Wide Incised Valley vs. Unincised Fluvial Sheet: Why does it matter in terms of deepwater exploration? Case Study of an Areally Extensive Fluvial-Marine Transition, Missisauga Formation, Offshore Nova Scotia, Canada

Don Cummings* and RWC (Bill) Arnott
Department of Earth Sciences,
University of Ottawa, Ottawa, Canada. K1N 6N5
*email: cummings@eps.mcgill.ca

and

Bruce S. Hart
Department of Earth and Planetary Sciences,
McGill University, Montreal, Canada.H3A 2A7

ABSTRACT

In passive margin basins, determining whether fluvial systems are incised vs. unincised is important when developing deepwater exploration models, as incised systems have a greater potential of linking downdip to shelf margin, slope, and basin floor sand bodies. However, this distinction is not always simplistic, as autocylically-generated channel scour can mimic fluvial incision generated by relative sea level fall. In the Panuke field, offshore Nova Scotia, a thick (~100 m) and areally extensive (>20 x 100 km) sheet-like fluvial/coastal plain/barrier/marine transition has been identified at the top of the Missisauga using core, well logs, and seismic (2&3D) data. The fluvial sheet is ~50 m thick, and has a relatively planar basal contact across the study area. A braided-channel pattern is inferred based on the medium to coarse sandstone sediment caliber, lack of preserved cohesive bank material, and presence of braid-bar features interpreted from 3D seismic data. Overlying the fluvial unit is a ~50 m thick coastal plain unit composed of tidal flat, lagoon, tidal creek and tidal bar facies. The coastal plain unit is capped by a thin transgressive barrier complex (the main reservoir), which in turn is overlain by a storm-dominated offshore/shoreface unit. Despite it's apparent planar nature and significant width perpendicular to interpreted paleoflow (at least 20 km), the base of the fluvial sheet is interpreted to be a wide incised valley, based on (1) the thickness of the fluvial unit with respect to estimated bankful channel depth, and (2) lack of underlying delta front facies.