Petrology and geochemistry of Middle Proterozoic meta-tonalite in Cape Hinode, Prince Olav Coast, East Antarctica

*Atsushi Kamei¹, Hazumi Tashima¹, Tomokazu Hokada², Sotaro Baba³, Ippei Kitano⁴, Yoshikuni Hiroi²

1. Shimane University, 2. National Institute of Polar Research, 3. University of the Ryukyus, 4. Kyushu University

Middle Proterozoic meta-tonalite distributes in Cape Hinode, Prince Olav Coast, East Antarctica. Sun et al. (2014) suggested that this meta-tonalite was strongly metamorphosed at granulite-facies. However, the metamorphic condition of Prince Olav Coast is generally achieved up to amphibolite-facies. Additionally, Shiraishi et al. (1995, 2003) referred the intrusive age of the meta-tonalite around 1017 Ma by SHRIMP U-Pb zircon method. It is not corresponding to 550 - 500 Ma that the timing of main igneous and metamorphic activities of Prince Olav Coast. Therefore, the meta-tonalite of Cape Hinode is considered to have unique lithological character in this region. This study investigates the petrological feature of the meta-tonalite in the whole area of Cape Hinode. The geochemical characteristics are also investigated to consider its petrogenesis.

Geochemical compositions of the meta-tonalite, such as higher Al, Na, and Sr, and lower K and Y, in Cape Hinode suggests that the rock is conformable to a typical TTG produced by oceanic crust melting. On the other hand, the mafic rocks included in the meta-tonalite as xenoliths or meta-dikes show a wide variation of mineral assemblage and geochemistry. The most rocks are thought to be basic products on juvenile arc setting because they have almost flat chondrite normalized REEs patterns and negative Nb and Zr and positive LILEs MORB normalized patterns. However, several mafic rocks indicate a possibility of within plate type component based on the geochemical discriminations. These evidences suggests that the meta-tonalite of Cape Hinode was produced as a portion of a juvenile oceanic arc formed at about one billion years ago.

Keywords: Meta-tonalite, Juvenile oceanic arc, Proterozoic, Antarctica