

Organic Matter Preservation in Devonian-Mississippian Marine Black Shales of Central Kentucky (U.S.A.), Susan M. Rimmer and Harold D. Rowe, Department of Earth and Environmental Sciences, University of Kentucky, Lexington, KY 40506-0053, srimmer@email.uky.edu, hrowe@email.uky.edu

Geochemical and petrographic analysis of black shales of Middle Devonian age through Lower Mississippian age suggests that multiple controls influenced organic matter accumulation, including primary productivity, sediment influx, redox conditions, and variations in organic-matter type. The role of inorganic input was evaluated using Ti/Al, K/Al, and Si/Al as proxies for clastic input; C-S-Fe relationships, Mo, V/(V+Ni), Ni/Co, V/Cr, and trace-metal enrichment ratios were used to assess paleo-redox conditions; and C/P was used as a proxy for paleoproductivity. Organic-matter type was evaluated using organic petrography, carbon-isotopic composition, and Rock-Eval pyrolysis.

C-S-Fe relationships and trace-element data suggest anoxic conditions prevailed during deposition of a significant proportion of this interval. However, bottom-water conditions were intermittently dysoxic and possibly oxic, particularly during accumulation of the Huron (especially the lower Huron). Productivity appears to have been an important factor in the accumulation of organic carbon: high C/P ratios are consistent with a productivity-anoxia feedback mechanism. In addition, nutrients from increased terrestrial weathering may have contributed to enhanced productivity.

Other factors include variations in sediment influx and in the source of organic matter. Whereas most of the interval consists of Type II kerogen, terrestrial organic matter is seen to increase up-section, a trend that may reflect vegetative changes occurring on land. Most of this change is attributable to increases in inertinite, much of which appears to be fusinite (“fossil charcoal”). This latter observation has implications for the expansion of land plants and for Late Devonian atmospheric oxygen levels.