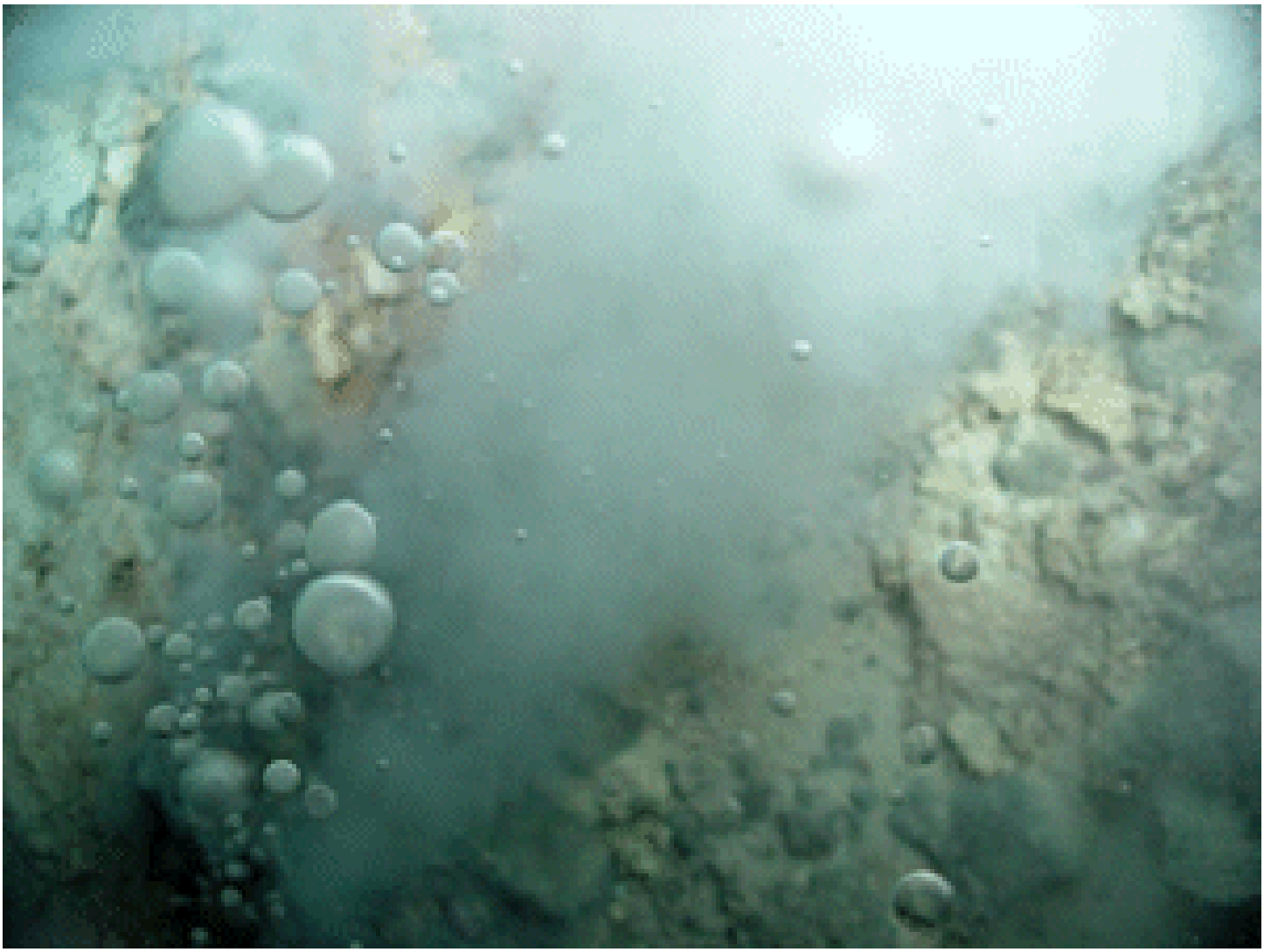
Pacific Petroleum Geology NEWSLETTER

Pacific Section • American Association of Petroleum Geologists

November & December •

Naturally Occurring Seeps...



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Every Issue

This Issue

Message from the President

Don Clarke

We are in a period of dramatic change. The oil industry has transformed from a bunch of provincial oil groups into a global operation. Houston is the current capital of the oil industry. Our own Pacific Section AAPG represents the states on the western seaboard of the United States. At one time we geoscientists operated quite independently, not anymore. We need the experience of those from around the world to best exploit our oil reserves just as they need our experiences. Our professional societies like PSAAPG provide the mechanisms for this. Next year the Pacific Section's annual meeting is in Ventura and Tom Hopps is the General Chairman. Tom has asked for papers on your recent work. He is also looking for papers on other oil fields that may assist us in our oil finding endeavors. Please consider this request and prepare an abstract and submit it to the PSAAPG at our website.

AAPG is undergoing significant changes as it adjusts to the global community. Currently AAPG plans to do a significant reorganization. This reorganization will help to protect AAPG's assets while allowing the organization to better serve the global geological community. As part of this effort the Pacific Section may have to make some changes to its constitution and bylaws to accommodate the AAPG changes. We expect to see the outline of these plans in the next AAPG Explorer. The reorganization will also be brought to the AAPG House of Delegates. Please take some time to evaluate these proposed changes. They are critical to our future.

When AAPG shares their recommended changes for PSAAPG with the Executive Committee we will evaluate them and share the AAPG recommended changes along with our recommendations with you in this newsletter. If constitutional changes are needed we will submit the changes for vote to the members of the Pacific Section. All of this will need to be completed prior to the annual AAPG meeting in Denver this spring.

We have elected a new President of the United States and Barack Obama will bring change to our profession. We will need to work with his people and the new Congress to bring energy security to our nation. It is imperative that we give his administration all of the cooperation possible so that we can work together to produce the hydrocarbon reserves of this country in a safe and efficient manner.

In conclusion I would like to share some observations with you. I just returned from Africa where I attended the AAPG International Meeting in Cape Town. I took a little extra time and visited Zambia and Botswana also. Everywhere I went the people were excited about our presidential election. They saw huge hope in the selection of Obama as president. My feeling was that they saw his election as the elimination of oppression and has a harbinger of hope for the world. Let us hope that they are right and these hopes will be realized and a new era in improved international relations will follow. As AAPG members we are ahead of the game because AAPG is already well underway in the process of globalization.

Letter to the Editor

Dear Karen:

By way of introduction I am Art Spaulding, Pacific Section President, 1972-1973, and not quite in my dotage but getting there. I am responding to your note in the latest Newsletter, asking for information on the blowout. My impressions and recollections are rather dim, and I am sure others who remember more will be in touch with you, but I did give a lecture about the event at L.A. Valley College in 1969, so here goes.

First off, the Retrospective in the same issue is essentially OK, but their terminology and details are not quite accurate, e.g., they talk about the "fragmentation of the well head". I am reasonably sure that did not happen, because well heads don't do that. Union Oil Co. (Union) was drilling an outstepping development well, as I remember, and encountered unusually high reservoir pressures in an oil and gas saturated formation for which they were unprepared. Union's big mistake was not having enough protective casing in their first major string to contain this high pressure. As I recall, there was only about 1200 feet of that casing, and, when the high pressure zone was penetrated, even with the well shut in, the lithostatic pressure was less than the that of the zone below, and the flow of oil and gas simply fractured its way to the surface around the shoe of the casing.

Normally, a blowout occurs within the confines of the well bore itself, blowing mud out of the drill pipe and usually destroying all of the hardware above, usually by fire. Such was the case at the Richfield drillsite near USC circa 1967, where in the process of completion a well blew out with consequent fire, killing two roughnecks and turning the 4 and one half inch drillpipe into macaroni. The day was saved when one of the crew darted under the fire and turned the preventer off.

