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Fault patterns and fault-controlled topography at a releasing bend of the Vienna Basin Fault System

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The sinistral active Vienna Basin Fault System (VFB) extends from the Eastern Alps through the Vienna Basin into the West Carpathians. It consists of several strike slip segments which differ both in their kinematic and seismologic properties. Seismic mapping of a grid of 2D seismic lines crossing a releasing bend of the VBF 30 km east of Vienna (Lassee Segement) depicts a negative flower structure, which developed during the Middle and Upper Miocene. The segment was reactivated during the Quaternary leading to the subsidence of a basin on top of the flower structure and the accumulation of up to 120 m thick Pleistocene growth strata.

The flower structure strikes about NE and shows an array of concave-up oblique sinistral-normal faults, which are separated by relay ramps at shallow depth. These en-echelon faults confine the 5-8 km wide Pleistocene basin and converge to depth into a common master fault. Major branch lines are located between 3500 and 5500 m depth preferably occurring at the interface between pre-Neogene basement and basin fill. The distribution of Quaternary thickness along the flower structure seems to be linked with the depth of the major branch. Accordingly, shallow branching is associated with higher Quaternary sediment thickness within the releasing bend. The master fault is thought to root in the basal detachment of the Alpine-Carpathian floor thrust at some 8 km depth. The general shape of the basin between the branch faults is asymmetric with greater amounts of vertical displacement and thick Miocene growth strata at its SE margin. The total displacement there is distributed over a $\sim$ 600-800 m wide zone, which includes several faults spaced at distances of some 100 m. The total vertical displacement across the NW boundary of the flower changes varies strongly along strike.

Geomorphologic data proves that Pleistocene landscape evolution is partly controlled by faulting along the flower structure. Pleistocene deformation is documented by tilted and offset Pleistocene river terraces and the formation of composite fault scarps with several incised hanging valleys. Scarp morphologies seem to be controlled by the en-echelon arrangement of underlying splay faults and the presence of relay ramps between individual faults.