geomorphology in the southern and central Vienna Basin

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The active Vienna Basin Transfer Fault system is related to the formation of several Pleistocene basins with depths of up to 170 m (e.g. Mitterndorf and Lassee Basin) and areas covering up to 270 km^2. Detailed fault and geometric information of these Pleistocene basin's as well as the impact of faulting on the recent geomorphology of the Vienna basin is very limited. Evidences are derived from sparse outcrop and geophysical data. Geophysical surveys covering the first 300 m below ground are limited to data from drillings and to data of few geoelectric measurements. In this study we present a technique using conventional Bouguer gravity data derived from hydrocarbon exploration surveys to obtain precise fault data and show the linkage between normal faults and geomorphology

Different first order derivates of gravity data are used to precisely determine shallow fault locations. The obtained fault locations are validated against geophysical and geological data such as 2 D, 3 D seismic, geoelectric, drill log information and outcrop data. Using this technique a new and considerably more accurate model of Austria's largest Pleistocene Basin, the Mitterndorf Basin, was developed, demonstrating the kinematic (sinistral, pull apart basin) impact on the basin geometry and on fault activity during the Pleistocene. We also show the impact of Plio- to Pleistocene tectonics in a more regional framework, along the Danube in the southern and central Vienna Basin and the evolution of the Eisenstadt Basin at the transition to the Pannonian Basin. Results demonstrate the major impact of faults on landscape development. The precise constrain of near surface faults allowed to link diverse geomorphologic features to a tectonic origin such as scarps, grabens, valleys and erosional gullies. We suggest that this technique would be suitable for many continental basins where shallow lithological density contrasts do occur (i.e. marine to fluvial sediments).