
A Comparative Study of the Diagenetic Alteration of Clay Minerals in Mesozoic Shales from Papua, New Guinea, and in Tertiary Shales from Louisiana, U.S.A.

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Abstract: Gradual change from 60% montmorillonite/40% illite randomly interstratified clay minerals at 3500 ft depth to 20% montmorillonite/80% illite at 10,200 ft can be observed in a complete section of Mesozoic shales at Barikewa in New Guinea. The top of a similar complete type Mesozoic section at 10,544 ft in the nearby Omati borehole contains 20– 40% montmorillonite in randomly interstratified montmorillonite/illite. From 10,800ft downward there is only 10– 20% expandable material. Consequently depth of burial rather than stratigraphic level controls the proportion of expandable material present. Similar diagenetic alterations occur in the Wilcox Formation, Louisiana, also controlled by burial.

The amount of illite 2M polymorphs in the Papuan samples is usually less than 5 per cent, the illite 10 Å peak sharpness ratio is about 1· 4. Corresponding values for the Louisiana samples are 43% 2M polymorphs and about 2· 0 sharpness ratio. Chemical analysis of the Papuan shales show low MgO and K₂O values when compared with the Louisiana samples. The latter sediments contain some chlorite, the former hardly any. Differences demonstrate a higher proportion of relatively unweathered material in the American samples.

Increase of chlorite content increase of magnesium content and decrease of kaolinite content from 12,368 ft down in the Louisiana samples suggests a change in sedimentation pattern.

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