Geoelectrical investigations at a planned ICDP drill site in the geodynamic active Eger Rift to understand subsurface CO2 migration processes

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keywords: migration of geogenic CO_2, mofettes, ERT

The western Eger rift area (West Bohemia/CZ and Vogtland/D) is characterized by ongoing magmatic processes in the intra-continental lithospheric mantle. These processes take place in absence of any presently active volcanism at the surface. However, they are expressed by a series of geodynamic phenomena like occurrence of repeated earthquake swarms and surface exhalation of mantle-derived and CO_2-enriched fluids in mofettes and mineral springs. The focus of the recently started ICDP project "Drilling the Eger Rift" is to understand the processes underlying the generation of swarm earthquakes in relation to the fluid/CO_2 ascent and movement in the subsurface ("fluid triggered lithospheric activity") supported by a proposed network of boreholes which serve different monitoring aspects (seismological, fluid, microbiological).

During the last decade, intensive geoelectrical investigations (ERT, SP), combined with other geophysical and soil gas methods, had been conducted especially in the area of the Hartoušov-Bublak mofette field (Flechsig et al., 2008; Kämpf et al., 2013; Nickschick et al., 2015 and 2017) to get insight in fluid movements and their tectonic control. Distinct resistivity anomalies in the subsurface below the strong degassing areas have been revealed. These anomalous areas are most likely related to the force behind fluids' ascent and consecutive sediment alteration and/or transport linked with the migration of the CO_2-rich fluids on deep seated faults. ERT (and gravity surveys) also support the theory of a significant change in the lithological composition between eastern and western flank along the PPZ fault zone, that it is still active up to this day. This fault zone of several tens of kilometres seems to play a major role in the regional tectonic frame (Nickschick et al., 2015).

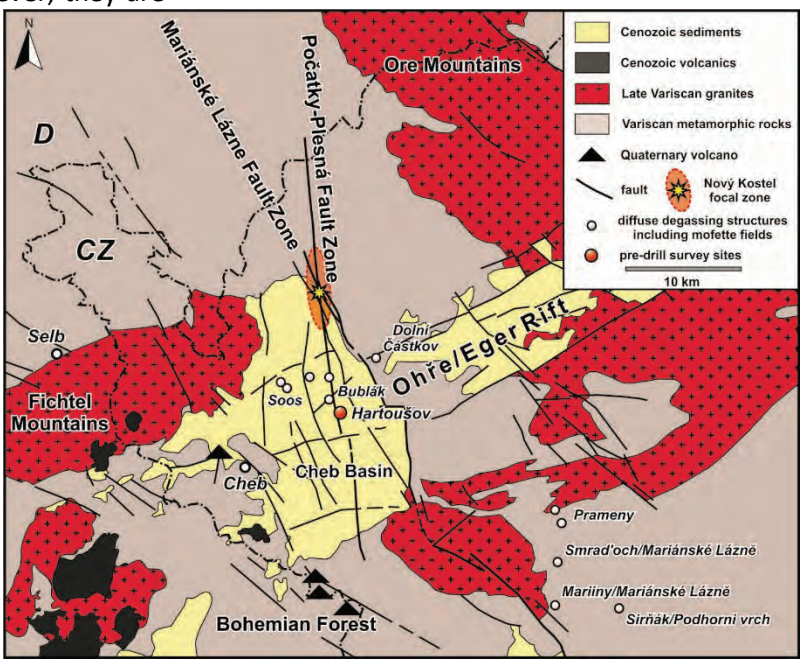

Figure: Geological map of the Cheb Basin and surrounding with locations of degassing areas of magmatic CO_2, Quaternary volcanoes and the recent swarm earthquake focal zone near Novy Kostel (based on Flechsig et al. 2008 and Bussert et al., 2017).

REFERENCES

Flechsig et al. ZGW 2008; Kämpf et al. Chem. Geol. 2013; Nickschick et al. IJES 2015 and IJES 2017; Bussert et al. Sci. Drill. 2017