PBS-SEPM MARCH LUNCHEON

Tuesday, March 19, 2024 – 11:30AM

Bush Convention Center - 105 N Main St, Midland, TX 79701

$25 Early Bird Rate | $35 Walk-In/Late RSVP | $10 Student | $5 Virtual

Register by **3PM** on **03/15**: www.pbs-sepm.org/events | info@pbs-sepm.org | (432) 279-1360

Exploring Shelf-Margin Architecture & Seismic Stratigraphy: Landsliding & Gully Formation Set up Deep Water Delivery

Jake Covault, Zoltan Sylvester, Dallas Dunlap– BEG, Jackson School of Geosciences, UT Austin

ABSTRACT

Submarine-channel networks connect deltas or littoral cells to sandy, deep-water fans. For passive continental margins, with wider shelves than tectonically active ones, sea-level fall can promote delta progradation to the shelf edge as the shoreline regresses. At the shelf edge, deltas are a staging area for terrigenous sediment delivery to deeper water. There are multiple ideas for the formation of the submarine channels that connect deltaic source areas to fans; for example, they can result from headward erosion of landslide scars forming on the shelf margin that capture sediment-gravity flows or from progressive widening of gullies sourced by deltas.

Here, we use published ages and a large (nearly 4,000 sq. km) three-dimensional seismic-reflection dataset (dominant frequency in the shallow interval ~45 Hz) in the Gulf of Mexico, east of the Mississippi submarine canyon, to discover the timing of delta progradation to the shelf edge relative to sea level and interpret the processes of submarine-channel formation. At least three deltas of the Mobile and/or nearby rivers prograded to the shelf edge since Oxygen Isotope Stage (OIS) 14; these deltas are linked to submarine channels named Dorsey (>OIS 14), Sounder (OIS 8), and Lagniappe (OIS 2). All deltas, in sequence, prograded to a prominent shelf-edge growth fault. Landslides initiated at the growth fault when the Dorsey and Sounder deltas reached the shelf edge. The landslides reshaped the shelf edge and upper slope into chutes that captured and directed submarine channels into deeper water. Sea-level falls likely controlled delta progradation to the shelf edge; however, once there, events that oversteepened the margin, i.e., landsliding, promoted a period of slope readjustment when terrigenous sediment was bypassed to deeper water. The Lagniappe delta is much smaller than Dorsey and Sounder and it did not initiate landsliding, potentially because of lower overburden across the shelf-edge growth fault. Dorsey-Sounder channel evolution is useful as a process analog for older subsurface intervals of the Gulf of Mexico and other settings with delta-fed submarine-channel systems. Understanding submarine landslide occurrence and its impact on sediment dispersal through channels has implications for geohazard assessment in the Gulf of Mexico and other resource-rich basins.

BIOGRAPHY:

Dr. Jacob Covault is a Research Professor at the UT-Austin Quantitative Clastics Laboratory. His expertise is the geology of clastic depositional systems. Jacob applies his research to subsurface challenges in reservoir/storage characterization and geologic hazard assessment. Prior to his position at UT-Austin, Jacob was a research scientist at Chevron Energy Technology Company and the U.S. Geological Survey. He received Ph.D. and B.S. degrees in Geological and Environmental Sciences at Stanford University. The Quantitative Clastic Laboratory (QCL) is an industrial affiliates program at the Bureau of Economic Geology within the Jackson School of Geosciences at UT-Austin. The mission of the Quantitative Clastics Laboratory (QCL) is to develop a predictive understanding of processes and controls on sediment transport and the stratigraphic evolution of depositional systems, with applications in subsurface characterization, modeling, and correlation.