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# Kaolin Mineralogy of Clays in Paleosol Profiles on the Late-Miocene Sediments in Penghu Islands (Pescadores), Taiwan

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**Abstract:** Clay mineral compositions from 2 paleosol profiles (Chu-Wan, CW, and Shiao-Men Yu, SMY, profiles) on the late-Miocene sediments in Penghu Islands (Pescadores), Taiwan, are characterized by random X-ray powder diffraction (XRD) and transmission electron microscopy (TEM). By the clay assemblage of the paleosol profile, we want to explore the probable formation mode of the Penghu paleosols.

The paleosol profiles in study are overlain by a layer of basalt flow. However, the clay mineralogy of the 2 paleosols was not altered metasomatically after burial. Results show that 3 distinctive zones of different dominating kaolin-group minerals are apparent in the profiles. In descending order, they are: 1) spheroidal, hollow 7 Å-halloysite, 2) platy, irregular-shaped and disordered kaolinite, and 3) platy, irregular-shaped, disordered kaolinite. The relative crystallinity of kaolin minerals of the 3 layers is: layer 2 > layer 3 > layer 1. On the basis of the XRD, TEM analyses and the crystallinity calculations, the distribution of kaolin in Penghu paleosol profiles appears to be unique. Penghu paleosol profiles show systematic change in kaolin crystallinity and polymorphs with depth. Because the clay type is heterogeneous within the profile, this represents that Penghu paleosol profiles were polypedogenic.

The contact between the upper basalt and the paleosol is the erosion surface, so we do not know exactly what the thickness of the original paleosol was. The first layer (about 20 cm) of the profiles appears to be constituents of the original paleosol. It contains high contents of pedogenic (*in situ* weathering) hematites and 7 Å-halloysites, which implies that the local climate of the Penghu Islands at late Miocene was warm and humid. Intense leaching and dry/wet cycle should be the reason for high contents of halloysite (>60%) in the Penghu paleosols. Laterization was the probable pedogenic process for the formation of the paleosols.

**Key Words:** 7 Å-Halloysite • Kaolinite • Late Miocene • Laterization • Paleosol

*Clays and Clay Minerals*; February 1998 v. 46; no. 1; p. 1-9; DOI: [10.1346/CCMN.1998.0460101](https://doi.org/10.1346/CCMN.1998.0460101)

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