

Evolution of kerogen carbon isotopes during early Cambrian to Ordovician in eastern Tarim Basin, China

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The carbon isotopic value ($\delta^{13}\text{C}$) is widely used in the oil–source correlation. However, there are no systematic $\delta^{13}\text{C}$ for the Palaeozoic source rocks in the Tarim Basin until now. The best source rocks in Eastern Tarim Basin are the Lower Cambrian black shales, followed by the Middle Cambrian black shales and lime mudstones. The black shales of Heituo Fm. and lower member of Queerqueke Fm. are also active source rocks. The Tuershaketage Fm. as well as the Upper Queerquek Fm. are not effective source rocks. Carbon isotope values of the kerogen are obviously controlled by both the geologic time and sedimentary environment. The Lower Cambrian has the most depleted $\delta^{13}\text{C}$ value source rocks, while the Upper Cambrian to Ordovician is characterized by much more enriched $\delta^{13}\text{C}$ values. The black shales are obviously depleted in $\delta^{13}\text{C}$ values than that of dolomite and grey mudstone during the same geological time.

The oils with the carbon isotope values less than -33‰ must be derived from the Lower Cambrian source rocks, while oils with the carbon isotope values more than -32‰ can be originated from the Middle Cambrian source rocks, or Lower-upper Ordovician source rocks, or both of them.