

Geochronology of detrital zircon from the Highland Complex, Sri Lanka: Implications for Gondwana reconstruction

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Sri Lanka is regarded as one of the important regions to unravel the process of Gondwana amalgamation because it was located in the center of the collisional orogeny formed during Late Neoproterozoic. The Highland Complex, exposed at the central part of Sri Lanka, is metamorphosed to granulite-facies conditions (e.g., Faulhaber and Raith, 1991; Hiroi et al., 1994; Raase and Schenk, 1994). Ultrahigh-temperature metamorphic conditions are also reported from some localities in the Highland Complex (e.g., Osanai et al., 2006; Sajeev and Osanai, 2004; Sajeev et al., 2007). The Highland Complex is dominantly composed of metasediments that include detrital zircons, and their age distributions can be used to infer the correlation between some depositional basins and their provenance (e.g., Collins et al., 2007; Kuznetsov et al., 2014). Although some authors (Holzl et al., 1994; Kroner et al., 1987) obtained Archean to Paleoproterozoic detrital zircon ages from metasediments in the Highland Complex, they did not discuss about the detail correlation of the Highland Complex with other Gondwana fragments. This study focuses on geochronology of detrital zircons in metasediments from the Highland Complex in order to unravel the regional geographical correlation of Sri Lanka within Gondwana supercontinent.

We collected four samples of quartzite and pelitic gneiss from the Highland Complex, separated detrital zircons from them, and analyzed U-Pb ratios using LA-ICP-MS. The detrital zircon ages are distributed from ca. 3500 Ma to ca. 1700 Ma with strong peaks at around 2700 Ma, 2500 Ma, and 2000 Ma. These age distributions of detrital zircons are consistent with those from the Palghat-Cauvery Suture Zone (e.g., Raith et al., 2010; Sato et al., 2011), but different from those of the Trivandrum Block and the Achancovil Shear Zone (Collins et al., 2007), South India, because they have Mesoproterozoic detrital age not found in the Highland Complex zircons. Thus, the Highland Complex could be correlated with the Palghat-Cauvery Suture Zone as a sedimentary basin rather than the Trivandrum Block or the Achancovil Shear Zone in southern India.

The precursor of the Wannai Complex could be a possible source of the Highland Complex before it was reworked based on available Hf crustal model ages of zircon (Santosh et al., 2014). The Dharwar Craton (ca. 3400-2500 Ma; Chadwick et al., 2000; Collins et al., 2003), the Salem Block (ca. 2750, 2600, 2500 Ma; e.g., Collins et al., 2014; Ghosh et al., 2004; Saitoh et al., 2011), and northern Madurai Block (ca. 2500 Ma; Collins et al., 2014; Plavsa et al., 2012; Teale et al., 2011) are also possible provenances of sediments of the Highland Complex. In contrast, crustal blocks in East Africa are difficult to be source regions of the Highland Complex because they are composed of rock units younger than Mesoproterozoic (Kibaran belt; ~1400 Ma; Kokonyangi et al., 2004).

Keywords: Gondwana, Sri Lanka, The Highland Complex, Detrital Zircon, LA-ICP-MS, Suture Zone