

Source rock characteristics and sedimentary environment of the Longmaxi Formation in southeast Sichuan and northern Guizhou

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Black shales in the Longmaxi Formation of the Lower Silurian developed in Yangtze plate and its surrounding areas are one of the high quality source rocks in the marine strata of South China. These shales in southeast Sichuan and northern Guizhou are widely distributed with a great thickness and rich in organic matters. The Longmaxi Formation is the favorable strata of shale gas exploration in South China.

Based on the data of 30 field outcrops and 12 wells, the characteristics of organic petrology, organic geochemical characteristics, sedimentary environment and its control action on source rock development have been studied. The organic maceral was dominated by marine low grade organisms and was classified into algae group, amorphous group, animal organic clastic group and secondary group. From the bottom to the top of the strata, the organic content was gradually decreased and the hydrocarbon generation potential became worse. The effective source rock is mainly concentrated in the lower part of the Longmaxi Formation. It has high abundance of organic matter and the organic matter is type I. Most of it is in post-mature stage. Luzhou to Qijiang area are the most favorable gas generation, followed by Shizhu to Lichuan area. The facies marks are summarized from a few aspects such as lithology, element geochemistry, well logging and paleontology. Eight sedimentary types are identified including deep muddy shelf, turbidite deposit etc. The main sedimentary environment is deep muddy shelf. According to the research of the sedimentary environment, the controlling factors of the source rocks development were studied. The anoxic retention environment and the low sedimentary rate in early transgression stage are the main controlling factors. This study is beneficial to the shale gas exploration of this area.