In Union's case control of the blowout was made very difficult, because the oil and gas flow was through the sea floor around the casing. My recollection corresponds to the account in the Retrospective; mud, or I rather think cement, was used to seal the fractures around the well, but the damage was done, and the oil business was forever changed, probably forever.

Best regards,
Art

In This Issue

Are seeps dangerous?

Is drilling helping to eliminate the seeps off the coast of Santa Barbara?

Two good questions coming out of the Santa Barbara County Board of Supervisor's Meeting in August. When looking for articles to answer these questions, I ran across the UCSB press release 'Gas Escaping From Ocean Floor May Drive Global Warming'.

WHAT! Naturally occurring seeps - not BIG OIL, responsible for global warming? Makes sense, considering high levels of greenhouse gases occurred in the past. Is there a role for the oil industry to remove methane hydrates from sediments before they become unstable and are released into the atmoshere?

Excerpts from
Natural Seep Inventory Final Report

Complete report available at:

http://www.countyofsb.org/energy/information/NaturalSeepInventoryFinalReport.htm

**The Natural Oil Seep Inventory was conducted from April, 2002, to March, 2004, jointly by:
Santa Barbara County, Planning and Development Department, Energy Division, and
U.S. Geological Survey, Western Coastal and Marine Geology Team, Menlo Park, CA**

Abstract

This project was conducted in conjunction with a U.S. Geological Service (USGS) project funded by the Minerals Management Service (MMS), utilizing the expertise of USGS research scientists and resources of their Menlo Park laboratory. We conducted monthly sampling at 10 Santa Barbara County beaches in order to establish a baseline estimate of the amount of tar present. Field crews composed of geology students from the University of California at Santa Barbara (UCSB) weighed tar and counted tar balls during a 12-month period. Sampling was extended an additional 4 months by USGS personnel. 346 tar samples were collected in 637 beach transects. More than 182 of the beach tar samples were analyzed for persistent hydrocarbons ("biomarkers") and isotopic composition. The samples analyzed include these beach tar samples, plus additional samples collected by the USGS from beaches, natural offshore oil seeps, and offshore production platforms. Biomarker ratios were computed from the analytical data. Clustering and principal component methods were applied to the biomarker data, resulting in a classification of the tar samples into 9 groups. The transect sampling data were used to estimate the amount of tar present per kilometer of shoreline of each beach during each month of the project. The locations of samples from the various tar groups were mapped using color coded dots, providing a graphical picture of the location of seep sources in relation to beaches where corresponding tar was found. Estimated beach tar amounts were presented in bar graphs.

The study has provided significant new information about the deposition of tar originating in offshore natural oil seeps onto Santa Barbara's beaches. The tar "fingerprint" database and data on amounts of tar deposited on the beaches developed during the study contributes to the knowledge of baseline beach tar conditions. However, the study is not conclusive. Additional analysis of samples from natural seeps and production platforms will be needed to determine sources of some of the beach tar samples, and to refine the classification model and test its limitations in discriminating natural seep oil from platform-produced oil. The estimates of beach tar amounts indicate that the amount of tar present is highly variable. It may be possible to reanalyze the data set in the future, controlling for some of the factors responsible for the variability, such as tides and currents. An error analysis of the tar deposition data should be done.

Findings & Conclusions – In Brief

Patterns of Beach Tar Deposition

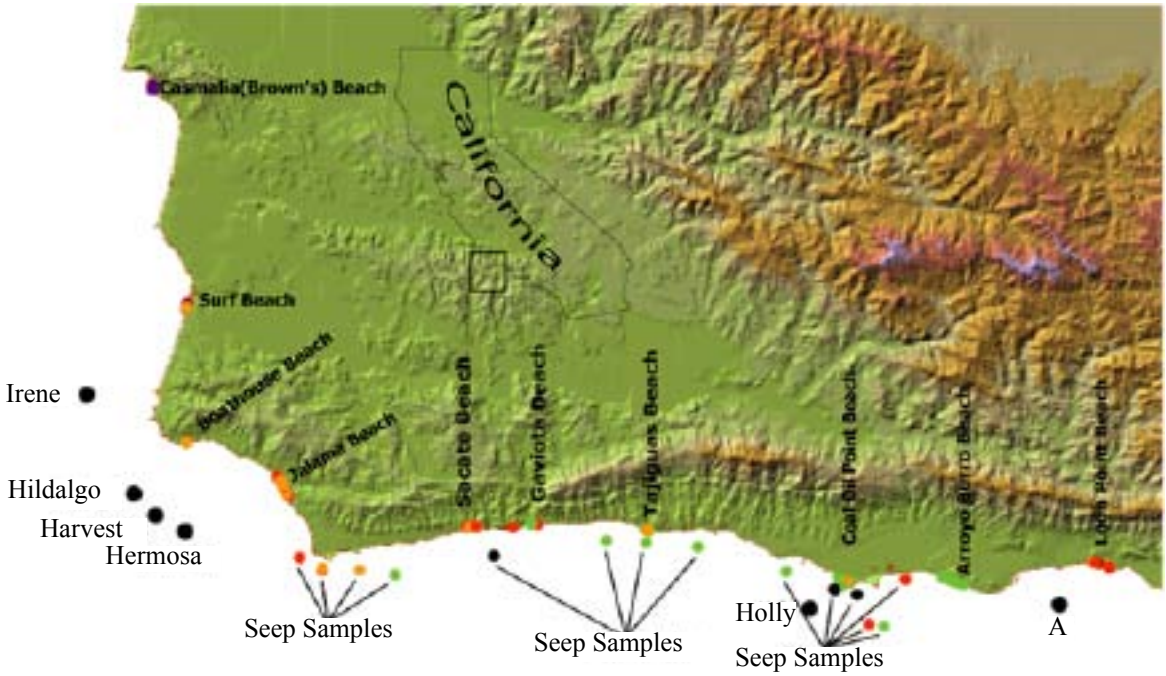
The tar and oil samples analyzed in this study could be classified into 9 groups, based on differences in chemical composition, as reflected in isotope analysis and ratios of various persistent hydrocarbons ("biomarkers"). Each beach tar sample falls into one of the groups. In some cases, oil sampled at a natural seep and tar collected at nearby depositional beaches fall into the same group. In other cases, nearby seeps that match the beach tar are not identified. It appears that some samples may originate in seeps near the Channel islands. The tar groups represented in the samples vary from beach to beach. At some beaches (e.g., Sacate Beach), almost all samples are associated with no more than two groups, while the tar collected at some other beaches is more diverse. The correspondence between tar sources and deposition is incomplete. Collection and analysis of additional oil from offshore seeps will be needed to fill in the gaps. The depositional patterns are discussed and mapped in the accompanying USGS report.

Discrimination of Seep Tar from Oil Produced at Platforms

Biomarker analysis is able to distinguish oil from distinct sources with confidence. Thus, beach tar believed to originate from natural seeps can be distinguished from oil produced at some platforms (e.g., Point Arguello platforms; Irene). However, samples of oil produced at Platform Holly (offshore of Coal Oil Point) and Platform "A" (in the eastern Santa Barbara Channel) are very similar to much of the oil found on Santa Barbara's southern beaches. The biomarker method so far has been unable to distinguish these oils. It is uncertain whether the inability to distinguish them represents a limitation of the method (which potentially could be overcome with refinements to the method), or whether the sources of the produced oil and beach tar are identical or nearly so.

