Abstract

The principal goal of the thesis is to examine the tectonic evolution of the Teplá–Barrandian unit (TBU) of the central Bohemian Massif from Cadomian subduction and active margin processes, through Cambro–Ordovician extension to Variscan terrane collisions. The thesis is based on extensive field research, detailed structural mapping, and structural analysis, combined with other analytical methods such as the anisotropy of magnetic susceptibility (AMS) coupled with an analysis of magnetic mineralogy, analysis of deformational microstructures, and U, Th and Pb isotope analyses carried out by laser ablation – inductively coupled plasma–mass spectrometry (LA–ICP–MS).

The most important conclusions of the thesis are as follows.

(1) The Neoproterozoic (Cadomian) basement of the Teplá–Barrandian unit reveals a complex structure and mostly unclear stratigraphic relations of its components. It was proposed that this unit exposes perhaps the best preserved fragment of an accretionary wedge of the whole Avalonian–Cadomian belt, represented by the newly defined Blovice Complex. In the central part of the TBU, this complex consists of three lithotectonic belts differing in style and intensity of deformation, magnetic fabric, and degree of Cadomian regional metamorphism. In addition, the central Radnice–Kralupy belt is interpreted as a complex of Franciscan-type mélanges of dual, sedimentary and tectonic origin.

(2) The Cambro–Ordovician rifting following the cessation of the Cadomian subduction and causing the break-up of the northern margin of Gondwana was also recorded in the Barrandian area of the TBU. Directions of the principal crustal extension during the Cambro–Ordovician rifting was reconstructed from orientations of dikes, interpreted as being feeders to the associated extrusive rocks of the Křivoklát–Rokycany Volcanic Complex, and by the depocenters and facies distribution in the Lower Ordovician of the Prague Basin which developed on eroded Cadomian accretionary wedge.The Upper Cambrian dikes and Lower Ordovician rocks of the Prague Basin record a major kinematic change in the amount and directions of regional extension. Dikes supplying the volcanic complex indicate minor E–W crustal extension in the late Cambrian whereas the linear array of depocentres suggests opening of this Rheic Ocean rift-related basin during the NW–SE pure shear-dominated extension. This kinematic change was accompanied by the onset of basic submarine volcanism, presumably resulting from decompression mantle melting as the amount of extension increased. The triggering mechanism of this extension may have been the onset of subduction of the Iapetus Ocean at around 510 Ma. Unequal extension resulted in the break-up and drift of some terranes while other portions of the belt remained adjacent to Gondwana.

(3) According to studies in areas to the NW from the Kralovice–Rakovník belt, the Variscan orogenic processes in the TBU resulting from the Saxothuringian/Teplá–Barrandian convergence was strongly partitioned. Newly mapped and analyzed NE–SW-trending dextral transpressional Krakovec Shear Zone (KSZ) represents a principal orogen-scale tectonic feature that separates two crustal segments with contrasting Cadomian and Variscan deformation and metamorphic histories and delimits the northwestern front of Variscan ductile reworking in the TBU. Finally, a synthetic model for the deformation partitioning in the Teplá–Barrandian upper crust in response to the Late Devonian to early Carboniferous subduction and underthrusting of the Saxothuringan lithosphere was proposed. In this model, the TBU is interpreted as consisting of pure shear-dominated domains alternating with narrow, orogen-parallel, high-strain zones.