# QUANTITATIVE CHARACTERIZATION OF SUBMARINE MASS TRANSPORT DEPOSIT (MTD) TOP SURFACE TOPOGRAPHY AND ITS INFLUENCE ON "HEALING PHASE" POST-EMPLACEMENT SEDIMENTATION

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## ABSTRACT

Topography created on the top surface of mass transport deposits (MTD) (termed the "healing-phase top surface") exerts a significant influence on the distribution, thickness and heterogeneity of post-MTD emplacement turbidites and debrites. Such deposits form significant reservoirs worldwide, including fields from the Alaskan North Slope to the Gulf of Mexico to the offshore Niger Delta. The nature of topography on MTDs is highly variable,influenced by sheer spatial size, lithological composition, and deformation styles of the failed material. Understanding the nature of this "healing-phase" surface and its influence on the distribution and properties of overlying deep-water deposits is crucial for identifying exploration and development opportunities in deep-water basins worldwide.

3D seismic surveys of two fundamentally different MTDs, one in offshore Morocco and the second in offshore Trinidad, West Indies, are employed to illustrate methodologies and outcomes of spatial analysis of these MTD top surface. The Cretaceous-aged MTD along Morocco's margin is characterized by large, extant rafted blocks and shows a flow-perpendicular fabric. The Pleistocene-aged MTD along Trinidad's margin is characterized by muddier, lastic flows, moving around randomly-distributed, isolated mud diapiric buttresses, but exhibiting a more flow-parallel fabric. High-resolution paleobathymetric MTD top surfaces have been mapped and extracted from the seismic data. In addition, the seismic data allow deterministic mapping of healing phase deposits overlying these surfaces. Topographic data (slope, curvature, ruggedness, surface shapes, etc.) is collected from the paleobathymetric surfaces, to assess variables influencing sediment bypass and sediment accumulation. Accommodation distribution is quantified for these two different MTD top surface settings and spatially analyzed to examine controls on sediment sinks in these complex settings that can lead to identification of reservoir sweet spots. Additional mass transport top surfaces can eventually provide a suite of templates to assess reservoir risk in post-MTD emplacement strata.

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