

The influence of sedimentary environment on the development of lacustrine source rocks: A case from the Paleogene Qikou Sag, Bohai Bay Basin

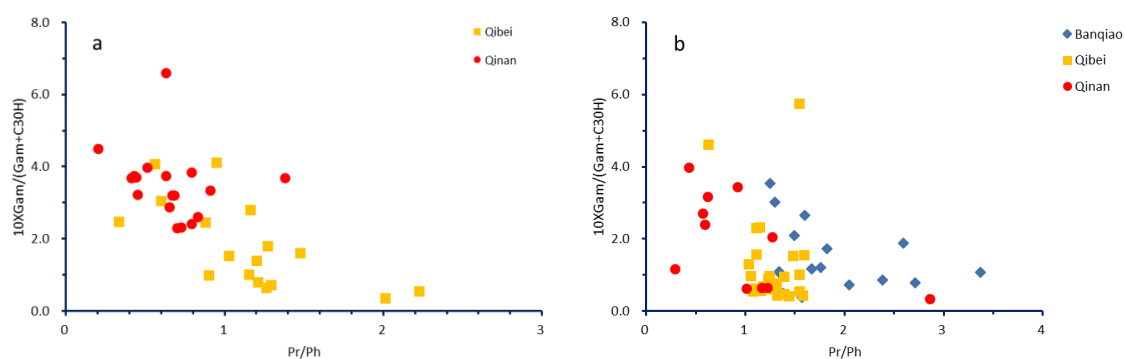
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A series of meso-cenozoic basins with enriched oil are developed in the eastern part of Chinese continent, and these oils were mainly generated by the widely distributed lacustrine source rocks. The mechanism of organic matter enrichment in these source rocks has caused extensive concern over the past few decades. Additionally, the development of organic rich sediments (source rocks) was closely related to paleoproductivity, organic matter sources, periodic variation of climate and so on. The primary aim of this work was to investigate the connection between geologic environment and the formation of high-quality source rocks through geochemical and inorganic elements analysis. And this paper presents a case study on the first member and the third member of Eocene Shahejie formation in the Qikou Sag.

The first and third member of Eocene Shahejie formation in the Qikou Sag formed during the overall expansion of the lake. The result shows that the sedimentary rhythm and heterogeneity were different between the first member and the third member. As far as the first member is concerned, its lithology was relatively uniform with a bulk of mudstones, and the rhythm and heterogeneity were not obvious. By comparison, the third member was made up of a wide variety of rocks, and showed a strong heterogeneity in the vertical direction. Both members of Eocene Shahejie formation had a very good correlation between gammacerane index and Pr/Ph indicating that a long-term anoxic environment existed in the bottom water, while the water during the deposition of the first member had a relatively higher salinity and more stable stratification (Fig. 1). Combined with the results of inorganic elements analysis, anoxic environment and water column stratification with high salinity is favorable for the development of excellent source rocks.



**Figure 1** The relationship between gammacerane index and Pr/Ph of the first (a) and third member (b) of Eocene Shahejie formation in the Qikou Sag.

In general, huge thick mudstone section with high organic matter abundance deposited at the middle part of the first member and the middle-upper part of the third member of Eocene Shahejie formation. However, each layer had high heterogeneity in spatial distribution, and their organic matter abundance and rock associations were different from one part from the other, reflecting the depositional environment had apparent controlling effect on the development of source rocks.