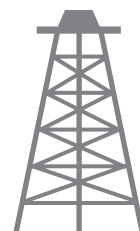




Pacific Petroleum Geology



NEWSLETTER

Pacific Section • American Association of Petroleum Geologists

July-August 2023

Geology Hikes in the Pacific Section

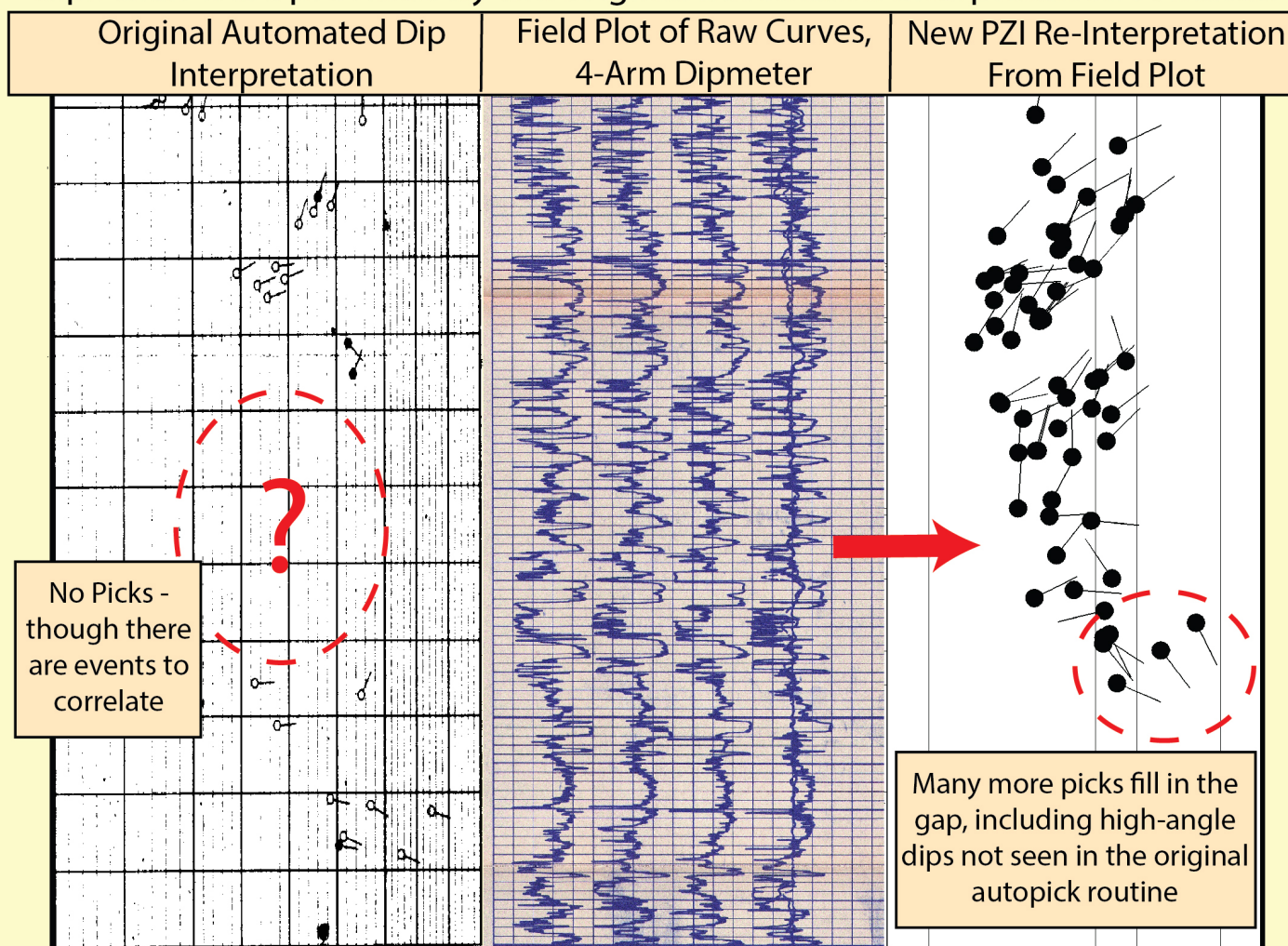


Towsley Canyon, Ventura Basin
Santa Susana Mountains, California
see page 14

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Editor's Comments: I took the photograph on this month's newsletter of the base of the Towsley Formation several years ago while planning a field trip for Oxy to examine the deep-water stratigraphy of the eastern Ventura Basin. The hike along the Don Mulally Trail is a wonderful example of a geology hike that would be of interest to geologists as well as friends and family. If you have a favorite hike with interesting outcrops, please see page 14 and contact me at editor@psaapg.org.

Submit an Article to the Pacific Petroleum Newsletter!

- CONTACT THE EDITOR at editor@PSAAPG.org
- Images (graphics, photos, and scans) must be at least 300 dpi resolution. Text should be at least 600 dpi.
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Dear fellow PS-AAPG members,

I am excited to take the reins from Plaman Ganev as the 2023-2024 PS-AAPG president. I look forward to continuing to expand PS-AAPG's activity in the realms of alternative energy and carbon storage with help and support from you, the members. This is not to replace what we do with the petroleum industry but to capitalize on the geologic synergies of the industries.

It is evident in the news and through the national AAPG's offerings the energy transition is underway, and we need to be a part of it. PS-AAPG's initial step toward getting involved came through supporting the second annual Carbon Management Technical Symposium discussed in last month's newsletter. We intend to continue this support in the coming years. We would also like to hear from you regarding ways to increase our involvement in the alternative energy space, carbon storage, and other professional interests you may have.



