

CGS Monthly Meeting Tuesday September 16, 2008

Using Active Tectonics to Extend the Amazing Santa Barbara Basin Record a Million Years Further Back in Time

Presented by:
Dr. Richard Behl,
California State University Long Beach

Co-authors: Craig Nicholson, James Kennett, and Christopher Sorlien
(all UC Santa Barbara)

Abstract: Ocean Drilling Program (ODP) Site 893, located in Santa Barbara Basin, has provided one of the highest-resolution continuous climate records of the late Quaternary being studied from the world's oceans. Isotopic, microfossil and sedimentologic analyses of these sediments reveal a remarkable correlation of climate change between Santa Barbara Basin and the high-resolution Greenland ice cores since 70 ka, and extreme climate variability in coastal California. The Santa Barbara record indicates that the atmosphere and oceans respond both rapidly and dynamically to short-term climatic oscillations. ODP Site 893 also provides the highest resolution marine record in the world to date for the penultimate deglaciation and has contributed to new hypotheses about greenhouse amplification of climate change. The paleoclimate records from Santa Barbara Basin are so detailed because the basin's unique geologic, tectonic, and oceanographic setting has resulted in a relatively small well-defined bathymetric basin that has proven highly sensitive to changes in global climate and ocean fluctuations.

MEETING INFO: 3RD TUESDAY OF EVERY MONTH (DARK IN JULY & AUGUST)

BIEDERMANN HALL AT SACRED HEART CHURCH

10800 Henderson Road Ventura, CA 93004

(See the MAP at the end of this Newsletter for directions.)

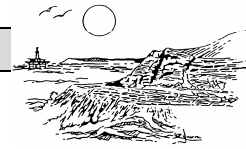
Reservation Deadline: 4:00 PM on THURSDAY before the meeting.

E-mail Reservations to: secretary@coastgeologicalsociety.org or visit the CGS website

*****Please specify your dinner choice: Tri-Tip, BBQ Chicken or Vegetarian Lasagna,**

Social Happy Hour - 6:00 p.m., Dinner - 7:00 p.m., Speaker - 8:00 p.m.

\$18 - With Reservation, \$25 - Without Reservation, \$ 10 - For Students and K-12 Teachers



Unfortunately, ODP Site 893 was only drilled to a depth of 200 meters below the seafloor, which goes back to ~160 ka.

Santa Barbara Basin is situated in the middle of a young, active fault-and-fold belt, and much of this deformation is <1 Ma. The global climate record produced and preserved in the basin is present in large part because of the basin's unique location within this tectonically active region. Where most paleoceanographers avoid areas of tectonic disruption, we have embraced them. Detailed mapping of high-resolution multichannel seismic (MCS) reflection data and stratigraphic correlation with existing well data, indicate that continuous Quaternary strata originally deposited in the deep basin were subsequently uplifted, folded, and in places eroded across young, active fault-related fold structures in the eastern Santa Barbara Channel. These older strata are exposed at or near the seafloor, where they are now accessible to piston coring. In 2005, we were able to systematically recover substantial sections of many of these older late-Quaternary sedimentary sequences back to about 700 ka. We now intend to use this methodology to extend the spot record back to 1.2 Ma, to test the hypothesis that climatic sensitivity to high-frequency oscillations developed at the Mid-Pleistocene Transition (~800 ka) and to make the case for continuous coring by the new Integrated Ocean Drilling Project.

Biography: Dr. Richard J. (Rick) Behl is Professor of Geological Sciences at California State University Long Beach, where he is also on the faculty of the Environmental Sciences and Policy program, and a founding member of the Institute for Integrated Research in Materials, Environment, and Society (IIRMES), a teaching and research consortium of geologists, archaeologists, and biologists. Behl earned his Bachelors degree from UC San Diego, his PhD at UC Santa Cruz, and was a Post-Doctoral Fellow at UC Santa Barbara. He has participated in numerous international ocean coring expeditions, consults for the petroleum industry, and was an AAPG Distinguished Lecturer and President of the Pacific Section SEPM. His expertise is in sedimentary geology, particularly as it relates to the climatic, oceanographic, and tectonic evolution of the California margin and the Pacific Ocean. Behl's research focuses on the Quaternary Santa Barbara Basin and the Miocene Monterey Formation.

