Tuesday, February 21, 2006

The Sofitel Hotel • 425 Sam Houston Pkwy. North
Social 11:15 a.m., Luncheon 11:30 a.m.

Cost: $31 Preregistered members; $35 non-members & walk-ups

The HGS prefers that you make your reservations on-line through the HGS website at www.hgs.org. If you have no Internet access, you can e-mail reservations@hgs.org, or call the office at 713-463-9476 (include your name, e-mail address, meeting you are attending, phone number and membership ID#).

HGS Northsiders
Luncheon Meeting

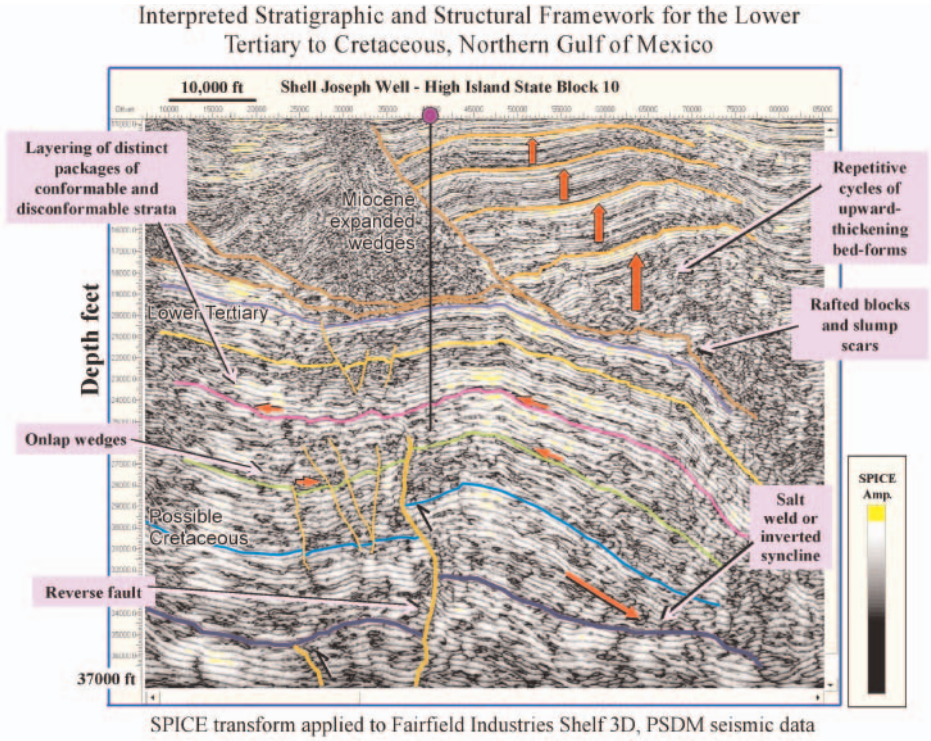
by ***Dr. Barbara J. Radovich***
Silver Grass Enterprises
Sugar Land, Texas

West Cameron 76 Field and Deep Lower Tertiary Framework Revealed Using Sequence Stratigraphy Integrated with SPICE

The Miocene to Cretaceous geology of the northern Gulf of Mexico is the subject of active investigation with the most modern data and techniques available in the industry. The geology is examined here with long-cable 3D seismic data and pre-stack depth migration (PSDM) processing to better image from below 13,000 ft to greater than 40,000 ft. The data is also input to a new type of transform. The SPICE (Spectral Imaging of Correlative Events) transform combines wavelet decomposition with spectral characterization and the result looks similar to an "outcrop." This bed form, layered framework is derived from all the frequencies in the seismic data and provides precise sharp-boundary criteria for interpretation.

The West Cameron 76 Field area and several deep lower Tertiary drilling sites are examined to illustrate the architecture of the bed forms and faults. Emerging ideas include a mid-Tertiary section composed of many cycles of upward-thickening bed forms that represent prograding sediments filling and driving large expansion faults, Paleogene features that resemble rafted blocks as in West Africa, and a Lower Tertiary to Mesozoic extensional and compressional structured platform that shows upper to mid-slope criteria of thick wedges filling broad canyons cutting fairways to deep water.

Mid-Tertiary sediments were deposited, during many cycles of sea level rises and falls, into a complex series of large, expanding, down-to-basin regional décollements that sole out onto lower Tertiary to Mesozoic blocks. The West Cameron 76 Field area sediments are the result of a combination of changing sea level and rapidly expanding accommodation basins forming at each expansion fault. A new attribute called SPICE is applied to the data and the resulting bed form, layered framework shows distinct sequence and parasequence packages, with sands distributed in shelf to slope environments of deposition. Well log gamma ray curves tie to sharp SPICE bed form boundaries defined by downlap and onlap geometries, just like seismic data. The sequence architecture shows a thick stack of repetitive, bed thickening-upward cycles that are interpreted as prograding complexes filling the accommodation space at each lowstand of sea level. These tie to upward-coarsening log shapes. Slope fan parasequence sets also fill the rapidly forming accommodation space, and these tie to upward-fining log shapes. Pay sands are distributed among these prograding elements with distinct fairways of deposition. This architecture can be interpreted at great depths below existing well data and facies reliably predicted at these depths.



SPICE transform applied to Fairfield Industries Shelf 3D, PSDM seismic data

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The High Island (HI) state waters area has been the site of deep drilling recently by the Shell Joseph well in HI State block 10. The SPICE sections on PSDM data show a structured platform of lower Tertiary to Mesozoic sediments in this area. These structures are extensional but in places look like compressional reverse faults. The top of this section shows features that are possible rafted blocks and major slump scars that fill in with younger sediments, similar to the offshore West Africa and Brazil shelf margins. The lower Tertiary bed forms are characterized by laterally continuous conformable bed sets, but also by packages of disconformable beds that resemble hummocky slope fans. Criteria indicative of broad canyon cuts are seen on several sequence boundaries and these canyons are filled with sediment onlap wedges. This is characteristic of upper to mid-slope environments of deposition, and these canyons could provide fairways to transport sands into deeper water. This geologic time is at the end of the Late Cretaceous Laramide orogeny. Uplift and restructuring of this area would enhance canyon cutting, erosion and redeposition of sediments to the basin in deeper water. Compressional features in the deep shelf platform may be linked to structural overprints from the end of the Laramide orogeny that could restructure the original graben/transform architecture. The Cretaceous section is interpreted as the most conformable bed-set package; possible salt welds are seen at the deepest levels of the data. ■

Biographical Sketch

Dr. Barbara J. Radovich has 28 years of worldwide experience in 2D and 3D seismic and well log sequence stratigraphy of clastics and carbonates, fluvial to deepwater settings, and regional basin to reservoir scales of investigation. She is a proven oil-finder, having developed new deep water interpretation criteria leading to major discoveries in the deepwater offshore Nigeria for which she received Texaco's highest research award. She is a recognized speaker on the integration of 3D seismic attribute and visualization techniques within a framework of sequence stratigraphic architectures, especially in shelf margin to deepwater settings. Her experience covers over 40 areas around the world including West and East Africa, South America, the Mediterranean, the Gulf of Mexico, the North Sea and Southeast Asia. Presently she works as an independent consultant, but her previous corporate affiliations are Texaco, Pennzoil and Exxon Production Research.