

A newly discovered combustion metamorphic complex in the Miocene coal-bearing sedimentary units of Salgótarján Basin, Novohrad-Nógrád UNESCO Global Geopark

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Abstract

Combustion metamorphism as a geological process produces unique metamorphosed rocks resembling siliciclastic contact metamorphic formations as well as modern ceramics. Industrial slag and ceramics looking rocks attracted our interest in our research area, in the eastern end of the Salgótarján Basin, N Hungary. The local combustion metamorphic complex that consists of clinker, pseudoconform buchite and paralava has been discovered by the geopark's geologist. The lithology of the outcropping units on the hillside varies on centimeter scale. The highest degree of alteration was observed on the samples from the chimney-structure, which were annealed by the gases released from the coal burning process, and are characterised by melted or partially melted rocks, while the lowest degree of alteration was in the “clinker” metaaleurolite rock units.

Following field observations XRD, SEM-EDS and DTA measurements were carried out on the different rock types to describe the mineralogical and textural characteristics. Quartz is characteristic of all metamorphic rocks, mostly as relict grains, and all samples contain plagioclase with increasing Ca content with increasing metamorphic grade, often in several generations. In addition to these, clinker may contain biotite; buchite may contain K-Na-Ca feldspar, pyroxene and glassy matrix; and paralava rocks contain cordierite, pyroxene and feldspar. SEM measurements have shown that clinker samples have a relict sedimentary texture, whereas partially melted and melted rocks are characterised by an intersertal texture, in which plagioclase is often symplectitic and pyroxene nodules appear as pseudomorphs or have coccoidal shape along sharply defined formations, presumably replacing original sedimentary mineral grains. Based on our observations, the outcrop near Rónabánya is the first documented combustion metamorphic complex in Hungary.