

## **Brittle and ductile deformations in the Sopron Gneiss Formation (Sopron Mts., W-Hungary) and their importance in the formation of the Pannonian Basin**

Zsolt Benkó\*, Éva Bugledits & András Récsi

*Department of Physical Geography, Faculty of Earth Sciences, University of West Hungary,  
Károli Gáspár tér 4., Szombathely, H-9700*

### Abstract

The role of uplift and exhumation of metamorphic core complexes and the related reactivated low-angle thrust faults in the (de)formation of the Pannonian Basin is widely discussed and accepted. However, due to the intense post-rift subsidence of the Pannonian Basin during the late Miocene all metamorphic core complexes are currently buried, except for the metamorphic rocks of the Sopron Mts. (W-Hungary).

Structural analysis and stress field analysis integrated in the regional tectonic evolution of the area revealed that six tectonic events can be distinguished in the Sopron Gneiss Formation. The foliation planes of the gneiss that formed during the Cretaceous defined the displacement planes of the coeval and subsequent ductile-brittle deformations. Based on the plastically deformed foliation-perpendicular metamorphic quartz veins, overthrusting and mylonitization must have been taken place in the ductile-brittle transition zone, parallel the foliation. As a result of the uplift of the mountains the low-angle thrust planes should have reactivated in the late Cretaceous still in the brittle-ductile zone. Overthrusting and reactivation resulted in only small scale offset of the footwall and hanging-wall units, whereas large scale displacements were confined to the metasomatized leucophyllite zones. Variations in lineation, foliation planes and overprinting fault systems, Cretaceous-Palaeogene uplift was uneven and resulted in tilting of different blocks of the Mountains. During the late Palaeogene-early Miocene, extrusion of Austroalpine nappes from the Alpine collision zone defined the structural evolution of the gneiss. In a N-S-directed compressional stress field dextral NW-SE trending and NE-SW strike-slip faults formed. This latter one can be correlated with the major Salzach-Ennstal fault in the Northern Calcareous Alps. After a NNW-SSE extensional event during the late Miocene, NE-SW trending normal faults with cataclasites formed related to the rapid subsidence of the Little Hungarian Plain Basin. Along these faults, small ridges were uplifted in the foreland of the Sopron Mts. that are now exhumed relative to the surrounding areas.

In summary, two principal modes of formation of the Pannonian Basin were identified in the Sopron Mts.: reactivation of low-angle thrust faults as normal faults which played an important role in the early phase of the formation of the Pannonian Basin and steep normal faults that are responsible for the formation of deep subbasins during the late Miocene.