Monday, December 16, 2002

HGS General & International Explorationists Joint Dinner Meeting

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Social 5:30 p.m., Dinner 6:30 p.m.

Cost: $25 Preregistered members; $30 Nonmembers & Walk-ups

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by Mark Chapin
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Houston, Texas

Integrated Subsurface Characterization of the Bonga Field, Offshore Nigeria

The development of the Bonga field is presented as an example of integrated subsurface modeling of complex, deepwater channel reservoirs, highlighting geophysical techniques. Three main static reservoir parameters were modeled in detail: (1) net sand distribution, (2) sub-seismic channel architecture, and (3) reservoir connectivity. Proprietary probabilistic, model-based seismic inversion has provided excellent predictions of net sand thickness in development wells in the main reservoir, adding confidence to our in-place oil volume assessment.

Because of limits to seismic resolution, all potentially relevant sand and mud beds cannot be visualized from (inverted) seismic data alone. Sub-seismic channel architectures have been deterministically placed in the static models based on analogue and well data and guided by seismic attributes. Connectivity is especially important because pressure support and sweep from water injection wells are crucial to productivity from these nearly hydro-pressured reservoirs. Reservoir connectivity is defined as a function of horizontal and vertical permeability and of transmissibility barriers. Analysis of seismic equal-amplitude surfaces provides a way seismic can potentially help indicate areas of relatively better and worse connectivity. Each reservoir is simulated multiple times using scenarios based on all combinations of the above parameters. Highly amalgamated channels ➢

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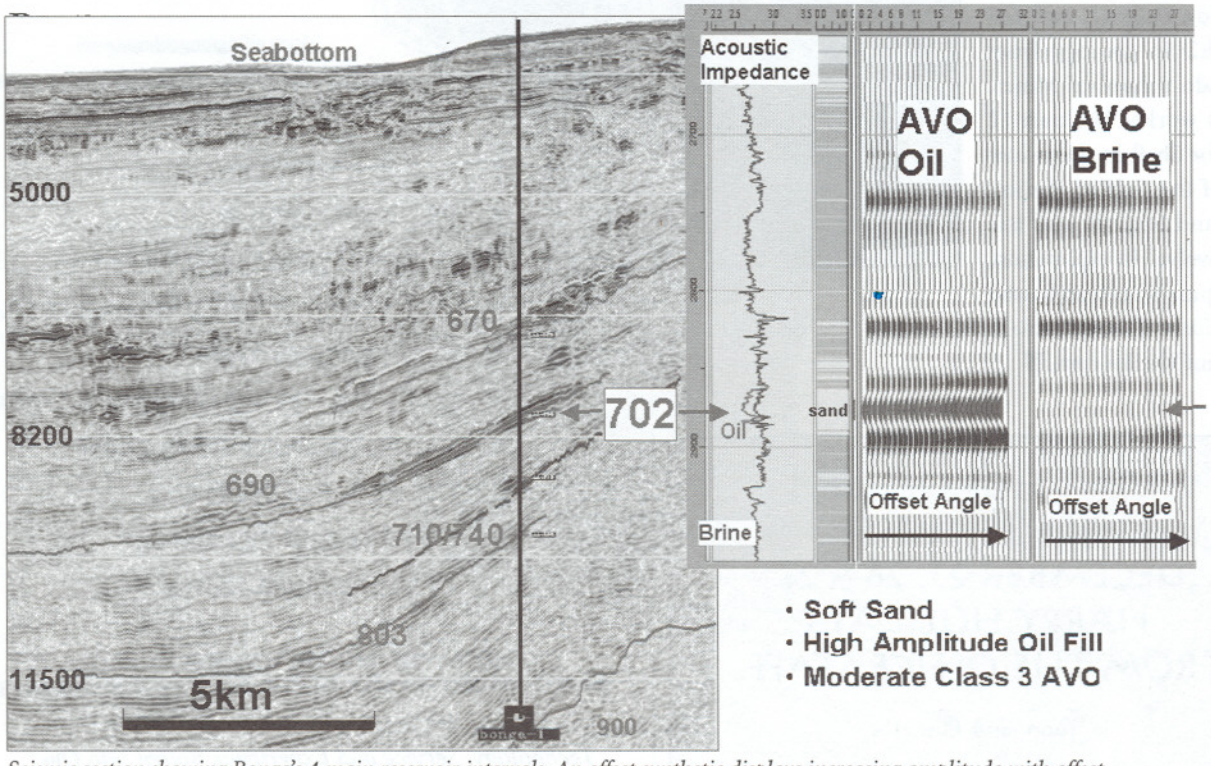

