

Geochemical and mineralogical studies in clastic sediments of lower Krishna River, India: Implications to weathering, transportation and deposition of sediments

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The chemical and mineralogical compositions of riverine sediments are important in understanding geochemical cycling of elements [1-3]. Major, trace and rare earth elemental (REEs) compositions of river sediments are controlled by lithology, weathering processes, diagenesis and sedimentary sorting in catchment areas [5-6]. The geochemical characteristics of bed sediments from the lower reaches of Krishna River suggest their origin from weathering of Deccan basalts and Precambrian rocks of southern India. Elemental compositions indicate evidence of sedimentary sorting during weathering, transportation and deposition of sediments. Highly depleted Na₂O and high Chemical Index of Alteration (61-72) are suggestive of moderate to strong chemical weathering environment. A strong relationship between CaO and Sr suggests biotite control on sediment geochemistry.

The bed sediments contain significantly low concentrations of Ba, Sr, La, Ce and Nd and moderately low or identical concentrations of other trace and REEs relative to upper continental crust (UCC). Strong relationships of Σ REEs with TiO₂ and Zr in bed sediments suggest that REEs are mainly controlled by heavy minerals like titanite and zircon. Higher concentrations of REEs in clay fractions of bed sediments indicate their adsorption and/or substitution on clay lattice.

Clay mineralogical studies in lower Krishna River sediments indicate predominance of smectite mineral with minor amounts of kaolinite and illite. The smectite mineral may have derived by the weathering of basalt and black cotton soil in its drainage basin.

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