

Progress on Source Rock potential of Deepwater Turbidite and Case Study of Lingshan Island

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Turbidite process is one of the most important ways by which sediments are transferred from shallow to deepwater. Due to significant terrestrial organic carbon input and high accumulation rate, turbidites have a higher source rock potential than normal deepwater background sediments. OM (organic matter) type of deepwater turbidites varies between a mixed Type II and III and mainly has gas-prone potential, this is due to the fact the turbidites receive both pelagic and terrigenous inputs.

TOC of deepwater turbidites varies between 0.1-50 wt.%, with most of them in the range of 1-2 wt.% and a small part of them in the range of 0.1-1 wt.%. Heterogeneity of source rock potential exists in different turbidite systems, different geological periods, different architectural elements of turbidite systems and turbidites with different grain sizes and different divisions of turbidites. The excessive heterogeneity is the main factor that make it difficult to evaluate accurately their source rock potential and restrict them to be the prominent targets of hydrocarbon exploration.

OM in the turbidites can be divided into mesoscopically visible OM (including leaf- and wood derived particles) and silt-size organic grains (dominated by very fine vitrinite and amorphinite). So, the terrestrial contribution, especially the mesoscopically visible terrigenous OM, has a crucial contribution to the heterogeneity

Terrigenous OM delivery are mainly controlled by activities of canyon-channel systems, which are influence by the tectono-morphologic character of margin (e.g., narrow shelves) and climatic forcings (e.g., subglacial meltwater and monsoon) [1]. For most fluvial controlled turbidite system, when fluvial systems can reach canyon heads, there tend to be turbidites with high frequency and high organic content, which can be treated as favourable organic matter sink.

The organic matter contents of different divisions of turbidites were investigated in Lingshan Island, which is characterized by deepwater turbidite sequence in the Late Mesozoics and located in East Shandong Province, China. TOC content of fine-grained rocks in turbidites mainly depends on the contribution of silt-sized material, while the organic matter content of turbidite sandstones are affected greatly by the content of large plant remains.

The survey and analysis of organic matter content variation of deepwater turbidite systems would have implication for assessing their source rock potential.

References:

[1] Covault J A et al (2010). *Geology*, 38,939-942.