Tar Deposition Rates and Variability

The amount of tar collected at each beach was converted into estimates of tar mass and number of tar balls per kilometer of beach. Comparisons of tar deposition at the 10 beaches are presented in graphs in



Locations of beaches, sampled oil platforms and natural seep samples.

the attached report. There are obvious differences in tar mass and numbers of tar balls among the beaches, with generally greater amounts occurring on northern beaches. Among the South Coast beaches sampled, Coal Oil Point receives the largest amount of tar, whereas Jalama and Surf beaches are most heavily tarred of the beaches north of Point Conception. Such differences are expected, due to the location of offshore seeps relative to the depositional beaches, the prevailing current patterns, the orientation of the shoreline, etc. On average, tar balls found on the four northern beaches were substantially larger than those found on the South Coast beaches. Many large tar blobs and ropes were found on the north beaches, whereas small tar balls and tiny flecks were more typical in the south. This finding is consistent with the fact that oil in the more northerly fields is generally heavier and more viscous than that found off the South Coast. Tar deposition appears to vary seasonally, with the greatest accumulations observed during summer and fall. The data shows large variability in tar deposition from month to month, and differences in this variability among beaches. Factors responsible for the variability are discussed below.

Complicating Factors

Part of the variability observed tar deposits may be attributable to under-sampling, both spatially and temporally. Part may be due to the fact that the accumulated tar deposit can change greatly over a single tidal cycle. A likely major cause of variability is that differences in wind, current, and surf energy affect how much tar can reach and strand on a beach; these effects vary among beaches and seasonally. Wind speed and surface chop affect natural dispersion of floating oil in the water column. Current direction affects the trajectory of floating oil and weathered tar balls. Surf and tidal action can wash the beach clean, or bury tar under the sand, or release previously sequestered tar. Variations in seep activity of different seeps may also be an important factor.

It may be possible, in a future analysis of the tar sample data, to explain some of the variability by taking into consideration wind, currents, and tides at the time of sampling, in relation to the relative locations of seeps and the beaches. However, at this point, the variability cannot be adequately explained.

Viscous tar sampled offshore Point. Conception. This tar differs in both morphology and chemical composition from oil and tar found offshore the southern coast of Santa Barbara.

Sampling a natural oil slick. Inset shows the evolution of oil and mousse into tar patties that are often found on the southern Santa Barbara County coastline.

Establishing a Baseline of Beach Tar Deposition

The tar "fingerprint" database contributes to the understanding of baseline conditions, and may aid in determining the cause and responsible party in the case of future unusual beach oiling events. The database constitutes a record of what types of oil, as classified by biomarker composition, are commonly found at points along the coastline (during the year 2002-2003).

The study has established the normal range of tar mass deposited during the year, and a qualitative description of its appearance. This information could aid in judging whether a future tarring event is unnatural and/or in determining whether beach tar is it may not be possible to distinguish spilled oil from natural seep tar, based on the current database and tar "fingerprinting" methods. Further analysis of oil samples from platforms and natural seeps, and further refinement and validation of the tar classification model, should lead to improved differentiation of tar groups in the future.

University of California, Santa Barbara
Press Release
July 19,2006

Ira Leifer
Bruce Lyendyk
Shane Anderson

Gas Escaping From Ocean Floor May Drive Global Warming

(Santa Barbara, Calif.) – Gas escaping from the ocean floor may provide some answers to understanding historical global warming cycles and provide information on current climate changes, according to a team of scientists at the University of California, Santa Barbara. The findings are reported in the July 20 on-line version of the scientific journal, Global Biogeochemical Cycles.

Remarkable and unexpected support for this idea occurred when divers and scientists from UC Santa Barbara observed and videotaped a massive blowout of methane from the ocean floor. It happened in an area of gas and oil seepage coming out of small volcanoes in the ocean floor of the Santa Barbara channel — called Shane Seep — near an area known as the Coal Oil Point seep field. The blowout sounded like a freight train, according to the divers. Atmospheric methane is at least 20 times more potent than carbon dioxide and is the most abundant organic compound in the atmosphere, according to the study's authors, all from UC Santa Barbara.

"Other people have reported this type of methane blowout, but no one has ever checked the numbers until now," said Ira Leifer, lead author and an associate researcher with UCSB's Marine Science Institute. "Ours is the first set of numbers associated with a seep blowout." Leifer was in a research boat on the surface at the time of the blowouts.

Aside from underwater measurements, a nearby meteorological station measured the methane "cloud" that emerged as being approximately 5,000 cubic feet, or equal to the volume of the entire first floor of a two-bedroom house. The research team also had a small plane in place, flown by the California Department of Conservation, shooting video of the event from the air.

Leifer explained that when this type of blowout event occurs, virtually all the gas from the seeps escapes into the atmosphere, unlike the emission of small bubbles from the ocean floor, which partially, or mostly, dissolve in the ocean water. Transporting this methane to the atmosphere affects climate, according to the researchers. The methane blowout that the UCSB team witnessed reached the sea surface 60 feet above in just seven seconds. This was clear because the divers injected green food dye into the rising bubble plume.

Co-author Bruce Luyendyk, professor of marine geophysics and geological sciences, explained that, to understand the significance of this event (which occurred in 2002), the UCSB research team turned to a numerical, bubble-propagation model. With the model, they estimated methane loss to the ocean during the upward travel of the bubble plume.

The results showed that for this shallow seep, loss would have been approximately one percent. Virtually all the methane, 99 percent of it, was transported to the atmosphere from this shallow seep during the blowout. Next, the scientists used the model to estimate methane loss for a similar size blowout at much greater depth, 250 meters. Again, the model results showed that almost all the methane would be transported up to the atmosphere.

Over geologic time scales, global climate has cycled between warmer, interglacial periods and cooler, glacial periods. Many aspects of the forces underlying these dramatic changes remain unknown. Looking at past changes is highly relevant to understanding future climate changes, particularly given the large increase in atmospheric greenhouse gas concentrations in the atmosphere due to historically recent human activities such as burning fossil fuels.

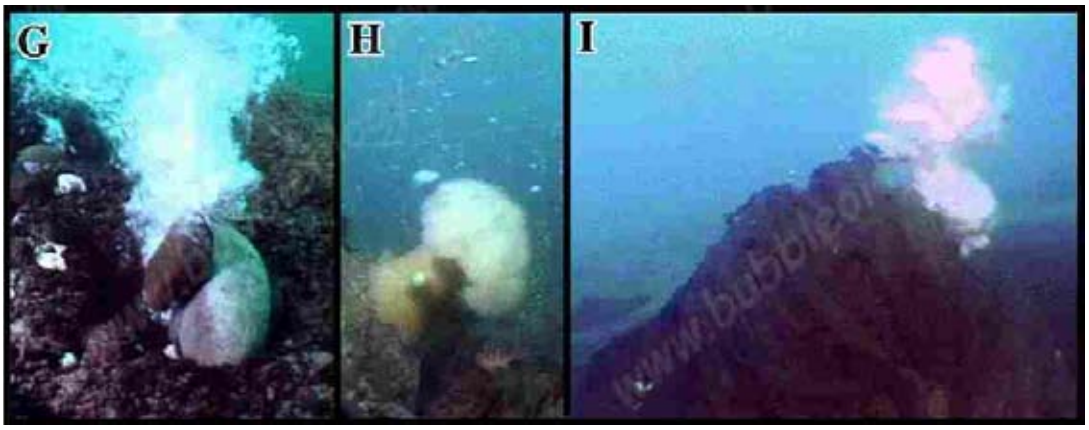
One hypothesis, called the "Clathrate Gun" hypothesis, developed by James Kennett, professor of geological sciences at UCSB, proposes that past shifts from glacial to interglacial periods were caused by a massive decomposition of the marine methane hydrate deposits.

