RMS-SEPM talk May 2011

Continental Ichnology—Interpreting Paleoenvironments, Sedimentation Rates, Paleosol Formation, Paleohydrology, and Paleoclimate

Stephen T. Hasiotis

University of Kansas

The study of trace fossils—ichnology—includes the analysis of microbial, plant, and animal behaviors that produce root patterns, tracks, trails, burrows, nests, etc. The study of ichnology was developed in marine strata based on marine trace fossils. Only recently has continental ichnology advanced, being greatly enriched by research on the activity of organisms in terrestrial and aquatic environments as well as their role in soil formation. The record of organism activity preserved as trace fossils in continental strata is surprisingly abundant and diverse in rocks as old as the Late Ordovician (~440 million years ago). Laboratory and field studies with soil biota reveal burrowing mechanisms and burrow morphologies analogous to, but different from, marine trace fossils. Under experimental conditions the morphology, depth, and distribution of animal and plant traces can be quantitatively evaluated under specific conditions of moisture and temperature, as well as under increased or decreased levels to simulate changes in temperature and precipitation. Such studies can be used to more accurately interpret the behavior and significance of trace fossils in continental strata and reconstruct their environmental and climatic settings.

Traces can be used as proxies for hidden biodiversity (not recorded by body fossils) and organism size, behavior, presence in soil, and role in soil formation and nutrient cycling. Traces also record the rate of landscape aggradation, soil-moisture and water-table level, environmental setting, and relative amount of precipitation and its seasonality because they are the result of organisms interacting and responding to the other four soil-forming factors. This information can be used to recognize and delineate significant surfaces that can be used to develop sequence stratigraphy in continental deposits, as well as differentiate continental from marine deposits and intercalated sequences. Integration of interpretations from ichnologic, paleontologic, sedimentary, and stratigraphic analyses results in the reconstruction of environments, hydrology, climate, and their variation through geologic time

Back to the RMS-SEPM Luncheon Abstract Archive