

Authigenic Minerals in a 'Stable' Siliciclastics-Dominated Inner Shelf During the Quaternary

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Studies on a 'stable' siliciclastics-dominated inner shelf of the South China Sea off Hong Kong have revealed a sequence of marine and terrestrial deposits dating back to almost 0.5 Ma. Up to 5 marine units and 5 terrestrial units corresponding to oxygen-isotope stages 1, 2, 5, 6, 7, 8, 9, 10, 11 and 12 have been recognised.

Four authigenic minerals - pyrite, limonite, siderite, and glauconite are found within the Quaternary shelf sequences. In marine deposits where the seabed conditions are anoxic, pyrite is formed by bacterial action. However pyrite is preserved entirely only in Holocene marine deposits because they have never been sub-aerially exposed. During stages 2, 6, 8 and 10 when sea-level fell by about 130 m, pyrite within marine deposits of stages 5, 7, 9 and 11 respectively were oxidised to different degrees through the development of acid-sulphate soils.

Both limonite and siderite are authigenic minerals associated with the formation of palaeo-desiccated crusts during periods of low sea level. Limonite was formed by the oxidation of pyrite in soil while siderite was formed by the *in situ* replacement of plant rootlets with iron originating from pyrite and carbonate originating from the dissolution of shell fragments. Glauconite is found to be greater in abundance in the deeper (> 15 m) and more exposed parts of the inner shelf. This mineral was subjected to post-depositional alteration in the palaeo-desiccated crusts.

Soil development during glacial periods was responsible for the formation of limonite and siderite in shelf sediments. Pyrite and glauconite were both authigenic minerals influenced by post-depositional alteration.