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Weathering style and geochemical (major and rare earth elements) content of granitic and basaltic soils from Kuantan, Peninsular Malaysia

AZMAN A GHANI

Department of Geology, Faculty of Science, University of Malaya, 50603, Kuala Lumpur

The variation of major and rare earth elements in soils is largely dependent on the type of rock or parent material from which they are weathered and are largely controlled by the mineralogical content in the rock or parent material. Minerals such as allanite, apatite, sphene, zircon, garnet and monazite are the main carriers of REE in the parent rock. During weathering, all these minerals will release rare earth elements, into the soil either by soil solution or incorporated into secondary minerals in the soil Examples of secondary minerals that can hold the rare earth elements in soils are clay minerals (e.g. kaolinite, chlorite, illite, vermiculite and smectite) and Fe-Mn oxide. This paper investigates the behavior of major and rare earth elements of rock–soil system in basaltic and granitic weathering product that occur in the same area, Kuantan, Peninsular Malaysia. The granite type is hornblende biotite granite of Permian age whereas the basaltic formation consists of alkali olivine basalt, limburgite and olivine nephlinite of early Pleistocene age. Grained size and mineralogy of both rocks is recognized as among the important factors that controlled the weathering. The basalt and granitic rocks crystallised from different types of magma, i.e. mafic and felsic magma respectively. The basalt shows more coherent soil-rock rare earth profile while the granite soil-rock profiles are more erratic. In granite profile, total rare earth elements increase with depth. Ce anomaly in granitic profiles suggested that the oxidation of Ce^{3+} to Ce^{4+} is important process during weathering where Ce^{4+} may be incorporated into zircon structure or forms a new substance such as cerianite $(Ce^{4+},Th)O_2$.

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