# “Pseudo-concordance” of U-Pb system in zircon at Harvey Nunatak, Napier Complex, East Antarctica

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U-Pb zircon dating has played a pivotal role in geochronology due to zircon’s high durability and high closure temperature. In addition, the paired decay scheme of two U isotopes allows us to verify the determined U-Pb zircon age. The Napier Complex in East Antarctica is well known because it preserves both of evidence of ultrahigh-temperature (UHT) metamorphism (e.g., Sheraton et al., 1987; Harley & Hensen 1990) and long Archaean crustal history from 3800 Ma to 2500 Ma (e.g., Harley & Black 1997). Previous researchers also reported the possibilities of the early Archean crust in the Napier Complex (e.g., Compston and Williams, 1982). Some previous researchers pointed out discordant U-Pb data including reverse discordance which was derived from the redistribution of radiogenic Pb isotopes in zircon in the Napier Complex samples (e.g., Kusiak et al., 2013). The some discordant U-Pb data looks concordant but actually reflect the Pb redistribution, namely “pseudo-concordance.” They suggest the redistribution of the radiogenic Pb isotopes in zircons was associated with the UHT metamorphism based on the Pb isotope mapping of the zircons. This report is critical for accurate U-Pb zircon geochronology in the UHT metamorphic region, such as the Napier Complex. Therefore, in this study, the zircons from the rock sample of the Napier Complex were characterized on the basis of the observation and trace-element contents, and the information was utilized for interpretation of the U-Pb data.

Zircons collected from a tonalitic gneiss (170223-2A-09) were first analyzed using sensitive high resolution ion-microprobes (SHRIMP IIe and SHRIMP IIe/AMC) at the National Institute of Polar Research, Japan. The sample was collected at the Harvey Nunatak, which is located close to Mt. Sones. The geochronological data from the Harvey Nunatak had never been reported. The sample was crushed by a high-voltage pulse power fragmentation device (Selfrag Lab) to preserve the external morphology of zircons and prevent contamination (Takehara et al., 2018). After pulverizing, the zircon grains were concentrated using conventional mineral separation techniques, including heavy liquid separation with methylene iodide and magnetic separation.

The zircon grains include fractures and slightly mineral inclusion based on the observation of transmitted light images by an optical microscope. BSE images show that some zircon grains have darker BSE-response domains, which suggests depletion of contents of Zr and Si during hydrothermal alteration of zircon. The zircons show typically high U contents (average is ~2500 ppm), and the U-Pb age from the high U zircons was corrected for the matrix effect derived from the high U contents according to the method by Williams & Hergt (2000) and White & Ireland (2012). It seems that the unaltered zircons show concordant data from about 2450 Ma to 2540 Ma with discordance (Disc.(%) = 1 −(206Pb/238U age)/(207Pb/206Pb age)} ×100 (e.g, Song et al., 1996)) ranges from -5 to +9%. On the other hand, trace element geochemistry of zircons does not support detritus protolith. In this presentation, the information of trace-element contents in zircons was utilized for the interpretation of U-Pb data and “pseudo-concordance.”

 