RESERVATIONS: E-mail Secretary@coastgeologicalsociety.org or visit the CGS website by the Thursday before the meeting at 4 pm. Please include name and menu choice (Tri Tip, Chicken, or Vegetarian Lasagna) for each person attending. If you don't make a reservation, it's possible there will not be a meal available for you the day of the meeting.

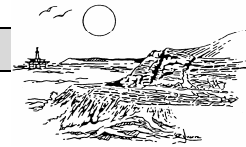
Member Contribution on Item of Interest:

BURNT OIL SHALE DEPOSITS OF VENTURA COUNTY, CA

By

Stephen P. Mulqueen

Burnt oil shale is formed through a geologic process known as combustion metamorphism. The occurrence of burnt shale can be found in Ventura County at Grimes Canyon near Fillmore, South Mountain and Adams Canyon near Santa Paula and above Highway 101 along the Rincon. There are also some occurrences of burnt oil shale in Santa Barbara County. One such deposit is at the inactive Airox rock quarry near Casmalia.



In deposits near Grimes Canyon in Ventura County, the formation was originally deposited as diatomaceous shale with phosphate nodules and minor interbedded sandstone. This unit is a portion of the Monterey Formation, deposited during the Miocene epoch. With time, petroleum from an adjacent source-rock migrated into the pore spaces of the diatomaceous shale and sandstone. The void spaces in the originally deposited rock units included “primary” porosity (intergranular porosity) and “secondary” porosity (fractures and faults).

After uplift and de-watering of the sedimentary unit, a subsurface fire started during prehistoric times. This fire could have been the result of spontaneous combustion or perhaps a lightning strike/ brush fire at a surface outcrop. Fire resulting from an extraterrestrial event such as a meteor impact is also within the realm of possibilities as a combustion source.

Heat from the combustion of the petroleum circulated upward as steam and “exhaust”, altering rock far above the burning petroleum. This upward rise of heat allowed oxygen-rich atmosphere to circulate inward through fractures, allowing the process to continue. Volume changes caused by the combustion process added to the porosity and to the circulation of oxygen-rich atmosphere within the rock unit.

The intense heat from the combustion process altered the rock into slag, ash and glass-textured rocks that resemble volcanic rocks such as obsidian, pumice and basalt scoria. The altered rock may have a variety of colors including red, yellow, black, brown, tan and purple. Fragments of relatively unaltered rock can be found in close contact to the altered and fused rock. This includes unaltered sandstone and shale.

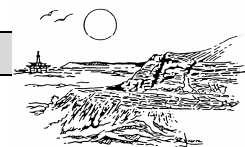
Burnt shale deposits from the Grimes Canyon areas can fall into all of the three rock-types including sedimentary, metamorphic and igneous. It is quite common to find a rock which appears to have all three rock-types in one hand specimen.

Archeological evidence shows that members of the Chumash tribe worked pieces of the burnt shale that resemble obsidian glass into arrowheads, spear points, scrapers and other tools.

A geologic feature that was informally named “The Rincon Volcano” was an exposure of burning oil shale on the cliff along Highway 101 above the Rincon. The exact location is along the sea cliff between the community of La Conchita and Bates Rd. Up to the mid-1960s, smoke and steam could be seen rising from the cliff face.

Burnt oil shale is currently being mined as a source of dimension stone, decorative rock and gravel. A quarry is presently operating in Grimes Canyon along Highway 23 south of Fillmore. Most of the red and multi-colored rock that we see in Ventura along roadways, in yards and gardens was mined from the quarries in Grimes Canyon. The decorative rock in the center-divider of Victoria Avenue between Highway 126 and Telegraph Road is just one example of the burnt oil shale from this deposit.

Written by Stephen Mulqueen for the VGMS, February, 2004

**MARK YOUR CALENDAR:****• Upcoming CGS meetings:**

October 21, 2008: To Be Announced

November 18, 2008: To Be Announced

UPCOMING EVENTS:

- The 10th Annual "Woolley" Golf Tournament and BBQ, Friday October 10, 2008 at Elkins Ranch Golf Course - 1386 Chambersburg Road, Fillmore, CA. See attached Entry Form.



