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Climate-sensitive sediments of the Cretaceous in South China

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Several types of the Cretaceous sediments sensitive to the climatic change were investigated and studied in South China. They are clay mineral, evaporite, aeolian sandstone, and paleosol.

Clay minerals are potential to indicate climate. In general, clay mineral smectite, chlorite and illite indicate a dry climate, and kaolinite do hot and wet climate. Ratios of the clay minerals have been applied to the analysis of paleoclimate changes through geological time. In South China, the relative content of illite is over 80% in average through the Cretaceous, and abundant smectites and a few kaolinites present in some horizons in western Fujian and Zhejiang, indicating an arid-semiarid climate of tropic-subtropic in Southeast China with some interruptions of hot-wet in western Zhejiang and dry-cold in western Fujian and western Zhejiang. Kaolinites are increased to 8-15% in Nanxiong basin, implying an ascending of moisture in the late Late Cretaceous in that region.

Evaporites (gypsums, halines, and glauber's salts, even dolomites) are results under the strong arid and hot climate. The Cretceous evaporites can be found through South China. They can reach Guangzhou in south (~23˚N), northern Jiangsu in north (~33˚N), Chuxiong of Yunnan in west (~101˚E), and Ningbo, of Zhejiang in east (~122˚E). But evaporites are only occurred above the Aptian in South China, indicating it became much drier and hotter after the epoch. This climate change is consistent with the indication of the decrease of calcisols in South China.

Aeolian sandstones are a kind of markers for the arid-semiarid paleoclimate. The Cretaceous aeolian sandstones distribute in some basins of South China, e.g. they are common in the Yunnan-Sichuan basin in Southwest China, the Jianghan basin, basins in Jiangsu, the Xinjiang basin in Jiangxi. The occurrence of

the aeolian sandstones verify the arid-semiarid climate in the Aptian to the Maastrichtian in South China, compatible with those from the evaporite and paleosol.

At least four kinds of paleosols can be observed in South China. They are argillisol, calcisol, oxisol, and spodosol. Of them, the calcisol is most popular and feasible to diagnose due to conspicuous calcretes and caliches in field. A detail distribution of calcisol has been investigated. Calcisols were developed in the most Cretaceous horizons in South China, indicating arid-semiarid climate. But calcisols were much more common in the early-mid Cretaceous (Ber-Tur) than in the late Cretaceous (Con-Maa). Argillisols and oxisols imply that it was hot and wet during the Cenomanian in southwestern Zhejiang.

In summary, the Cretaceous climate was overall in arid-semiarid of subtropic in South China with interruptions of wet-hot and dry-cold in the Early Cretaceous in Southeast China, but it became drier and hotter after the Aptian (mostly in the Late Cretaceous) by the evaporites and aeolian sandstones.