SANTA RITA #1 CENTENNIAL CELEBRATION

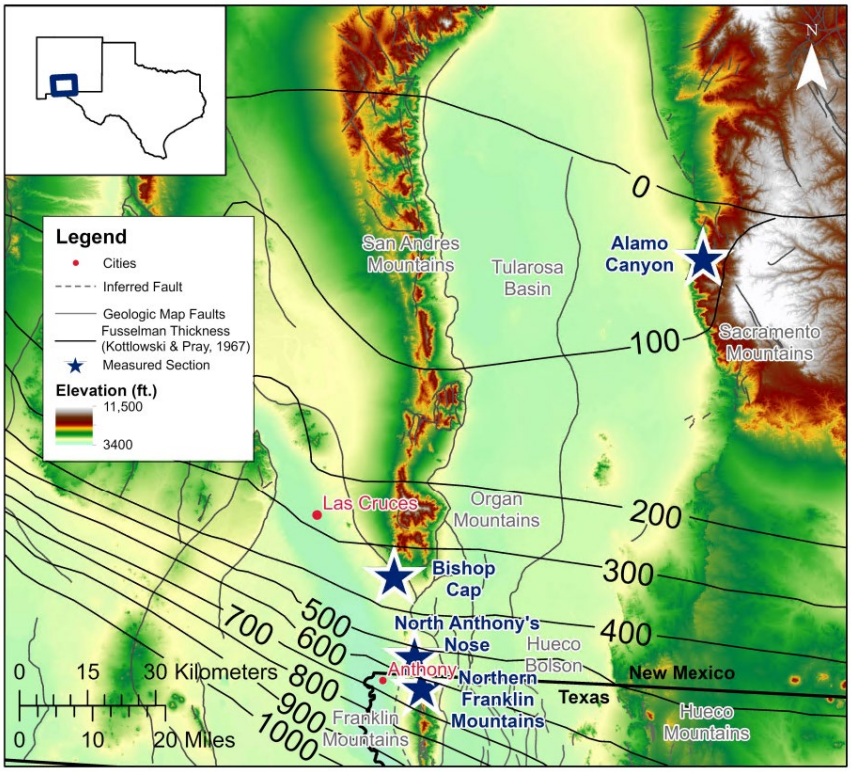
100 years of oil and gas exploration in the Permian Basin

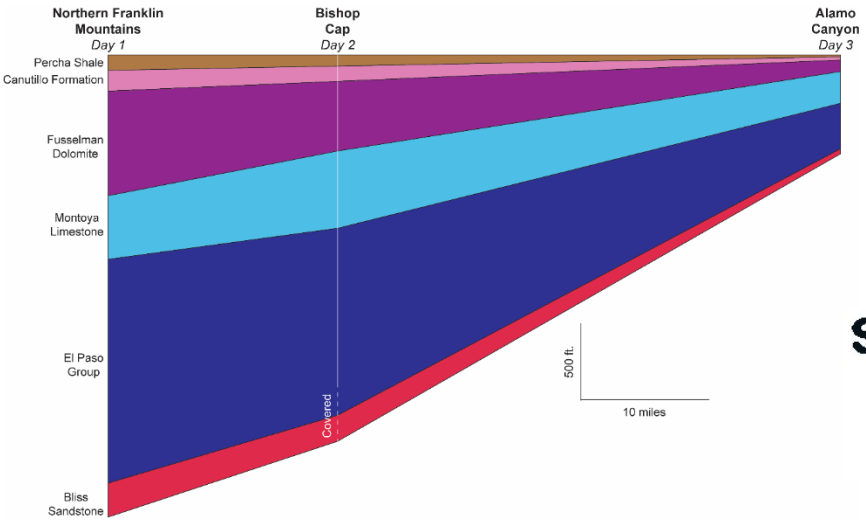
Announcing the Field Trip for WTGS's 2023 Fall Symposium

Old Rocks, New Ways: The Lower Paleozoic of Far West Texas and Southeast New Mexico

Andy Roark, Leader and WTGS Field Trip Chair

Depart: Thursday afternoon, September 21 (immediately after the Symposium)
Return: Sunday evening, September 24
Cost to participants: $950





