Seismic structure of the Cheb Basin from high resolution surveying – data quality assessment and first results

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In this study we present data and preliminary results from several shallow high-resolution seismic surveys in the Cheb Basin, CR, a small intracontinental basin in the North-West Bohemian Massif, located at the Western end of the Cenozoic Eger Rift. The area is well known for its intense earthquake activity, with the largest instrumentally recorded magnitude of $M_\text{L}=4.6$. Macroseismic reports of local seismicity date back to the early 19th century, with magnitudes possibly above 5. Quaternary volcanoes, CO$_2$-rich moffettes, and the swarm-like occurrence of the earthquakes suggest they are being triggered by crustal fluids. In contrast, most focal mechanisms show a dominant strike-slip component, indicative of tectonics. Investigating the role of fluids in triggering those earthquakes is one of the objectives of an ongoing ICDP program.

We expect high-resolution images of the basin structure to provide additional constraints regarding the importance of tectonic faulting. To that end, we surveyed several up to 3-km-long reflection and refraction profiles in the basin center across the putative Počátky-Plesná Fault, and at its edge, across the basin-bounding Mariánské Lázně Fault. The up to 350-m-thick basin sediments are mostly of Miocene and Quaternary origin, overlying Paleozoic Variscan units and post-Variscan granites. The main reflectors are around 200-400 ms. The data were collected with a 500-m-long split-spread of single geophones at 2 m spacing, and the raw shots are dominated by ground roll. In this presentation, we will show an overview of the field campaigns and present first results.