San Joaquin Geological Society

Date: **Tuesday, May 10, 2011**

Time: **6 pm Social Hour**
7 pm Dinner
8 pm Lecture

Place: **American Legion Hall**

Cost: **PSAAPG Members & Mesozoics**
$20 w/reservation
$25 without reservation

Non PSAAPG Members
$25 w/reservation
$30 without reservation
Full-time Students with ID:
Free, Courtesy of Chevron

"Predictive Patterns of Slope Channel Architecture"

Dr. TIMOTHY REED MCHARGUE

BIOs
Dr. TIMOTHY REED MCHARGUE

PROFESSIONAL EXPERIENCE:

- Consulting Professor, Stanford University Department of Geological and Environmental Sciences, 2002-present: collaborative research on turbidite depositional systems, participate in PhD committees and instruct courses on clastic sequence stratigraphy and turbidite architecture.
- Chevron Petroleum Co., 1981-2009: Research Consultant, 1997 to 2009, coordinated Chevron's research on turbidite reservoirs. This function involved project design, vision, and integration for multiple internal research activities as well as collaborative research projects with several universities and other research institutions. In addition, my job involved mentoring, training and consulting on turbidite reservoirs, clastic sequence stratigraphy, and seismic interpretation. Previously with Chevron, 1981-1997, I was involved in exploration and regional geologic studies of various locations around the world, particularly West Africa and Australia.
- Phillips Petroleum Co., 1974-1977: Exploration Geologist.

ABSTRACT

The study of many slope channel systems has led to the recognition of recurring architectural patterns. In turn, recognition of these patterns has facilitated the development of hypotheses of controlling mechanisms. Together these patterns and hypotheses constitute rules that are used to construct computer forward models of petroleum reservoirs that are internally consistent, reproducible, and quantifiable.

Channelized turbidite deposits can be interpreted to be the product of multiple cycles of waxing-waning flow energy at multiple scales. Systematic changes in the volume and caliber of turbidity flows through time trigger a fall of the equilibrium profile, which drives erosion and sediment bypass of the slope, followed by a rise of the equilibrium profile, which allows deposition on the slope of increasingly mud-rich sediments through time. In most turbidite successions, at least three scales of waxing-waning cyclicity can be interpreted: element, complex-set, and sequence. The stacking pattern of channel elements within a complex-set cycle tends to be sequential: (1) erosion and sediment bypass; (2) amalgamation of channel elements associated with a low rate of aggradation; (3) a disorganized stacking pattern of channel elements associated with a moderate rate of aggradation; and (4) an organized stacking pattern of channel elements associated with a high rate of aggradation. Stages 1 and 2 may be absent or minor in mud-rich systems but prominent in sand-rich systems. Conversely, stage 4 may be prominent in mud-rich systems but absent in sand-rich systems.

Utilizing rules, forward modeling can produce realistic architectures, such as the 4 stages described above. Multiple realizations and multiple alternative models can be constructed to quantitatively examine the probability of specific parameters of interest.

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