[EE] Evening Poster | S (Solid Earth Sciences) | S-MP Mineralogy & Petrology

[S-MP35]Antarctica and surrounds in Supercontinent Evolution

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Supercontinent formation and dispersion has been enigmatic in the Earth's history. Eurasia is one such current supercontinent and incredible progress in the understanding of its geological evolution has been achieved in the past decade. Earlier supercontinents in the Earth's history such as Gondwana (0.5 Ga), Rodinia (1.0 Ga), Columbia/Nuna (2.0 Ga), Kenorland (2.5 Ga) and Vaalbara (3.1 Ga), have been the focus of several studies, however limited information on older supercontinents has restricted an understanding of their tectonic evolution. Antarctica and surrounding areas in Gondwana, including southern Africa, Sri Lanka, India, Australia, are key regions for studying several important unsolved issues. In honor of the retirement of Professor Kazuyuki Shiraishi, Director of the National Institute of Polar Research, who developed the pioneering geological and geochronological framework of Antarctica within the Gondwana supercontinent, we invite authors around the world to present new as well as review results on the continental scale crustal processes and tectonic evolution that are associated with supercontinent formation events in Earth's history. The well-studied Eurasia, Pangaea, Rodinia and Gondwana supercontinents are of particular focus. Topics of interest include, but not restricted to, extremes in metamorphism, P-T-d-t evolution, magmatism, and the role of fluids. We hope to provide a platform for scientific discussions that will enlighten our understanding of the physical and chemical processes in the continental crust that records episodes of orogenesis that contributed to the formation and evolution of supercontinents.

[SMP35-P02]**Younging direction of carbonate depositional age in Highland Complex, Sri Lanka: Implications for Gondwana amalgamation tectonics**

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Sri Lanka is an integral part of the Latest Proterozoic to Early Cambrian Gondwana collision zone, the so-called East African-Antarctic Orogen (EAAO) that includes Mozambique, Madagascar, southern India and the Dronning Maud Land in East Antarctica. Mozambique Ocean is supposed to have existed between the West- and East-Gondwana before the final amalgamation of Gondwana supercontinent. Thick metasedimentary sequences found in the high-grade terranes of Gondwana continents contain layers of pure metacarbonate rocks, which are considered to have deposited as chemical precipitates in the Mozambique Ocean. The Highland Complex (HC) in Sri Lankan basement is one such terrane for which the age of sedimentation is unclear, although several studies confirmed a metamorphic age of late Neoproterozoic to Cambrian. Here we attempt to deduce the sedimentation age of metacarbonate rocks using Sr isotope chemostratigraphy and postulate a possible tectonic scenario for the sedimentary basin of the HC.

In order to estimate the depositional age using meta-carbonate rocks, it is necessary to evaluate the influence of post depositional chemical alteration during accretion, metamorphism and exhumation. Using a multi-isotope (carbon and oxygen) and, trace and rare earth element screening method we were able to select the least altered metacarbonate rocks from the HC. Although the HC is highly metamorphosed, very low contents of primary Rb in sedimentary carbonates helps to accurately estimate Sr initial (Sr_i) ratios. The results show that the metacarbonate rocks from the HC have different Sr_i ratios (at 850 Ma) depending on the region; nearer to the Wanni Complex ($^{87}Sr/^{86}Sr$ = 0.70459±0.00014, central HC ($^{87}Sr/^{86}Sr$ = 0.70578±0.00016) and those nearer to the Vijayan Complex (VC) ($^{87}Sr/^{86}Sr$ = 0.70722±0.0005). This variation suggests that the depositional age of carbonate rocks is younging from west through central to east across the HC, corresponding to ca. 1800-1500 Ma, 890-870 Ma and 750-700 Ma, respectively, when compared with the standard seawater Sr isotope evolution curves of Halverson et al. (2010). Thus, our results clearly point out the fact that the age of sedimentation at the HC-WC boundary in west differs from that at the HC-VC boundary in east.

Our sediment depositional ages when compared with geochronological data from previous studies, suggest that the pelitic rocks in the HC-WC boundary has detrital zircons of Archean, whereas the metapelites of the HC-VC boundary have only zircons of Tonian age. Therefore, we suggest that the sedimentary basin for deposition in the HC-WC boundary was situated nearer to an Archean craton, most probably the Dharwar craton. This is further supported by the fact that the Sr isotopic composition of the carbonate rocks in the HC-WC boundary derived in this study shows the lowest values in the East Gondwanan metacarbonate rocks (Meleshik et al 2008, Otsuji et al 2013). In contrast, the sedimentation at the HC-VC boundary took place next to the Vijayan Arc itself, perhaps as a part of the Tonian Oceanic Super Arc Terrane (TOAST, Jacobs et al., 2015). Thus, our results on Sr isotopic composition of metacarbonate rocks provide important constraints on the temporal and spatial extent of the Mozambique Ocean, which may lead to the understanding of the processes and timing of Gondwana formation.

Halverson et al. (2010), Precam. Res. 182, 337–350.
Jacobs et al. (2015), Precam. Res. 265, 249-272.
Melezhik et al. (2008), Precam. Res. 162, 540–558.
Otsuji et al. (2013), Precam. Res. 243, 257-278.