Seismic section showing Bonga's 4 main reservoir intervals. An offset synthetic displays increasing amplitude with offset, characteristic of Bonga oil sands.

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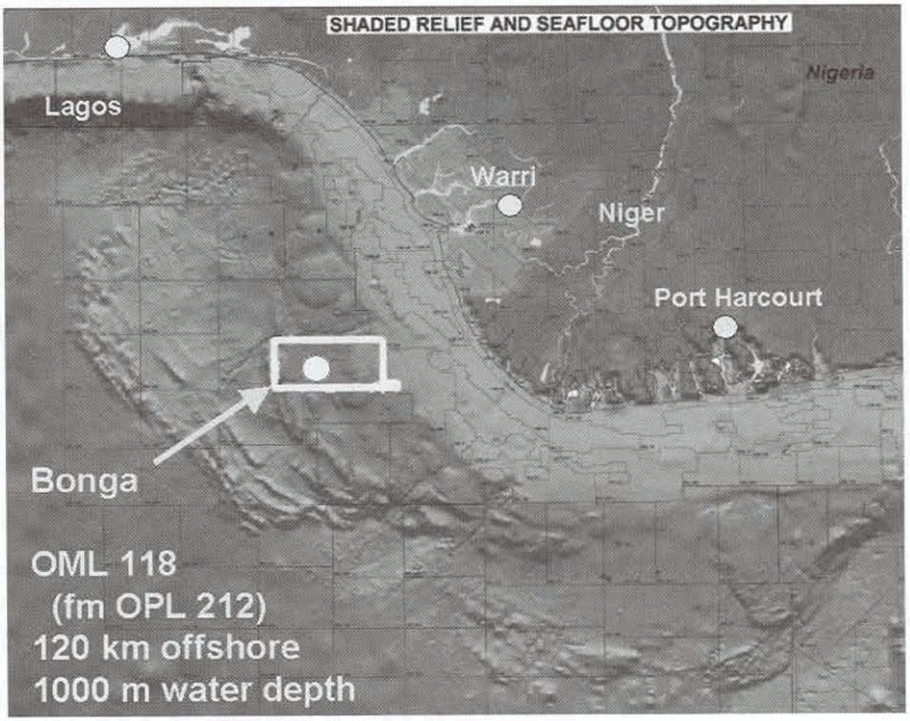
are less impacted by connectivity variation than less well amalgamated channels. Reservoir simulation models have been transferred to synthetic seismic models and demonstrate the potential value of time-lapse (4D) seismic. Other "in-field opportunity" reservoirs have been identified in addition to the main reservoirs and may provide added production potential in the future.



Location map of Bonga Field, offshore Nigeria.

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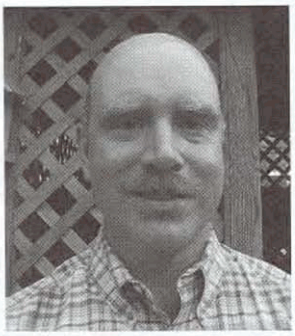
Biographical Sketch



MARK CHAPIN received a BS degree in geology from Wheaton College, and MS and PhD in geology from Colorado School of Mines. He has worked the past 12 years for Shell in deepwater areas of the Gulf of Mexico, U.K., and Nigeria and has been involved in exploration, development, research, and operations. Contact email: mchapin@shellus.com. ■