Baddeleyite, zircon and monazite minerals in the metasomatites of the Varena Iron Ore deposit in the western East European Craton: application for dating skarn and ore formation processes

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The Varena Iron Ore deposit in the Proterozoic basement of southern Lithuania, western East European Carton is situated predominantly in former dolostones along continental margin of ca. 1.84 Ga crust [1].

High-grade skarns (forsterite, enstatite, spinel and diopside) were produced during metamorphism at 750° C and 5-6 kbar, followed by fluid in-flux and amphibole (tremolite, actinolite, anthophyllite etc), phlogopite, magnetite, sulphide, apatite, zircon, monazite and baddeleyite mineralizations. Most of iron was introduced or remobilized at low temperatures (ca. 300-400° C) together with serpentinization and iddingsite formation.

LA ICP-MS study was applied to the skarns in order to determine the age of mineralization. Sample 982-3 consists of thin, magnetite-rich and carbonate-dominated (with rounded serpentine and iddingsite grains) layers. Both baddeleyite and monazite yielded ages of approximately 1730 Ma. The D8-1 phlogopite-rich serpentinite is impregnated by magnetite and crosscut by magnetite, sulphide and carbonate veinlets. Irregular-shaped zircon grains intergrowing with magnetite produced somewhat ambiguous and scattered age results, with a main age group yielding ca. 1700 Ma.

The ore mineralization of ca. 1.73 Ga is semi-simultinious with ca. 1.73 Ga metamorphic reworking in the neighbouring Lazdijai area and metamorphic overprint recorded by hornblende 40Ar/39Ar ages [2]. These events may be related to the TIB magmatism further west, across the Baltic Sea, in south-central Sweden.

[1] Bogdanova et al. (2015) *Precambrian Research* **259**, 5-33. [2] Bogdanova et al. (2001), *Tectonophysics* **339**, 39-66.