



The development of convergent metamorphic core complex, the Vepor Unit in the West Carpathians

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The metamorphic core complexes are commonly associated with regions of orogenic collapse and refer to crustal thinning induced by the gravitational instability of a thickened crust. Similar domal structure can be also found in the convergent accretionary wedge system resulting in formation of the purely convergent metamorphic core complex: the Vepor Unit in the Central West Carpathians. The Vepor Unit is composed of pre-Alpine basement and Late Palaeozoic to Mesozoic cover sequences incorporated into the Alpine (Cretaceous) thrust sheet stack of the Central West Carpathians. The existing seismic sections show that the Vepor crust is sandwiched in between the overlying low grade Gemer Unit located in the south and the underlying Tatra Unit located in the north. The Vepor basement mantled by the cover sequences exhibits originally subhorizontal mylonitic fabric bearing an orogen-parallel stretching lineation. Syn-metamorphic mineral assemblage indicates prograde development of mylonitic fabric reaching peak pressures and temperatures of 1.1 GPa and 620 °C. Importantly, the PT gradients are characterised by higher dP/dT in the shallower crustal levels and lower dP/dT in the deeper crust. Quartz textures studied within quartzo-feldspathic rocks across the Veporic basement revealed conflicting shear senses consistent with large scale pure shear dominated process. The petrological and structural data are consistent with orogen parallel spreading induced by load of overthrust Gemer Unit. Ar-Ar mica ages from convergent structures developed in the suprastructure Gemer Unit restrict this burial event to 130–110 Ma. Subsequent folding and reworking of the sub-horizontal mylonitic fabric is associated with the onset of underthrusting of the Tatric basement in the north. Our macro- to micro-scale strain analysis carried out on the quartz aggregates show systematic regional variations from oblate to prolate deformation symmetry of the subhorizontal mylonitic fabric. These spatial variations are in a good agreement with spacing of crustal-scale folds pointing to the competition between vertical and horizontal convergent force during the switch from burial (Gemer related) to the exhumation (Tatra related) of the Vepor metamorphosed core. The ongoing unterthrusting of the Tatric basement led to “en bloc” exhumation of the Vepor Unit as well as to the development of crustal scale antiforms within the Veporic basement reflecting its heterogeneous exhumation. The existing Ar-Ar ages from the Veporic basement restrict the exhumation process to 90–75 Ma.