Paleoredox condition variation of the Upper Triassic Yanchang Formation, Ordos Basin, China: Insight from pyrite framboid size distribution

GUO CHEN[1] WENZHE GANG[1*]

[1]College of Geoscience, China University of Petroleum (Beijing), Fuxue Road no.18, Changping District, Beijing, China (879332613@qq.com; *correspondence: gwz@cup.edu.cn)

Pyrite framboids are spherical or ellipsoidal compact aggregates of submicron pyrite microcrystals. The sediments in the Chang 7 unit of the Upper Triassic Yanchang Formation contain abundant pyrite framboids, which provide an opportunity to understand the fluctuation in paleoredox conditions and the relative sedimentation rate during deposition. The measured diameters of pyrite framboids from the Chang 7 unit are characterized by large mean diameters (9.7 to 16.6 μm) with a wide distribution range and are plotted in an area that is far away from the euxinic environment, indicating that the paleoredox condition shows a dyoxic to oxic character during Chang 7 sedimentation. Based on correlation analysis, the strong correlation between the paleoredox-sensitive trace elements ratios (V/Cr, U/Th and Cu/Zn) and the mean size of framboids shows that the mean size of framboids serves as a reliable indicator for paleoredox conditions. In addition, the results of the framboid size distribution can also deciphered through Crystal Size Distribution Theory(CSDT). According to CSDT, the relatively sedimentation rate of the Chang 7 unit fluctuated during deposition in parallel with the fluctuation in lacustrine levels. Furthermore, the strong positive correlation between TOC and paleoredox condition indicates that though the relative oxic condition may not contribute to the preservation of organic matter, yet it conduces to improve the paleoproductivity. Similarly, the relationship between TOC and the relative sedimentation rate suggests that the relative high sedimentation rate has an influence on TOC in two ways, that is, improving preservation of organic matter and dilution of organic matter.