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# A zircon vs titanite geochronometres by SHRIMP IIe as a tool in multistage magmatic intrusion problems

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Most of crystalline basement area of NE Poland is represented by late Svecofennian (1.84-1.80 Ga) orogenic granitoids and supracrustal succession. These early rock assemblages were intruded by plutons of the Mezoproterozoic AMCG suite, which occupies most of W-E trending belt of the so called Mazury Complex. This suite is dominated by A-type granitoids of rapakivi-like texture. The subsequent important components are gabbro-norite, anorthosite and locally mangerite and charnockite rock variations. Anorthosite occurs at three autonomic massifs Sejny, Suwałki(SAM) and Ketrzyn. The basic geochronological investigation was carried out previously using mainly the U–Pb–Th system of zircon and monazite geochronometers. The AMCG suite yielded ages mainly in the range between 1548 to 1500 Ma. The isotopic work also reveals sporadic ages recorded on titanite (1526±11 Ma), considered as the crystallization age of the titanites under subsolidus conditions (Dörr et al.,2002). The geochemical and isotopic whole rock investigation suggests that formation of the AMCG suite was a complex process with multiple magma batches sequentially differentiating, and probably undergoing mixing and crustal assimilation.
In this study, we report sensitive high-resolution ion microprobe (SHRIMP) U–Pb zircon and titanite single grain age data from upper part of drill section (Krasnopol 6, depth 1003m) located within easternmost vicinity of the SAM. Both of mineral phases have been selected from the contact between A-type granitoid with Pb-Pb TIMS age of 1525±5 Ma (op cit) and mafic chilled margin interpreted as next magma input. Dating of 20 single zircons from the contact zone yielded concordia ages of 1510±10 Ma for most of grains defined as emplacement age with inheritance at 1850±10 Ma. It evidenced a younger dose of the melt on the top of plutonic body and some input of older crustal material, detected also by whole rock isotopic signatures. Single titanite grains from the same zone reveal a relatively low uranium contents of about 11-30 ppm resulting in less precise U–Pb apparent ages overlapping 40 Ma (intercept age 1449 ±40 Ma). This age seems to be too young to be interpreted as a simple cooling age. The closure temperature (Tc) for the U–Pb system in titanite is assumed on the level of about 700ºC. This younger and imprecise titanite age corresponds however with the youngest expressions of magmatism in this region, documented mostly within Lithuanian crystalline basement, where AMCG plutonic components are known from the Nemunas - Geluva granite suite with U–Pb (SIMS) zircon age in range of 1447 -1445±8Ma ( Skridalite et al. 2007).

Dörr W., Belka Z., Marheine D., Schastok J., Valverde-Vaquero P., Wiszniewska J., 2002. U–Pb and Ar–Ar geochronology of anorogenic granite magmatism of the Mazury Complex, NE Poland. Precambrian Research, 119, 101–120.
Skridlaite G. Whitehouse M. Rimsa A. 2007 Evidence for a pulse of 1.45 Ga anorthosite–mangerite–charnockite–granite (AMCG) plutonism in Lithuania: implications for the Mesoproterozoic evolution of the East European Craton, Terra Nova 19, 294-301.
This is a contribution to the project; ”Isotopic parameters of the Suwalki Anorthosite massif – an attempt to explain multistage Fe-Ti-V ore intrusion generation using titanite and apatite geochronometres by SHRIMP IIe " 61.2116.1601.09.0