New Approach to Interpretation of Superposed Cleavage Patterns in Weak Rocks: Result of Independent Movements of Rigid Basement Promontories on an Example of the Gemer Unit

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We examine the role of shapes and spatial distribution of rigid basement blocks on the progressive development of superposed cleavage patterns within surrounding weak metasedimentary rocks. This complex evolution is first defined by standard structural field mapping and verified using finite element modeling of deformation of thin viscous sheet surrounded by rigid indenters.

Cretaceous tectonic evolution of the Gemer unit is marked by three major distinct tectonic events: 1) Formation of the Gemer Cleavage Fan (GCF) structure affecting central part of the Gemer unit, 2) transpressional shearing affecting the western Vepor promontory and development of the Trans-Gemer Shear Zone (TGSZ), 3) extrusion of the Gemer complex over the eastern Vepor promontory along the Eastern Gemer Thrust (EGT). Each of these above-mentioned events resulted in the recent complex shape of the whole structural succession.

The GCF represents the most spectacular structure overprinting pre-Mesozoic metamorphic fabric of the Gemer unit. This cleavage forms asymmetrical positive fan structure developed across the entire length of the Gemer unit. The intensity and metamorphic grade of cleavage are highest in ~5 km wide E-W trending axial zone of fan structure. Here, the lower greenschist facies steep slaty cleavage contains only rare relics of pre-Mesozoic fabric in form of rootless folds. The main cleavage of the GCF is in the axial zone affected by kink bands with kink planes perpendicular or oblique with respect to strongly developed vertical anisotropy. These structures are interpreted as a result of vertical collapse of steep cleavage associated with mechanical evolution of GCF. Above described features of GCF are developed prominently along the central part of the Gemer unit. Lateral extension of GCF towards the western and eastern Vepor promontories is marked by change in trend of cleavage, so that it becomes parallel to their boundaries. In addition, positive fan structure disappears and the cleavage is dominantly vertical and very intense. We suggest that the GCF resulted from indentation produced by northward movement of sub-Gemer basement along deeply rooted thrust.

Along the western Vepor promontory in the strongly attenuated Gemer unit, relics of E-W trending GCF fabric and new NE-SW trending cleavage form map-scale sigmoidal shape surrounded by highly sheared Upper Paleozoic rocks. Locally, early-developed foliation is refolded by synschistose noncylindrical folds with steeply to sub horizontally plunging hinges which become sub parallel with horizontal stretching lineation. These features are consistent with progressive folding in transpressional shear zones. Towards the NE, this 5 km wide zone of steep cleavage continues into central part of the Gemer unit. This NE-SW trending zone of shear deformation (TGSZ) overprinted all previously developed metamorphic fabrics and exhibits ~20 km sinistral offset of lithological stripes and axial zone of GCF. The displacement and intensity of deformation gradually disappears towards the NE edge of the Gemer unit.

The southern part of the Gemer unit is displaced along the sinistral TGSZ towards the NE, and consequently is thrust over eastern Vepor promontory along large-scale compressive shear zone – Eastern Gemer Thrust (EGT). This zone is marked by imbrications of basement and cover (both Paleozoic and Mesozoic), intense lower greenschist mylonitization of all lithologies across a width of several kilometers. Important feature is the incorporation of the Gemer Permo-Triassic cover as well as Triassic – Jurassic Vepor cover into imbricated thrust system in form of large-scale isoclinal synclines. The foreland dipping duplexes and mylonitic foliation of the EGT system are dipping to the SW, bear intense stretching lineation plunging to the SW and show top to the NE sense of shearing.

Based on the above – described structural features we have developed a numerical model (Ježek et. al, poster session) which allows us to verify a consistency of the proposed tectonic model. Numerous aspects and consequences will be briefly discussed.

Depositional Processes in a Low-Sinuosity Fluvial System: Facies and Depositional Geometries of the Permian Havlovice Member, Krkonoše Piedmont Basin.

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The Krkonoše Piedmont Basin formed in the northern part of the Bohemian Massif as a post-orogenic basin of inferred extensional/transtensional regime, records a long history of continental sedimentation between the Late Carboniferous and Early