

Parental rocks of Carpathian keuper sandstone clastics as inferred from heavy mineral spectra and monazite dating (Malá Fatra Mts., Slovakia)

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Carpathian Keuper Formation occurs in three West Carpathian units: Fatric, Tatric and in restricted extent also in the Pieniny Klippen Belt. Its facies variability is obvious mainly in the Krížna Nappe (Fatric). The Carpathian Keuper Formation consists of pale-grey, fine-grained dolomite beds (rarely with silicite concretions), beds of carbonatic breccias, variegated claystones, aleuroliths and sandstones (litharenites, subarcoses and quartz arenites). The sandstones are generally dominated by quartz; less common are feldspar grains and lithoclasts (mainly carbonates and claystone, rarely also lithoclasts of plutonic rocks). Subject of our research was represented by sandstones occurring in the Kriváň part of the malá Fatra Mts., from the localities situated between the Párnica and Zázrivá villages (600 m SE and 1600 m SSE from the Čierťaže elevation point), on the slopes of Tržinovo Valley. On the top of the studied formation in the Krížna Nappe rests Rhaetian Fatra Formation. Therefore, based on superposition, the Carpathian Keuper Formation is ranked to the Norian. The lower boundary of the formation is not clearly dated because of the absence of stratigraphically important fossils. The Carpathian Keuper sandstones are fine- to medium-grained, dominated by monocrystalline, subangular to angular quartz and quartz with undulatory extinction. Rarely, polycrystalline quartz grains appear, too. The sandstones also contain sericitized K-feldspars, plagioclases, carbonates, (dolomite, calcite), micas, clay minerals and heavy minerals (HM). HM are generally dispersed within the sandstones, but rarely they can form laminated accumulations. From HM, rutile, apatite, zircon, monazite-(Ce), xenotime-(Y), Ti-magnetite, ilmenite and tourmaline were identified. The HM spectrum indicates that the source area was dominated by acidic plutonic rocks (granitoids).

In the HM laminae, oval monazite grains are numerous (up to 50-100 μm in size). The monazites were analyzed by EPMA microprobe analyser. Results of the chemical (EMPA) U-Th-Pb dating of monazite-(Ce) from (22 analyses) indicates quite an uniform age 306 ± 3.2 Ma (ages calculated by statistical method of Montel et. al., 1996). The HM spectrum, together with monazite dating indicate that the source area of the detritic material might be presented by the Moldanubian Zone of the Bohemian Massif (Upper Carboniferous to Lower Permian Plutonic Suite).

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References:

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