

An Ichnological and Sedimentological Facies Model for Mud-Dominated Inner-Estuarine Deposits, Bay of Fundy, Canada

Pearson, Nadine J.¹, Murray Gingras², George Pemberton² (1) University of Saskatchewan, Saskatoon, SK (2) University of Alberta, Edmonton, AB

Analysis of fine-grained clastic deposits associated with the macrotidal inner-estuarine mouth of Chignecto Bay, Bay of Fundy, New Brunswick, Canada concentrated on identifying the ichnological and sedimentological characteristics of tidally dominated point bars and their adjacent tidal flats. The aim of the study was to establish an ichnological model for application to the geological record.

Within the study area, the distribution of ichnological structures and sedimentary characteristics such as grain-size distribution and total-organic content are associated with bank bathymetry, tidal-bank slope, and the local hydraulic processes. The distribution of infaunal traces is influenced by the duration of intertidal exposure and sedimentation rates. The size and diversity of the burrowing fauna are affected by the chemistry of the depositional waters and by seasonal variations in the composition and temperature of those waters. The extreme seasonality of the depositional setting favors opportunistic fauna and thereby contributes to an impoverished, brackish-water trace assemblage.

Geomorphologically, the area is dominated by point-bar and tidal-flat deposits, which comprise rhythmic bedding, composed of interlaminated to thinly interbedded silty and sandy mud. Point-bar bedding dips channelwards and represents mud-dominated inclined heterolithic stratification (IHS). Bedding alternates between burrowed and laminated beds. Cyclic variations in laminae thickness are attributed to spring-neap variation in tidal-current strength.

The burrowed interbeds exhibit high degrees of bioturbation that eradicate the preexisting lamination. The intercalation of laminated and burrowed beds represent seasonal variations in the depositional system: laminated beds characterize early winter and early spring sedimentation and the bioturbated beds represent late spring through fall deposits.