

Protolith characteristics and tectonic implications for high-grade metamorphic rocks in the Highland and Wannai Complexes, Sri Lanka.

*Ippei Kitano¹, Yasuhito Osanai¹, Nobuhiko Nakano¹, Tatsuro Adachi¹

1. Division of Earth Sciences, Faculty of Social and Cultural Studies, Kyushu University

Sri Lanka has been considered to locate inside the collision zone during amalgamation of Gondwana supercontinent (e.g. Meert, 2003). Therefore, Sri Lanka plays an important role to elucidate the process of amalgamation of the Gondwana supercontinent. On the basis of rock type, metamorphic grade and Nd model ages, the metamorphic rocks in Sri Lanka are subdivided into three major crustal units (e.g. Cooray, 1994), which are Wannai Complex (WC), Highland Complex (HC) and Vijayan Complex (VC). This study conducted whole rock chemistry and LA-ICP-MS zircon U-Pb ages from 45 metamorphic rocks in the Highland and Wannai Complexes, and discuss their origin and tectonic models.

The bulk chemical analyses indicated sedimentary affinities for 17 samples and igneous affinities for 28 samples as protolith types. The metasedimentary rocks are characterized by relatively sandy, felsic compositions from the HC and relatively muddy, mafic compositions from the WC. The metaigneous rocks from both complexes are mainly characterized by the volcanic arc affinities. The zircon dating results provided dominant detrital zircon ages of *ca.* 3500–1500 Ma and igneous protolith ages of *ca.* 2000–1800 Ma in the east and dominate detrital zircon ages of *ca.* 1100–700 Ma and igneous protolith ages of *ca.* 1100–800 Ma in the west. The systematic differences of inherited zircon ages suggest eastern and western areas correspond to the HC and WC, respectively. Additionally, metamorphic ages of *ca.* 650–500 Ma are widely recognized from the HC and WC. The geochemical and geochronological characteristics of these complexes gave their tectonic implications for the protolith formation as the continental arc at the margin of old continental crust. The provenances of detrital zircons in the HC may be a mixture of detritus from local arc igneous rocks (2000–1800 Ma) and Paleoproterozoic to Archean craton, while those in the WC may consist of the detritus come from mainly arc igneous basements (1100–800 Ma), minor metamorphic rocks (1000–800 Ma) and old craton (2500–1500 Ma). However, before the assembly of these complexes precursors, that of the HC might have had a passive tectonic setting after its arc magmatism at *ca.* 2000–1800 Ma, and subsequently started to approach that of the Wannai Complex during subduction-related arc magmatism at *ca.* 1100 Ma, maybe as a part of continent. Moreover, the protolith characteristics, *P-T* evolutions and oldest ages of metamorphic zircons/monazites (*ca.* 650–620 Ma) are similar among southern India (Trivandrum Block, Achankovil Shear Zone and Southern Madurai Block), the HC and WC and Lützow-Holm Complex (Skallen Group, Ongul Group and Okuiwa Group). It suggests possibly that the protoliths (continent) of the Trivandrum Block, HC and a part of Skallen Group had collided together with continental arcs of Achankovil Shear Zone and Southern Madurai Block, WC, Ongul and Okuiwa Groups (except Cape Hinode) precursors at *ca.* 650–620 Ma.

Keywords: protolith characteristics, tectonic implication, Highland Complex, Wannai Complex, Sri Lanka, Gondwana supercontinent