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Geochemistry of Rare Earth Elements in Mollusk shells of family *Potamididae* from coastal sediments of Southeastern Sri Lanka: Implications for Paleoclimatology

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Bio-mineralization of carbonate skeletons is sensitive to changes in physico-chemical conditions of the ambient water. Despite possible vital effects, Rare Earth Elements (REE) could be incorporated in biogenic carbonates without major fractionation and thus it can be used as a useful proxy for paleo-climate and paleo-environment applications. Here we present REE imprints of climate and environment changes around Southeastern Sri Lanka during Holocene, based on Mollusk shells of family *Potamididae* extracted at different depths of an AMS ^{14}C-dated sediment core (5.1 m) from Pottuvil Lagoon. 43-shell samples were digested with reverse aqua-regia (3:1 of HNO_3: HCl) solution in a microwave assisted high pressure digestion system and analyzed for REE contents using ICP-MS. North American Shale Composite (NASC) normalized REE patterns show that the shells are enriched in Light REE (LREE) with distinct negative Eu and Ce anomalies and a slightly positive Gd anomaly imply, the shells were bio-mineralized in shallow marine settings with a significant terrestrial influence. In addition, Total REE (ΣREE), magnitude of LREE enrichment, Y/Ho ratio, Eu and Ce anomalies in Pottuvil-shells exhibit distinct variations with depth. Asynchronous increase in ΣREE, LREE/HREE ratio together with troughs in Y/Ho profile recorded at 2531-2959, 3873-4004, 4196-4671, 4832-5219 and 5345-5507 yrs BP intervals suggesting a significant terrestrial input to the nearshore environment. In contrast, a predominant marine REE signature is observed in 2959-3873, 4004-4196, 4671-4832 and 5219-5345 yrs BP sections as inferred by decreased ΣREE, LREE/HREE ratio and peaks in Y/Ho. Further, Eu and Ce anomalies showed more or weakly negative shifts in association with wax and wane terrestrial signature. We surmise that REE composites in mollusk shells closely reflect monsoon induced changes, because the area is under the influence of dominant Indian Winter Monsoon variant. The periods with significant terrestrial REE signature in shells could be attributed to increased terrestrial flux during intense monsoon phases. In contrast, weak monsoon conditions favor marine REE signature to be retained in the shells due to less influence by terrigenous detritus. Lanthanide geochemistry based approach executed in this study provides new insight in to paleoclimate conditions around southeastern Sri Lanka during mid-late Holocene.