

LA-ICP-MS Zircon U-Pb ages from metamorphic rocks in the southwestern part of Highland Complex, Sri Lanka

KITANO, Ippei^{1*} ; OSANAI, Yasuhito¹ ; NAKANO, Nobuhiko¹ ; ADACHI, Tatsuro¹

¹Kyushu University

Sri Lanka has been considered to locate inside the collision zone during amalgamation of the Gondwana supercontinent in Neoproterozoic to Early Cambrian (e.g. Meert, 2003). Therefore, Sri Lanka plays an important role to elucidate the process of amalgamation of the Gondwana supercontinent. Based on rock type, metamorphic grade and Nd model ages, the metamorphic rocks in Sri Lanka are subdivided into three major crustal units (Cooray, 1994; Kehelpannala, 1997; Kröner et al., 2003), which are Wannai Complex, Highland Complex (HC) and Vijayan Complex. The HC is composed of interlayered predominantly granulite-facies partly attaining to ultrahigh temperature (e.g. Osanai et al., 2006), granitic (charnockitic to enderbitic) gneiss and supraclastic metasediments with Nd model ages of ca. 2.0-3.0 Ga. However, because of the shortage of zircon U-Pb isotope data by spot analysis and these geochronological data reported mostly from the central part of HC, the geochronological framework of HC is still unclear. In order to understand the geological process in HC, it's necessary to conduct the geological, petrological, geochemical and geochronological work by the unified method on the whole area of HC. This study provides the first report of LA-ICP-MS zircon U-Pb ages from metamorphic rocks in the southwestern part of HC.

We carried out LA-ICP-MS zircon U-Pb dating for ten samples corrected from five localities (2101: South of Horana, 2510: Southwest of Ratnapura, 2704: West of Morawaka, 2201: Southwest of Rakwana, 2803: Northwest of Embilipitiya). In 2101, zircons in Grt-Opx-Bt gneiss (2101D1) show 2560-670 Ma from inherited domain and 640-470 Ma from overgrown domain. Grt-Opx-Bt granulite (2101D2) has similar ages to 2101D1, which are 2500-710 Ma from inherited domain and 640-470 Ma from overgrown domain. In 2510, zircons in felsic Grt gneiss (2510A) show 1840 Ma from inherited domain and 630-490 Ma from overgrown domain. Although zircons in Two Px granulite (2510L) have inherited domain and overgrown domain, we could obtain the ages only from overgrown domain (620-490 Ma). In 2704, zircons in Spl bg. Grt-Sil-Crd gneiss (2704G) show 2040-730 Ma and 620-470 Ma from inherited domain and overgrown domain, respectively. In respect to Grt-Opx granulite (2704C), inherited domain and overgrown domain of zircons are recognized of ages of 620-530 Ma and 590-490 Ma, respectively. In 2201, Grt-Bt gneiss (2201B) is resulted in zircon U-Pb ages of 1860-1450 Ma from inherited domain and 620-530 Ma from overgrown domain, and zircons in Grt charnockite (2201A1) show the concordant age of ca. 1820 Ma from inherited domain and 610-510 Ma from overgrown domain. In 2803, zircons in felsic Grt-Hbl-Bt gneiss (2803B) show 1980-690 Ma from inherited domain and 640-550 Ma from overgrown domain, and those in Grt-Hbl-Bt gneiss (2803C) show two concordia ages of ca. 1890 and 1770 Ma from inherited domain and 580-520 Ma from overgrown domain.

Samples in 2101, 2510 and 2704 show broad age cluster of 550-510 Ma from both CL bright and dark overgrown domain, and Neoproterozoic ages (ca. 1000-700 Ma) with the small amount of Paleoproterozoic to Archean ages (ca. 2700-1600 Ma) from inherited domain. On the other hand, samples in 2201 and 2803 show mainly 590-580 Ma from CL dark overgrown domains and Mesoproterozoic to Paleoproterozoic ages (ca. 2000-1500 Ma) with the small amount of Neoproterozoic ages (ca. 700 Ma), which is the similar characteristics in the central part of HC. 2101, 2510 and 2704 are located at less quartzite or marble distributed area, while 2201 and 2803 are mostly located at quartzite or marble distributed area in the southwestern part of HC. On the basis of the relation between the internal texture of zircons and ages, the distribution of ages from inherited domain and overgrown domain of zircons, and constituent rocks, the southwestern part of HC can be divided into two areas such as Southwestern Group and Highland Group previously recognized.

Keywords: Gondwana, Sri Lanka, Highland Complex, LA-ICP-MS, zircon