ACTIVE MAGMATIC UNDERPLATING IN AN INTRAPLATE SETTING: COMBINED SEISMIC, SEISMOLOGICAL, AND ISOTOPE STUDY IN WESTERN EGER RIFT, CENTRAL EUROPE

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The Eger Rift is an active element of the European Cenozoic Rift System. It is associated with the intense Cenozoic intraplate alkaline volcanism and system of sedimentary basins. The intracontinental Cheb Basin at its western part displays concurrent geodynamic activity with fluid emanations, persistent seismicity, Cenozoic volcanism, and neotectonic crustal movements at the intersections of major intraplate faults. The CO_2-rich gases have increased helium isotope ratios evidencing their lithospheric mantle origin.

Active and passive seismic data show increased lower-crustal velocities, which points to the magmatic addition at the base of the crust and to a concept of magmatic underplating. However, character of the seismic image differs laterally, which enables to differentiate two types of the magmatic underplating related to its different timing and tectonic setting. High-velocity lower crust with increase seismic reflectivity evidences the first type of magmatic underplating related to Variscan or pre-Variscan age westward of the Eger Rift. High-velocity reflection-free lower crust together with a strong reflector at its top at depths ~28-30 km forms a lower-crustal magma body. Lateral extent of this body correlates with the distribution of mantle-derived fluid emanations at the surface.

The seismic and seismological evidence of the crust/mantle Moho transition is supplemented by gas-geochemical investigation and xenolith studies from corresponding depths and indicates that the second type of magmatic underplating is of the Late Cenozoic to recent. In the same way, different behavior of fluids in the Cheb Basin with the highest isotope mantle fractions together with Quaternary volcanism points to the ongoing magmatic activity within the broader Late Cenozoic magmatic body and its reactivation in the last 0.3 Ma during Mid Pleistocene to Holocene.