

The oldest rocks in the world

Tsuyoshi Komiya^{1*}

¹University of Tokyo, Komaba

The solar system was formed at 4.567 Ga; thus we can obtain the age from chondrules in a chondrite. On the other hand, it is well known that the earth was formed soon after the formation of the chondrites, but we cannot directly obtain the age of the formation of the earth from materials on the earth. So far, the oldest rock in the world goes back to 4.03 Ga, and occurs in the Acasta Gneiss Complex, Canada. The first five hundred million years of the history of the earth are still in dark. The Hadean from the formation of the earth to the oldest age of rocks or geologic bodies is the most mysterious period because no rocks and geologic bodies are preserved at present except for the Hadean zircons only in several terranes, Western Australia, Canada, China and Greenland [1]. But, the Hadean period is the most important because the early evolution in the Hadean possibly clinched the evolution of the earth. In order to investigate the Hadean tectonics, we try to find the earliest Archean geologic terranes in the world. So far, the oldest geologic terranes comprise Acasta Gneiss complex, Akilia association in the West Greenland, Nuvvuagittuq in Quebec, Canada, and Nain Complex in Labrador, Canada [2].

We made geological survey in the Nain Complex, and reinvestigated the occurrence of the supracrustal rocks and the relationship with the ambient orthogneisses. Because previous works focused on distribution of the supracrustal belts within the orthogneisses, the detailed field occurrence of the supracrustal rocks within the belts is still ambiguous. Therefore, we focus on their internal structures.

Although the supracrustal belts are repeatedly intruded by granitic intrusions with some ages and their original structures are obscured, their lithostratigraphies are relatively well preserved in Nulliak, Big and Shuldham islands and St Jones Harbor. The supracrustal belts in Nulliak Island and Big Island comprise ultramafic rocks, mafic rocks and mafic sediments intercalated with banded iron formations in ascending order. In the St. Jones Harbor, it is composed of ultramafic rocks, mafic rocks, banded iron formation, and clastic sediments, intercalated with chert in the middle and with bedded carbonate rocks in the upper part, in ascending order. In the Shuldham Island, it consists of ultramafic rocks, layered gabbro with precursors of plagioclase and pyroxene accumulation layers, mafic rocks and psammitic sediments in ascending order.

Recently, we found 3.956 Ma zircons from the Nanok Gneiss, intruding the supracrustal rocks in the St. Jones Harbor area [3]. So far, the host rock including the zircons is the second oldest rock in the world. Because no supracrustal rocks are found in the Acasta Gneiss Complex, the Nulliak supracrustal rocks are the oldest supracrustal rocks in the world. The discovery of the oldest supracrustal rocks opens the door to investigate the early evolution of the earth in the Hadean.

[1] Froude et al. (1983) *Nature* 304, 616-618; Nelson et al. (2000) *EPSL* 181, 89-102; Mojzsis & Harrison (2002) *EPSL* 202, 563-576; Iizuka et al. (2006) *Geology* 34, 245-248; Wang et al. (2007) *CSB* 52, 3002-3010. [2] Bowring & Williams (1999) *CMP* 134, 3-16; Nutman et al. (1996) *Precamb. Res.* 78, 1-39; O'Neil et al. (2008) *Science* 321, 1828-1831. [2] Shimojo et al. (2012) abstract for Goldschmidt Conference 2012.