

**AAPG Annual Meeting
March 10-13, 2002
Houston, Texas**

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Dynamics of Allochthonous Salt Emplacement and Deformation: Walker Ridge, Keathley Canyon and Garden Banks Areas, Deepwater Gulf of Mexico

As part of an area-wide 3D prestack depth migration (PSDM) project, seismic data covering some 1,500 OCS lease blocks were interpreted to categorize and map the distribution of allochthonous salt.

Moving from the Sigsbee Escarpment updip some 100 miles (160 km), and covering 150 miles (240 km) along strike, these seismic data display a complete record of allochthonous salt evolution. At the Escarpment undeformed salt canopies displaying amalgamation surfaces between salt cells are gradually displaced by embryonic through completely formed (welded base) mini-basins updip along the prevailing clastic depositional systems. Structure along the base of salt commonly displays elongate, northwesterly trending amalgamation trends, roughly perpendicular to the trend of inferred salt source stocks.

Subsalt structuring comprising the southwestward extent of the Mississippi Fan Foldbelt is abruptly terminated at a pronounced bend in the allochthonous base of salt trend. The northwestward extension of this bend projects into a region of deformed shallow salt masses, and is inferred to represent a significant regional transform. West of this transform, the zone of salt stock canopies and nappes is narrower than in Walker Ridge.

Updip of the salt stock canopy belt is a zone of remobilized salt, with an extensive deep regional weld surface representing earlier extensive allochthonous salt. This weld is overlain by roho and stepped counterregional fault-bounded mini-basins, with asymmetric dip different from the Walker Ridge symmetric mini-basins. There is evidence of extension and compression accompanying salt remobilization. Several primary basins (no evidence of allochthonous salt) are noted throughout the region.