Tuesday, November16, 2004

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GSH
Luncheon Meeting

by ***Tarek Ghazi, Pete Emmet*** *(presenter),*
Bob Hickman, Glenn Granata,
Angel Callejon *and* ***Maurice Slot***

New Genetic Framework and New Plays in Offshore Peru

In the spring of 2004, Gaffney, Cline & Associates, Inc. undertook a comprehensive reinterpretation of the hydrocarbon prospectivity of the offshore basins in Peru. From north to south, the study included the Tumbes-Progresso, Talara, Trujillo, Salaverry and Pisco basins. The main focus was to delineate basin geometry and evolution, while tracing a robust tectono-stratigraphic correlation scheme across a region greater than 1000 km in strike length. Kinematic reconstructions of key dip lines, thermal maturation models and a regional velocity model and depth conversion were essential in building this new framework. These new interpretations were built on the back of an intensive multi-discipline integration of key seismic lines, wells, remote sensing, and surface geological data.

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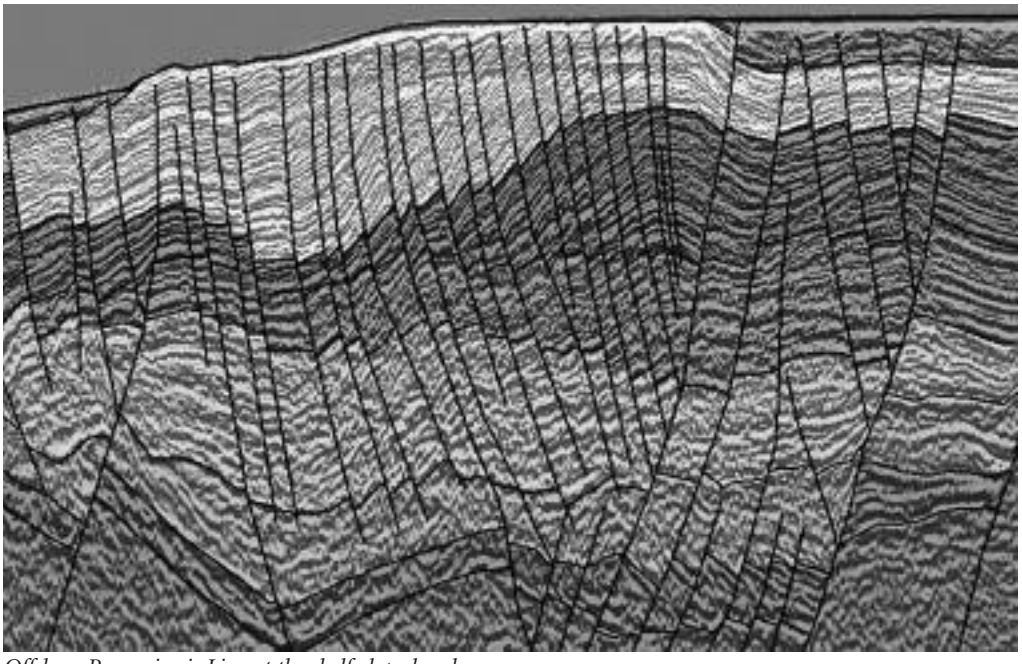
Overall, the Peruvian offshore is an anomalous convergent margin. It is underlain by continental crust, including Cretaceous and Paleozoic strata and Precambrian crystalline rocks, whereas many other convergent margins are underlain by oceanic accretionary prisms. Several extensional basins have formed and have been inverted during the Cenozoic, largely controlled by the reactivation of basement faults. This new genetic framework has exposed several new play concepts and has produced a better understanding of previous concepts. The new prospectivity, especially in shallow water, will likely attract another round of exploration licensing in the area.

Wildcat wells in the Tumbes-Progresso basin have penetrated a thick Neogene section and have tested substantial flows of oil and gas. However, a thicker lower Eocene section that hosts large complex structural and possible stratigraphic traps remains essentially untested. Remigration of hydrocarbons from early-forming traps may be an important controlling factor here.



Offshore Peru seismic Line at the shelf-slope break.

In the Trujillo basin, post-mortem analysis of wildcat failures suggests that two of the four wildcat wells were drilled off-structure with respect to deep targets, while the other two tested the Trujillo-Salaverry basement arch. This arch likely formed in the late Miocene, which is significantly later than previously believed. Although the arch itself is not prospective, this earlier time of formation leaves the way clear to charge the Salaverry basin with hydrocarbons migrating out of the Trujillo basin in the late

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Eocene to early Miocene. The Salaverry basin was previously thought to be unprospective.

Traditional exploration targets in the Trujillo basin have been turbidite sands of Eocene to Miocene age that are draped over basement structures. The study has resulted in a better understanding of the paleogeography and paleobathymetry that controlled the distribution of these sands. Cretaceous sandstones in the Trujillo and Salaverry basins and Eocene carbonates in the Salaverry and Pisco basins may also be prospective. Carbonate targets have not been tested in the Peruvian offshore to date. ■

Biographical Sketch

Pete Emmet is a consulting geophysicist with Brazos Valley G&G Services of Cypress, Texas (pete@bvgg.com). Pete's geophysical practice involves data management and interpretation services utilizing The Kingdom Suite™ applications of Seismic Micro-Technology. Pete earned a PhD in geology and geophysics from Rice University in 1996, for which he studied the structural and stratigraphic evolution of Cenozoic inversion structures of the western Flores Sea, Indonesia.

This project was conducted by a management and interpretation team assembled by Gaffney, Cline and Associates, Inc. (GCA) specifically for the project. The project management, data integration and final documentation responsibilities were handled by Tarek Ghazi of GCA, Houston (tghazi@gaffney-cline.com). Seismic data loading and interpretation were performed by Pete Emmet. Structural analysis was performed by Bob Hickman of Structural Solutions, Sugar Land (rghickman@earthlink.net). Well log analysis and composite log creation were performed by Glenn Granata of Granata Geological Consulting, Houston (gwgranata@sbcglobal.net). Thermal maturation modeling was performed by Angel Callejon of Platte River Associates, Inc., Houston (a.callejon@platte.com). Velocity modeling and depth conversion were performed by Maurice Slot of In-Depth Solutions, Oklahoma City (maurice@in-depthsolutions.com).