



Tectonic inheritance of Variscan boundaries in mantle lithosphere and their imprint in topography of Eger Rift (central Europe)

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Tectonics of the mantle lithosphere plays important role in topography of the Eger Rift (ER) in the western Bohemian Massif. The region is known by a present-day geodynamic activity manifested by earthquake swarms, neotectonic crust movements and emanations of CO₂ dominated gases of mantle origin. Deep structure can be characterized as junction of three domains of mantle lithosphere with different olivine fabrics revealed by consistent orientations of seismic anisotropy. The domains represent mantle components of the major tectonic units (micro-plates): Saxothuringian (ST), Teplá-Barrandian (TB) and Moldanubian (MD), which assembled during the Variscan orogeny. The variable rift structure and morphology depend on the character of the pre-rift suture between the northern ST unit and the TB/MD units in the southern rift flank. The proper rift with typical graben morphology has developed above the steep lithosphere-scale suture between the ST and TB units. The suture is marked by an abrupt change in the mantle fabric and sharp gradients in regional gravity field and in metamorphic grade. The secular TB-side-down normal movement is reflected in deep sedimentary basins, which developed since the Carboniferous to Cenozoic and in topography. The graben morphology of the ER terminates above the “triple junction” of the ST, TB and MD mantle lithospheres, where the Cheb Basin (CHB) developed. The junction is characterized by offsets of surface boundaries of the tectonic units from their mantle counterparts indicating a detachment of the rigid upper crust from the mantle lithosphere. Though the CHB is located within the ST crust domain, which is thrust over the ST/TB mantle junction, it is the mantle suture, which controls the basin shape and its development through the allochthonous ST crust. The most subsided parts of the ER and CHB developed above the centre of the mantle transition, whereas a well expressed morphology developed above its flanks. Our study documents a long memory of the mantle lithosphere assembly inherited from the Variscan orogeny.