NÁDOR A., THAMÓ-BOZSÓ E., MAGYARI Á. and BABINSZKI E., in press. Fluvial responses to vertical crustal movements and MIS 2 climate changes: The Berettyó Körös system, E-Hungary, Sedimentary Geology.
RÉTHLY A., 1952. A Kárpátmedencék földrengései (455-1918). Akadémiai Kiadó, Budapest.
SÜMEGHY J., (1944). A Tiszántúl. – M.Kir. Fdt. Int. kiadványa, Budapest, 1944, p. 208.

REE Accessory Minerals as Regional Metamorphic Processes Indicators: An Example from Wedel Jarlsberg Land, Svalbard

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Accessory minerals are commonly used in reconstructions of metamorphic evolutions and geotectonic interpretations – from thin section scale to large regions. Significant role in that play REE- and REE-bearing minerals, such as monazite, xenotime, allanite and apatite. These minerals were previously used as indicators of metamorphic processes and their P-T conditions by numerous authors (e.g. Finger et al. 1998, Spear and Pyle 2003, Wing et al. 2003). In this paper we present use of interpretations based on reactions involving monazite, xenotime, apatite and allanite compiled with geochronological data in reconstructions of metamorphic evolution of the Isbjørnhamna Group rocks (see also Majka and Budzyń 2006).

Polimetamorphic tectonic block, composed of the metasedimentary Isbjørnhamna Group, conformably covered by metavolcanosedimentary Eimfjellet Group, is distinguished in SW part of Wedel Jarlsberg Land in Svalbard (Czerny et al. 1993). This complex was affected by metamorphism two times: firstly under amphibolite facies conditions (Barrovian type), and secondly under greenschist facies conditions (Majka et al. 2004).

Fine-grained mica schists from the Isbjørnhamna Group were studied. Quartz, biotite, muscovite, garnet, chlorite (progressive) and plagioclase are present as main minerals. Kyanite, staurolite, chloritoid occur in some samples. Moreover accessory tourmaline, zircon, sphene, apatite, monazite, xenotime, allanite, unidentified Th-phases, ilmenite, hematite and magnetite are common. Partial or complete replacement of garnet and biotite by chlorite, disintegration of muscovite, sericitization of plagioclase and kyanite indicate changes related to the low temperature metamorphism.

Euhedral monazite grains generally without zonation occur in the Isbjørnhamna Group metapelites. Chemical U-Th-total Pb method performed on monazite grains (some of them enclosed in garnets) provided uniform Cadomian (643 Ma) ages. Basing on the fact that monazites enclosed in garnets yield the same age, it is unquestionable that first metamorphic event took place during that time and also indicate, that this event was a result of orogenic movements in large scale. Previous geochronological results of Ar-Ar dating performed on micas and hornblende, reported by Manecki et al. (1997) indicate similar Cadomian ages (616 Ma for Hbl, 584–575 Ma for micas).

Investigated region was affected by later changes of P-T conditions resulting in breakdown of primary monazite and formation of apatite and/or allanite coronas. It is important to notice, that these secondary minerals are stable in lower P-T conditions than monazite, characteristic for low and middle greenshist facies (lower than Bt-in isograd). These changes are probably connected with younger Calledonian metamorphic event indicated by Ar/Ar dating (459 Ma; Manecki et al. 1998), or could be connected with cooling during the exhumation of orogen after Cadomian metamorphic event.

Compilation of the geochronological data and closing temperatures of investigated monazites – as well as hornblende and micas analyzed by Manecki et al. (1998) – provides the cooling ratio of the whole orogen equal to ca. 100 °C / 20 Ma. These data indicate maximum of metamorphism at ca. 643 Ma followed by slow exhumation of the orogen and erosion without significant uplift what took place till early Cambrian (ca. 575 Ma). Connecting of such geological history of this part of Wedel Jarlsberg Land with tectonic and litostratigraphical knowledge provides description of evolution of unique exotic terrain in Svalbard Archiepalgo.

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References

CZERNY J., KIERES A., MANECKI M., RAJCHEL J. and MANECKI A. (Editor), 1993. Geological map of the SW part of Wedel Jarlsberg Land, Spitsbergen 1:25000. Institute of Geology and Mineral Deposits, Cracow, 1-61.
FINGER F., BROSKA I., ROBERTS M.P. and SCHERMAIER A., 1998. Replacement of primary monazite by apatite-allanite-epidote coronas in an amphibolite facies granite gneiss from the eastern Alps. Am. Mineral., 83, 248-258.
MAJKA J. and BUDZYŃ B., 2006. Monazite breakdown in metapelites from Wedel Jarlsberg Land, Svalbard. Miner. Polon., 37/1 (in print).

MAJKA J., CZERNY J. and MANECKI M., 2004. Petrographical charcteristics of the Isbjørnhamna Group Rocks (Wedel Jarlsberg Land, Spitsbergen). *Pol. Tow. Mineral. Prace Spec.*, 24: 279-282.

MANECKI M., HOLM D.K., CZERNY J. and LUX D., 1997. Thermochronological evidence for late Proterozoic (Vendian) cooling in southwest Wedel Jarlsberg Land, Spitsbergen. *Geol. Mag.*, 135 (1): 63-69.

SPEAR F.S. and PYLE J.M., 2002. Apatite, Monazite and Xenotime in Metamorphic Rocks. In: M.J. KOHN, J. RAKOVAN and J.M. HUGHES (Editors), Phosphates – Geochemical, Geobiological and Materials Importance, pp. 293-335

WING B., FERRY J.M. and HARRISON T.M., 2003. Prograde destruction and formation of monazite and allanite during contact and regional metamorphism of pelites: petrology and geochronology. *Contrib. Mineral. Petrol.*, 145: 228-250.

The Tectonic History of the Mýto – Tisovec Fault (Western Carpathians)

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The Mýto-Tisovec fault has been first described as the Mýto fault by Zoubek (1935), according the village Mýto pod Ďumbierom in his vicinity. The name Mýto-Tisovec fault (Marko 1993a) used herein unambiguously defines the southern studied segment (in between Mýto pod Ďumbierom and Tisovec) of this important NW-SE striking disslocation (Fig. 1).

Methods

As the research approach to solve the topic, combination of field mesostructural observations and map-scale structures analysis has been applied. Structural research has been focussed to investigation of brittle deformations related to paleostress field studied along the map trace of the Mýto-Tisovec fault. Area of

■ **Fig. 1.** Structural-tectonic map of the northwestern Veporic area (Marko 1993b). Coded names of faults and shear zones: Be – Benkovo fault, Ce – Čertovica shear zone, CiBa – Čierny Balog f., Di – Divín f., Ma – Málinec f., Mu – Muráň f., MyDu – Mýto-Dúbrava f., MyTi – Mýto-Tisovec f., Po – Pohorelá s. z., St – Štítnik f., Tr – Trangoška f., Vk – Vikartovce f., Vy – Vydrovo f., Zd – Zdychava s. z.