

Zircon textural analyses, Th/U and geochronology, tools to understand Neoproterozoic to Cretaceous events registered by I-type anatectic granitic basement in the Mamfe Basin (SW Cameroon, Centra Africa)

Nguo Sylvestre KANOOU*¹, Arnaud Patrice KOUSKE², David Richard LENTZ³, Rose Fouateu YONGUE⁴

¹Mineral Exploration and Ore Genesis Unit, Department of Mining Engineering and Mineral Processing, Faculty of Mines and Petroleum Industries, University of Maroua, 08 Kaélé, Cameroon

²Department of Civil Engineering, The University Institute of Technology, University of Douala, Cameroon

³Department of Earth Sciences, University of New Brunswick, 2 Bailey Drive, Fredericton, New Brunswick, E3B 5A3, Canada

⁴Department of Earth Sciences, University of Yaoundé I, 812 Yaoundé, Cameroon

Abstract

BSE-CL images, U- Th-Pb abundance, and U-Pb ages were obtained for zircon crystals from Nkogho I- type anatectic granitic basement cropping in the Mamfe Basin (SW Cameroon). These data were used to characterize, classify each zircon crystal and elucidate their registered information. They were also used to develop a formation model to their host and source rock, and present registered post-emplacement events.

The studied zircons ranging in size from < 75 to >150 μm , form long and short prisms, pyramidal to dipyramidal with few subspherical, subhedral and anhedral crystals. They show oscillatory zoning, complex growth zoning, sector zoning, patchy zoning, faint broad zoning, a preserved xenocrystic core with overgrowth rim, or are unzoned. These features are mainly compatible with those of igneous zircons. The U (30-6380 ppm), Th (4-1280 ppm), and Pb (12-648 ppm) contents show core, zone and rim variations with most values being within the range limit in igneous crustal granitic zircons. The Th/U ratios (0.08-1.23) with core, zone and rim difference mainly enclose values of magmatic zircons with few values characterizing metamorphic zircon grew in equilibrium with an anatectic melt. The U-Pb age (108.4 ± 1.7 - 988.4 ± 19 Ma) with some core and rim difference date: Early Neoproterozoic, Cryogenian-Ediacarian, Early Cambrian-Ordovician, Devonian-Carboniferous, and Aptian-Albian, events.

The Nkogho I-type granite was formed during Cryogenian to Ediacarian times from slow cooling of a deep-seated crustal magma originated from partial fusion of a preexisting granitic protolith. This rock underwent partial fusion with granitization during Early Cambrian-Ordovician, Devonian-Carboniferous, and Aptian-Albian periods. The Aptian-Albian periods can date the opening of the Mamfe sedimentary basin (the southernmost Cameroon portion of the Benue Trough).

Key words: Cameroon, Mamfe Basin, I-type anatectic granitoid, zircon analyses, Early Neoproterozoic- Cretaceous events.