Regional Controls on the Development of Neogene Deepwater Fields in Mississippi Canyon, Atwater Valley, Desoto Canyon, and Lloyd Ridge Areas, Northern Deep Gulf of Mexico

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A regional structural, stratigraphic, and petroleum systems analysis of the northern deep Gulf of Mexico indicates distinct regional controls on the locations and ages of 85 Neogene deepwater fields. Four general provinces are present.

The oldest Miocene reservoirs were deposited in the unconfined province near the base of slope between 18 and 15.3 Ma. Reservoirs are sheet or amalgamated channels. These reservoirs are found in fields that were later deformed by the MS Fan Fold Belt (Neptune) or in normal-fault related traps (Isabella, Santiago) farther to the east.

Between 15.3 and 13.0 Ma, reservoirs were deposited in the deep confined basin province of central Mississippi Canyon. Reservoirs sands were deposited either the deep inverted part or along the flanks of turtles. The deep reservoir sands are sheet, amalgamated sheet or amalgamated channel-fill (Thunder Horse, Blind Faith), whereas the reservoirs developed along the turtle's flanks are more channel-fill to some thin beds in levees (Thunder Hawk, Thunder Bird, Thunder Horse North).

In the confined suprasalt basins province of western part of Mississippi Canyon, reservoir sands were deposited above the middle to late Miocene allochthonous salt canopy. Reservoirs vary from 9.0 to 4.1 Ma, and consist primarily of channel fill to thin beds. Fields sizes are smaller because of the syndepositional structural deformation that limited the size of reservoirs.

The eastern portion of the study area consists of a largely unconfined slope province during the Cenozoic. Reservoir sands were deposited between 10.75 to 4.1 Ma near the flanks (Aconcagua, King) or as compactional drape overlying deeper structures (San Jacinto, Vortex, Jubilee). Reservoir sands are primarily channel-fill to levees.

One intriguing aspect of the regional stratigraphic relationships is the general lack of reservoirs between 13 and 10.75 Ma. Three sequences are present (13.0, 12.2, 11.4 Ma), each averaging 1000 feet in thickness. The thick shale-dominated sequences are not likely the product of pelagic fallout, rather sediment gravity flows. Regional controls on the grain size of sediments delivered to the basin are examined in the talk.