MINERALOGY AND K-Ar GEOCHRONOLOGY OF ILLITE-RICH FAULT GOUGES IN THE MÓRÁGY GRANITE, HUNGARY

VICZIÁN, I.[1]*, KÓNYA, P.[2], KOROKNAI, B.[2], KOVÁCS-PÁLFFY, P.[2], MAROS, Gy.[2], BALOGH, K.[3] & PÉCSKAY, Z.[3]
[1] Debrecen University, Egyetem tér 1, H-4032 Debrecen, Hungary
[2] Geological Institute of Hungary, Stefánia út 14, H-1143 Budapest, Hungary
[3] ATOMKI Institute of Nuclear Research, Bem tér 18/c, H-4026 Debrecen, Hungary
* E-mail: viczian@mafi.hu

The products of syntectonic fluid/rock interaction were studied in the Mórágy Granite, an Early Carboniferous pluton (~ 340 Ma) in the Variscan crystalline basement (Tisza unit) of the Pannonian basin. Following a Variscan regional metamorphism during cooling accompanied with the formation of a regional, NW-dipping foliation and localized ductile shear zones, the pluton suffered intense brittle deformation in several phases. In this granite body the final disposal of low and intermediate level radioactive waste is planned.

The analyzed clay gouge samples contain an illite + smectite + mixed-layer illite/smectite + chlorite + palygorskite + kaolinite + quartz + K-feldspar + plagioclase + calcite + dolomite assemblage with highly various ratios of the individual minerals. Clay minerals and chlorite are clearly newly formed phases formed at the expense of feldspars and mafic minerals of the original granitoid protolith. According to detailed XRD analyses, the polytypic variety of illite in clay gouges containing illite in considerable amount is almost exclusively 1*M*, suggesting the hydrothermal origin of illite. In some samples minor amounts (<10 %) of $1M_d$ and/or $2M_1$ polytypes also occur, whereas the former may represent the low-temperature alteration product of the 1*M* hydrothermal illite. The $2M_1$ polytype presumably display inherited component from primary magmatic biotite and/or metamorphic muscovite. The Kübler index values scatter mostly in the range of 0.51–0.61º 2θ for discrete illite structures and 0.73–1.02º 2θ for assemblages containing mixed-layer illite/smectites. Even broader basal reflections occur in smectite-rich assemblages.

K/Ar dating of illite-rich fine fractions (<10, <2, <1 μm) was carried out in the Institute of Nuclear Research (ATOMKI), Debrecen, Hungary. Strongly scattering Mesozoic ages were obtained (Middle/Late Triassic–Late Cretaceous) that are, however, in correlation with the degree of alteration of illite. Considering the absence of I/S and smectite, the oldest (Triassic–Early Jurassic) ages seem to represent indeed the time of important brittle tectonic activity accompanied with syntectonic fluid flow. Also the youngest (Late Cretaceous) age seems to indicate illite formation accompanied with a tectonic deformation. The Middle Jurassic and Early Cretaceous ages, however, are most probably mixed ages formed by low-temperature alteration of the hydrothermal illite-1*M* phase, if one regards the considerable amounts of illite/smectite and smectite in these samples.

The K-Ar ages obtained are compared with other age determinations and possible tectonic events in the territory of the Tisza tectonic unit and with the ages of illites in the Permian Boda Siltstone Formation in the vicinity of the granite body studied.