Timing of Pan-African Events in the eastern Dronning Maud Land, East Antarctica

Kazuyuki Shiraishi[1]

[1] Natl Inst Polar Res

High precision zircon SHRIMP U-Pb age determinations with the P-T history of East Antarctica are essential in the understanding of the formation of Gondwana. The Sor Rondane (SR) consists of Grenvillian juvenile. The granulite facies regional metamorphism occurred between 900-1000 Ma, and subsequently it was metamorphosed at 630-590 Ma under the granulite to amphibolite facies conditions. An A-type granitoid activity occurred from 560 Ma and the youngest granite occurred at 515 Ma. In the Lutzow-Holm Complex (LH) to the east, the peak metamorphism is 530-550 Ma with older metamorphic events, except for the detrital ages. The younger peak metamorphic event of LH compared to those of SR implies that it is probable for the LH to record the last stage of amalgamation of East and West Gondwana.

In recent times, the Indian Ocean sector (Dronning Maud Land - DML) of East Antarctica has been considered to be the southern continuation of the Mozambique belt in continental plate reconstructions. In the eastern DML, there are several discrete, isolated tectonic terranes; from west (~20E) to east (~50E) these are the Sor Rondane Mountains (SRM), Yamato-Belgica Complex (YBC), Lutzow-Holm Complex (LHC), Rayner Complex (RC), and Napier Complex (NC). High precision zircon and titanite SHRIMP U-Pb age determinations, in conjunction with the P-T history of these plutono-metamorphic terranes are essential in the understanding of the formation of Gondwana during the Pan-African events. Specifically the identification of the Pan African Mozambique Suture in the SRM is one of the major discussion points in the amalgamation of East and West Gondwana. Whether there was a single Circum-East Antarctic Grenville-aged mobile belt reactivated in Pan African times, or Pan African juxtaposition and assembly of three discrete Grenville-aged belts into East Gondwana (Fitzsimons, 2000) is a burning question. The SRM are underlain by a medium- to high-grade metamorphic rocks together with various plutonic rocks and minor mafic dykes. No ophiolite sequences have been recognised thus far. Taking into account the previous Sm-Nd and Rb-Sr data, together with our SHRIMP U-Pb data, the basement of the SRM consists of Grenvillian juvenile crust (ca.1100-1300 Ma) with minor amounts of an Archean component from the hinterland of the Sor Rondane regions. The granulite facies regional metamorphism (M1) occurred between 900-1000 Ma, and subsequently the terrane was metamorphosed at ~630-590 Ma under the granulite to amphibolite metamorphic conditions (M2). An M3 event is characterized by extensive A-type granitoid activity from 560 Ma and the youngest granite intrusions occurred at ~515 Ma. Whether the M3 is associated with a regional metamorphism or local thermal effects related to the granitic mass is not clear. This history is similar to that reported for central DML to the west (Jacobs et al., 1998) where initial magmatism occurred at ~1130 Ma with distinct metamorphic events at 1080 Ma, 575 Ma and 520 Ma respectively. On the other hand, in the LHC to the east, the peak metamorphic age is 530-550 Ma with no indication of older metamorphic events, except for the inherited (?detrital) ages from the metasedimentary rocks (Shiraishi et al., 1994). There is little evidence for a Grenvillean basement in this area. The younger Pan-African peak metamorphic event of the LHC compared to those of the SRM implies that it is more probable for the LHC to record the last stage of amalgamation of East and West Gondwana.