



Cooling history of some crystalline basement rocks from the transitional zone between Alps, Carpathians and Pannonian basin, assessed by apatite fission track thermochronology

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The transitional zone between Eastern Alps, Western Carpathians and Pannonian basin is characterized by a horst-and-graben structural pattern. The graben structures are filled with variably thick Neogene sediments of the Pannonian basin; the horst structures are formed by pre-Tertiary basement rocks. The objective of our study is to investigate the exhumation and burial history of this area by means of apatite fission track (AFT) thermochronology. The samples, taken mainly from crystalline basement rocks, were collected from the following mountains: Leitha Gebirge, Hainburger Berge, Malé Karpaty, Považský Inovec, Tribeč, Žiar, Strážovské Vrchy and Malá Fatra. New results combined with published data (Danišík et al., 2004) yield a relatively wide range of AFT ages (between 52.9 ± 3.7 and 9.6 ± 0.6 Ma). However, according to similarities in the AFT data, the studied mountains can be divided into two distinct groups:

(i) The first group is characterized by Eocene AFT ages and bimodal track length distributions with short mean track lengths. Thermal modeling reveals a complex cooling history with two phases of reheating (during Middle Eocene - Oligocene times and at ~ 17 Ma). We interpret the first phase of reheating as a consequence of the burial of the study area beneath sediments of the Central Carpathian Paleogene Basin. This basin became inverted and disintegrated around the Oligocene-Miocene boundary. The second phase of reheating (~ 17 Ma) is interpreted as reflecting an increased thermal gradient during Miocene extension in the region.

(ii) The second group is characterized by Middle to Late Miocene AFT ages and unimodal track length distributions with long mean track lengths. Thermal modeling reveals final cooling in a simple fashion during Middle to Late Miocene times. In this group all the pre-Miocene "AFT memory" was erased during Miocene extension.

References

DANIŠÍK, M., DUNKL, I., PUTIŠ, M., FRISCH, W. and KRÁL, J. (2004): Tertiary burial and exhumation history of basement highs along the NW margin of the Pannonian Basin - an apatite fission track study. *Austrian Journal of Earth Sciences*, Vienna, 95/96, 60-70.