Abstract

Geo-vegetation mapping through image processing techniques and field data can be considered as a novel approach in earth sciences, a mean to confirm the conceptual statements in geological theories. This research makes use of the knowledge of the historical trends in vegetation mapping concepts may provide useful insights for tracing the boundary of serpentinite body from non-serpentinite area at Idikolapelassa, close to Embiliptiya, south of Sri Lanka. This approach was successfully employed to demarcate the boundary of underlain serpentinite rocks shown by bear lands with occasional bushes and non-serpentinite rocks indicated by the surrounding cultivated lands including chena, paddy and residential areas.

The serpentinite body at Idikolapelassa is an ultramafic rock, which is mainly composed of hypesthene and olivine, and is crusted by an iron rich lateritic soil cap. This body, together with other four serpentinite bodies at Ussangoda, Ginigalpelassa, Katupota and Yodaganawa, is located as overthrusted lithotectonic boundary between the Highland Complex (HC) and the Vijayan Complex (VC) of Sri Lanka.

The geochemical results allowed us to conclude that the Indikolapelessa deposit is one of the mantle fragments exposed in the Sri Lankan crust. This idea is supported from geochemical evidence of the serpentine soils (n=39), adjacent serpentine boundary soil (n=11) and non-serpentine soils (n=13). Cations of Mg, Ca, Al, Fe, Ni, Cd, Zn, Cu and Cr were measured in all collected soil samples and six fresh serpentinite rocks by Atomic Absorption Spectrometry. Soil depth of the sampling locations, grain size distribution pattern and soil pH were also detected in representative samples. Exchangeable Ca/Mg values in serpentine soils range at lower values of 0.03-0.90 whereas in non-serpentinite soils the Ca/Mg values are in the range of 0.61-3.42. Low Ca/Mg ratios are very commonly observed in the soils in the serpentinite bodies having mantle origin elsewhere in the world. The serpentine soils contained high levels of nickel (0.4604±0.1929% dry soil) and chromium (0.0706±0.0415), in addition to 10.8789±3.2067% of iron and 0.1991±0.0586% of manganese. The inter-correlated elements Fe, Ni, Cr and Mg and Mn of the soils from Idikolapelassa reflect their association with the ultramafic rocks and with the Fe–Ni mineralization. Low Al content of serpentine soils (1.2497±0.6109%) and relatively high Al in non-serpentine soils (2.0679±0.6695%) further reflect that serpentinite rocks have not been derived from the crustal blocks as these concentrations are far below the average crustal values. Therefore, it is possible to conclude that Mg-rich magma had been intruded into the

crust along the HC-VC litho-tectonic boundary during the overthrusting of the two crustal blocks which may probably be occurred well after the main collision of Gondawana fragments.

Our study reveled that the serpentine soil at Idikolapelassa is characterized by lack of macronutrients, presence of heavy metals at toxic levels, low ratio of Ca/Mg, moderately acidic pH, shallow soil thickness, existence of a slight fraction of clays and silts, etc., which have created a harsh environment for healthy growth of plants. Consequently, the existing vegetation on the serpentinite body is confined to occasional bushes and serpentine habitats. Moreover, presence of a little portion of clays and silts in the serpentine soil had made an environment for soils to be eroded easily resulting shallow soil depth and rock outcrops.