

Depositional ages for metacarbonate rocks from the Highland Complex, Sri Lanka

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Sri Lanka is an integral part of the Late Proterozoic to Early Cambrian collision zone of the so-called East African-Antarctic Orogen (EAAO) that includes Mozambique, Madagascar, southern India and the Dronning Maud Land in East Antarctica. The Mozambique Ocean is supposed to have existed between the different continents between East and West Gondwana, before its final amalgamation. The carbonate rocks in the EAAO are considered to have chemically deposited. Therefore, these rocks are ideal for obtaining the geochemical information of the Mozambique Ocean. The 540-600 Ma metasedimentary rocks in the Highland Complex (HC) is the only unit in Sri Lankan basement containing metacarbonate rocks. In this study, we attempt to apply the strontium (Sr) isotope chemostratigraphy to estimate the sedimentation age of the Highland Complex. In order to estimate the depositional age, it is necessary to consider the influence on carbonate rocks by metamorphism. For example, the oxygen isotope records fluid-rock interaction, while carbon isotopes alter with lithification or rare earth element + yttrium pattern changes by the contamination with the mixing of continental rocks. In addition, it is necessary to consider the effect of radioactive decay of rubidium to strontium. Thus in this study, taking advantage of the characteristics of metacarbonate rocks, samples that were least influenced by alteration were selected by chemical screening. For this purpose oxygen and carbon isotopic composition and trace and rare earth element pattern and Sr isotope ratio were used. $\delta^{18}\text{O}$ and $\delta^{13}\text{C}$ values of the samples range between 19 to 25 ‰ and -2.0 to 1.5 ‰. The results indicate that they preserve the primary depositional marine chemical composition. REE + yttrium patterns had oceanic characteristics as well. However, the Sr initial ratios have regional differences, $^{86}\text{Sr}/^{84}\text{Sr}$ (850 Ma) values ranges from 0.70431 to 0.70711. These values when correlated with the late Proterozoic Sr isotope chemostratigraphic curve of Halverson et al. (2010) suggest the depositional age in between 900 to 660 Ma.

The depositional ages are consistent with the inference from the youngest detrital ages of 834 ± 12 Ma and 722 ± 14 Ma for zircons in the metapelitic rocks, though there is considerable regional differences. Our estimate of the depositional age are also comparable with the depositional age of metacarbonate rocks from the Sør Rondane Mountains (SRM), East Antarctica (880-850 Ma and 820-790 Ma; Otsuji et al., 2013), and those of Mozambique belt (890-860 Ma; Melezhik et al., 2008). The results indicate that the carbonate sedimentation in the Mozambique Ocean persisted extensively from southeastern Africa to east Antarctica, through southern India and Sri Lanka during the late-Tonian to early-Cryogenian periods. The result also places 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. Further detailed analytical studies are being carried out, to understand the reliability and regional extent of depositional ages for the metacarbonate rocks in the Highland Complex, Sri Lanka.

References; Dharmapriya et al. (2015), *Precam. Res.* 771, 311-333., Halverson et al. (2010), *Precam. Res.* 182, 337-350., Melezhik et al. (2008), *Precam. Res.* 162, 540-558., Otsuji et al. (2013), *Precam. Res.* 243, 257-278.

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