With the success of the Coast Geological Society's Monterey Formation Research Conference in November 2022 and the Alaska Technical Conference in April 2023, the executive committee is looking to move toward smaller conferences teaming up with the local affiliate societies. These smaller conferences or symposiums would allow for flexibility in the format of technical talks, networking, and optional field trips while enabling members to build their network outside of their local society. We are in the process of reaching out to the affiliated societies and are open to suggestions and ideas from our members.

We are also exploring ways to provide educational opportunities through access to industry courses, webinars, and member-led field trips. For example, in the spring of 2023, PS-AAPG circulated the SCA Applied Subsurface Geological Mapping course being held in Bakersfield, California and offered to supplement part of the cost to attend. We also held a field trip to the Ridge Basin in California led by Dan Schwartz. We intend to continue providing these types of opportunities into the future. Please reach out if you would like to lead a field trip or course, or if your local society is planning an event we can assist with.

Additionally, if you have a suggestion, idea or would like to help with an event or field trip, please contact the executive committee through secretary@psaapg.org.

In closing, I want to alert the members to an upcoming request for you to vote on changes to the by-laws. The by-laws need a few minor updates to account for the changing times. Please watch out for this in the coming months.

Again, I am looking forward to what the 2023-2024 PS-AAPG year brings and working with the executive committee to incorporate the energy transition into the opportunities we bring to members like you.

Regards.

Kristy Whitaker
President

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Pacific Section AAPG Field Trip

Ridge Basin: Lessons for Carbon Capture

Dr. Daniel Schwartz

***Editor's Note:** The Pacific Section AAPG field trip was held on May 12, 2023 and led by Dr. Daniel Schwartz. The purpose of the trip was to examine the outcropping sandstone and shale intervals as analogs for subsurface units that may be used for storing and trapping Carbon.*

When considering carbon sequestration in saline aquifers, subsurface elements include: laterally continuous reservoirs with moderate to high porosity and permeability overlain by laterally continuous thick containment layers with very low porosity and permeability; and an absence of potential leak points (faults and fractures or wellbores). Broadly distributed stratigraphic units in homoclinal settings are targeted in favor of sparsely deposited porous strata in complex structural settings (fault blocks or fold and thrust belts). In the subsurface, reservoir-seal pairs are characterized with well logs and cores, and reflection seismic analysis. Outcrop analogs for a reservoir and containment complex can provide critical information on lateral continuity and internal reservoir character that is below the resolution of the seismic and well-to-well e-log correlation.

The Mio-Pliocene strata of the Ridge Basin is a good analog for the Oligo-Miocene strata of the eastern San Joaquin Basin. West-southwestward prograding units of the Mio-Pliocene Reef Ridge and Peace Valley Formations comprise a series of well exposed and conveniently accessible vertically stacked marine to non-marine upward coarsening and thickening stratigraphic sequences that are similar to the Oligo-Miocene Vedder to Fruitvale succession in the San Joaquin Basin. The prograding successions in the San Joaquin and the Ridge Basin were shed westward from granitic uplifts into forearc basins. They occupy the east flanks of the basins, overlying granite basement. In the Ridge Basin, like in the San Joaquin, the shoaling upward units are not extensively folded or complexly faulted so the litho-stratigraphic members can be



Field trip attendees inspecting the laterally extensive delta plain sandstone of the Marple Canyon Sandstone Member along Templin Highway. Photo courtesy of Tom Hampton.

When describing reservoir and containment layers for EPA Class VI permitting, the evaluation of vertical and lateral characteristics of the potential injection and confinement zone is to be assessed considering vertical and lateral continuity. This assessment forms the foundation for the calculation of the potential storage capacity based on reservoir thickness, lateral extent, porosity, and fluid saturation. These parameters provide the basis for static and dynamic quantitative reservoir modeling. The static models are used to determine contiguous net rock volume, pressure and temperature while the dynamic models are used to determine critical fluid injectivity, and reservoir pressure and saturation variations with time to predict the volume, rate, and duration of injection as well as the number and placement of injection and observation wells. The relationships between and the characteristics of the reservoir and containment layers within the reservoir models are used to determine containment pressure, sequestration duration, and the risk of seal failure or fluid movement.

The Ridge Basin stratigraphic sequence studied during the field trip consisted of five shale-to-sand vertically shoaling doublets: the Castaic Formation to Marple Canyon Sandstone Member; Paradise Ranch Shale Member to Fisher Spring Sandstone Member; the Osito Canyon Shale Member to the Frenchman Flat Sandstone Member; and the Alamos Canyon-Posey Canyon Shale Members overlain by the Apple Canyon Member. In this stratigraphic succession, the Marble Canyon is the reservoir unit while the Paradise Ranch is the containment layer. Likewise, the Osito Canyon seals the Fisher Spring, the Cereza Peak seals the Frenchman Flat, the Posey Canyon seals the Piru Gorge. The Apple Canyon Sandstone Member is overlain by the sandy Hungry Valley Formation. There is no containment for the Apple Canyon.



Fisher Springs Shale Member of the Peace Valley Formation on Templin Highway, an example of laterally continuous sealing facies that overlies the Marple Canyon Sandstone Member. Photo courtesy of Tom Hampton.