Methane hydrate is a form of water ice that contains a large amount of methane within its crystal structure, called a clathrate hydrate. According to Kennett's hypothesis, climatic destabilization would cause a sharp increase in atmospheric methane — thereby initiating a feedback cycle of abrupt atmospheric warming. This process may threaten the current climate, according to the researchers. Warmer ocean temperatures from current global climate change is likely to release methane currently trapped in vast hydrate deposits on the continental shelves. However, consumption of methane by microbes in the deep sea prevents methane gas released from hydrates from reaching the ocean surface and affecting the atmosphere.

Bubbles provide a highly efficient mechanism for transporting methane and have been observed rising from many different hydrate deposits around the world. If these bubbles escape singly, most or all of their methane would dissolve into the deep-sea and never reach the atmosphere. If instead, they escape in a dense bubble plume, or in catastrophic blowout plumes, such as the one studied by UCSB researchers, then much of the methane could reach the atmosphere. Blowout seepage could explain how methane from hydrates could reach the atmosphere, abruptly triggering global warming.

Thus, these first-ever quantitative measurements of a seep blowout and the results from the numerical model demonstrate a mechanism by which methane released from hydrates can reach the atmosphere. Studies of seabed seep features suggest such events are common in the area of the Coal Oil Point seep field and very likely occur elsewhere.

The authors explain that these results show that an important piece of the global climate puzzle may be explained by understanding bubble-plume processes during blowout events. The next important step is to measure the frequency and magnitude of these events. The UCSB seep group is working toward this goal through the development of a long-term, seep observatory in active seep areas.



http://www.bubbleology.com/FrameSeeps.html

Measurements Show Greenhouse Gas Methane on the Rise Again
Press Release
October 29, 2008

Steve Cole, Headquarters, Washington
Jen Hirsch, Massachusetts Institute of Technology, Cambridge

The amount of methane in Earth's atmosphere shot up in 2007, bringing to an end approximately a decade in which atmospheric levels of the potent greenhouse gas were essentially stable. The new study is based on data from a worldwide NASA-funded measurement network.

Methane levels in the atmosphere have more than tripled since pre-industrial times, accounting for around one-fifth of the human contribution to greenhouse gas-driven global warming. Until recently, the leveling off of methane levels had suggested that the rate of its emission from Earth's surface was being approximately balanced by the rate of its destruction in the atmosphere.

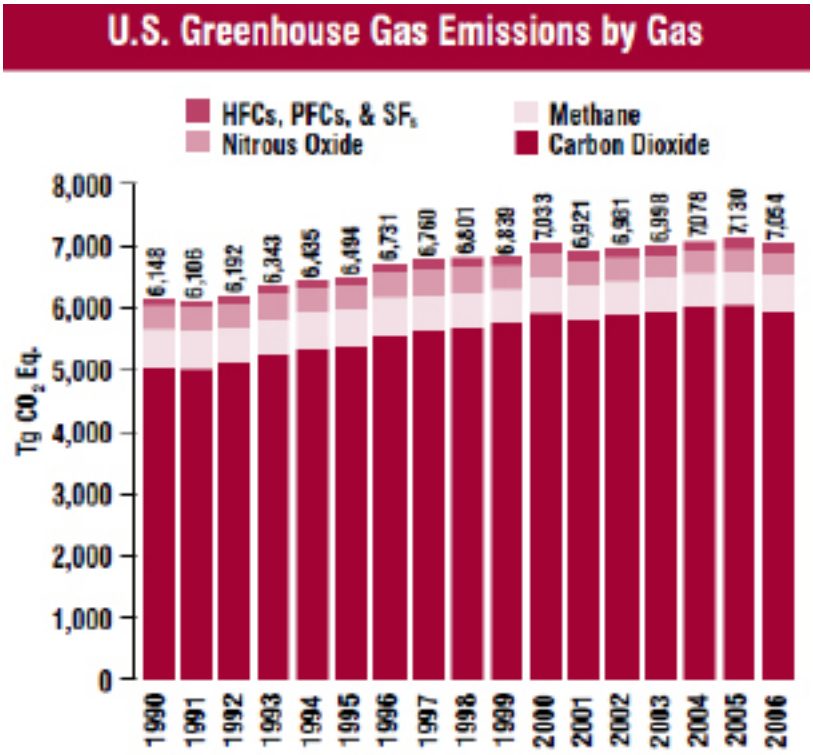
However, the balance has been upset since early 2007, according to research published this week in the American Geophysical Union's "Geophysical Review Letters." The paper's lead authors, Matthew Rigby and Ronald Prinn of the Massachusetts Institute of Technology, say this imbalance has resulted in several million metric tons of additional methane in the atmosphere.

Methane is produced by wetlands, rice paddies, cattle, and the gas and coal industries. It is destroyed in the atmosphere by reaction with the hydroxyl free radical, often referred to as the atmosphere's "cleanser."

"This increase in methane is worrisome because the recent stability of methane levels was helping to compensate for the unexpectedly fast growth of carbon dioxide emissions," said climate modeler Drew Shindell at NASA's Goddard Institute for Space Studies in New York.

"If methane continues to increase rapidly, we'll lose that offsetting effect. We will use NASA's climate modeling capability to improve our understanding of what is causing the increase and project future methane levels."

One surprising feature of this recent growth is that it occurred almost simultaneously at all measurement locations across the globe. However, the majority of methane emissions are in the Northern Hemisphere, and it takes more than one year for gases to be mixed between the hemispheres. Theoretical analysis of the measurements shows that if an increase in emissions is solely responsible, these emissions must have risen by a similar amount in both hemispheres at the same time.



Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990 – 2006
http://www.epa.gov/climatechange/emissions/index.html#inv

The scientists analyzed air samples collected by the NASA-funded Advanced Global Atmospheric Gases Experiment ground network from 1997 through April 2008. The network was created in the 1970s in response to international concerns about chemicals depleting the ozone layer. It is supported by NASA as part of its congressional mandate to monitor ozone-depleting trace gases, many of which also are greenhouse gases. Air samples are collected and analyzed at several stations around the world.

According to the researchers, a rise in Northern Hemispheric emissions may be a result of very warm conditions over Siberia throughout 2007, potentially leading to increased bacterial emissions from wetland areas. However, a potential cause for an increase in Southern Hemispheric emissions is less clear.

An alternative explanation for the rise may lie, at least in part, with a drop in the concentrations of the methane-destroying hydroxyl free radical. Theoretical studies show that if this has happened, the required global methane emissions rise would have been smaller and more strongly biased to the Northern Hemisphere. At present, however, it is uncertain whether such a drop in hydroxyl free radical concentrations did occur.

"The next step to pin down the cause of the methane increase will be to study this using a very high-resolution atmospheric circulation model and additional measurements from other networks," Prinn said. "The key is to determine more precisely the relative roles of increased methane emission versus a decrease in the rate of removal. Apparently we have a mix of the two, but we want to know how much of each is responsible for the overall increase."

It is too early to tell whether this increase represents a return to sustained methane growth, or the beginning of a relatively short-lived anomaly, according to Rigby and Prinn. Given that methane is about 25 times stronger as a greenhouse gas per metric ton of emissions than carbon dioxide, the situation will require careful monitoring in the near future to better understand methane's impact on future climate change.

