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Polymetamorphic evolution of the upper part of the Iezer Complex (Leaota Massif, South Carpathians) constrained by petrological data and monazite ages

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The Leaota Massif in Romania consists of a flat-lying sequence of five structurally concordant units displaying mutual and partly internal lithologic and metamorphic contrasts. The lower part of the lithologic sequence is the Iezer Complex, a medium-grade psammopelitic unit with a structurally concordant thin granite sill located at its upper part. The lower limit of the granite is marked discontinuously by hornfels, also present as enclaves, which experienced intense strain and a subsequent low-pressure thermal overprint. Both granite and hornfels were affected by a medium-temperature, medium- to high-pressure event (Săbău, 2000). This event was also identified in gneisses below the hornfels. These rocks contain the assemblage garnet-phengite-chloritoid-kyanite which had overprinted an older garnet-kyanite-staurolite-biotite-muscovite assemblage. Available U-Th zircon ages indicate 472.7 $\pm$ 7.3 Ma (Balintoni et al. 2009) for the granite. Monazite geochronology (Săbău & Negulescu, 2013) reveals for the associated hornfels (1) inherited ages of 528 $\pm$ 17.86 Ma overprinted by pervasive Ordovician contact metamorphism (462 $\pm$ 4.54 Ma), slightly postdating the age of magmatic zircon in the granite, (2) Silurian to Early Devonian recrystallization episodes, and (3) a Variscan medium- to high-pressure metamorphic overprint responsible for the garnet-phengite-kyanite assemblage.

New petrological and geochronological data constraining the polymetamorphic evolution of the upper part of the Iezer Complex were acquired from kyanite-garnet mylonitic gneisses made up of large garnet porphyroclasts embedded in a strongly deformed matrix. Large garnets are rich in quartz, phengite, epidote, kyanite, rutile, and ilmenite inclusions. Biotite, chlorite, apatite, monazite, and Al-cerite inclusions are also present. Garnet porphyroclasts are wrapped by laminae of small garnet - white mica - biotite - quartz or zoisite - kyanite - plagioclase alternating with bands made up of fine-grained symplectite-like amphibole + plagioclase (+ kyanite). The small garnets have grown in several textural sites: (I) around garnet porphyroclasts, (II) associated with biotite-rich layers (garnet contains many rutile inclusions), and (III) related to amphibole-plagioclase symplectite layers (garnet is rich in kyanite inclusions). Very rare pyroxene inclusions were identified in the rims of type III garnets. The small garnet is poorer in Mn and Fe, and richer in Ca and Mg than porphyroclastic garnet. All small garnet grains show a similar zoning pattern, characterized by high-Mn, low-Ca cores, low-Mn, high-Ca intermediate zones and high-Mn, high-Ca inclusion-free overgrowth rims.

Monazite geochronology indicates a similar age pattern as recorded by granite and the associated hornfels: inherited ages of 539 $\pm$ 27 Ma corresponding to the old mineral assemblage with garnet porphyroclasts, an Ordovician (472.6 $\pm$ 8.1 Ma) episode corresponding to the age of the granite, a Silurian to Early Devonian recrystallization episode, and mineralogical and textural reworking during syn-metamorphic Variscan (346 $\pm$ 14 Ma) tectonic loading, corresponding to the small garnet - pyroxene - phengite - kyanite - rutile high-pressure mineral assemblage.

Balintoni et al. (2009) Gondwana Research 16, 119-133.
Săbău (2000) Lithos, 52, 253-276.
Săbău G., Negulescu E. (2013) International Journal of Geological Sciences, 1/1, 20-29.