

Integrating ERT and other near-surface geophysical techniques for the investigation of a maar structure near Neualbenreuth (Eastern Bavaria, Germany)

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With the existence of the Quaternary Mýtina Maar at the Germany Czech border that was proven in 2007, further geophysical prospecting for a maar structure nearby was carried out at a morphological depression 4 km SE of the Mýtina Maar and close to the village of Neualbenreuth (NE-Bavaria, Germany, Figure). Several ERT-profiles were measured across the area of interest in a concentric arrangement and clearly revealed a zone of 350-400 m diameter with low resistivity material of 50-250 Ohmm encircled by high-resistive rocks of at least 2000 Ohmm in the subsurface. Additional results from refraction seismics and gravity surveying supported the interpretation of a bowl-shaped depression in the quartzitic bedrock of at least 100 m depth that is filled with low velocity and low density material.

In 2015, drilling successfully recovered a drill core from an area the geological depression was considered to have its deepest center. A widely continuous stack of laminated organic poor sediments that are characteristically for maar-lake sediments could be established from core analysis to a depth of at least 100 m. This undermined the majority of results from integrated geophysical surveying that had been carried out before and gave an additional and fundamental piece of evidence for the existence of a maar structure.

With the Cheb Basin as an area of earthquake swarm and hidden magmatic activity being located only ca. 30 km from Neualbenreuth, the presented results argue for future geophysical prospecting in search of other maar volcanoes, considering the potential for future hazard (volcanic/phreatomagmatic eruptions) in Eastern Bavaria and the Cheb Basin area.

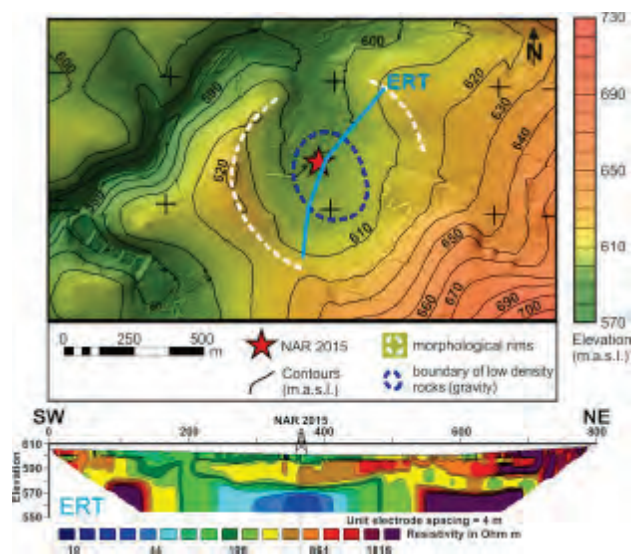


Figure: Digital elevation model with morphological rim of the inferred maar structure, zone of low density rocks, drill hole NAR 1 and outline of a single characteristic ERT-profile (top). ERT-profile that shows the distribution of low resistivity material surrounded by high resistive rocks in the subsurface (bottom).