Vent and Seep Communities on the Arctic Seafloor

Peter Vogt
Naval Research Laboratory
Washington, DC

Deep, under perpetual ice cover, with reduced photosynthesis and thus little organic matter coming from above, the sea floor of the central Arctic Ocean is a marine desert, its life more sparse than in other ocean basins. But photosynthesis is not the only basis for life: locally, methane and hydrogen sulfide seep from the ocean floor, supporting dense oases of organisms that depend on bacteria able to consume these chemicals. Such "chemosynthetic" life does not directly depend on sunlight and can thrive even at great ocean depths.

Two basic kinds of oases are now known from the oceans. Hot vents, first discovered in 1977, are now known from several places along the Mid-Oceanic Ridge. These seafloor geysers belch out seawater heated up to 400°C and laden with nutritious chemicals. Dramatic colonies of large clams, giant tubeworms, and other strange life-forms have been discovered at some hot vents.

The second broad category of chemosynthetic oasis is the "cold seep," which usually involves the upward seepage of methane dissolved in water or as small bubbles. Mud volcanoes and related cold-seep features form over great sediment accumulations in which bacteria digest buried organic matter, producing methane as a waste product. Specially evolved bacteria oxidize the methane, forming the foundation of a food chain. Different bacteria have evolved to oxidize the foul-smelling hydrogen sulfide, itself the waste product of yet other bacteria living below the ocean floor, which oxidize sulfate ions of seawater origin. The conspicuous and, by bacteria standards, large sulfur bacteria (Beggiatoa spp.) form thin, snow-like mats on the seafloor where seepage takes place. Bacterial mats form at hot vents also, but Beggiatoa is common at cool oceanic seeps and some non-seep environments where hydrogen sulfide rises close to the seafloor and oxygen is present in the water.

Neither hot nor cold vents had been found in the Arctic until, in 1995 and 1996, a team of American, Norwegian, and Russian scientists discovered an active cold-seep mud volcano on the continental margin west of the Barents Sea, at 72°N. The Haakon Mosby mud volcano is about a kilometer in diameter, and stands only a few meters high in water 1250 meters deep. The mud volcano has a patchy white cover of sulfur bacteria mats (which few creatures eat), and is home to a diverse community of creatures whose food web is based is methane-consuming bacteria. Whereas the mud volcano underlies a presently ice-free part of the Arctic, there is no reason not to expect discovery of similar features in the ice-covered Arctic Ocean.

See complete article at: http://www.arctic.noaa.gov/essay_vogt.html

Haakon Mosby Mud Volcano

British Antarctic Survey
NATURAL ENVIRONMENT RESEARCH COUNCIL

First Evidence of Under-ice Volcanic Eruption In Antarctica

The first evidence of a volcanic eruption from beneath Antarctica's most rapidly changing ice sheet has been reported. The volcano on the West Antarctic Ice Sheet erupted 2000 years ago (325BC) and remains active.

The subglacial volcano has a 'volcanic explosion index' of around 3-4. Heat from the volcano creates melt-water that lubricates the base of the ice sheet and increases the flow towards the sea. Pine Island Glacier on the West Antarctic Ice Sheet is showing rapid change and BAS scientists are part of an international research effort to understand this change.

Using airborne ice-sounding radar, scientists from British Antarctic Survey (BAS) discovered a layer of ash produced by a 'subglacial' volcano. It extends across an area larger than Wales.

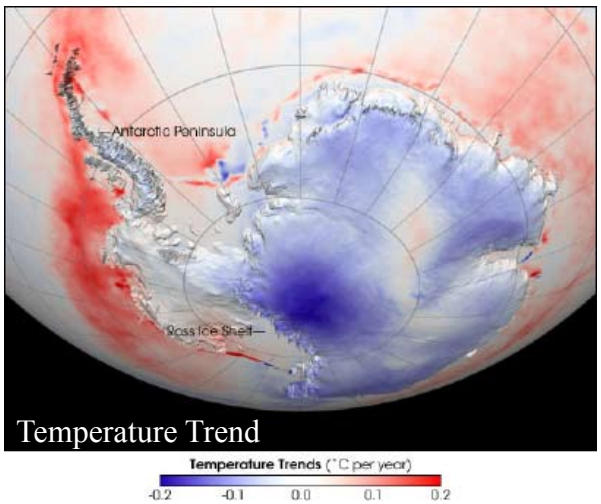
Lead author* Hugh Corr of the BAS says, "The discovery of a 'subglacial' volcanic eruption from beneath the Antarctic ice sheet is unique in itself. But our techniques also allow us to put a date on the eruption, determine how powerful it was and map out the area where ash fell. We believe this was the biggest eruption in Antarctica during the last 10,000 years. It blew a substantial hole in the ice sheet, and generated a plume of ash and gas that rose around 12 km into air."

The discovery is another vital piece of evidence that will help determine the future of the West Antarctic Ice Sheet and refine predictions of future sea-level rise. Glaciers are like massive rivers of ice that flow towards the coast and discharge icebergs into the sea.

Co-author Professor David Vaughan (BAS) says,"This eruption occurred close to Pine Island Glacier on the West Antarctic Ice Sheet. The flow of this glacier towards the coast has speeded up in recent decades and it may be possible that heat from the volcano has caused some of that acceleration. However, it cannot explain the more widespread thinning of West Antarctic glaciers that together are contributing nearly 0.2mm per year to sea-level rise. This wider change most probably has its origin in warming ocean waters."

For complete article see:
British Antarctic Survey (2008, January 22). First Evidence Of Under-ice Volcanic Eruption In Antarctica. ScienceDaily. Retrieved November 4, 2008, from http://www.sciencedaily.com/releases/2008/01/080120160720.htm

http://wattsupwiththat.files.wordpress.com/2008/01/antarcticvolcanoes2.jpg



http://wattsupwiththat.files.wordpress.com/2008/01/antarctic_temps_avh1982-2004.jpg

Methane Hydrate - The Gas Resource of the Future

Methane hydrate is a cage-like lattice of ice inside of which are trapped molecules of methane, the chief constituent of natural gas. If methane hydrate is either warmed or depressurized, it will revert back to water and natural gas. When brought to the earth's surface, one cubic meter of gas hydrate releases 164 cubic meters of natural gas. Hydrate deposits may be several hundred meters thick and generally occur in two types of settings: under Arctic permafrost, and beneath the ocean floor. Methane that forms hydrate can be both biogenic, created by biological activity in sediments, and thermogenic, created by geological processes deeper within the earth.

While global estimates vary considerably, the energy content of methane occurring in hydrate form is immense, possibly exceeding the combined energy content of all other known fossil fuels. However, future production volumes are speculative because methane production from hydrate has not been documented beyond small-scale field experiments.

The U.S. R&D program is focused on the two major technical constraints to production: 1) the need to detect and quantify methane hydrate deposits prior to drilling, and 2) the demonstration of methane production from hydrate at commercial volumes. Recent and planned research and field trials should answer these two issues.

In recent field tests, researchers have demonstrated the capability to predict the location and concentration of methane hydrate deposits using reprocessed conventional 3-D seismic data, and new techniques, including multi-component seismic, are being tested. Modeling of small-volume production tests in the U.S. and Canadian Arctic suggest that commercial production is possible using depressurization and thermal stimulation from conventional wellbores. Large-scale production tests are planned in the Canadian Arctic in the winter of 2008 and in the U.S. Arctic in the following year. Demonstration of production from offshore deposits will lag behind Arctic studies by three to five years, because marine deposits are less well documented, and marine sampling and well tests are significantly more expensive.

Why We Need Methane From Hydrate

Natural gas is an important energy source for the U.S. economy, providing almost 23 percent of all energy used in our Nation’s diverse energy portfolio. A reliable and efficient energy source, natural gas is also the least carbon-intensive of the fossil fuels.

