

Variability in Estuarine Systems as a Function of Drainage Basin Style, North Oregon Coast – Implications for Interpretation of Sandstone Reservoirs

Gerry Reinson*

Consulting Geologist, Calgary, AB
greinson@telus.net

Jason Lavigne

Talisman Energy, Calgary, AB, Canada

Summary

Existing theories imply that major basin wide changes in one or more of tectonic regime, eustasy and climate, are required to produce large-scale variations in estuarine systems and further, that drastically different estuaries will never be located proximal to one another. Drainage Basin style (size, relief, runoff pattern), sediment supply and vegetation cover are generally considered less important factors than the above-mentioned 'first order' controls. Yet such factors can impart very significant differences in estuary depositional types, as evidenced by a small segment on the North Oregon Coast.

The North Oregon Coast extending from Cape Lookout northward to Cape Falcon, is 45 Km long and features three very different estuary geomorphic types: 1) Netarts lagoonal estuary, 2) Tillamook estuary bay with a large bayhead delta, and 3) Nehalem River estuary, a classical drowned river valley. All three estuaries contain extensive sand bodies that differ with respect to size, orientation, geometry, and heterogeneity. Sea level rise is constant along this coastal compartment, as are tidal range and offshore wave climate. Littoral sediment supply is relatively high along the entire coastal reach, the main variation being the summer/winter beach cycle of accretion/erosion. Given that all other factors can be shown to be relatively constant, the variations between the three estuary systems and their contained sand bodies can be attributed to major differences in size, relief, and runoff patterns of the three drainage basins. Thus when interpreting estuarine sandstone bodies in the Alberta Basin, one should not be surprised to encounter closely-spaced, age-equivalent reservoirs which display very divergent orientations, geometries, and internal heterogeneities.