

## **Cadomian protolith ages of 'exotic' mega blocks from Bugaj and Andrychów and their significance for the reconstruction of the palaeogeography of the Western Outer Carpathians (Poland): evidence from zircon U-Pb LA-MC-ICP-MS dating**

*Burda, Jolanta (Faculty of Earth Sciences, Sosnowiec, POL);*

*Woskowicz-Slezak, Beata (Faculty of Earth Sciences, Sosnowiec, POL);*

*Kloetzli, Urs (Department für Lithosphärenforschung, Wien, AUT);*

*Gaweda, Aleksandra (Faculty of Earth Sciences, Sosnowiec, POL)*

Despite the long period of research conducted in the Western Outer Carpathians (WOC) the genesis and tectonic evolution of their crystalline basement is still poorly recognized. At present the crystalline basement is hidden below thick Upper Jurassic-Neogene flysch deposits of the WOC proper. Fragments of crystalline rocks, so-called exotics, interpreted to be derived from uplifted ridges and transported by turbidity currents and debris flows into the adjoining flysch basins, offer the opportunity to investigate the geotectonic history of these no longer existing alimentary areas of the Carpathian flysch.

A number of studies concerning the palaeogeography of the WOC have used a range of geochronological methods to constrain the timing of magmatic and metamorphic processes recorded in the exotics. The general outcome of these investigations is that numerous exclusively pre-Alpine, in parts pre-Variscan ages were determined, but no obvious correlation of stratigraphic and tectonic position and/or geography emerged. From a methodological point of view this is due to the fact that especially K-Ar mica ages are sensitive to thermal and metasomatic overprint thus obscuring any primary geochronological signal directly dating igneous or metamorphic events. This published radiometric age data set is therefore not conclusive for the unambiguous identification of protolith and metamorphic ages, respectively.

The main purpose of this study is to present and discuss zircon U-Pb ages from two exotic mega blocks (a granite from Bugaj and an orthogneiss from Andrychów), representing the alimentary crystalline basement area of the WOC flysch. Due to the size of these two exotics (> 100 m) it can safely be assumed that their loci of deposition is far more proximal to their respective shedding ridge(s) than the probably more distally derived pebbles dated in previous studies. Additionally, the latter might easily be re-sedimented making any palaeogeographic implications drawn from ages derived from such rocks severely ambiguous.

The CL images of zircons from both samples reveal typical magmatic textures characterized by a well-defined concentric and oscillatory zoning. A concordia age of  $580.1 \pm 6.0$  Ma of the zircons from the Bugaj granite is considered to represent its uppermost Proterozoic crystallization age. The zircon crystals from the Andrychów orthogneiss yield an age of  $542 \pm 21$  Ma, interpreted as the also uppermost Proterozoic magmatic crystallization age of the granitoid protholith.

The U-Pb zircon ages, derived from the exotic mega blocks thus:

a) directly reflect the presence of substantial amounts of a proximal 'Cadomian' aged crust proper in the vicinity of the WOC basement. This is a marked difference to earlier published data, which were gained from cm-dm sized pebbles only. As these can easily be derived from re-sedimented sources the ages do not necessarily reflect direct derivation from a 'Cadomian' basement, in as much as transport distances are not known.

b) exotic mega blocks deposited to the WOC basins were related to the Brunovistulicum Terrain. They belong to the group of Vendian/Early Cambrian granitoids, representing the latest, post-tectonic expression of the Cadomian cycle.

These results provide new information to the ongoing discussion of the late Neoproterozoic paleogeography of tectonic units which intervene between the East European Craton (Baltica) and the lithotectonic units of the Variscan orogeny.