Historically, the United States has produced much of the natural gas it has consumed, with the balance imported from Canada through pipelines. According to EIA, total U.S. natural gas consumption is expected to increase from about 22 trillion cubic feet today to 26 trillion cubic feet in 2030- a projected jump of more than 18 percent.

Production of domestic conventional and unconventional natural gas cannot keep pace with demand growth. The development of new, cost-effective resources such as methane hydrate can play a major role in moderating price increases and ensuring adequate future supplies of natural gas for American consumers.

International Cooperation in Methane Hydrate R&D

In April and June 2008, the U.S. Department of Energy signed agreements for cooperative research efforts with representatives from three countries with gas hydrate research programs: India, Korea and Japan. Officials from DOE and the Indian government signed a Memorandum of Understanding for Cooperation in Methane Hydrate Research and Development in New Delhi on April 4. The agreement provides for exchange of information and personnel in the areas of exploration and quantification of natural gas hydrates, resource assessments, laboratory characterization, and production testing. On April 18, Energy Secretary Samuel Bodman and South Korea Minister Lee Youn-ho signed a Statement of Intent to exchange information on gas hydrate topics and technologies. Korea is looking to gas hydrates as a future energy source and hopes to take part in U.S. pilot testing early next year.

On June 6, 2008, Secretary Bodman and Japanese Minister of Economy, Trade and Industry, Akira Amari signed a Statement of Intent for cooperation in methane hydrate research and development. Japan has an active methane hydrate R&D program that has resulted in the discovery of large offshore hydrate deposits and successful short-term production testing in the Canadian arctic..

http://fossil.energy.gov/programs/oilgas/hydrates/

Imperial Barrel Award Program Student Competition

IBA is

* 30-year program adopted by AAPG from Imperial College London
* Team-based, prospect presentation competition for graduate geoscience students
* Opportunity for students to analyze geologic, geophysical, land, economic, and production data
* Access for students to energy industry experts for coaching and scouting
* Advancement of winning teams from local IBA competitions to the IBA final competition on June 5-6, 2009, prior to the AAPG Annual Convention in Denver, Colorado, USA

Benefits to Participating Students and Universities

* Marketable energy industry skill development using technology and real data
* Introductions to industry leaders and potential employers
* Large cash prizes to top 3 universities and trophies to top 3 student teams
* Unparalleled international networking opportunity

2008 IBA winning team from the University of Oklahoma

IBA Provides

* Industry data sets via AAPG
* Uniform judging criteria at local and final competitions
* Financial assistance (airfare, lodging, and meeting registration) for teams advancing to the finals

For More Information, Contact

Connie Mongold, 2008 AAPG IBA Committee Chair clmongold@aeraenergy.com
• USA: 1-661-665-5585 (office) • 1-661-703-6922 (cell)
Mike Mlynek, AAPG Student Program Coordinator mikem@aapg.org
• USA: 1-918-560-2653
Carol McGowen, AAPG Sections & Regions Manager cmcgowen@aapg.org
• USA: 1-918-560-9403

For more information and to view sample IBA data set, go to:
www.aapg.org/iba

Help Support AP Geology High School Classes

Members and Friends of LASPE:

Believe it or not, there are dozens of AP high school courses offered, including environmental sciences, but not one for geology. Several years ago a nation-wide survey was sent out to the high schools and colleges to see if there was an interest in proceeding with an AP Geology class. The survey was very well received but The College Board* decided not to pursue it as they stated that they have too many sciences and need to expand on other subjects. When you review the list of AP courses**, I think you will agree that an AP Geology course is more relevant than many of the current offerings, especially with our energy situation. I have been working with Mr. Mike Fillipow, who teaches two courses of geology at Long Beach Polytechnic High School. His students are engaged in a full spectrum of a true college geology class including lessons on logging, log correlations, faulting, sand deposition, tsunamis, field trips to our Wilmington Field operations and to geologic sites showing outcrops, landslides and formation deformation. He is an excellent teacher who recently won the AAPG Teacher of the Year award. LASPE provides him an annual grant to cover most of his lab work and field trips.

An AP Geology class would encourage our best and brightest students throughout the country to learn more about earth sciences and maybe consider a career in our industry. Mr. Fillipow and another high school geology teacher have developed curriculums that are based on college-level classes and would jump at the chance to propose a lab-based AP Geology curriculum for consideration by The College Board. He believes that many of the best students generally give priority to taking AP classes and will not consider taking a regular science (geology) class, no matter how interesting or practical. We are seeing direct benefits from Mike's efforts. One of his honors students was a high school summer intern for me and she later interned for Oxy. She is on the verge of getting her Geology degree at UC Santa Barbara. I understand another of his students interned for Oxy this past summer.

I have contacted Mr. Barry Russell, CEO of the Independent Petroleum Association of America (IPAA), to request his help in convincing The College Board to approve an AP Geology course. He is considering this request and is interested in getting industry feedback. Please write a short note to Barry this week at brussell@ipaa.org that supports creating an AP Geology class.

Scott Hara
Chief Reservoir Engineer
Tidelands Oil Production Company / Occidental Petroleum
scott_hara@oxy.com

*The College Board (the company which handles the SAT and AP tests) contact info: http://www.collegeboard.com
**AP Test list: http://www.collegeboard.com/student/testing/ap/subjects.html

NEW INSIGHTS IN HISTORIC AREAS
AAPG PACIFIC SECTION ANNUAL MEETING
MAY 2-7, 2009 - VENTURA, CALIFORNIA

CALL FOR PAPERS AND PROPOSALS FOR FIELD TRIPS AND SHORT COURSES

MESSAGE FROM THE GENERAL CHAIR

In **May, 2009**, you will have an opportunity to share **New Insights** in geoscience with your colleagues at our **Annual Pacific Section AAPG Convention in Ventura, California** – a beautiful city on the sparkling Pacific at the southern tip of California's Central Coast. In addition to a great technical program, choose from golfing, hiking, biking, fine dining, deep-sea fishing, kayaking, and just hanging out at the beach to round out your enjoyment of this meeting by the sea.

Whether driven by opportunities from higher prices or by necessity from lower prices; whether from academia, government, or private industry; and whether from geoscience, engineering, or environmental fields, the need to apply **New Insights** to both new and existing problems and areas is always with us.

Coast Geological Society, our host, welcomes you to Ventura and will be working hard to make this an exciting and memorable Convention.

MESSAGE FROM THE PROGRAM CHAIR

Recent increases in the price for crude oil and our need for increased domestic energy production have opened the door for using new techniques to produce more from older historic areas. This was the inspiration for our Convention theme, **"New Insights in Historic Areas"**, which easily extends to all areas of the geosciences. To make the meeting successful we need a few good **short courses** and **field trips** and a major outpouring of **abstracts** for presentation at the **oral and poster sessions**. A tentative list of session topics is in the column to the right. You are encouraged to write up your recent thoughts and discoveries and submit an abstract. If your abstract doesn't fit into one of the tentative categories, we will make a place for it. Please accept our invitation to advance the practice of our profession by documenting and sharing some of your valuable insights and the fruits of your labor with your colleagues and to learn about their insights.

Details for abstract submittal are at the top of the next column. **Submit your abstract by January 31, 2009**, and be an active participant in this meeting and in your profession.

Tom Hopps
General Chair
tom@ranchoenergyinc.com
805-652-0066

Gene Fritsche
Program Chair
geneandsuef@dslextreme.com
818-882-8468

SUBMITTING ABSTRACTS AND PROPOSALS

Please submit your **abstract(s)** to the technical program committee through the PSAAPG website at http://www.psaapg.org. Follow the links to the instructions for abstract submittal.

