Thermochronology of the Recsk Igneous Complex, NE-Hungary

Róbert Arató[1], István Dunkl[2], Ágnes Takács[1], Géza Szebényi[3]
[1] Eötvös Loránd University of Science, Department of Mineralogy, Budapest, Hungary (arato.robi@gmail.com)
[2] Abteilung Sedimentologie/Umweltgeologie, Geowissenschaftliches Zentrum der Universität Göttingen, Göttingen, Germany
[3]Mecsekérc ZRT., Pécs, Hungary

Most of the Alpine subduction related Paleogene magmatic complexes are located along the Periadriatic Lineament (Exner, 1976); the Recsk Paleogene volcanic centre is the northeasternmost endmember of these. The Recsk Complex is unique, since the Paleogene volcanic edifice is well preserved and the intrusive-volcanic assemblage hosts various ore deposits (Földessy & Szebényi, 2008). The evolution of this area is complex, because the Mátra Mountains, a significant volcano covered the Paleogene magmatic system in the Middle Miocene. It is assumed, that the thermal heating induced by the Mátra volcano, affected the adjacent areas, possibly the Paleogene complex of Recsk as well. According to this assumption, the main goal of this study is to reconstruct the thermal history (Paleogene burial, Miocene magmatic heating and subsequent exhumation) of Recsk, after its formation. To answer this complex question, we applied the (U-Th)/He thermochronological method, which is sensitive to shallow crustal thermal events (60°C and 180˚C for apatite and zircon, respectively), and so, combined with K/Ar and fluid inclusion data, it is suitable for the reconstruction of the low temperature thermal history of the area. All of the new apatite (U-Th)/He-ages (5.9-19.9 Ma), and most of the zircon (U-Th)/He-ages (17.7-30.7 Ma) are considerably younger, than the Oligocene formation age of the volcanics. Furthermore, there is also a vertical trend in the (U-Th)/He-ages (younger ages with increasing depth). According to these results, the Paleogene rocks must have suffered a thermal overprint, but their cooling postdated the Miocene volcanism, and terminated only in the Late Miocene. In order to determine the most possible time-temperature cooling path, a one-dimensional thermal modelling was carried out, which is also presented in this study.

Exner, P. (1976): Verh Geol Bundesanstalt Wien, 2: 3-64.
Földessy, J., Szebényi, G. (2008): Geosciences, Proceedings of the University of Miskolc Series A, Mining, 73: 87-101.