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著者	下條将徳, 山本伸次, 牧賢志, 平田岳史, 岡田吉弘, 澤木佑介, 青木一勝, 石川晃, ケン コラーソン, 小宮剛
Author	masanori shimojo, shinji yamamoto, Kenshi Maki, TAKAFUMI HIRATA, Yoshihiro Okada, Yusuke Sawaki, Kazumasa Aoki, Akira Ishikawa, Kenneth D. Collerson, Tsuyoshi Komiya
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カナダ, ネーンコンプレックスの初期太古代火成活動

Early Archean magmatic events of the Nain Complex, northern Labrador, Canada

下條 将徳^{1*}, 山本 伸次¹, 牧 賢志², 平田 岳史², 岡田 吉弘³, 澤木 祐介⁴, 青木 一勝¹, 石川 晃¹, Kenneth D. Collerson⁵, 小宮 剛¹

SHIMOJO, Masanori^{1*}, Shinji Yamamoto¹, Kenshi Maki², Takafumi Hirata², Yoshihiro Okada³, Yusuke Sawaki⁴, Kazumasa Aoki¹, Akira Ishikawa¹, Kenneth D. Collerson⁵, Tsuyoshi Komiya¹

¹ 東京大学大学院総合文化研究科, ² 京都大学大学院理学研究科, ³ 東京工業大学大学院理工学研究科, ⁴ 独立行政法人海洋研究開発機構, ⁵ クイーンズランド大学

¹The University of Tokyo, ²Kyoto University, ³Tokyo Institute of Technology, ⁴JAMSTEC, ⁵The University of Queensland, Australia

The Early Archean crustal records on Earth are rare, thus there are still many unsolved matters. The Early Archean crusts are still preserved only in northern Labrador, Northwest Territories of Canada and southern West Greenland. The Saglek-Hebron area in the Nain Complex, northern Labrador is located in the west end of the North Atlantic Craton, and is underlain by Eo-Paleoarchean (4.0-3.2 Ga) suites: the Nanok iron-rich monzodioritic gneiss, the Nulliak supracrustal assemblage, the Uivak I tonalite-trondhjemite-granodiorite (TTG) gneisses, the Uivak II augen gneisses and the Lister gneiss (e.g. Collerson, 1983; Schiotte et al., 1989). The emplaced or formed ages of these rocks are pre-3.8 Ga, ca. 3.8 Ga, 3.7-3.6 Ga, 3.5-3.4 Ga and ca. 3.2 Ga, respectively (e.g. Schiotte et al., 1989; Nutman and Collerson, 1991). The Nanok, Uivak and Lister orthogneisses occupy 80 percent or more in this area. The lithological similarity with those in southern West Greenland suggests that the Nulliak supracrustal assemblage and Uivak gneisses correspond to the Akilia association and Amitsoq gneiss complex, respectively (e.g. McGregor, 1973). However, the ages and origins of their protoliths are still obscure because of lack of detailed geochronological works, including comprehensive dating with LA-ICPMS and cathodoluminescence (CL) imaging.

We carried out geological survey and rock sampling, and conducted U-Pb dating of zircons from the Uivak I gneisses from Nulliak Island, Big Island, Tigigakyuk Inlet, the eastern and southern coasts of St. Johns Harbor and the surrounding areas in the Saglek-Hebron area. The CL images of zircon grains display internal structures of oscillatory zoning or of homogeneous core with overgrowth rim.

The distribution of their ages clearly shows presence of three groups. The first is characterized by both presence of older zircons than 3.8 Ga, with the maximum age of 3914 Ma in ²⁰⁷Pb/²⁰⁶Pb age, and apparent absence of the 3.6 to 3.8 Ga zircons, and is defined as the Nanok gneiss. The second and third groups have clear peaks of 3.7-3.6 and ca. 3.3 Ga in their age distribution of zircon cores, indicating the Uivak I gneiss and the Lister gneiss, respectively. All rims of the analyzed zircons show ca. 2.7 Ga overgrowths. The combination of age distributions of their zircons and their CL image observation differentiates three crustal events, and provides a very powerful tool.

Early Archean magmatic events of the Nain Complex, northern Labrador, Canada

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