Deadline For Abstract Submittal
JANUARY 31, 2009

Proposals for **field trips** or **short courses** should be sent **ASAP** by way of email to Gene Fritsche at geneandsuef@dslextreme.com.

SOME SUGGESTED TECHNICAL CATEGORIES

- Theme Session: New Insights in Historic Areas
- Renewed Offshore Drilling in California: Pros and Cons
- Energy Minerals of the Pacific Region
- New Insights into Global Warming
- New Insights into Pacific Region Shale Reservoirs
- New Insights into Pacific Region Gas Production
- New Insights in Exploration Technology and Seismic Interpretation
- New Insights into Stratigraphy and Sedimentology within the Pacific Region
- Modern Sea-Floor and Quaternary Turbidite Systems Offshore the Western Margin of the United States in Honor of Bill Normark
- Making the Link from Modern to Ancient Turbidite Systems: An Integrated Approach in Honor of Bill Normark
- New Insights into Marine Geology and Oceanography within the East Pacific Region
- New Insights into Structural Geology and Tectonics within the Pacific Region
- New Insights into Neotectonics and Paleoseismology within the Pacific Region
- New Insights into Engineering Geology within the Pacific Region
- New Insights into Hydrogeology within the Pacific Region
- New Insights into Environmental Remediation within the Pacific Region

The First West Coast Student Expo Is A Success!

By Don Clarke, President, Pacific Section, AAPG and
Terry W. Thompson, Chevron North America E&P

The first AAPG-SEG Student Expo was a success. Professor Kathleen Marsaglia coordinated and organized this event at California State University, Northridge on September 25-27, 2008. There were eleven sponsoring companies who sent recruiters to talk with west coast students. The students came from University of California, Santa Cruz. Long Beach State, Cal State LA, Boise State, Cal Tech, Occidental, Oregon State, Penn State, San Diego State, San Francisco State, UC Davis, UCLA, University of Nevada, Reno, University of Oregon and the University of Southern California. Over 50 students participated in the event.

AERA, Occidental, Chevron and Venoco represented California oil producers. Others like ConocoPhillips, ExxonMobil, Hess and Schlumberger sent recruiters from Houston. Their showing was especially appreciated because they came from the hardships caused by Hurricane Ike. BHP Billiton brought recruiters from down under.

Thursday's poster sessions and reception went very well. All were spoiled with chocolate covered strawberries, shrimp and a multitude of other delicious munchies. Friday's field trips showed off the Los Angeles basin and allowed the recruiters time to get to know the students. The evening reception continued the flow of good food. Interviews followed on Saturday. The Pacific Section, AAPG was well represented by Kathy Miller, Cynthia Huggins, Jon Schwalbach, Connie Mongold, Terry Thompson, Don Clarke and others. Our thanks go out to the faculty and staff of CSUN for making this event so successful. I would also like to congratulate the students who got jobs. Well done!

An important objective of the Expo was to provide a venue for students, particularly those from California schools, to learn more about the robust petroleum industry within the state and Pacific Section region. Many students were introduced to careers within our business where foundational and specialized earth science skills could be applied in a high-technology, exciting environment… not to mention high paying. From the perspective of California oil producers, one objective was to attract students who would have a desire to live and work in the state, i.e. Bakersfield! Historically many students have been recruited from institutions in traditional oil centers (Texas, Oklahoma, Louisiana). Quite naturally, many of them gravitate back to their roots. One thought is to increase the number of California-sourced Petroleum Geologists to ensure a long-term supply for our business in the west.

The quality and number of student participants at this first ever West Coast Student Expo was exceptional. I expect that it will grow in size and reputation. I congratulate the faculty, staff, volunteers, field trip leaders, and students who supported the Expo. Above all I wish to thank Dr. Marsaglia. Without her vision, hard work, and enthusiasm this event would not have been possible.

Update on student expos

By Don Clarke, President, Pacific Section, AAPG

I attended the AAPG Student Expos in Houston and Pittsburgh. At Houston there were between 300 and 400 students and dozens of interviewers. The event was a huge success. In Pittsburgh the event was much smaller with about thirty students and about six companies providing interviews. I spoke with many students at each event and all were thrilled with AAPG's effort to connect with them. On a less positive note I learned that nearly all of the Student Chapters for colleges in the Pacific Section were inactive. If your school is in the greater Pacific Section please contact them and encourage them to either reactivate their Student Chapter or start a new Student Chapter.

Eastern Section's Annual Meeting

By Don Clarke, President, Pacific Section, AAPG

The AAPG Eastern Section's Annual meeting was held in conjunction with SPE in Pittsburgh (October 11-15, 2008). The meeting was their most successful meeting ever with over 1300 attendees. Our congratulations go out to General Chairman Patchen and his committee. The middle Devonian Marcellus Shale was the hottest topic at the meeting.

Pacific Section Awardees at the Geological Society of America's Annual Meeting in Houston

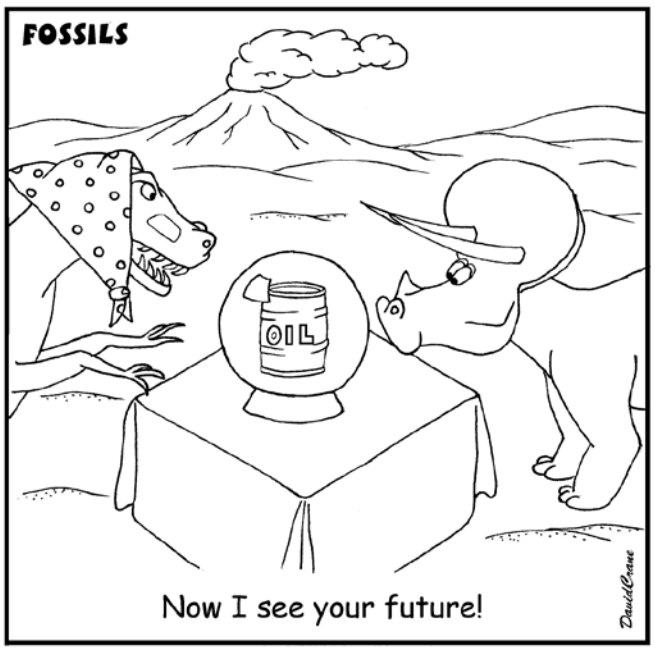
I'm at the Annual Meeting of GSA in Houston, Texas. This has been a good year for California Geologists. Dr. Roy Shlemon won the President's Award for outstanding contribution to GSA. Roy is only the second recipient of this award. Roy who lives in southern California and is a member of the Los Angeles Basin Geologic Society and the Pacific Section, AAPG has dedicated his life to helping others. The Shlemon Mentor Program in Applied Geology has helped over 7000 students meet with 1,700 professionals working in applied geology. Our congratulations go out to Roy! Roy wasn't the only awardee from California. Professor Lisa White of San Francisco State University received the 2008 Bromery Award for the Minorities. Dr. Lorraine Lisiecki, Assistant Professor at the University of California, Santa Barbara received the 2008 Subaru Outstanding Woman in Science Award for her work on the "LR04 stack" that helped with the understanding of paleoclimate data. The GSA 2008 Arthur L. Day Medal went to W. M. Keck Professor Kenneth Farley of the California Institute of Technology for his work in noble gas geochemistry. George A. Thompson, Professor Emeritus, Stanford University received the 2008 Penrose Medal for his work on the role of lithosphere buoyancy in surface elevation, the nature of the lower crust in extended terranes, brittle upper crust deformation and plume tectonics. It was a very nice showing for these California geologists. Our congratulations to each of them.

