Integrating Ichnology, Sedimentology and Sequence Stratigraphy to Delineate Incised Fluvio-Estuarine Valleys and Shoreface-Offshore Complexes in an Early Palaeozoic Basin of Northwest Argentina

Mangano, M. Gabriela, and Luis Buatois, University of Saskatchewan, Saskatoon, SK

The Upper Cambrian-Tremadocian Santa Rosita Formation of Cordillera Oriental (northwest Argentina) reveals a series of transgressive-regressive cycles punctuated by incision of fluvio-estuarine valleys. Ichnologic models of marginal- and shallow-marine environments were originally based on Mesozoic units and need to be calibrated in order to be useful for Paleozoic reservoirs. Open-marine, wave- and storm-dominated deposits range from the shelf to the upper shoreface. Alternating and contrasting energy conditions due to repeated storm events superimposed on fairweather sediments were among the key controlling factors for ichnofossil distribution and preservation.

The fairweather assemblage is the most diverse and includes the more varied behavioral strategies, containing Archaeonassa, Arthrophycus, Bergaueria, Cruziana, Diplichnites, Dimorphichnus, ?Gyrolithes, Gyrophyllites, Monomorphichnus, Palaeophycus, Phycodes, Planolites, Rusophycus and Trichophycus (Cruziana ichnofacies). The storm-related assemblage is monospecific (Skolithos), representing the Skolithos ichnofacies. Ichnofossils also occur in transgressive tide-dominated estuarine valley deposits that overlie fluvial facies along the valley axis. No trace fossils are recorded in the inner estuary, where salinity values were probably too low. Middle estuarine deposits are mostly unbioturbated; only arthropod trackways (Diplichnites), vertical burrows (Skolithos), and horizontal vermiform burrows (Palaeophycus) rarely occur in tidal rhythmites.

The presence of trackways in middle estuarine deposits may reflect the ability of some marine arthropods to periodically migrate inland. The highest ichnodiversity is restricted to the outer zone of the estuary, representing near-normal marine conditions. The outer estuarine ichnofauna consists of trilobite trace fossils (Cruziana, Rusophycus, Monomorphichnus), vertical burrows (Skolithos, Diplocraterion, Conostichus) and feeding structures (Teichichnus, Planolites).