How (Dis)Continuous Are Turbidite Systems?

L. D. Meckel, III[1], *G. A. Ugueto*[2], *B. J. O'Neill*[2], *B. Tichelaar*[2], *and C. Wojcik*[3]. *(1) Mars Basin Nearfield Exploration, SEPCo, 701 Poydras St, One Shell Square, New Orleans, LA 70139, phone: +1 (504) 728 7931, trey.meckel@shell.com, (2) SEPCo, (3) Shell*

Conventional understanding - based on outcrop, subsurface, and experimental studies - argues that stratigraphic discontinuities are a characteristic feature of most turbidite systems. While such discontinuities unquestionably do exist, and certainly have the potential to adversely affect reservoir performance, we suggest that the continuity of turbidite systems may be equally characteristic, and greatly underappreciated.

Using a combination of well log, seismic, paleontologic, and pressure data, we are able to accurately correlate fourth-order (ca. 0.5 Myr) genetic sequences, the flooding surfaces that bound them, and, in some cases, individual sands over the area of hundreds of square kilometers in the Greater Mars-Ursa Basin, northern Gulf of Mexico. High-resolution, IPS-assisted, quantitative biostratigraphy allows us to identify “highstand” and “transitional” shales that separate alternating packages of high net-to-gross “sheet” sand systems and lower net-to-gross channel or amalgamated channel complexes. Each sand package has a distinctive seismic and log character that aids in interpretation. Pressure cell analysis establishes continuity and connectivity of sands by demonstrating hydraulic equilibrium between shales and sands of a given cell (comprising one or more fourth-order sequences). Subsequent depletion of reservoir pressures by production observed up to tens of kilometers away from control wells validates and further quantifies the degree of continuity of the sands.

This robust stratigraphic framework improves our pre-drill predictions of sand presence, reservoir quality, and overpressures, which allows us to explore, appraise, and develop with confidence in areas with minimal data, such as beneath allochthonous salt bodies, where seismic imaging is poor and well control is sparse.