Fluvial and Shallow Marine Modern Depositional Systems: Subsurface Uncertainties in Clastic Reservoirs, Texas (G138)

Tutor(s)

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Overview

Active depositional processes and their products in the modern incised valleys of the Trinity, Brazos, and Colorado Rivers of Texas provide excellent 3D and 4D analogs for fluvial, marginal marine, and shallow marine clastic reservoirs anywhere in the world. The scale, geometry, internal stratigraphy, sedimentology, and ichnology of a variety of clastic bodies are examined by digging trenches and walking out features in combination with seismic and core data from the same deposits. Additional outcrop and subsurface analogs are leveraged to highlight key similarities and crucial features.

Duration and Logistics

A five-day field course based on the southern Texas coastline near Houston, comprising a mixture of modern analog examinations and discussions (70%) and lectures/exercises (30%).

Exertion Level

The class requires a MODERATE exertion level. Most walks are under 2 km at elevations of sea level. Participants will be required to wade in shallow water and to dig trenches and pits for sediment observation.

Level and Audience

Intermediate. Exploration and production staff working fluvial and shallow marine environments, including integrated asset teams of geologists, geophysicists, and reservoir, petroleum, geothermal, and CCS engineers.

Objectives

You will learn to:

1. Analyse fluvial, deltaic, tidal inlet, bay margin, and barrier island/shoreface deposits based on grain size profile, sedimentary structures, and ichnofossils.
2. Evaluate reservoir properties of a variety of fluvial and coastal geobodies away from well bore and beyond seismic resolution by using first principle observations and appropriate analogs.
3. Assess and predict the presence of strike-fed and point source sandstone bodies in coastal settings using regional context and physicochemical proxies.
4. Build depositional environment maps constrained and informed by appropriate modern and ancient analogs.
5. Establish that fluvial systems and their associated coastal deposits and incised valleys are primarily driven by sediment supply and climate in the drainage basin and can be decoupled from sea level

changes.

Course Content

Day 1: Arrive, Houston, Texas

Classroom:

- Informal introduction to course topics
- Safety briefing

Overnight Houston

Day 2: Trinity River Valley

Fieldwork:

- Architecture, heterogeneity, scale, and factors affecting reservoir preservation in quality in fluvial, bayhead delta, and spit deposits in an underfilled incised valley (Trinity River Valley). Emphasis on key differences and similarities between distributive (aggradational) and tributary (degradational) fluvial systems.

Overnight Galveston

Day 3: Galveston

Fieldwork

- Depositional context, heterogeneity, and factors affecting reservoir quality and preservation in a microtidal, wave-dominated barrier island (Galveston) with a tidal inlet complex and flood tidal delta. Examination of back-barrier environments and their potential as hybrid plays.

Overnight Galveston

Day 4: Brazos and Colorado River Valleys

Fieldwork:

- The role of sediment supply and marine processes on preservation of wave-dominated deltas in an overfilled incised valley (Brazos and Colorado River Valleys) with emphasis on lateral as well as updip-downdip variability in facies distribution and preservation.

Overnight Freeport

Day 5: Brazos and San Bernard River Valleys

Fieldwork:

- Active and abandoned wave-dominated river mouths and tidal inlets (Brazos and San Bernard Rivers). Boats used to explore the role of storms and sediment supply on the deposition, modification, destruction and preservation of mouth bar deposits and beach ridges/shorefaces.

Overnight: Houston

Day 6: Depart from Houston, Texas

- End of course and travel home.