LOS ANGELES BASIN GEOLOGICAL SOCIETY

April 2023 Meeting Announcement

NEW PLACE, NEW TIME: Double-Header talks at CSU, Long Beach!

Influence of Tectonics, Burial History, and Sediment Composition on the Temperature and Depth of Diagenetic Transition from Opal-A to Opal-CT in the Subsurface San Joaquin Basin – Kenton Crabtree, CSULB

Formational-Scale Differences in Styles of Deformation and Implications for Petroleum Migration and the Structural Evolution of the Pismo Basin – Justin Arakaki, CSULB

Thursday, April 27th, 12 Noon Lunch, start 1st Talk at 12:30 PM, CSULB Dept. of Geological Sciences, Room HSCI-384, free parking is available, see below

Kenton Crabtree's Abstract & Bio

Previous studies of diagenetic changes in siliceous mudstones – from opal-A to opal-CT to quartz silica phases – were either performed in strata that were one-directionally buried to maximum depth or were uplifted completely to the surface. Together, these studies found large, overlapping temperature windows for phase changes that make it difficult to predict the depth of the diagenetic transition zones. However, many subsurface occurrences of bio-siliceous rocks with different tectonic and burial histories have experienced more complex histories of burial and uplift and have narrower temperature/depth transition zones. In the Belridge field, San Joaquin Basin, the opal-A to opal-CT phase change can occur as much as 2000' (610m) shallower than what would be predicted from previous studies (c.f. Keller and Isaacs, 1985) with a simple burial history and a constant heat flow. One-dimensional models of the burial, uplift and erosional histories, and paleo- and present-day heat flows in five wells from three structural positions on the Belridge anticline are utilized to understand the thermal history of these rocks and their paleo-depths, temperatures, thicknesses, and character of the opal-A to opal-CT diagenetic transition zones. These wells contain opal-A to opal-CT transitions zones with tops from 1350' to 2000' in true vertical depth and that range from 80' to 170' in true vertical thickness. To characterize the diagenetic processes that occurred within phase change windows, we use SEM and XRD methods to identify opal-A, opal-A' and opal-CT, d-spacing, and related primary and authigenic minerals, as well as processes including fragmentation, dissolution, precipitation, and replacement.

Kenton Crabtree is currently working as a Geologist at BRY Corporation (formerly Berry Petroleum Corp.) where he has worked for five years as both a geology technician and as an analyst after receiving my BSc in

Geology from the University of Nebraska, Lincoln in 2017. In 2019, Kenton began a master's program in geology with California State University, Long Beach, focused on the study of silica diagenesis (summer 2023 completion). Outside of work Kenton enjoys a stout pickleball contest and board games with family.

Justin Arakaki's Abstract & Bio

The Pismo-Huasna Basin is a petroliferous Neogene basin located in a Pliocene-Quaternary fold and thrust belt between the Coast Ranges and the Western Transverse Ranges, central California. The Obispo, Monterey, and Pismo formations deformed with different styles and intensities due to distinct lithologies and mechanical layer thicknesses which had profound implications on the role of deformation in the petroleum system. Structures in the Obispo and Monterey Formations formed early in basin history and were subsequently tilted into favorable orientations to remain active as petroleum source rocks during later stress regimes. Obispo Volcanics and the Edna Member of the Pismo Fm. contain abundant shear bands which exhibit fault sealing characteristics in the Arroyo Grande oil field. Edna shear bands formed during the current compressive stress regime, after hydrocarbon charging, and subparallel to bedding. Edna shear band kinematics are influenced by the regional tectonic stress field and local stress fields. Quantitative photomicrograph analysis of the grain sizes within the shear band and sandstone host rock finds up to a 33.2% decrease in average grain size and a reduction in porosity from 32-22% to 17-4%, due to cataclasis. Scanning Electron Microscope imagery shows that sand grains within the bands are sheared, fractured, spalled, and locally coated in smectite clay. In contrast to the sealing shear bands in the bituminous Edna Member of the Pismo Formation, faults and fractures in the underlying Monterey Formation and tar sand injectites in the Miguelito Member of the Pismo Formation provide conduits for migration of hydrocarbons through and out of otherwise low-permeability lithologies.

Justin Arakaki is currently working as a GeoAnalyst at BRY Corporation in conventional and unconventional assets in the Uinta Basin, Utah. He received his BSc in Geological Sciences from the California State University, Long Beach and has recently completed his MSc in Geological Sciences at the same university. He assisted Spring and Summer field classes during the COVID-19 pandemic and was designated as Graduate Student of the Semester in 2021. His thesis work involved exploring the Pismo Basin to study outcrop-scale deformation. His interests outside of work and academics include camping, hiking, fishing, and roasting specialty coffee.

Luncheon Prices, cash or check

Lunch and Talk (pre-registered)	$25.00
Retired:	$20.00
Student:	$10.00
Walk-ins:	$35.00

Free Parking/ Logistics

Parking Shuttle Vans will be available courtesy of CSULB Dept. of Geological Sciences: Bandshell on Federation Drive, Recreation Park, Long Beach, pick up and shuttle times 11:30-11:45 (See Map); Lat-Long: 33°46'35.9"N 118°08'09.7"W, copy-and-paste into your navigation map for free parking or park on your own and head to Geological Sciences Room HSCI-384.

Reservations are required by noon, Monday, April 24th at labgs.org/meeting_info.html. Alternatively, contact LABGS Secretary Joseph Landeros at (626) 497-1710 or landerosjd@gmail.com.

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"The only thing new in the world is the history you do not know."

- *Harry S. Truman (1884 – 1972), 33rd President of the United States of America*

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