Sr and Nd Isotope Geochemical Studies on Fossils from Cauvery Basin, South India: Implications to Paleo-Ocean Circulation

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The Mesozoic Cauvery basin of south India developed as a result of extension during the break-up of Gondwanaland. As this basin contains abundant marine fossils of Albian to Danian age (112 Ma to 65 Ma) and biostratigraphy of this basin is well established [1] it is well suited for isotope geochemical studies. This study aims to build Sr isotope chrono-stratigraphy and understand past ocean circulation pattern on Nd isotope analysis on the marine fossils.

The Sr isotope composition is uniform in all the oceans and evolution of marine $^{87}Sr/^{86}Sr$ ratio through Mesozoic Era has been well established [2, 3]. The $^{87}Sr/^{86}Sr$ ratios on fossils of the Cauvery basin are compared with the global seawater $^{87}Sr/^{86}Sr$ evolution curve. More radiogenic $^{87}Sr/^{86}Sr$ values than the seawater at the time of their deposition were observed for fossils from Niniyur and Kallamedu Formations (Danian and Maastrichtian) and Anaipadi Formation (Coniacian) indicating either increased freshwater influence or meteoric water induced alteration of fossils. The $^{87}Sr/^{86}Sr$ ratios on fossils from other Formations fall on the global seawater Sr isotope evolution curve and their $^{87}Sr/^{86}Sr$ ages correspond to their biostratigraphic age. If the $^{87}Sr/^{86}Sr$ ratios of the fossils were not altered then during deposition of Ninyur, Kallamedu and Anaipadi Formations regression of sea either due to lowering of sea level or uplift of land could have occurred.

Strongly negative ε_{Nd} (t) values (-19.7 to -24.2) on fossils of Ariyalur basin could have resulted due to Nd released by weathering of old evolved continental crust and restricted connection the Cauvery basin had with the open ocean. The relatively more radiogenic $\varepsilon_{Nd}(t)$ value of Kilpalvur Member suggests that the basin established wide connection with Indian Ocean 85 Ma ago. Two component mixing calculation reveals that input from the Archean granitoid rocks of Dharwar craton and Southern Granulite Terrain controlled the Nd isotope composition of seawater in Cauvery basin.

Keywords: Seawater; $^{87}Sr/^{86}Sr$ evolution; $^{143}Nd/^{144}Nd$; Cauvery Basin; Fossils

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