

On the Origin of Mini-Basins in the Gulf of Mexico

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ABSTRACT

The Gulf of Mexico mini-basins are small (from ten to a few hundred square miles) bowl like or elongated depressions on the shelf and slope. They are conventionally explained as density driven sinks into salt formed by deposition of clastic sediments above salt.

However, locally, density contrasts between sediments of different types are not the driver for basin initiation and the tectonic forces rule. Recently, it has been pointed out that some mini basins near the Sigsbee scarp formed synchronous to lateral shortening, as indicated by the presence of thrust faults in the depths of these basins.

On the Louisiana shelf and beyond, one also finds a third kind of mini basin where tectonic forces also appear to play a significant role in the formation process. Such mini basins may or may not contain the allochthonous salt, and are bound by deep cutting, high angle to vertical, normal or wrench faults. Salt, where present, may be a contributing factor. However, it seems to be hanging high in the section, whereas the basin continues far below to great depths.

Some of these basins have been noticed to continue from the current mud line to great depths (30,000 to 40,000 ft), with the salt hanging above 18,000 ft. This indicates that such basins probably owe their origin to crustal tectonics rather than salt movement. It is suspected that active wrenching, rifting, or a combination of the two – in some cases clearly of episodic origin – may be responsible for these basins. The basins could also be pre-salt, syn-salt or post-salt in origin.