When viewing the outcrops, attention was given to lateral lithofacies changes which displayed extensive thickening and coarsening upward sandstone layers comprised of shallow marine shelf and deltaic deposits overlain by more channelized and laterally complex delta plain deposits. The delta plain units are overlain by fluvial deposits with lateral accretion surfaces and fining upward sand packages indicative of meandering streams overlain by channelized units that resemble braided stream deposits. At the intersection of Ridge Route and Templin Highway this succession from slope and outer shelf shales to extensive sandstones covers several kilometers of road cut with a significant three-dimensional aspect. Review of the Marple Canyon provides an analog for the Vedder to Pyramid Hill Formation succession in

the eastern San Joaquin. The 1000 meter stratigraphic succession from Osito Canyon shale to Frenchman Flat sandstone, and Cereza Peak shale and to Piru Gorge sandstone along Golden State Highway between Templin Highway and the base of Pyramid Dam is an excellent analog for the 700 meter succession from the Vedder-Pyramid Hill sandstone to the Freeman Jewett shale, and the Olcese sand, to Round Mountain shale in the San Joaquin north of Bakersfield, only accessible via wellbore or imaged with seismic.

The facies distributions of the Mio-Pliocene in the Ridge Basin from the center of the basin (along Interstate Highway 5 between Golden State Highway and the Old Ridge Route) are indicative of suitable sequestration reservoirs and seals. To the east, toward the granite source of the sediments at Liebre Mountain the volume of shale diminishes. As shales pinch out into sandstones, the coverage of containment layers is eliminated. For sequestration, the lack of containment eliminates the application. Likewise to the west of the basin axis, the Violin Breccia which was shed eastward into the basin across the San Gabriel Fault eliminates Peace Valley Formation containment strata and truncates Ridge Route Formation sandstones.



The Piru Gorge Sandstone Member as seen along Golden State Highway, just south of Pyramid Lake dam. Photo courtesy of Jon

The Ridge Basin and the San Joaquin Basin are similar with sandstones onlapping onto granite basement toward the east. A concern with carbon sequestration is the potential for pore pressure-induced seismicity. Injecting supercritical carbon dioxide into a porous reservoir will increase pore pressure. If the injection increases pore pressure at the contact between an injection zone (sandstone) and the lateral seal (granite) it could cause shear of the basement or reactivation of faults that emanate from the basement. In the Ridge Basin there is a contact between the Ridge Route Formation and the granite basement along the Libre Fault Zone. The contact occurs on Old Ridge Route near Liebre Mountain. This location is over six kilometres from the eastern-most extent of Peace Valley Formation shale, and would not be considered a suitable target for injection.

The Ridge Basin is an excellent analog for carbon sequestration reservoir-seal analysis to aid in EPA Class VI permit preparation. The excellent exposure of laterally extensive stratigraphic elements can aid in building reservoir models. The areal extent of the units also enables evaluation of potential well placement scenarios.



On Pyramid Lake Road (formerly Golden State Highway, north of Pyramid Lake), Dan discusses another regional sealing interval, the Alamos Canyon Shale Member, with several field trip attendees. Photo courtesy of Tom Hampton.



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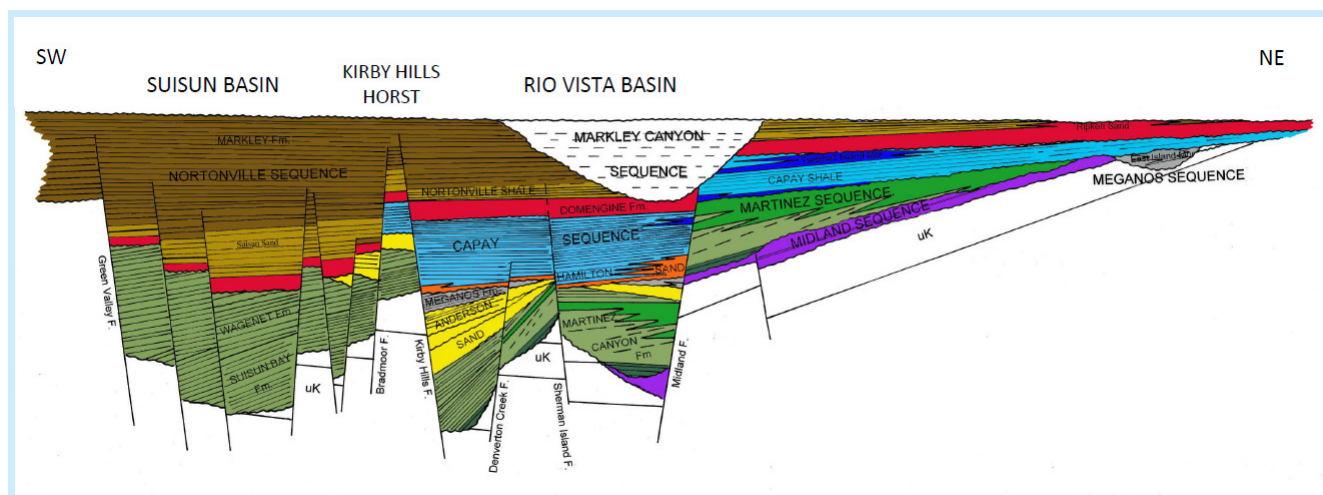


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Pacific Section AAPG Digital Publication CD 7

Advances in the Geology of the Sacramento and Northern San Joaquin Basins

since PSAAPG Miscellaneous Publications 41 and 43



This volume is an important contribution to the geology of the Great Valley and captures much of Vic Cherven's work during his 50 years of research in the valley. His paper on the Northern Diablo Range incorporates a great variety of surface and subsurface data, some of which were supplied by Al Almgren, to identify and map a dozen submarine fans that were deposited during the last 35 million years of the Cretaceous Period. The paper on the early Tertiary sequence stratigraphy of the southern Sacramento Basin also makes extensive use of data supplied by Al and others, and is an exceptionally detailed and comprehensive analysis of the interplay between tectonics, sedimentation, and eustasy. A companion paper summarizes and clarifies the nomenclature used for these lower Tertiary strata and describes previously unrecognized members of several formations. A third paper on these lower Tertiary rocks illustrates them in a highly detailed structural cross section that extends more than 30 miles across the basin and includes 50 closely-spaced gas wells.