Roy Shlemon, Barbara Phillips, Elridge and Judy Moores

George A. Thompson and Mary Lou Zobach

Alaska Geological Society

Governor Palin and Joyce Outen (DGGS)
2006 Alaska Miners Conference



Alaska Geological Society

www.alaskageology.org

P. O. Box 101288
Anchorage, AK 99510

Contact: Jim Clough
907.*451.5030*

Luncheon meetings are held monthly September through May, usually on the third Thursday of the month, at the BP Energy Center (1014 Energy Court) from 11:30 a.m. to 1:00 p.m. The hot lunch cost is $20 for members with reservations; $22 for non-members with reservations; and $25 without reservations. The box lunch cost is $13 for members with reservations; $15 for non-members with reservations; and $18 without reservations.For reservations, call the AGS reservation voice mail at 907-258-9059 or contact **David Hite** at hiteconsult@acsalaska.net by noon on Monday before the meeting.

President:	Jim Clough	907.451.5030	Jim.clough at alaska.gov	DNR/DOG
President-Elect:	Tom Homza	907.770.3701	Shell Oil	
Vice-President:	Tom Morahan	907.230.1672	PRA	
Secretary:	Ken Helmold	907.269.8673	Ken.helmold at alaska.gov	DNR/DOG
Treasurer:	David Shafer	907.263.7864	Chevron	
Past-President:	Art Banet	907.334.8241	Arthur.banet at mms.gov	BLM

Coast Geological Society

www.coastgeologicalsociety.org

P. O. Box 3055
Ventura, CA 93006

Contact: Bob Ballog
805.498.6294

Dinner meetings are held monthly September through June, usually on the third Tuesday of the month, at Biedermann Hall at Sacred Heart Church - 10800 Henderson Road in Ventura. Social hour starts at 6:00 p.m., dinner is served at 7:00 p.m., and the talk starts at 8:00 p.m. The cost of dinner is $18 (with reservations), $25 (without reservations), or $10 (students and K-12 teachers); the talk is free. For reservations, please email Christine White at cwhite@dcorllc.com or make reservations online at www.coastgeologicalsociety.org. Reservations should be made by 4:00 p.m. on Friday before the meeting.

President:	Bob Ballog	805.498.6294	president@coastgeologicalsociety.org
Past President:	John Minch	805.682.4711 x137	pastpresident@coastgeologicalsociety.org
Vice President:	Bill Bilodeau	805.493.3264	vicepresident@coastgeologicalsociety.org
Secretary:	Christine White	805.535.2074	secretary@coastgeologicalsociety.org
Treasurer:	Muriel Norton	805.658.1550	treasurer@coastgeologicalsociety.org

Los Angeles Basin Geological Society

www.labgs.org

515 So. Flower Street, Ste 4800
Los Angeles, CA 90071

Contact: Jon Kuespert
213.225.5900 x224

Luncheon meetings are held monthly September and October; and January through June, usually on the fourth Thursday of the month, in the Monarch Room at The Grand at Willow Street Conference Centre (4101 E. Willow Street) in Long Beach. Lunch is served at 11:30 a.m., and the talk starts at 12:15 p.m. The cost is $20 (with reservations), $25 (without reservations), or $0 (students are covered by Halliburton and Schlumberger). Reservations can be made online at www.labgs.org or by contacting **Jon Keuspert** at jkuesper@breitburn.com or (213) 225-5900 ext. 224. Reservations must be made prior to Tuesday before the meeting.

President:	Jon Kuespert	213.225.5900 x224	jkuespert@breitburn.com
Program Chair:	Bill Long	213.225.5900 x205	william.long@breitburn.com
Treasurer:	Jean Kulla	949.500.3095	k2mobile@MSN.com
Secretary/webmaster:	Marieka Gaudet	562.624.3364	Marieke_Gaudet@oxy.com

Northern California Geological Society

www.ncgeolsoc.org

9 Bramblewood Court
Danville, CA 94506-1130

Contact: Barb Matz
Barbara.Matz@shawgrp.com

Evening meetings are held monthly September through May, usually on the last Wednesday of the month, at the Masonic Center (9 Altarinda Road) in Orinda. Social hour starts at 6:30 p.m., and the talk starts at 7:00 p.m. (no dinner). For reservations, leave your name and phone number at (925) 424-3669, or at danday94@pacbell.net before the meeting. Cost is $5 per regular member; $1 per student member; and $1 per K-12 teachers (new!).

Northwest Energy Association

dlgellar@msn.com

P. O. Box 6679
Portland, OR 97228-6679

Contact: James Jackson
503-771-3887

Luncheon meetings are held monthly September through May, usually on the second Friday of the month, at the Multnomah Athletic Club (1849 SW. Salmon Street) in Portland. Meeting time is at 7:30 - 9:00 am. The cost is $15. For information or reservations, contact **Shelley Thomas** at 503-848-2947 or **Treck Cardwell** at 503-226-4211 ext. 4681.

Sacramento Petroleum Association

P. O. Box 571
Sacramento, CA 95812-0571

Contact: Rick Blake
925.422.9910

Luncheon meetings are held monthly January through November, on the third Wednesday of the month. Location to be announced. The meetings starts at noon. The cost is $20. For information or reservations, contact **Pam Ceccarelli** at 916-322-1110 or pceccare@consrv.ca.gov.

President:	Rick Blake	blake2@llnl.gov
Secretary	Pam Ceccarelli	Pam.Ceccarelli@conservation.ca.gov
Treasurer	Pam Ceccarelli	Pam.Ceccarelli@conservation.ca.gov
Editor	Pam Ceccarelli	Pam.Ceccarelli@conservation.ca.gov

San Joaquin Geological Society

www.sjgs.com

P. O. Box 1056
Bakersfield, CA 93302

Contact: Rob Negrini
rnegrini@csub.edu

We have dinner meetings on the second Tuesday of the month at the American Legion Hall at 2020 “H Street” in Bakersfield. There is an icebreaker at 6:00 pm, dinner at 7:00 pm, and a talk at 8:00 pm. Dinner is $20.00 for members with reservations and $25.00 for nonmembers, $25.00 for members without reservations and $30.00 for nonmembers without, and the talks are free.

President:	Kurt Neher	kurt_neher@oxy.com
President-Elect:	Kurt Johnson	kurt_johnson@oxy.com
Vice-President:	Jack Grippi	JGrippi@aeraenergy.com
Secretary:	Anne Draucker	AnneDraucker@chevron.com
Treasurer:	Kelly Blackwood	K.Blackwood@chevron.com

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Newsletter Deadline

January - February Issue

December 20th

- Images (graphics, photos, and scans) must be at least 300 dpi resolution. Text should be scanned at least 600 dpi.
- Scanned photos, illustrations (line art) or logos must be scanned at 300 dpi minimum and saved as a tiff or eps.
- Avoid clip-art and images from the internet. These images are low-resolution (72 dpi).

Photo courtesy of Nick "Redfish" Hawkins, MS '68 PhE

Investing in energy to support education and research

The alumni-managed Stanford Petroleum Investment Funds own, manage, and acquire producing oil and gas royalties and other energy investments. Income from these investments provides essential discretionary funding in support of energy and environmental education and research and other programs of the Stanford School of Earth Sciences.

If you would like to sell or donate producing oil and gas royalties or learn more, visit http://earthsci.stanford.edu/support/pif or call or email David Gordon, Associate Dean, Stanford School of Earth Sciences, at (650) 723-9777 or dsgordon@stanford.edu to see how you can help.

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