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Geochemical Signature and Micromorphology of Ferruginous Gravel and Laterite Deposits in Northern Sri Lanka

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Abstract

Ferruginous gravel is an iron-cemented clastic sedimentary deposit that covers most of the northern province with interconnecting laterite and red earth deposits. The study is conducting a novel investigation of the detailed geochemistry and micromorphology of the ferruginous gravel and laterite deposits in northern Sri Lanka. Two profiles were selected for detailed investigation in the Mullaitivu district and collected samples from two profiles were analysed for micromorphology, phase identification, and the geochemical signature of the ferruginous gravel and laterite deposits using scanning electron microscopy (SEM), X-ray diffraction (XRD), and inductively coupled plasma mass spectrometry (ICP-MS), respectively. SEM images of thin sections revealed the nature of microfractures, cavities, and authigenic minerals, including goethite and kaolinite, in the ferruginous gravel and laterite deposits. XRD analysis confirmed the dominance of quartz and goethite, with minor kaolinite peaks. Fe-Al-V-Cr-Mn-Ge-Ba is the major element, and traces of rare earth elements were identified using ICP-MS data. The similar mineral and chemical compositions of ferruginous gravel and laterite deposits suggest a common formation pathway under intense weathering conditions, leading to silica-rich, iron-cemented, clastic sedimentary deposits highlighting their unique characteristics.

Keywords: Ferruginous gravel, Laterite, Micromorphology, Geochemistry, Clastic sediments