At the other end of the scale are two papers that look in detail at individual formations in local areas. One paper describes the stratigraphy and alluvial-fan facies of the Valley Springs Formation in its type area, and a second paper, co-authored with Pete Fischer and Scott Hector, is a detailed study of the facies, geometry, and gas production from two lobes of the Winters submarine fan in the Walnut Grove gas field.

Included in the 2023 version of the CD is a dedication to Al Almgren, the renowned California micropaleontologist and stratigrapher who died in 2020 at the age of 100. Al and Vic Cherven were friends for almost 40 years, and Al provided paleo data for Vic's dissertation. Over the years Vic and Al had dozens of discussions about the geology of the Central Valley, and Al's influence on Vic is demonstrated throughout the articles in this volume. Scott and Vic intended to dedicate a volume as early as 2011, and with this second printing of Volume CD 7 we are able to include Mark Filewicz's eloquent dedication to Al.

Advances in the Geology of the Sacramento and Northern San Joaquin Basins

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NO MORE SPA TREATMENTS!

Excerpts From the Last SPA Newsletter

OK, fellow members of the Sacramento Petroleum Association, after a meeting scheduled for later this year you will no longer be able to get your SPA TREATMENTS!

In other words, you're once a month "fix" that allowed you to get together with other oil and gas industry fellows and fellas that made you feel so much better about yourselves is finished! At least as far as the tie to the Pacific Section of the American Association of Petroleum Geologists is concerned!

The presence of the oil and gas industry in the Sacramento Basin is diminishing. Many of the companies that used to come up with natural gas prospects ideas, shoot the 2D and 3D seismic to define the hair-brained ideas the geologists and geophysicists came up with, lease the lands that needed to be used for the drilling, raise the money with private investors to drill the well, get your permit from the DOG, DOGGR or CalGEM, and go drill your well- WELL, they are gone! (Oh, also you might have had to find out if you had any rare and endangered species at your drill site if the lands came under CEQA).

The SPA has had a few meetings recently (months ago) and the attendance at Club Pheasant was 25 or so for the next to last one and 12 or so for the last one. So, the officers of the SPA got together for lunch at the Club a few days before it closed (Yes, they are no longer in business as of the end of 2022!). At that meeting, we decided that it was time to end the existence of the SPA, at least as a part of the Pacific Section AAPG. Several of the officers said that we could still have speakers at meetings in a restaurant, perhaps as just a group of concerned citizens in need of the SPA type treatment. I mentioned then that we had people lined up to speak, who had contacted me and wanted to give talks, including Neil Delfino and Steve Testa.

I called the Club Pheasant in late 2022, knowing that they were going to shut down by years end. I asked if we could still have a meeting in the small meeting room in November or December, but the manager I talked to said that they could no longer have such meetings due to a lack of personnel. So, it was of interest to me that at our little executive luncheon I mistakenly walked into and looked around the big meeting room, and a man there setting up a projector asked me if I was there for the Rotary Club. I guess the manager meant to say that our group was too small to matter.

Anyway, my thanks to my cohorts who have put years and years into the success of the SPA:

Jerry Reedy, President

Derek Jones, Secretary

Pam Ceccarelli, Treasurer/Editor

Well, in order to finalize this chapter of our existence, I decided to go back and look at the ultimate reference of our basin: Volume 3 of the Oil and Gas fields Data Sheets! I then remembered that this publication was made around 1980. So, I went to look at the list of oil and gas wells on Well Finder, the map that CalGEM uses to show all the fields and wells in the State. I found some 26 new gas fields in the greater Sacramento Basin discovered since (roughly) 1980! I then created a spreadsheet of all of the production by year for the 28 fields. This list of fields and production roughly coincides with the advent of modern 3D seismic. I know that many Townships (that's 36 square miles of area, to those of you who don't know!) have been shot with 3D. I have had several adventures into a large 3D shot in the southern part of the basin, where the operator wanted to name the effort an acronym of "Sacramento". So, they came up with the name "Conestrama". You can look up a paper authored by May that talks about that particular 3D and shared a lot of it in the publication. I think this shoot alone covered about 250 square miles of area!

Anyway, the new fields for the most part were short lived and made only small amounts of natural gas. Some of them lasted for decades, but most last only a few years. The basin has made some 11 trillion cubic feet of natural gas, a lot of it coming from the greater Rio Vista group of fields (about ½ of the total, around 5 trillion!) and another large amount from the Greater Grimes (and Sutter Buttes) area (around 2 trillion!).

So, it was disappointing but not unexpected to see that all of the new fields discovered between 1980 and 2019 (the "3D" period of exploration) added only a miniscule amount to the basin total. The total natural gas production for these new fields through 2019 was 120 billion cubic feet. I remind you that the total for the basin is about 11 trillion cubic feet. So, the total gas produced from NEW DISCOVERIES (not additional gas found in new pools within existing, known fields found before 1980) is about 1% of the total. And, according to the fields listed by CalGEM on the WELL FINDER, the latest discovery I could find was Hood-Franklin in 2007. However, I added Oakdale field as well, which is a little bit south of the old District 6 area, but still well within the "Greater Sacramento Basin". Almost all the 26 fields are no longer producing. The largest ones found were Knight's Landing (18 Bcf) and Elkhorn Slough (14 Bcf).