2008 woolley entry
form.pdf

- Geology and Mining History Field Trips Co-Sponsored by Bureau of Land Management and Buena Vista Museum of Natural History:

Visit website at www.blm.gov/ca/st/en/fo/bakersfield/Programs/geology/fieldtrips.html or call Dr. Greg Wilkerson at 661-391-6081 or at gwilkerson@blm.gov.

Oct. 13-15, 2007: Mother Lode III: Northern Mines

This 3-day field conference looks at the structure, stratigraphy and geologic history of the Northern Mines of the Mother Lode in Sierra and Plumas Counties. Friday's trip in Grass Valley where we see the North Star Power house and Empire Mine. Saturday we journey to Edward's Crossing, Malikoff Diggings, Forest Hill, Downieville, and the Kentucky Mine. We end Saturday in Quincy. Sunday's trip will be from Quincy to the Walker Basin. We will go through Taylorsville, see the Englesmine and other mines of the Walker Basin. The program ends in Portola.

Nov. 1, 2008: San Andreas Fault: Ft. Tejon to Pallet Creek

This segment of the San Andreas fault takes us to several sag ponds and offset streams. Stops are made at Ft. Tejon, Quail Lake, Devil's Punchbowl and Wrightwood. Carbon 14 radiometric dating and it's application to understanding the frequency of earthquakes along the San Andreas Fault is considered at the Pallet Creek paleoseismic site. Examples of the interaction between ecosystems and fault systems are discussed.

Jan. 26, 2009 : Santa Maria-Carrizo Plain-Cuyama Valley

This trip starts in Santa Maria and investigates the ecology of the Santa Margarita Lake region including the Rinconada and La Panza mining districts. The tour continues on Highway 58 to the Carrizo Plains for a look at the San Andreas Fault.



- The 2009 Pacific Section AAPG Convention will be hosted by the Coast Geological Society May 3 - 7, 2009 at the Ventura Marriott. Tom Hopps will serve as the Convention Chairman and Gene Fritsche will be the Technical Chairman. More Information Coming Soon.
- Upcoming Events at the California Oil Museum: See www.oilmuseum.net

CGS MEMBERSHIP: CGS membership is through Pacific Section AAPG. Be sure to select **Coast Geological Society** as your local affiliated society. To join CGS, please go to: www.psaapg.org/member.html

CGS OFFICERS DIRECTORY:

President: **Bob Ballog**, Hueneme HS 805-498-6294/805-402-1173, president@coastgeologicalsociety.org
Past Pres: **John Minch**, SB Museum of Natural History. 805-682-711, pastpresident@coastgeologicalsociety.org
Vice-Pres: **Bill Bilodeau**, California Lutheran University, 805-493-3264, vicepresident@coastgeologicalsociety.org
Treasurer: **Muriel Norton**, Subsea Systems USA 805-658-1550, treasurer@coastgeologicalsociety.org
Secretary: **Christine White**, DCOR, LLC 805-535-2074, secretary@coastgeologicalsociety.org

NOTICES

1. *No-Cost* Employment Announcements (Help Wanted & Job Wanted) are available on our website! Also, business card ads and employment ads available in the newsletter! Contact secretary@coastgeologicalsociety.org
2. If you forward the email notice to another party, cc: secretary@coastgeologicalsociety.org in the email, we will put your party on the monthly notification list. There is no cost to receive CGS email notifications.
3. Buy your raffle tickets! Money generated goes toward scholarships, field trips, etc., to promote the advancement of Geosciences. Check the CGS supported activities on our website (3 Tickets for \$1).
4. Always needed: **Sponsors for our meetings!** Sponsors get a beautiful colored banner hung at the meeting, and the opportunity to distribute their literature and introduce their businesses, as well as the satisfaction of having supported a great organization! Sponsorships are \$300 per meeting and may be shared between two individual sources. Contact vicepresident@coastgeologicalsociety.org for info.

MEETING PLACE: MAP AND DRIVING DIRECTIONS

Meetings are held at the Sacred Heart Church, Biedermann Hall, 10800 Henderson Road, Ventura, CA 93004.

The location is off Hwy 126 at the Wells Road/Route 118 Exit. Click on the map below for a more detailed view and directions.

