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# Petrochronological and structural arguments for upper plate thickening and relamination of the lower plate buoyant material in the Variscan Bohemian Massif

Vít Peřestý (1), Robert Holder (2), Ondrej Lexa (1), Martin Racek (1), and Petr Jeřábek (1)

(1) Institute of Petrology and Structural Geology, Faculty of Science, Charles University in Prague, Czech Republic (vit.peresty@natur.cuni.cz), (2) Department of Earth Sciences, University of California, Santa Barbara, USA

Recent tectonic models for the Variscan evolution of the Bohemian Massif emphasize the role of Rayleigh-Taylor instability for the 355-340 Ma evolution of the Moldanubian domain. This model is based on the presence of weak, low-density felsic material tectonically underplating a high-density mafic layer and its subsequent gravity-driven overturn. However, earlier phases of the Variscan orogeny concerning the emplacement of felsic low-density material to the base of the upper plate are so far poorly documented. We contribute to this problem by deciphering of polyphase early-Variscan (∼375 Ma) deformation and metamorphism close to the main Variscan suture. Detailed structural, pseudosection and microstructural analyses combined with LASS monazite dating were carried out in metapelites along the western margin of the upper plate represented by the Teplá Crystalline Complex (TCC). This region is represented by a ∼25 km wide deformation zone with E-W metamorphic gradients associated with two distinct early-Variscan events (∼380-375 and ∼375-370 Ma). The first compressional event produced a vertical NNE-SSW trending fabric and a continuous and prograde Barrovian metamorphic sequence ranging from biotite to kyanite zones at a field geotherm of 20 to 25 °C/km. Subsequently, a gently SE dipping normal shear-zone associated with retrogression develops along the base of the TCC. This sub-horizontal fabric shows normal metamorphic zonation ranging from sillimanite, biotite to chlorite zones and indicates vertical shortening related to unroofing of high pressure metabasites of the underlying Mariánské-Lázně Complex. The first metamorphic fabric is interpreted to result from early thickening of the upper plate during continental underthrusting of Saxothuringian continent (380 to 375 Ma) while the second deformation and metamorphism (∼370 Ma) reflects vertical shortening produced by buoyant uplift of accreted Saxothuringian felsic crust. This event is the unique yet indirect testimony of relamination mechanisms governing further evolution of the orogenic lower crust in the Bohemian massif.