Marine Influence and other controls on organic matter preservation in Langsettian, Carboniferous lacustrine source rocks of the Joggins Formation, Nova Scotia, Canada

TODD G. VENTURA[1], ANDREW R. MACRAE[1], YAISA OWINO[1], AND MATT STIMSON[1,2]

1. Department of Geology, Saint Mary's University, Halifax, Nova Scotia B3H 3C3, Canada
<todd.ventura@smu.ca>
2. Steinhammer Paleontology Laboratories, New Brunswick Museum, Saint John, New Brunswick E2K 1E5, Canada

The Joggins Fossil Cliffs UNESCO World Heritage Site represents one of the most continuous exposures of a Carboniferous coal-basin succession in the world. Much of this section is composed of the Joggins Formation, which extends for 2.8 km along the coastal section of the Cumberland Sub-basin. Subsidence from salt-withdrawal deeper in the basin's subsurface resulted in rapid accommodation to produce 14 distinct parasequences. Many of these parasequences reflect repeating transgression events, composed of fluvial/deltaic mudrocks overlain by bioturbated paleosols and bituminous coal measures. Parasequences begin with the deposition of carbonaceous-rich, freshwater limestone units marking the maximum flooding surface of the shallowing upward interval. Although the Joggins Formation was deposited ~2500 km inland from the Tethys paleo-shoreline, the basal section contains evidence of marine incursions. In this study we in vestigate whether geochemical data can (1) help resolve the temporal extent of these events and (2) determine what effects marine conditions had on the type and preservation of the organic matter in these prospective source rocks. Specific emphasis is focused on resolving whether sulfurization of organic matter was involved in kerogen formation. Forty samples spanning seven distinct parasequences extending from the base to the top of the formation are analyzed for transition metal and elemental sulphur concentrations using portable X-Ray Fluorescence. These data are compared with bulk pyrolysis measurements to evaluate factors controlling the richness, quality, and maturity of the host rock's organic matter. Additional geochemical constrains are provided via biomarker-based paleoecological reconstruction using comprehensive two-dimensional gas chromatography.

Atlantic Geology, 2018, Volume 54
Atlantic Geoscience Society Abstracts – 1st Joggins Research Symposium, September 22, 2018
doi:10.4138/atlgeol.2018.016