The application of graptolites in shale gas sweet spots optimization

Q. ZHANG[1*], F. LIANG[1], W. GUO[1], Z.L. PANG[2]

[1] P.O.BOX 44, Hebei, China, 065007
(*Correspondence:zhangqin2169@petrochina.com.cn)
[2] P.O.BOX 910, Beijing, China, 100083
(pangzl@petrochina.com.cn)

Introduction

Longmaxi shale in Sichuan Basin, as the most promising target for shale gas production has attributed $102.9\times10^8 m^3$ gas in 2018. However, as the fine-grained sedimentation, it is difficult to discriminate the lithology by naked eyes. Some experts argued that the layer correlation can be done by using logging curves. But in different areas, the logging curves are also different. The well preserved graptolites in Wufeng-Longmaxi enable us to correlate the shale in both spatial and temporal scales.

Methods

We follow the graptolite biozonation reported by Chen et al. [1](Fig.1) to divide biozonations in different wells. Then all experiments data were compared and analysed.

Results and discussions

XRD results show that siliceous shale is the major component for Rhuddanian and Katian stage, while argillaceous and silty shale are dominant in other stages. Cathodoluminescence analysis reveals that up to 60% of quartz in siliceous shale has an authigenic origin, which not only provides gas storage space but also resists to compaction. Organic rich shale are mainly deposited in both Rhuddanian and Katian stages with TOC ranging from 2.2% to 5.6%, on average 3.6%. Both Katian and Rhuddanian stages are featured by high paleoproductivity and stronger reducing sediment environment. Compared with other stages, early Rhuddanian(LM1-LM3) in Sichuan Basin is the most favourable target for shale gas exploration and development.

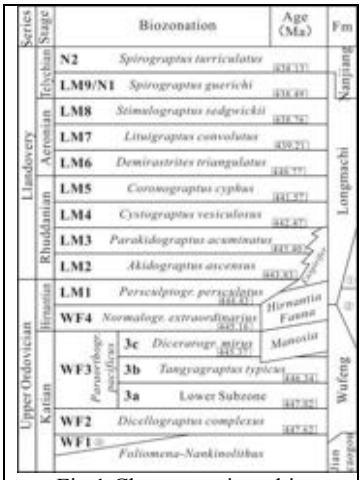

Fig.1 Chronostratigraphic framework and graptolite biozonation of Ordovician-Silurian boundary interval

[1] Xu. C(2000), *Geological Magazine***137**, 623-650