Heterogeneous Depositional Environment of Lower Cambrian Organic-rich Shale in Yangtze Platform: Evidences from Fe-Mo Geochemistry and Microorganisms

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Widespread lower Cambrian organic-rich shale in Yangtze Platform (LCOSYP), the major hydrocarbon source rock in South China, deposited during a crucial period in life evolution and environment changing. A detailed analysis of the marine paleoenvironment would be beneficial to figure out the controls on LCOSYP developing. In this study, high resolution Fe-Mo data from LCOSYP in different sedimentary facies were used to reconstruct paleoenvironment. On the basis of previous researches [1], we have supplemented Fe species and Mo/TOC ratios during 514-509 Ma, and a marine stratified redox model during early Cambrian (529-509 Ma) in Yangtze Platform, has been built: with mid-depth euxinic waters existed dynamically in edge of shelf to slope between oxic surface waters and ferruginous deep waters. Based on spore experiments, 4 types of microorganisms producing organic matters have been identified: a. plankton, b. benthos, c. bacteria, d. acritarch. Furthermore, phytoplankton (especially green alga and red alga) was main producer based on quantitative statistics of different spores, which suggested oxic surface waters could promote photosynthesis and phytoplankton growing [2]. Combined with the data of Fe-Mo, TOC and microorganisms, it is obviously that this special marine redox stratification resulted in high production and good preservation of organic matter. Organisms blossom in oxic surface waters and the sinked organic matter could be well preserved by anoxic bottom waters; TOC values in slope are generally higher due to upwelling. In general, the LCOSYP deposited under the anoxic-ferruginous or euxinic bottom waters with moderate-strong restriction and high primary productivity.

[1] Feng, L., C. Li, J. Huang, H. Chang, X. Chu, 2014. *Precambrian Res.*, **246**, 123-133. [2] Jin, C., C. Li, T. J. Algeo, N. J. Planavsky, H. Cui, X. Yang, Y. Zhao, X. Zhang, H. F. Ling, S. Xie, 2016. *Earth Planet. Sci. Lett.*, **441**, 38-51.