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## New Genetic Framework and New Plays in Offshore Peru

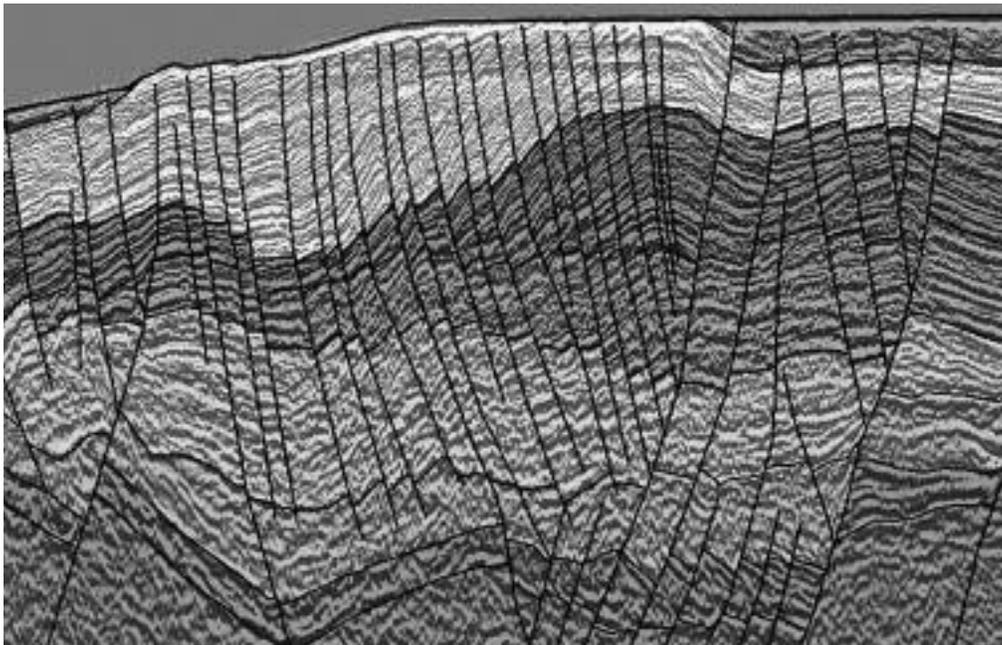
In the spring of 2004, Gaffney, Cline & Associates, Inc. undertook a comprehensive reinterpretation of the hydrocarbon prospectivity of the offshore basins in Peru. From north to south, the study included the Tumbes-Progresso, Talara, Trujillo, Salaverry and Pisco basins. The main focus was to delineate 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.

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.

*The Peruvian offshore is an anomalous convergent margin. It is underlain by continental crust.*



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@bvvg.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 (rgickman@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).



## Vunteer of the Month: Elsa Kapitan-White

**E**lsa Kapitan-White is the November recipient of Volunteer of the Month Award. Elsa has been a leading member of the Bulletin Editorial Board since 1995 and is currently an Associate Editor of the HGS *Bulletin*.

Elsa reviews seemingly every word that goes into the *Bulletin* and always finds things that need to be corrected or at least questioned. As she goes through the articles she often makes suggestions to the Editor for key parts of the article that can be highlighted in the "pull quote" that appears in every article to attract the reader's interest. She does all this typically in less than one day.

Elsa received a BS in geology from Centenary College in Shreveport, LA, and an MS in geology at Texas A&M University. She became an editor while working at the Ocean Drilling Program in College Station, Texas. She has since been a technical editor for numerous publications including journals and books.

She joined the HGS *Bulletin* Committee at the invitation of Gail Bergan, who was the 1995-96 Editor. Elsa also served as the Chair and Technical Chair for the Division of Environmental Geosciences when the AAPG National Convention was held in Houston, March 2002.

The HGS is fortunate to have had Elsa Kapitan-White as a devoted volunteer for the past nine years. Her professional attention to detail has made a profound impact on the quality of the *Bulletin*. She has provided an enormous assistance to the many HGS *Bulletin* editors and the Society is most grateful for her contribution.

Elsa is a Technical Editor for Schlumberger Oilfield Communications - Marketing. ■

