



Tectonic and sedimentary evolution from the Late Sinian to Early Cambrian and their control on hydrocarbon source rocks in Tarim Basin, Western China

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The lower Cambrian black shale is widely distributed all over the world, but due to the deep buried depth of Cambrian in the Tarim Basin, the black shale, as high-quality source rocks, has never been found in the interior of the basin. Through further survey on outcrops in the periphery of the Tarim Basin, a set of hydrocarbon source rocks with high-quality was found developed at the bottom of the lower Cambrian Yuertusi formation in Tarim basin. Lithology of the source rock is black shale. Its organic carbon (TOC) mainly ranges 2-10%, organic carbon of black shale layer reaches 17%, and the thickness of outcrop is 10-15m in Aksu area. This discovery of hydrocarbon source rocks draws much attention to the oil and gas exploration in Cambrian. The author, integrating with seismic, drilling and geological data, analyzes the tectonic sedimentary evolution in late Sinian-early Cambrian in the basin and its control on formation and distribution of hydrocarbon source rocks in Early Cambrian in this paper. The Nanhua - early Sinian clastic rocks rift basin formed on the basement on Tarim under the control of Rodinia supercontinent tectonic movement. Post-rifting marine carbonate siliceous shale deposited from the late Sinian to Early Cambrian rifting. Wide transgression in Tarim in the late Sinian departed Tarim into two patterns in North and South with the central land as a boundary with structural features: higher topography in middle and lower topography in two sides. There was no change in the pattern of basin during the late Sinian tectonic movement, and the Cambrian sediments deposited and filled the basin in this period. The central ancient land with structural high topography formed angular unconformity, while the basin with low topography formed parallel unconformity. Therefore, the Early Cambrian sedimentary filling in the late Sinian basin overlapped from low topography to high topography. Their distribution patterns were similar, both of which were of great difference between southern pattern to northern one.. The thickness center was in a nearly east-west trend. The late Sinian basin pattern controlled the distribution of Cambrian source rock. According to seismic and paleo-geographic data, it is recognized that the distribution of hydrocarbon source rocks is closely related to the Sinian period in an inheritance relation. It mainly distributes in a large area in the north and east of Tarim Basin with 10-45m thick and 260 thousand square kilometers distribution area, which defines potential and direction of the Cambrian oil and gas exploration.