Monday, February 15, 2010

Westchase Hilton • 9999 Westheimer
Social Hour 5:30–6:30 p.m.
Dinner 6:30–7:30 p.m.

Cost: $28 Preregistered members; $35 non-members & walk-ups

To guarantee a seat, you must pre-register on the HGS website and pre-pay with a credit card.
Pre-registration without payment will not be accepted.
You may still walk up and pay at the door, if extra seats are available.

Scott E Thornton, *Department of Geology and Geophysics, The University of Sydney and DI International*
Nicholas B. Harris, *Department of Geology, University of Alberta, Edmonton*
Ann-Marie Scott, *Roc Oil Company Limited; and*
Michael Dyer, *DI International*

Lacustrine and Marine Pre-Salt Clastic and Carbonates Of Brazil and West Africa: Drivers for Reservoir Quality, Environoments Of Deposition and Analogs

Recent discoveries, past exploration and ongoing exploration in pre-salt, lacustrine and marine reservoirs in Brazil and Angola have often encountered mindboggling complexity in both carbonates and clastics. The key to reaching an enlightened understanding of this complexity relies more on creative right brain thinking than left brain logic and data collecting. Discoveries made in the last several years have challenged our depositional models and the dogma that the carbonates and clastics in the pre-salt of Brazil and Angola are plagued by poor reservoir continuity and quality. In fact, the reservoir quality of the pre-salt, microbial limestone reservoirs in the Tupi-Jupiter cluster of fields displays outstanding reservoir quality. The reservoir distribution and reservoir properties are a function of the depositional environment in large and small rift lakes as well as broad, apparently marine transgressive systems in the early Cretaceous. Carbonate and clastic reservoir distribution and quality in lakes and marine sag basins pre-salt are controlled by rift geometry and orientation, lake or ocean depth and cross-section

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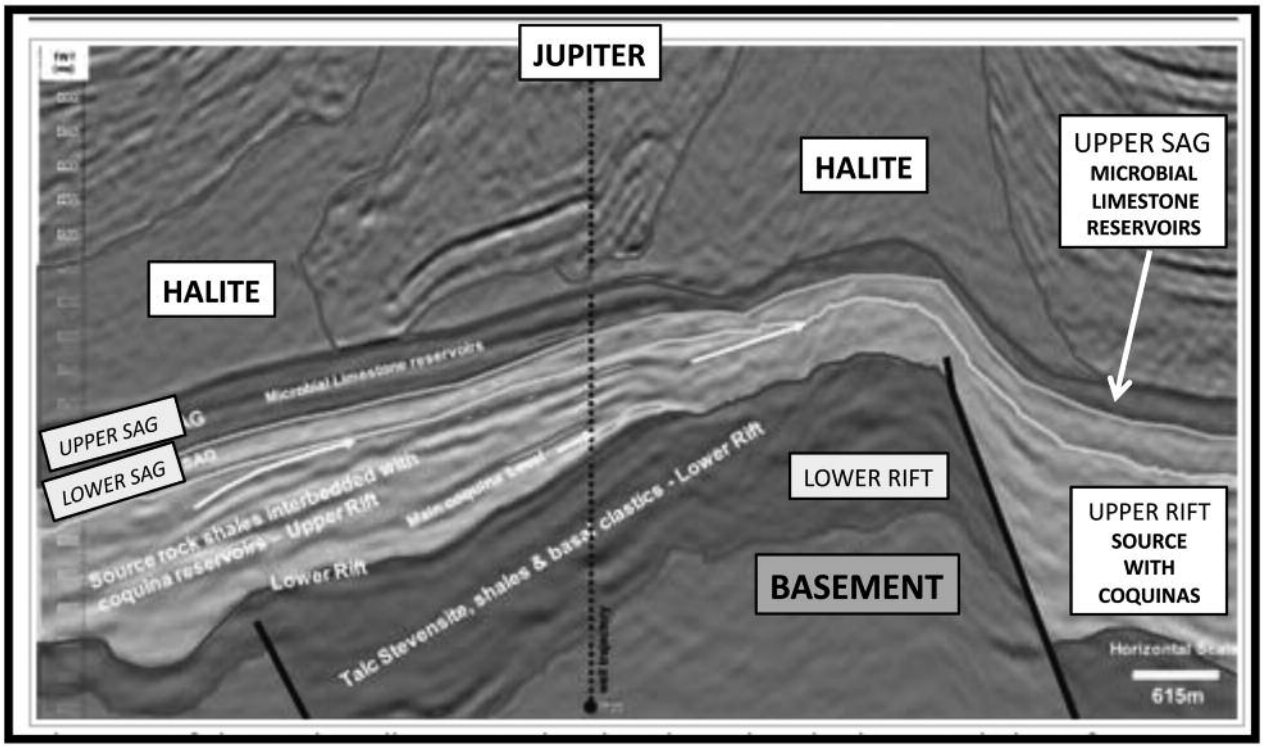
JUPITER DISCOVERY IN SANTOS BASIN, BRAZIL WITH PRE-SALT SEQUENCES



(AFTER Geo Expro, 2008, Image after HRT and CGG/Veritas time section)