- View outcrops of the Ellenburger (El Paso Group), Montoya, Fusselman, and Wristen Group reservoirs!
- Walk a stratigraphic section spanning nearly 100 myr of geologic time!
- Trace 2nd and 3rd order sequence boundaries laterally for nearly 80 miles along a proximal-to-distal transect!
- See analogs for induced seismicity in deep saltwater disposal zones!
- Explore crystal-laden fluorite mining excavations and stand inside a fault!
- Measure cross-cutting natural fracture systems in 3 dimensions!
- Follow regional changes in facies and redox conditions in the Percha Shale (Woodford Equivalent)!
- Study newly-collected outcrop well logs (gamma ray, mechanical stratigraphy, microscopy)!

Trip generously sponsored by Suttles Logging, Inc.

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Trip Information

This year's field trip will visit extraordinary exposures of the Ordovician, Silurian, and Devonian which outcrop in nearly identical facies and thicknesses to their equivalents in the Permian Basin subsurface. These rocks are perfect analogs for prolific oil, gas, saltwater disposal, and unconventional reservoirs in the most-productive basin in North America. Over 3 days in the field, this trip will traverse a ~75 mile distal-to-proximal section through these strata. We follow stratigraphically significant bounding surfaces and observe facies changes and thinning due to truncation and post depositional erosion. Understanding these features helps us more-reliably map and predict hydrocarbon and water/CO_2 disposal reservoirs.

Although we will see all formations in the Lower Paleozoic interval, plus underlying Precambrian Basement and overlying Mississippian/Pennsylvanian Limestone, the trip will focus especially on the Upper Ordovician/Siluro-Devonian Fusselman Formation (which includes both the Fusselman Formation and the Wristen Group of the subsurface), the Lower Ordovician Montoya Group, and the Devonian Percha Shale. The field trip leader has spent several months in this area measuring sections and collecting spectral gamma ray, rebound hammer, and microscopy data from this interval. These data establish a basis for extending the outcrop-based high-resolution stratigraphic framework in the subsurface using widely available wireline log and mudlog data.

The Bishop Cap locality allows us to study the region's tectonic history. Abandoned fluorite mining excavations dissect seismic-scale faults that cut the formations of interest in multiple orientations. We can literally stand inside these faults and touch their surfaces and associated gouge zones! This geometry allows us to observe cross-cutting natural fracture networks in 3D and definitively assign relative age relationships. Hundreds of fracture orientation/aperture measurements reveal similar fracture sets to those observed in Permian Basin subsurface image logs. Relative ages from cross-cutting relationships align with expectations for absolute ages of tectonic events in the area. This area is a unique analog for features associated with water disposal-induced seismicity. Plus, we get to see multicolored fluorite crystals!

A smaller but significant part of the trip is the Devonian Percha Shale. The shale is the immediate seal rock above Ellenburger/Fusselman/Montoya/Wristen reservoirs and has recently become a reservoir in its own right through unconventional development in the southwest Permian Basin. Within the area, we can see exposures of the Percha ranging from distal, clastic-dominated anoxic settings to more-proximal dysoxic and oxic settings with carbonate and coarse-grained clastic influence. This system is an analog for subsurface source rock reservoirs.

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Thursday, September 21	Depart Midland ~3 pm, stopping for dinner in El Paso and arriving by evening at our hotel in Las Cruces
Friday, September 22	Morning: ~5 mile hike in the northern Franklins exposing the entire stratigraphic section and cavernous karst porosity, dysoxic carbonate Percha Afternoon: Steep walk up Anthony's Nose for detailed look at the Fusselman/Montoya
Saturday, September 23	Explore Bishop Cap faults, fracture systems, fluorite, and enjoy a geosteering exercise in an anoxic black shale Percha exposure
Sunday, September 24	Truncated stratigraphic section at Alamo Canyon, proximal oxic Percha. Drive home over the western escarpment of the Sacramento Mountains through beautiful Cloudcroft.

ROCK PHOTOS!

These pictures were generously shared by previous attendees