

Grain size analysis of sediments of Thar Desert, India to infer sedimentary environment

CHANDER KUMAR SINGH, RINA KUMARI
AND SAUMITRA MUKHERJEE

School of Environmental Sciences, Jawaharlal Nehru
University, New Delhi-110067

Grain size is a fundamental descriptive measure of sediment and sedimentary rock. Grain size parameters are useful for recognizing sedimentary environments as dune, river, beach marine and others of continental shelf through graphical, moment and statistical methods. Bivariate plots between various statistical grain size parameters can be successfully used for distinction of such environments. The statistical grain size parameters were treated using different statistical tools such as factor and discriminatory analysis to decipher the depositional history of the sediments of the study region. The analysis suggests that the deposits are not unequivocally aeolian, but contain sediments contributed by marine, shallow marine, fluvial, aeolian and lacustrine processes. Fluvial and fluvio-lacustrine deposits formed the base for the aeolian deposition in the region. SEM analysis of grains are a type of caliche formation in which fine grained calcareous sediments has reached near surface by capillary action and deposited. Angular outlines and features such as high relief, sharp edges and articulate steps were observed in the grains. The results of bivariate plots of mean (ϕ), moment mean and discriminant analysis does not show any specific trend of grain size for different geomorphic environments however these functions states that the sedimentary depositional environment in the study area has been mainly controlled by fluvial and marine activities but the importance of aeolian action also can not be ignored.

Geochemistry and mineralogy of Tertiary sedimentary rocks from Kerala, South India – Implications to REE behaviour under intense chemical weathering

PRAMOD SINGH* AND C.G. LAKSHMIDEVI

Department of Earth Sciences, Pondicherry University,
Pondicherry 605014, India
(*correspondence: pramods@yahoo.com)

The Tertiary sedimentary rocks of Kerala along the south-west coast of India are mainly divided into three formations, Vaikom, Warkala and Quilon. This research evaluates the clay mineral and geochemical compositions including the rare earth elements (REE) of the mudstones and sandstones from two sedimentary sections of Warkala formation from the Karuchal and the Warkala region. The high CIA values ranging between 97 and 99 for Karuchal area and between 85 and 98 for Warkala area suggests that these sediments are extremely weathered. Further Kaolinite as the dominant clay in rocks from Karuchal section and Kaolinite / Gibbsite as the dominant clay in rocks from Warkala section also corroborate higher degree of weathering. All elements except Al, Ti and Ni exhibit depletion in comparison to UCC. The chondrite normalised REE pattern exhibit high degree of fractionation, $((Ce/Yb)_n)$ ranging between 30 and 67 for sediments of Karuchal section; $(Ce/Yb)_n$ ranging between 14 and 50 for sediments of Warkala section. On normalizing with all the probable source rocks exposed in the area, the REE plot of the sediments exhibit LREE enrichment and HREE depletion. This indicates that the higher $(Ce/Yb)_n$ ratios are not because of source, but due to the loss of HREE and residual enrichment of LREE bearing phases. This suggests mobilisation and removal of HREE from the system under extreme chemical weathering. Our finding has important implications as REE is commonly accepted to reflect the nature of exposed continental crust [1].

[1] McLennan, Nance & Taylor (1980) *Geochim. Cosmochim. Acta* **44**, 1833–1839.