Guadalupe Mountain Field Trip – Permian Sequence Stratigraphy and Sedimentation in a Mixed Siliciclastic-Carbonate System

Course Summary

This three-day field trip will introduce participants to a series of some of the finest outcrop exposures of carbonate and deepwater siliciclastic rocks in the world. Two principle themes of the trip are: (1) to observe the characteristics of a wide variety of sedimentary environments and lithofacies in the Permian section of the Permian basin, including examples of conventional and unconventional siliciclastic and carbonate reservoirs, and organic-rich mudrocks; (2) to observe sequence stratigraphic architecture at seismic scale; and (3) to observe reservoir flow unit architecture. Continuous outcrops in West Texas and New Mexico expose the majority of the Paleozoic rocks which are producing both conventional and unconventional hydrocarbons in the Permian basin of West Texas.

The field trip will begin in El Paso and will encompass four days in the field focusing on the Permian rocks of the Guadalupe Mountains, including the deepwater basin filling siliciclastics of the Brushy and Cherry Canyon formations, and the stratigraphy, lithofacies, and reservoir architecture of the San Andres and Grayburg formations. The San Andres is the most prolific conventional reservoir in the basin. The basin floor sandstones and carbonate debrites comprise the facies involved in the unconventional Wolfberry play of the Delaware basin. Traverses will also include organic-rich lime mudstones and siltstones of the late Permian interval. The field trip will end with a visit to the world famous Carlsbad Caverns with karst features analogous to the ancient karst developed during major Paleozoic unconformities in the region.

Instructor

Dr. J. Frederick 'Rick' Sarg received his Ph.D. (1976) in Carbonate Sedimentology and Stratigraphy from the University of Wisconsin-Madison. Rick obtained his M.S. (1971) and a B.S. (1969) in Geology from the University of Pittsburgh. He has extensive petroleum exploration and production experience in research, supervisory, and operational assignments with Mobil (1976), Exxon (1976-90), as an Independent Consultant (1990-92), with Mobil Technology Company (1992-99) where he attained the position of Research Scientist, and with ExxonMobil Exploration (2000-05), where he achieved the position of Stratigraphy Coordinator. Rick was a member of the exploration research group at Exxon that developed sequence stratigraphy, with his emphasis on carbonate sequence concepts. He has worldwide experience in integrated seismic-well-outcrop interpretation of siliciclastic and carbonate sequences, and has authored or co-authored 46 papers on stratigraphy and carbonates. In August of 2006, Rick joined the Colorado School of Mines as a Research Professor in the Department of Geology and Geological Engineering. Rick’s current projects at CSM include low-permeability, fractured carbonate mudrocks; and the lacustrine carbonates and stratigraphy of the Green River Formation in Colorado and Utah. Rick served as President of the Society for Sedimentary Geology (SEPM) (2004-05), and is currently the President of the SEPM Foundation. Rick was awarded the 2013 Robert R. Berg Outstanding Research Award by the AAPG.
Learning outcomes

This 5-day course will allow you to:

• Evaluate unconventional and conventional Permian reservoirs
• Determine processes (depositional, diagenetic, etc) that control facies distribution and lateral variation?
• Determine the stratigraphic framework for basin to shelf-margin correlation in the Bone Spring to Avalon interval of the middle Permian section
• Evaluate facies continuity and controls on facies variation?
• To use well logs and seismic to interpret the stratigraphy and facies variations in this classic shelf to basin transition

Itinerary

Day 1. Gather in El Paso, TX
• Hotel: Hotel at El Paso Airport

Day 2 Travel to Carlsbad
• Overview of Guadalupe Mtns. geology, and Basin & Range tectonics; introduction to deepwater sandstones, carbonate debrites and deepwater limestones, and Castile gypsum.
• Hotel: Best Western Stevens Inn, Carlsbad, NM (4 nights)

Day 3. Guadalupe Pass
• Brushy and Cherry Canyon confined channels, overbank deposits, and draping organic-rich shaley siltstones – Picnic Area, Salt Flat Bench, and Guadalupe Canyon

Day 4. Western Escarpment traverse
• Carbonate bank margin to basin facies, basin margin unconformities, deepwater carbonate debrites and turbidites, and deepwater sandstone onlap and stacked confined channel deposits.

Day 5. Sitting Bull Falls-Last Chance Canyon – San Andres/Grayburg
• mixed carbonate/shallow clastic prograding system, and sequence architecture. Mouth of Last Chance Canyon – Grayburg Formation wedge containing tidal carbonates and siliciclastics.


Will return to El Paso for flights 4:00 PM and after
Workshop Information

Logistics: Overnights in hotels, field trip with van

Physical demand: moderate.

Hikes will range from roadside stops, short traverses of less than ½ mile, to 2-3 mile roundtrip hikes over the span of a day. Off-road hikes are on well-maintained Park Service or National Forest trails and encompass relief of 100-600 feet. Weather conditions will be cool to warm, and generally dry.

Pricing: Price for the workshop is per participant for the entire course

Included:

• Hotel for 4 nights with breakfast in Carlsbad, NM
• Last night dinner in Carlsbad, NM
• Lunches for five days
• Transportation El Paso, TX – Carlsbad, NM – El Paso, TX
• Manuals and maps

Not included:

• Transportation to and from El Paso, TX
• Hotel for nights before or after the course. We can help you find accommodation for those nights if requested.
• Dinners except last night dinner in Carlsbad, NM