Geochemical Modelling of Philippine Nickel Laterites: Effect of Degree of Serpentinization on Ultramafic Weathering

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Nickel laterites are supergene deposits formed from the residual weathering of ultramafic rocks and serpentinites. These deposits have acquired economic significance lately as they are the major source of nickel for the stainless steel industry. A typical Philippine deposit is defined by a characteristic mineralogical zonation comprising limonite, saprolite and bedrock. The limonite layer is predominantly composed of iron oxyhyd(oxides), principally goethite, which extends from the uppermost cover to few meters before saprolite. The saprolite layer, which holds the highest Ni content, is marked by characteristic Mg silicates such as serpentine, talc and some poorly defined Ni-rich assemblage informally called garnierite. The temporal and mineralogical development of a typical nickel laterite profile is not well understood. An attempt to decipher the role of serpentinization extent is investigated in this study using reactive transport geochemical modelling via *GWB (Geochemists' Workbench)* X1t program. Hypothetical bedrocks of different composition and degree of serpentinization were reacted with a dilute river water in a span of 100 years. Chrysotile, talc, clinochlore, hematite, goethite, magnetite, tremolite and quartz were allowed to precipitate in the system. The changes in the mineral saturation states of these minerals over space and time were evaluated and correlates, with certain limitations, with actual laterite mineralogy.