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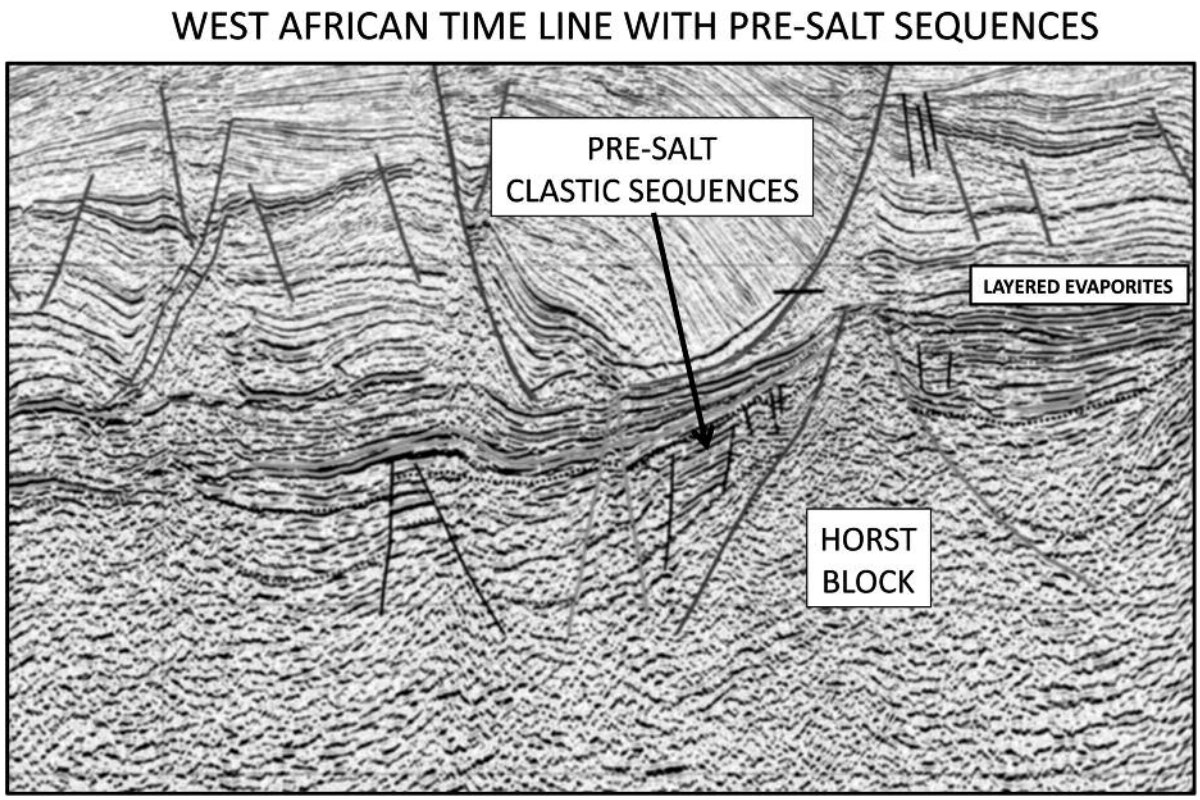

profile, wave climate and fetch, drainage patterns in the hinterland, entry points of clastics, lake salinity, local climate and cycles of lake level fluctuation. These drivers for understanding reservoir quality and continuity will be reviewed on first principles from our knowledge of recent and ancient deposits, as well as theoretical framing. Field analogs and regional data will be reviewed for the Santos and Campos basins of Brazil as well as the Kwanza and Cabinda basins of Angola. Our global analog set for clastic and carbonate reservoirs is really diverse in the aforementioned drivers, so that no two lacustrine, pore-salt basins are really alike. Our analog set for both Recent and ancient lakes is also not as statistically significant as sets for other reservoirs. Indeed, the microbial carbonate reservoirs being discovered in the pre-salt of the Santos Basin are likely marine, not lacustrine carbonates, deposited like other stromatolites. Computer-driven global climate models for lakes in the present and past are much more difficult than those for marine and deltaic depositional environments and have had limited success. An enlightened and more successful exploration campaign in these high-potential reservoirs will result from the understanding of these first principles. Exploration campaigns driven by only seismic interpretation and structural modeling may be prone to a lower rate of success if not tempered by a more sophisticated understanding of the drivers for these complex and often excellent reservoirs. ■

Biographical Sketch

Scott E. Thornton is currently Manager, West Africa for DI International in Houston. Scott has worked 25 years in international exploration for several companies and clients, with most of his experience at Unocal and Shell, including a 10 year consulting career predominantly working on pre-salt and post-salt basins of Brazil and West Africa. The last two years of that consulting career were with Devon Energy mapping the pre-salt of the offshore Kwanza basin, as well as regional and prospect-specific post-salt mapping of turbidites and marine carbonates in the Campos, Santos and Espirito Santo basins. After Devon, Scott moved to Sydney, Australia with Roc Oil Company Limited. One of his projects was seismic facies mapping of potential Toca lacustrine carbonate reservoirs in onshore Cabinda, which resulted in a well. Scott worked in a team that tried to leverage Roc's previous light oil discovery in the pre-salt Toca and Lakula sandstone. Scott has been responsible for acquiring or applying for acreage in Burma, Pakistan, NW China, Ecuador, Peru, Brazil, California and North Alaska. Scott received his BA in Geology and Geophysics at the University of Wisconsin, Madison, his MS in Geological Sciences at Duke University and his PhD in Geology and Geophysics at the University of Southern California. He currently is also an Adjunct Professor at The University of Sydney. Scott taught 2 short courses while in Sydney on Introduction to Petroleum Systems as well as Lacustrine Petroleum Systems at the Petroleum Society of Australia, where many of his students were from the local universities as well as the industry.