So, there you have it. When I worked in the basin, I was proud that my efforts (if successful, and some of them were) helped bring the methane to the burner tip of the stove so that people could cook. But now, the basin is near the end, and the SPA is near the end. The basin has become what the SPA became to Club Pheasant. Too small to matter.



Scott Towers Hector
Sacramento Basin Exploration Geologist Emeritus

Geology Hike to Towsley Canyon Santa Clarita, California

Tony Reid

Pacific Section AAPG Editor-in-Chief

I have always found it fun to watch old western movies and TV shows and play 'name that outcrop'. Exterior scenes were shot throughout southern California in places like Chatworth and Alabama Hills. A show I watched recently had an outcropping of vertical beds of sandstone in a narrow canyon. The site looked familiar, and after a few more scenes, I realized they filmed in Towsley Canyon, located in the eastern Santa Susana Mountains near the city of Santa Clarita. It's an area Stuart Gordon and I led field trips for Oxy/CRC staff to view the deep-water stratigraphy of the eastern Ventura Basin.

Towsley Canyon is a great place for hiking as well as seeing some wonderful exposures of Miocene and Pliocene stratigraphy. The canyon is now in Ed Davis Park, which is one of many parks in LA and Ventura Counties managed by the Mountains Recreation and Conservation Authority (MRCA). The park is located just west of I-5 at the south edge of the city of Santa Clarita. To get to the park, take the Calgrove Blvd exit and turn west (Figure 1). The road bends to the south and becomes The Old Road. About 500 feet further south is the park entrance. Turn right into the park. It is a very popular hiking spot for the locals and many hikers park for free in the dirt lot just off the road. I usually head west on the park road about half a mile to the road's end, where there is paid parking in a paved lot. The location is near the park headquarters and restrooms, and is more secure than out near the highway.

The park contains exposures of the Saugus, Pico, Towsley Canyon and Sisquoc Formations that span ages from Pleistocene to late Miocene (Figure 2). The primary structure of the area is the tightly folded Pico Anticline which trends northwest-southeast. A few small pools of the Newhall Oil Field are present along the crest of the fold, including the Towsley Canyon Area. Steeply dipping cemented sandstone of the Towsley Canyon Formation forms a hogback, and the creek in Towsley Canyon has created a water gap (The Narrows on Figure 1) through which the trail will pass.

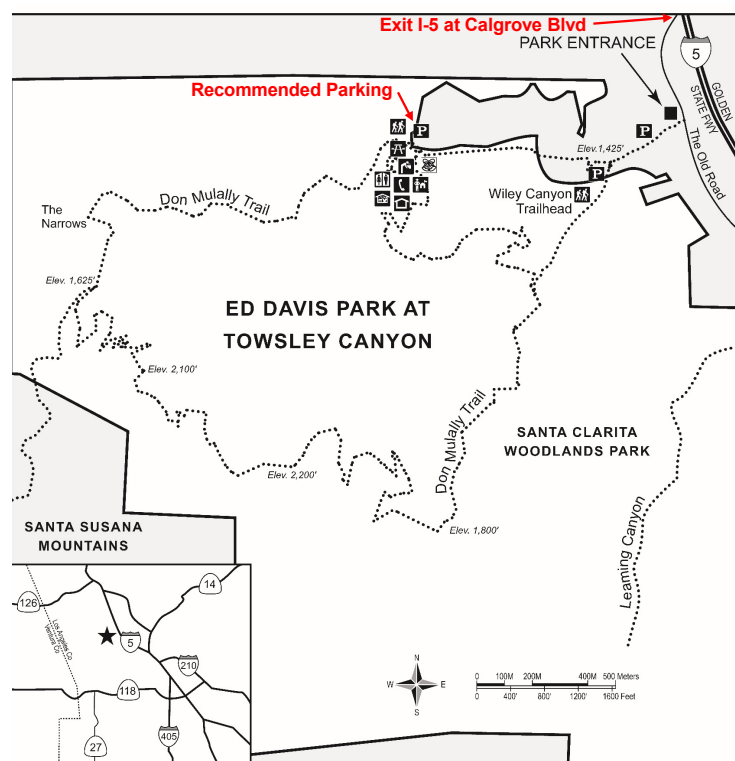


Figure 1. Location map of Ed Davis Park and the Don Mulally Trail. Modified from a map by the Mountains Recreation and Conservation Authority (MRCA).

