AAPG International Conference: October 24-27, 2004; Cancun, Mexico

Re-evaluation of the Gulf of Mexico as a Frontier Basin

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A normal approach to evaluate a frontier basin might be: (i) Acquire regional seismic data spanning the basin (ii) Identify and map the important unconformity-bounded megasequences (iii) Define the major tectonic/depositional events (iv) Define the major source/reservoir/seal units and hence the likely “sweet spots” within the basin (v) Focused seismic acquisition and exploratory drilling.

The Gulf of Mexico has historically been explored in the reverse of this sequence; understanding of the basin therefore developed in a piecemeal fashion.

We have reanalyzed the basin it as if it were a virgin frontier basin. Megasequence mapping in the deep water reveals that the development of the basin does not fit the commonly accepted models.

The basin was formed by three distinct stages of rifting in different directions. The distribution of Upper Jurassic and Lower Cretaceous sediments is fundamentally controlled by these rift episodes; as a result, there are regions with totally different Mesozoic stratigraphy within the deep water region, and the distribution of source rocks cannot be understood without defining this framework.

The major sediment input through time is clearly defined by the map pattern of megasequence thickness. The well-known Miocene and Plio-Pleistocene sediment inputs from the north are clearly defined, but also the patterns show the existence of major Paleogene sediment inputs from the west and NW and, more speculatively, from the SE. BHPB used this information to support a bold stepout of exploration in to a new play, rewarded by several major discoveries.

Relatively little data is as yet available from the southern half of the basin, and we should expect more surprises once a truly basin-wide analysis becomes possible.