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MONAZITE AS A NATURAL TRACER IN STUDYING THE EVOLUTION OF A YOUNG BEACH

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Monazite, a radioactive mineral containing thorium, occurs in the beaches of Sri Lanka, close to the outfalls of major rivers. Such a deposit can be found near the mouth of Kelani River (Lansiyawatta), on the beach and its vicinity. In an independent study in this area on the uptake of Thorium and its daughter products by the plants growing there, it was found that the surface radiation levels could not be correlated with the radioactivity in plants. Hence sand samples were taken at four sites at different depths

by using a hand auger. The radioactivity of sand samples at various depths were measured by three methods viz. Field Scintillation Counter (sensitive for Gamma rays), field dose rate meter with a G.M. Counter (more sensitive for Beta particles) and counting of sand samples with a G.M. Detector. The three sites along the beach from river mouth towards North, showed two peak Monazite concentrations at about 60cm. and 110cm. below ground surface. The fourth site near the river bank and about 100 meters inland from the beach contained well mixed sand of low radioactivity. Similar bands of Monazite at depths at a place called Kaikawala, have been reported.[1] There is evidence to believe that the source of Monazite of Sri Lankan beaches is Thorium bearing rocks like Pegmatite in the catchments of our major rivers. The natural weathering processes and runoff bring down the products along the river channels to the sea. The largest transport of such bedload materials occurs during major floods, following heavy rainfall. Once the material is brought to the sea, the wave action sorts the various minerals according to their densities. Monazite, being a heavy mineral, is deposited on the high water line of the beach. It is known that rough sea conditions separate and deposit more Monazite on the beach.

At the study site, the beach is young and the presence of Monazite on the top surface is indicative of deposition rather than erosion. Hence the presence of two radioactivity peaks in the sand profile may indicate exceptionally rough weather conditions, where high rainfall, high sediment yield in rivers under flood and rough sea conditions are the order of the day. Over the last 50 years, which apparently is the depositional history of the place, the flood in 1955 and the cyclone in 1978 were the exceptional weather episodes during the period. Hence the two Monazite peaks may indicate the Monazite deposition followed by the two events. This will enable us to calculate the deposition rates over the period at the site, using the two peaks as the datum points, even though some more confirmatory work is warranted.

Reference

1. Dharmawardena, K.G., Wickremaratne, S. (1985) Kaikawala radioactive mineral deposit, is it exhausted? Proc. Sri Lanka Assoc. Advmt.Sci.