

CHEMICAL WEATHERING OF VOLCANIC PROTOLITH TO BAUXITE ORE: A GEOCHEMICAL ANALYSIS USING MAJOR ELEMENT COMPOSITIONAL DATA

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The Palau Archipelago is the only emergent feature on the Kyushu-Palau Ridge. The islands are composed of volcanic rocks that plot within the tholeiite series ranging from basalt to dacite. Extreme chemical weathering due to a tropical climate has led to areas of bauxite formation, the primary ore of Aluminum. This study attempts to describe major element compositional changes between the volcanic parent rock (protolith) and the altered material (bauxite) in response to in situ chemical weathering using statistical modeling and geochemical analysis. A linear compositional model was found to fit 99.95% of the variation in the major element data. Titanium was identified as an immobile element and used to conduct mass balance calculations. Consistent with the extreme climate of the sample location, leaching (mass loss) was observed for the following minerals: SiO_2 96%, CaO 100%, MgO 98%, K_2O 99%, Na_2O 100%, MnO 90% and P_2O_5 53%. The only elements with observed increases in bulk mass were Al_2O_3 166%, Fe_2O_3 5%. A greater increase of Aluminum was seen in the nodular samples than was seen in the bauxite ore.