

## Quartzose sand and kaolinite-dominated mud derived from felsic plutonic rocks in intense weathering condition

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In the Upper Miocene - Early Pliocene time, Japanese island had a warm and subtropical climate. The mineralogical and chemical compositions of sand and mud of the Upper Miocene Tokiguchi Porcelain Clay and the Early Pliocene in the Kobiwako Group were examined for sedimentary petrography and geochemistry to clarify the influence of the warm climatic condition on sediment composition. Both sediments are considered to have been produced from felsic crystalline basement provenance. These sediments are characterized by the deposition in warm and humid climate on the basis of plant and diatom fossils.

The humid tropical climate produced quartz rich sand and kaolinite rich mud. The Upper Miocene sediments indicate that mafic silicates and feldspars were destroyed so that the sand ranges from arkoses with plagioclase rich sand to subarkoses with dominant of K-feldspar. The Upper Miocene mud show kaolinitic clay mineral composition and aluminous chemical composition. In contrast, the Pliocene sand is arkosic to litharenitic with abundant of feldspars and accessory minerals. In the Pliocene mud, an increase in the relative abundance of smectite accompanies the breakdown of volcanic fragments and volcanic glass is detected.

The intense weathering, rare earth elements (REE) are concentrated in mud. The Miocene sand shows the REE concentration less than one of PAAS level, whereas the Miocene mud display similar level of concentration in PAAS. In many samples, the REE concentration is mostly by biotite and zircon evidenced by HREE concentration.

The intense weathering condition, such as high temperature with humidity, affects the sand and mud compositions with selective destruction of minerals and newly formation of clay minerals. The relative increase of HREE, which is mainly housed in durable minerals, and mineral assemblage of sand and mud probably provide quantitative estimation of weathering degree for the sediments derived from felsic plutonic rocks.

Keywords: Miocene, sand composition, mud composition, REE composition, weathering