Geology of the eastern Dronning Maud Land, East Antarctica: Missing link to Sri Lanka

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The Neoproterozoic to early Paleozoic tectonic evolution in Antarctica related to the final amalgamation of Gondwana supercontinent has been contentious. The Japanese Antarctic activity area - eastern Dronning Maud Land (eDML: approx. 20˚E to 45˚E) in East Antarctica is located at the boundary zone of the East Gondwana and the West Gondwana. This presentation aims to discuss the tectonic relation among the discrete plutono-metamorphic terranes in this region. Three Neoproterozoic to early Paleozoic plutono-metamorphic terranes have been recognized in the eDML; Lützow-Holm Complex (LHC), Yamato-Belgica Complex (YBC) and the Sør Rondane Mountains (SRM) from east to west. LHC is characterized by the progressive high-grade metamorphism of the medium pressure type with a clockwise pressure-temperature (P-T) path from upper amphibolite facies in the east to granulite facies metamorphism (Hiroi et al, 1991) with ultra-high temperature metamorphism in the southwest (Hiroi et al., 1983, 1991; Motoyoshi et al., 1989; Kawasaki et al., 2011). YBC is characterized by widespread granitoid plutonism associated with amphibolite facies and granulite facies metamorphic rocks (Shiraishi et al., 1987). In contrast to LHC, YBC was metamorphosed relatively lower pressure condition. The main metamorphism of the LHC and the YBC was during the late Neoproterozoic to early Cambrian (630-550Ma) (Shiraishi et al., 1992, 2003). In SRM, two adjacent granulite facies metamorphic terranes with the contrast P-T paths, are bounded by the Main Boundary Thrust (Osanai et al., 2013). The southwestern part of the SRM is occupied by early Neoproterozoic (1000-900 Ma) metatonalite. Various types of granitoid rocks are widely exposed in SRM. The main metamorphic stage is defined at 650-600 Ma and the hydration event associated with many igneous activities took place at 560-550 Ma. Geochemistry, geochronology and recent aeromagnetic data suggested the SRM is underlain by late Mesoproterozoic to early Neoproterozoic juvenile crust (Shiraishi et al., 2008), whereas provenance of YBC is not definitive due to the scarce of isotopic data. Aeromagnetic data of the eDML show the significant N-S lineament along the ca. 36˚E in longitude and the NW-SE lineament along the Shirase glacier (Nogi et al., 2013), suggesting major tectonic boundaries between YBC and LHC. On the other hand, late Neoarchean crust (ca. 2.5 Ga) was reported in the southwest LHC and it was proposed that the late Mesoproterozoic northern LHC block collided the Neoarchean southwest LHC block by the late Neoproterozoic high metamorphic event (Dunkley et al., 2014; Tsunogae et al., 2014; Takahashi et al., 2018). These findings constrain the reconstruction of Gondwana fragments such as adjacent Sri Lanka and India. Previous literatures placed Sri Lanka in adjacent to the Lützow-Holm Bay area in East Antarctica. The Highland Complex (HC) and the Wanni Complex (WC) of Sri Lanka has been comparable to LHC by many authors in terms of lithology, petrology, petrochemistry and geochronology, while the origin and tectonic position of the late Mesoproterozoic Vjayan Complex (VC) of eastern and southeastern Sri Lanka remains controversial. The basement geology of YBC and the west coast of the Lützow-Holm Bay and, to the further north, the ice-covered Riisar-Larsen Peninsula is crucial to understand the final amalgamation of the Gondwana.

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