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Estimating the thermoluminescence dates of an ancient terracotta site at Rajanganaya

Terracotta and pottery samples collected from an ancient site at Rajanganaya were dated by Thermoluminescence (TL). In TL, age is estimated from the ratio of accumulated dose/ exposed dose. The accumulated dose is determined by TL. The natural radioactivity of these artifacts and their surrounding sediments was measured using *in-situ* and laboratory gamma spectrometry. The comparison of ^{238}U (deduced from ^{234Th} gamma emission) and that of ^{226}Ra (deuced from ^{214} Pb and Bi gamma emissions in equilibrium with ^{222} Ra) shows a significant disequilibrium of the U series. The activity ratio ^{238}U / ^{226} Ra which is greater than unity in the present study is interpreted as a result of either uranium enrichment or radium impoverishment which had been occurred before the burial of the objects. Taking into account this U-series disequilibrium and assuming this as a recent or permanent effect TL dates were calculated.

TL age estimates obtained for pottery and terracotta are 1292 • 73, 1257• 59 A.D respectively and are consistent with the uncalibrated radiocarbon dates obtained from Beta Analytical Inc. Florida, USA for charcoal collected at the same location which are 1215 • 1135 • 105 and 1175 • 105 A.D> Except for the TL age estimate 666 • 116 A.D obtained for a terracotta sample which indicate an older age to this cultural phase. Finally, OxCal Program was used to plot the TL and Calibrated radiocarbon dates where good agreement was obtained.

Therefore, the of gamma spectrometry and the necessary corrections due to disequilibrium of the U-series allowed the estimation of the TL ages without underestimation. The final results of this study- 6th to 13th century A.D are of fundamental interest to understanding the terracotta culture in Sri Lanka.