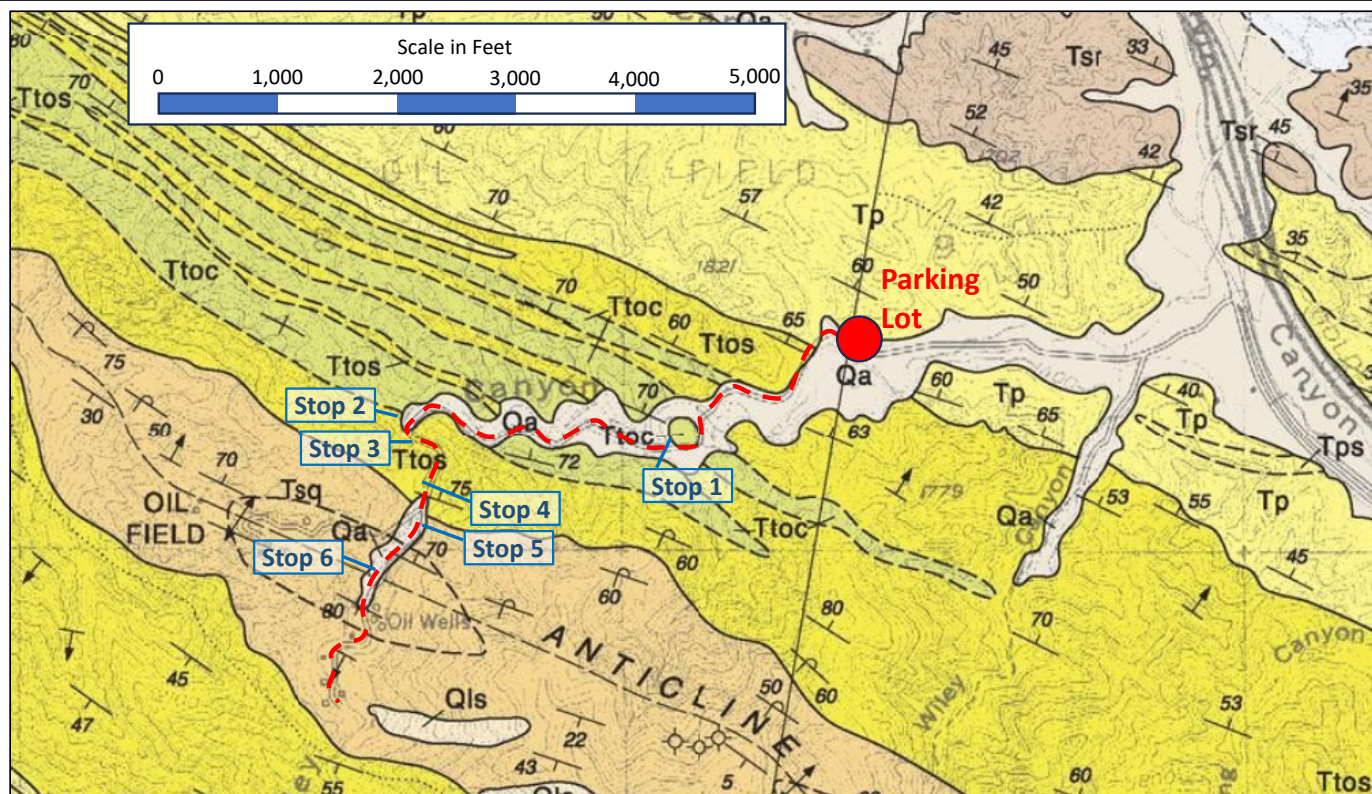


Figure 2. Geologic map of a portion of the Towsley Canyon area, from Dibblee, Ehrenspeck and Minch 2008, (Geologic map of the Oat Mountain and north $\frac{1}{2}$ Canoga Park Quadrangles, Dibblee Geology Center Map #DF-36). Geologic units include Sisquoc Shale (Tsq; upper Miocene), Towsley Formation (Tts, sandstone, and Ttoc, claystone and siltstone; lower Pliocene and possible uppermost Miocene), Pico Formation (Tp, sandstone; Pliocene) and Saugus Formation (Tsr; Pleistocene and Pliocene).

The park is hilly, but the main trail (Don Mulally Trail) is initially an easy walk as it follows the creek in Towsley Canyon west from the parking lot. The canyon is wooded, and the hills are covered in typical coastal chaparral. The Don Mulally Trail is a loop trail, and the total length is 5.2 miles, gaining more than 1,000 feet in elevation along the route. My discussion of the geology along the trail is just for the portion that passes through the water gap and to the crest of the Pico Anticline.

After a short distance you will start to see sandstone outcrops of the Towsley Canyon Formation (Figure 2). The top portion of the formation contains interbedded sandstone, claystone and siltstone. After about 2,000 feet along the trail, a resistant knob of sandstone crops out of the canyon alluvium (Stop 1 on the map; Figure 3). The outcrop contains sandstone with flame structures in clayey intervals between beds. Flame structures are one of the diagnostic sedimentary features of turbidity current-driven sediments.



Figure 3. Towsley Formation outcrop containing flame structures at the top of a clayey interval located between two sandstone beds.

After hiking another 2,500 feet, the trail turns southwest and enters The Narrows water gap, where several characteristic features of submarine fan deposits are present. The first outcrops seen are spectacular outcrops of interbedded sandstone and conglomerate, present in steeply dipping beds (Stop 2). An access road for the oil field once passes through here but has eroded away. The conglomerate contains a chaotic mixture of gravel and cobbles in finer grained matrix (Figures 4), with the hard, cemented beds defining the prominent ridgeline of the hogback (Figure 5). The texture of the conglomerate beds is characteristic of debris flows. Many environments of deposition have debris flows, including proximal submarine fans.



Figure 4. Poorly sorted pebbly conglomerate interbedded with coarse sandstone near the entrance to The Narrows.

In another 200 feet, the details of the relationship between conglomerate and sandstone beds are apparent (Stop 3; Figure 6). Poorly sorted pebbly conglomerate (a debris flow) is in erosional contact with laminated coarse-grained sandstone. Also at this site, flame structures in clayey layers between sandstone beds are present (Figure 7). The presence of debris flows, coarse-grained sandstone and clayey beds with flame structures are indicative of a high energy location on a submarine fan system, possibly on a slope setting.



Figure 5. Hard cemented conglomerate and sandstone for the resistant hogback ridge.

Continuing along the trail through The Narrows another 400 feet, the stratigraphy is more diverse, with beds of laminated claystone and siltstone and as well as sandstone and conglomerate (Stop 4; Figure 8). This location is near the base of the Towsley submarine fan, and other characteristic sedimentary features may be present, including rip-ups and graded beds. In map view (Figure 2), Towsley sandstone and conglomerate outcrops are more continuous to the southwest of Towsley Canyon, whereas claystone and siltstone are more dominate to the northwest. Towsley Canyon appears to be located at the western edge of a large Pliocene to Miocene-aged submarine fan.



