Tectonics of the Trangoška syncline – preliminary results

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The Trangoška syncline (Kettner, 1927) belongs to the Tatricum crystalline unit of the Central Western Carpathians. It consists of autochthonous Mesozoic rocks, which have been preserved in a form of more-or-less upright, tight syncline. The direction of the syncline axis is roughly E–W. The sedimentary record started in Early Triassic with basal clastic rocks such as quartzite, arkose and "Werfenian" shale. These rocks are covered by limestone and dolomite. The Cave of the Dead Bats was formed in the Triassic limestone and/or dolomite during Tertiary by water flowing through the interlayer spaces and faults created earlier. Thanks to complex 3D pattern of its corridors, the cave is a perfect place for taking readings of linear and planar structures by geological compass.

The readings document the two slightly different systems of bedding planes (Fig. 1a), which are plotted in diagrams by their poles. The poles form two intersecting belts; the first one in NNW–SSE direction and the second one in NNE–SSW. These belts correspond to two systems of the fold axes in ENE–WSW and ESE–WNW directions, which were recognized by Nemčok (1989, see Fig. 1b). These data demonstrate the existence of at least two phases of folding and a fact that the whole Trangoška structure is a bit more complicated than a straight, upright, tight W–E syncline.

The fault system consists of several fault sets. The dominant faults are parallel to bedding of the carbonates. Other faults are transversal, being either sub-horizontal or steep. Striae are usually close to dip line, thus, the majority of faults seems to be dip-slips (Fig. 1c). Two different striations on one fault surface indicate the activity of at least two subsequent stress fields, which formed and/or reactivated faults.

Described variable fault orientation was suitable for paleostress analysis, for which we used software Mark2006 by Kernstocková and Melichar (2011). Two different stress states were recognized. The dominant stress field is characterized by sub-vertical σ_3 (88/84) and subhorizontal σ_1 and σ_2 (259/6 and 349/1, see Fig. 1d – full circles). This field represents a reverse faulting regime with respect to Anderson's theory (e.g., characteristic by its shallow depth and the absence of subsequent rotation). Principal directions of subordinate stress fields include σ_1 = 217/61, σ_2 = 338/16 and σ_3 = 76/23 (Fig. 1d – squares). Oblique orientation of all principal stresses may indicate older age of these faults.

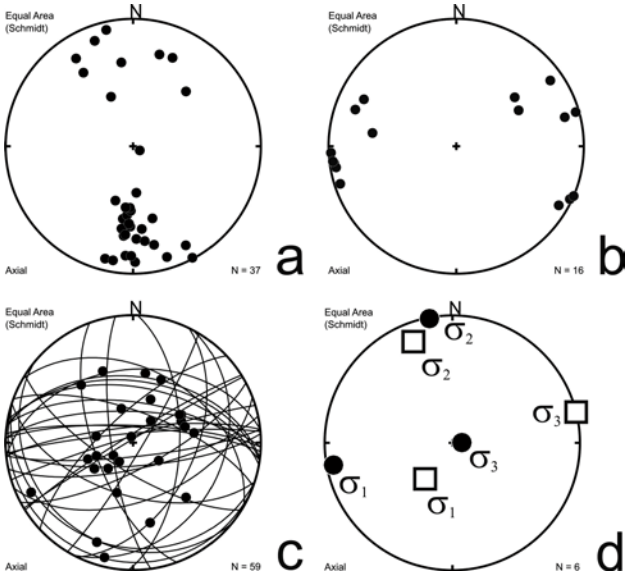

Fig. 1. Orientation of structural elements in the Trangoška syncline shown in Lambert equal-area projection, lower hemisphere. a – bedding; b – fold axes; c – fault surfaces and striae; d – principal stress directions.

References

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