



Application of EPMA dating of detrital monazite for age verification of the Carboniferous sandstone clasts from the Carpathian flysch

M. Paszkowski (1), **M.A. Kusiak** (1), B. Budzyń (2), D. Gmur (1), P. Konečný (3), T. Wolkowicz (1)

(1) Institute of Geological Sciences, Polish Academy of Sciences, Kraków Research Centre, Senacka 1, 31-002 Kraków, Poland (2) Institute of Geological Sciences, Jagiellonian University, Oleandry 2a, 30-063 Kraków, Poland (3) State Geological Institute of Dionyz Stur, Mlynská dolina 1, 817 04 Bratislava, Slovak Republic

The main scope of our study is reconstruction of primary extent of Carboniferous coal basins, recently buried beneath External Carpathian flysch belt. Pennsylvanian (Silesian) rocks containing thin coal-intercalations have been discovered in the Carpathian thrust basement (for instance Tarnawa-1, Czudec-1 wells). Coal fragments and blocks as well clasts of barren Pennsylvanian sandstones occur commonly not only in the whole Polish Carpathian flysch belt, but beyond, from Olza river in Czech Republic in the West to the state borders between Ukraine/Romania in the East. This, coupled with the results of the magnetotelluric sounding, proves the recent occurrence of this type of rocks in the deep substratum of the external nappe pile of Alpine Carpathians accretionary prism.

Vitrinite reflectance studies of exotic, carbonised plant-bearing (suspected as Carboniferous) siliciclastic pebbles as well as pure coal clasts from the Carpathians, carried so far, reveal general low maturity (mean 1.3 %). The range of the values is very wide (0.8 – 5.0 %), possibly because the particular exotic rock fragments are derived from various sources, or from various stratigraphical levels. The reason may also lie in the local phenomena (intrusions, unusually high heat flow due to local deformation or hydrothermal activity, coal-seam fires).

Geochronological analyses of monazite from suspected, as Pennsylvanian siliciclastic rock pebbles by the U-Th-total Pb method using EPMA were carried out. Monazite grains were separated from seven samples of the medium grained sandstones of sub-arkosic composition. Clasts with plant fossils were collected in the vicinity of Kraków and Cieszyn. Preliminary study of 376 analyses carried on 79 grains provided 284-311 Ma range of monazite ages. This confirms that those sandstones are not younger than Palaeozoic in age.

Facies analysis, sequence stratigraphy and provenance studies of siliciclastic detritus in Carboniferous deposits (accessible in situ and as clasts in younger sequences) will facilitate reconstruction of primary configuration and extent of "hidden" Pennsylvanian coal basins. This is going to be the basis for further search of the potential, unknown and hidden areas of occurrence of Upper Carboniferous coal-bearing successions. Potentially the investigated area of Carpathian flysch basin that comprise several carbonized flora-bearing sandstones: the Lower Devonian Oldred facies, the Givetian siliciclastics, Pennsylvanian coal-bearing sequence, Lower-Middle Jurassic Gresten coal-bearing sequence and Cretaceous-Palaeogene flora-bearing recycled Carpathian flysch sandstone clasts. In the light of our preliminary results, use of monazite dating is the optimal tool in discrimination of various population of allochthonous siliciclastic material of unknown depositional age.