

Distribution and accumulation of heavy metals in Marine sediment from Marudu Bay, Sabah

ABSTRACT

This study aims to analyse the distribution and factors that control the accumulation of heavy metals in marine sediment from Marudu Bay, Sabah. The sediment samples originated from the various types of rocks, namely ultrabasic rock, basic rock, and chert of ophiolite sequence, and sedimentary rock of the Kudat Formation. A total of 20 sediment core samples were systematically sliced for physico-chemical analysis such as pH value, organic matter (OM), and particle size distribution (PSD). Seven heavy metals are analysed in this research, namely cobalt (Co), chromium (Cr), copper (Cu), manganese (Mn), nickel (Ni), vanadium (V), and zinc (Zn) which is measured using the ICP-OES instrument. Descriptive statistics were used to study the distribution and accumulation of heavy metals from two main stations, namely Sg Karang Station (ST) and Kg Tampakan Station (SK). The results from both stations showed various levels of heavy metal concentration. The average concentration of Mn is between 2.19 mg/kg - 94.77 mg/kg and followed by Cr (0.87 mg/kg - 21.11 mg/kg). For Ni, Zn, Cu, V, and Co, the concentration range were between 0.28 mg/kg - 11.48 mg/kg, 0.94 mg/kg - 6.95 mg/kg, 0.55 mg/kg - 6.01 mg/kg, 0.64 mg/kg - 3.77 mg/kg, and 0.02 mg/kg - 0.85 mg/kg respectively. The result of correlation analysis showed the significant negative relationship between pH with Co, Cr, Ni, Mn, and Zn indicated the increasing concentration in acidic condition. A strong negative correlation between percentage of sand and Co, Cr, Mn, and Ni indicated the decreasing concentration in coarse sediment particle size. However, there was a strong positive correlation between percentage of sand and V due to the association in the carbonate minerals. The KruskalWallis tests showed there were no significant means difference of the percentage of heavy metals based on sample depth and the distance from the shoreline except for V and Mn.