

ORIGIN AND MINERALOGY OF GEM AND RARE EARTH ELEMENT BEARING GRAVELS IN EHELIYAGODA, SRI LANKA

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The most well-known Eheliyagoda alluvial gem deposits in Rathnapura District lies on the Highland Complex (HC) rocks of Sri Lanka. It has been discovered that Sri Lanka's gem-bearing gravels are incredibly rich in valuable gem quality minerals as well as minerals that are rich in Rare Earth Elements (REE). Though Eheliyagoda is famous for its high quality gems, the origin and the base mineralogy of Eheliyagoda gem fields have not yet been reported comprehensively. Hence, present study investigated the possible mineralogy of 20 different gem mining sites (paddy lands, forests, cultivated lands and river banks) located in Eheliyagoda, with a specific focus on the REE concentrations present in the gem-bearing gravel. Inductive coupled plasma mass spectroscopic (ICP-MS) analysis was carried out on the samples with the purpose of identifying the quality and quantity of REE while fourier transform infrared spectroscopic (FTIR) analysis and X-ray diffraction (XRD) analysis were performed to determine the auxiliary minerals. The gravels and the sandy sediments of the gem bearing layers were angular to sub angular in shape indicating its less reworked nature contrast to the well-known alluvial characteristics in most of the other gem fields in Sri Lanka. The average Total REE concentrations for the studied samples is 462 (Min:55-Max: 1442) ppm with about 75 % of Light REE (LREE) content. Results indicate that the study area is rich in LREE concentrations, which is comparable to the published data on other gem mining regions of Sri Lanka. The Pearson correlation between Heavy REE (HREE) shows strong positive correlations between each other and further they show a strong positive correlation with arsenic (average 10 ppm) indicating its regional metamorphic origin where the arsenic concentrations are comparable. High to moderate correlation is observed between LREE and HREE of the samples which might be controlled by the minerals such as garnets. Mineralogical analyses confirm the presence of gem or gem associated targeted minerals such as ilmenite, kyanite, zircon, sillimanite, corundum, xenotime and monazite which might have given the origin for the REE contents. Hence, the study concludes that the origin for the Eheliyagoda gem fields are the provincial rocks, specifically garnet-sillimanite-biotite gneisses and charnokitic gneisses which directs the in-situ weathering products.

Keywords: *Eheliyagoda, Gem-bearing gravels, Mineralogy, Rare earth elements, Origin*