Figure 6. Note the scour at the base of a poorly sorted pebbly conglomerate. The conglomerate was likely deposited by a debris flow.



Figure 7. Close-up of a thin clayey interval located between two sandstone beds. Note the flame structures.

Over the next 300 feet, the abrupt base of the Towsley Canyon Formation is reached (cover photo this this newsletter), and the underlying Sisquoc Shale is mostly covered by soil and vegetation. A few outcrops are present, including at Stop 5 (Figure 9). The Sisquoc consists of laminated fracture siliceous shale. Elsewhere in the Venture Basin, this interval is part of the Modelo Formation.

Six hundred feet further along the trail is the axis of the Pico Anticline (Stop 6). Be careful where you step because there are several oil seeps here (Figure 10). This is the site of the Towsley Canyon Area of the Newhall Oil Field. According to DOG engineer John Zulberti (Summary of Operations, vol. 52, no. 2, 1966), Indians collected oil here by soaking blankets in the seeps. Later, pits were dug, and the pooling oil was placed in wooden barrels and transported by burros to San Pedro. The first wells were drilled before 1890, but production was never significant, and cumulative production was probably less than 80,000 barrels. Today, the area is abandoned, and only scattered oilfield debris remains.



Figure 8. Near the base of the Towsley Canyon Formation, an interesting relationship between a sandstone bed that truncates and appears to have lifted the edge of an underlying claystone bed.



Figure 9. Outcrop of the Sisquoc Shale, showing laminated and fractured siliceous shale.

Zulberti, in his report, notes the large size of the Pico Anticline and attributes the lack of a significant petroleum accumulation to the fractured, ineffective sealing properties of the Sisquoc siliceous shale. Alternatively, Stuart Gordon, who studied the subsurface geology in the Ventura Basin extensively, contends that Pico Anticline is in a petroleum migration shadow caused by other nearby structures.

From this point, there are two routes back to the parking lot: return on the trail back through Towsley Canyon, or continue uphill to the east on the Don Mulally Trail and complete the 5.2 mile loop. Be aware that the trail in places is steep and exposed to the sun, but if it is a nice day, the hike should be enjoyable.



Figure 10. Active oil seep at the axis of the Pico Anticline. Oil is passing upward through the fractured Sisquoc siliceous shale to the surface.

This hike is recommended for winter and spring seasons, or early in the morning in the summer. Avoid summer afternoons as Santa Clarita has frequent days over 100 degrees. Also, avoid days with Santa Ana winds or 'red flag' conditions.

Submit your geology hike to the PPG Newsletter!

What's your favorite geology hike? A geology hike is an informal hike in a scenic area where you can see some interesting geology. It could be a hike you do with family or friends, or with other geologists, or with your dog. It's not a field trip, although the site might have been included in a formal field trip in the past.

Given the abundance of public lands and outcrops across the Pacific Section, there are almost no limits to the number of geology hikes in our region. If you have a favorite hike, please consider submitting a description of the route for publication in the Pacific Petroleum Geologist Newsletter. I plan on publishing at least one hike per edition.

Here are some guidelines:

1. Hikes should be on public lands and on established trails.
2. Hikes should be safe and on good trails, with no rock climbing, brush bashing, wave dodging, or bear wrestling required.
3. Hikes should be of geologic interest, but fun for family and friends
4. Your discussion should include directions to the hike's starting point, a description of the trail and of the geology along the walking route. Please include a geologic map and photos. Also note any hazards, such as parking security, critter cautions, or weather constraints.

To submit your geology hike, or for more information, please contact Tony Reid at editor@psaapg.org.



