
Absence of Clay Diagenesis in Cretaceous-Tertiary Marine Shales, Campos Basin, Brazil

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Abstract: In Upper Cretaceous-Tertiary marine shales (Campos Formation) from the Campos basin, Brazil, mixed-layer illite/smectite (I/S) has remained randomly interstratified to depths of 3500 m and to temperatures as high as 100° C, in contrast to the typical pattern of shale diagenesis in, for example, the Gulf Coast area. X-ray powder diffraction analysis of the bulk shale and several size fractions from samples from one well in the Brazilian basin and from one in the Gulf Coast region were carried out to assess the factors that might have controlled the lack of illitization in the Campos Formation shales.

In samples from the Gulf Coast well, the clay minerals are I/S (montmorillonite-type), discrete illite, chlorite, and minor kaolinite. In contrast, the clay minerals in samples from the Campos basin well are kaolinite, clay-size biotite, and I/S (nontronite-type). Kaolinite is abundant in this well, and the variation of its abundance with depth seems to reflect variations in sea-level stands. The original composition of the I/S (nontronite-type) was probably the main factor controlling the lack of illitization in the shales of the Campos Formation.

Key Words: Diagenesis • Illite • Interstratified • Nontronite • Shale • Smectite • X-ray powder diffraction

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