Monday, December 10, 2001 HGS General & North American Explorationists

Joint Dinner Meeting

Westchase Hilton • 9999 Westheimer
Social 5:30 p.m., Dinner 6:30 p.m.

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

Make your reservations now by calling 713-917-0218 **(5-0-1)** or by e-mail to Joan@hgs.org (include your name, meeting you are attending, phone number, and membership ID#).

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Physiographic Controls on Submarine Fan Development within Depositional Sequences

Depositional sequences with distinct depositional relief can occur on the craton and continental shelf, as well as along the continental margin. This depositional topography can occur along sequence boundaries (erosional), within sequences (constructional), or as abandoned (relict) physiography. Detailed analysis of the depositional topography associated with sequences deposited in a variety of tectonic settings reveals that neither the presence of depositional relief or proximity to the continental margin explains basin-floor fan development within sequences. However, in the data sets studied the magnitude of the depositional relief along sequence boundaries can be used to explain and predict basin-floor (low-stand) fan development within sequences.

Integration of published seismic, well-log, and outcrop data from the Cretaceous and Tertiary of the U.S. Gulf and Atlantic coasts, offshore Australia, Norway, Russia, as well as the Triassic through Tertiary of the Alaskan North Slope, suggests that three distinct types of depositional sequences (Low-, Moderate-, and High-relief) can be defined. Low-relief sequences lack clinoform development. These sequences typically have slopes of less than 0.5 of a degree and depositional relief of less than 50 meters (150') along sequence boundaries. Low-relief sequences, which are common in cratonic basins, lack basin-floor low-stand fans. Moderate-relief sequences display distinct clinoform development, have slopes of 0.5 to 3 degrees, and display depositional relief of less than 150 meters (500') along sequence boundaries. These Moderate-relief sequences are common in foreland basins and on continental shelves. Moderate-relief sequences also lack low-stand fans. High-relief sequences display slopes of 2–5 degrees and depositional relief greater than 150 meters (500') along sequence boundaries. These High-relief sequences typically occur along the continental margins, but can occur in foreland and rift basins. High-relief sequences contain low-stand fans.

These observed relationships suggest that there is a Critical Shelf Break that controls slope stability or failure during relative sea-level falls. In basins where the depositional relief is less than the Critical Shelf Break, progradation continues during relative sea-level falls. The resulting Low- to Moderate-relief sequences lack basin-floor (low-stand) fans. In basins where the depositional relief is greater than the Critical Shelf Break, slumping, canyon formation, fluvial capture, and sediment bypass occur during relative sea level falls. The resulting High-relief sequences contain basin-floor (low-stand) fans. In the data sets studied, it appears that the Critical (Erosional) Shelf Break occurs with erosional depositional relief of 150–180 meters (500–600') in clastic systems.

Biographical Sketch

ART D. DONOVAN received his PhD from the Colorado School of Mines in 1984. From 1984 to 2000, he worked for Exxon Production Research Company (EPR). At EPR, Art had the opportunity to conduct sequence and seismic stratigraphic studies from basins all around the world, as well as conduct fieldwork on almost every continent. During his time at EPR, he became a recognized corporate expert in seismic stratigraphy, sequence stratigraphy, and siliciclastic depositional systems. Over the last 17 years, Art has become a key player in the development of modern sequence stratigraphic theory, transferring this knowledge both within and outside of industry. The author of numerous publications on sequence stratigraphy, Art led field trips and short courses on sequence stratigraphy for AAPG, SEPM, GSA, and the London Geological Society. Presently he is the chairman of the SEPM Sequence Stratigraphy Research Group. Since December of 2000, Art has worked for BP, where he is the Sed/Analogue Global Network Leader. In this role he coordinates the stratigraphic discipline and champions issues associated with reservoir prediction and continuity, throughout the company. □