

東南極レイナー岩体西部地域における U–Pb ジルコン年代測定

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U–Pb zircon geochronology in western part of the Rayner Complex, East Antarctica

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The East Antarctic Shield consists of various Archean and Proterozoic to Cambrian high-grade metamorphic terranes which have distinct crustal histories and were amalgamated at various times from Precambrian to Cambrian. The Rayner Complex, initially defined by Kamenev (1972), includes coastal outcrops and minor inland nunataks in western Enderby Land and Kemp Land adjacent to the Napier Complex and further east into MacRobertson Land, and is considered to belong to the Proterozoic mobile belt. The rocks were affected by amphibolite-granulite-facies metamorphism at ~900 Ma (Harley, 2003, and references therein), whereas the Napier Complex is characterized by Neoarchean ultrahigh temperature (UHT) granulite-facies metamorphism (Harley and Motoyoshi, 2000, and references therein). Transition zone between the Rayner Complex and the Napier Complex is obscured in western Enderby Land, but most of the Rayner Complex has been thought to represent reworked Napier Complex rocks (Sheraton and Black, 1983). However, previously reported zircon inheritance and depleted mantle model ages of Sm–Nd system indicate that there is minor contribution of Archean crust to the Rayner Complex (Black et al., 1987).

Recent geochronological works in the Rayner Complex using secondary ion mass spectrometry (SIMS) and an electron microprobe (EMP) revealed that western coastal region adjacent to Lützow-Holm Complex contains younger zircons (537–522 Ma; Shiraishi et al., 1997) and younger monazites (528–517 Ma; Motoyoshi et al., 2006, 533–523 Ma; Asami et al., 2005) than those of inland region (~1320–760 Ma; Shiraishi et al., 1997), which suggests that the western coastal region was overprinted by high grade metamorphism during Cambrian (Pan-African). Therefore, the Rayner Complex is probably subdivided into two terranes having different thermal history and the western coastal region and was defined as the western Rayner Complex (Shiraishi et al., 2008). However, the boundary and the mutual relationship between the Rayner Complex and the western Rayner Complex is still remained ambiguity.

In this study, the U–Pb zircon geochronology using a sensitive high resolution ion microprobe (SHRIMP-IIe) was applied to the inland region of the Rayner Complex, in fact Mt. Yuzhnaya, Condon Hills, and Mt. Lira. Condon Hills and Mt. Lira revealed metamorphic ages of 894 ± 1 Ma and 934 ± 2 Ma, respectively. These metamorphic ages are consistent with previously reported timing of the metamorphism in association with the Rayner Structural Episode. Zircon grains in Condon Hills and Mt. Lira do not show any signatures of the Pan-African reworking. Previous works for Rb–Sr whole rock isochron and isotope dilution thermal ionization mass spectrometry (ID–TIMS) U–Pb zircon dating of granite in Condon Hills suggested the Pan-African reworking, but U–Pb zircon dating carried out in this study does not provide the evidence of the Pan-African reworking. Mt. Yuzhnaya samples contain detrital zircons from Paleoproterozoic (2464 Ma) to late Neoproterozoic, and the Mt. Yuzhnaya area did not record the Rayner episode at c.900 Ma, and was probably affected by the Pan-African reworking. Therefore, the western Rayner Complex undergoing the Cambrian metamorphism can be extended up to Mt. Yuzhnaya. The only Condon Hills samples include signatures of the Archean crusts and the age peaks from 3850 Ma to 2491 Ma are the oldest components in the Rayner Complex of western Enderby Land. There is no evidence of reworked Napier Complex rocks in the studied Rayner samples.

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