

## **Geochemical characterization of volcanic soils from Tawau, Sabah**

### **Abstract**

This paper discusses the geochemical characteristics of volcanic soils from Tawau, Sabah. The concentration of major elements and trace elements were determined using XRF analysis whereas mineralogical studies were carried out using XRD and SEM techniques. The results of the analyses show that SiO<sub>2</sub> and Al<sub>2</sub>O<sub>3</sub> are abundant in volcanic soils with concentrations from 43.06% - 67.96% and 12.55% - 29.92%, respectively. The concentration of Fe<sub>2</sub>O<sub>3</sub> is next in abundance with the concentration of between 6.82% and 11.29%. The concentrations of CaO, K<sub>2</sub>O, MgO, Na<sub>2</sub>O, P<sub>2</sub>O<sub>5</sub>, and TiO<sub>2</sub> are less than 5%. The high concentrations of SiO<sub>2</sub> and Al<sub>2</sub>O<sub>3</sub> are due to the high abundances of vermiculite and quartz as detected from XRD, while the high concentration of Fe<sub>2</sub>O<sub>3</sub> is due to the presence of goethite. The average concentrations for Ba, V, Zr and Zn in volcanic soils are 341 ppm, 315 ppm, 239 ppm, and 124 ppm, respectively. The strong correlations between Zn and Al<sub>2</sub>O<sub>3</sub>, Fe<sub>2</sub>O<sub>3</sub> and SiO<sub>2</sub>, indicate that Zn is being adsorbed by secondary minerals especially vermiculite and goethite.