Zama Field, Mexico Deepwater, Upper Miocene Slope to Basin Paleotransport

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Abstract

The Late Miocene source terrane tectonic history in the southern Gulf of Mexico Basin, as illuminated by detrital zircon geothermochronology data, support a detailed regional paleogeographic reconstruction from river headwaters to the deepwater Zama minibasin of the Sureste salt basin. Seismic amplitude mapping points to a trio of pathways that converge upon two spillpoints into the Zama minibasin, showing how sediment gravity flows transit a complex seascape defined by shallow salt bodies.

Consideration of empirical scaling relationships within and between segments of this sediment dispersal system allow testable predictions of Upper Miocene submarine fan run-out lengths over slope and basin exploration areas. Distances from the reconstructed shelf margin to the Zama wells is 80 km in a straight-line or about 100 km long, navigating around likely salt stocks, walls, and sheets. The latter is about 40% of the reconstructed minimum paleo–Rio Grijalva length, within the predicted range for smaller source to sink systems in tectonically active areas. The likely channel-lobe transition can be extended even further basinward, taking into account synchronous passage of the mobile Chortis block along the Tonala and paleo Montuga shear zone, temporarily expanding the paleo–Rio Grijalva drainage network during the Tortonian.

These Upper Miocene deepwater systems linked to the paleo–Rio Grijalva differ substantially from Western Mexico sourced turbidity flows feeding into the axis of the Veracruz Trough. The latter were likely less robust in terms of transport and grain sorting capacity, given the lower slope and simpler basin floor bathymetry. Differences between the transverse (Sureste) deepwater systems and the regional axial (Veracruz Trough) and are reflected in terms of contrasting reservoir properties. Local (intrabasinal) variations are also evident within the Zama minibasin as axially oriented turbidity flows deposited lower net to gross sandstones and thicker shales than those flowing transverse to the basin axis from a nearby entry point.