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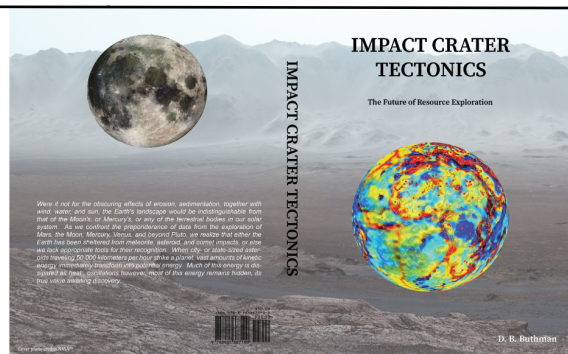
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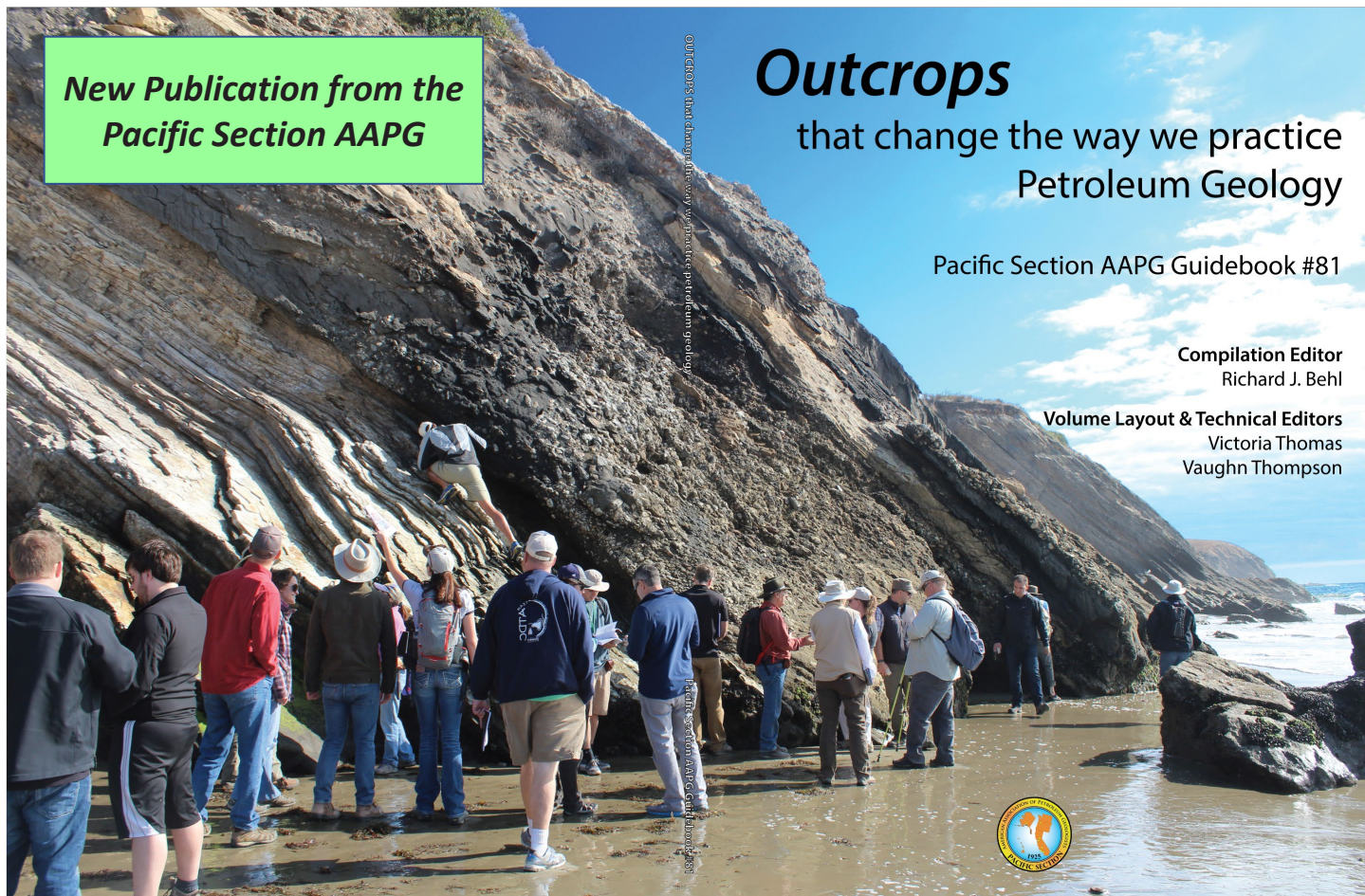
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Member Society News

Alaska Geological Society www.alaskageology.org

P. O. Box 101288
Anchorage, AK 99510

Monthly meetings are usually held on the last Thursday of the month. Most meetings are hybrids, using Google Meet, and in person at the BP Energy Center. Doors open 11:00 am.

Next Meeting: Thursday, September 14; talk 11:30 am–12:30 pm

Speaker: Jake Covault, Quantitative Clastics Laboratory, Bureau of Economic Geology, Austin, TX

Topic: Shelf-Margin Reservoir Analogs for the Brookian Sequence, Alaska

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Coast Geological Society <http://www.psaapg.info/cgs/index.html>

P. O. Box 3055
Ventura, CA 93006

In-person meetings are the third Tuesday of the month at the Poinsettia Pavilion, 3451 Foothill Rd, Ventura, CA 93003

Please visit the CGS website for information on upcoming meetings.

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Webmaster/Tech Support:	Eric Heaton	CoastGeologicalWebmaster@gmail.com

Los Angeles Basin Geological Society www.labgs.org

Luncheon meetings have a new venue: Signal Hill Petroleum located at 2633 Cherry Ave, Signal Hill, CA (562-595-6440, Brady Barto, ext. 5233). Meetings are on the fourth Thursday of the month, from 11:30 am to 1 pm.

Check the website for information on the next talk.

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(Continued on next page)

Northern California Geological Society
www.ncgeolsoc.org

 803 Orion #2
 Hercules, CA 94547-1938

Meetings are at the Orinda Masonic Hall and online using Zoom on the fourth Wednesday of the month. Talks are 7 pm to 8:30 pm (social half-hour at 6:30 pm)

Next meeting: Wednesday September 27, 2023

Speaker: Dr. Don Lowe, Stanford University

Topic: The Early Archean Earth: No Country for Old Men

October 25, 2023

Speaker: Linda Dismore Smith, Chevron (Ret)

Topic: Climate Change: Evidence and Possible Tipping Points

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Northwest Energy Association

 P. O. Box 6679
 Portland, OR 97228

*Contact: Jim Jackson or
 John Armentrout*

No activities are planned at this time. There is no active website.

Sacramento Petroleum Association

The Sacramento Petroleum Association has shut down. The last meeting was on April 19, 2023.

San Joaquin Geological Society
www.sanjoaquingeologicalsociety.org

 P. O. Box 1056
 Bakersfield, CA 93302

DINNER MEETINGS:

SJGS meetings are on the second Tuesday of the month at the American Legion Hall, 2020 H St Bakersfield, CA.

The annual SJGS Fall Fiesta will be on Friday, September 22 at the residence of Dan Schwartz and Cynthia Huggins. See the flyer in this newsletter for more information, including how to preregister for the event.

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