LOCATING NEOTECTONIC FAULTS BY GPR AND REFLECTION SEISMICS

R. Gegenleitner (1), R. Hinsch (2), E. Brückl (1), K. Decker (2) and K. H. Roch (1)
(1) Institute of Geodesy and Geophysics, Vienna University of Technology, (2) Institute of Geology, University of Vienna, Vienna, Austria

Ground penetrating radar (GPR) and shallow reflection seismics were applied in order to locate the outcrops of neotectonically active faults. These measurements were supplemented by electromagnetic resistivity mapping and a gravity survey. The target was a suspect fault scarp in the southern Vienna Basin between the Alps and the Carpathians. Quaternary to recent fault activity along a regional sinistral strike-slip fault is documented by moderate seismicity, tilted river terraces and up to 150 m deep Quaternary basins. The investigated SE-NW striking scarp separates elevated Miocene sediments from thick gravels of a local Quaternary basin (Mitterndorf Basin). The interpretation of an industrial 3-D seismic data show the scarp is underlain by a branching fault system of a negative flower structure (Hinsch & Decker, 2003).

The geophysical measurements were carried out along lines of a total length of 4.5 km. 100 MHz and 20 MHz antennas were used for the GPR measurements, the reflection seismics had a station spacing of 5 m and a nominal 42-fold coverage. The gravity survey was carried out with a Scintrex CG3, the electromagnetic resistivity mapping with a Geonics EM34. In general, processing of the geophysical data followed standard procedures. For GPR a technique was applied to separate reflected signals through the air from the relevant subsurface reflections. This technique was essential for the data of the unshielded 20 MHZ antenna.

The GPR survey with the 100 MHz and the 20 MHz antenna and the shallow reflection seismic survey yielded information for the following depth intervals: 1-4 m, 4-15 m and 15-400 m. The industrial seismic sections may be interpreted in depths >300 m. By an integrated interpretation potentially active faults are identified in the different depth ranges from the surface down to approximately 2000 m. The
supplementing resistivity and gravity data support these interpretation of active faults.

Hinsch, R., Decker, K., 2003, 3-D mapping of segmented active faults in the Vienna Basin from integrated geophysical, geomorphological and geological data, EGS-AGU-EUG Joint Assembly, Nice, France, 06 - 11 April 2003