

SAN DIEGO ASSOCIATION OF GEOLOGISTS

www.sandiegogeologists.org

SDAG MEETING ANNOUNCEMENT

Wednesday, March 22, 2017

Understanding the Licensure Laws and Responsibilities of the Licensee

*Presented by: **Laurie Racca, PG***

San Diego Earthquake Hazard: Geotechnical Synthesis

*Presented by: **Luke Weidman***

Watershed Runoff and Sediment Resuspension: Factors Affecting Turbidity and Sedimentation in Bays with Coral Reefs, St. John, USVI

*Presented by: **Stephen Campbell***

Archaeointensity Study on Armenian Archaeological Pottery Sherds from ~6000-1000 BCE

*Presented by: **Carlos Anguiano***

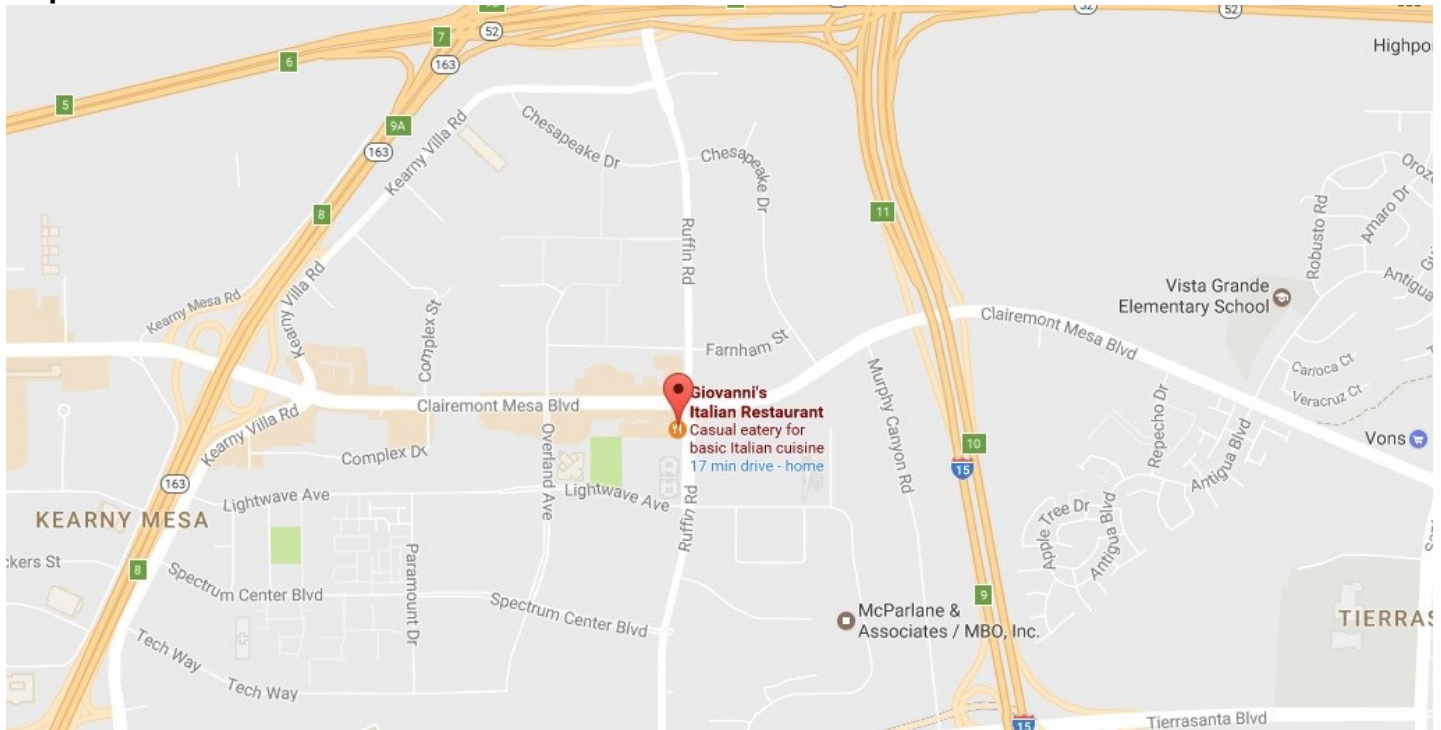
New Geodetic Measurements of Crustal Deformation in Southern California from the Sentinel-1 Mission

*Presented by: **Nick Lau***

- Where:** **Giovanni's Italian Restaurant—Clairemont Mesa**
9353 Clairemont Mesa Blvd, San Diego, CA 92123 (See Map)
- When:** 5:30 pm - Social Hour
6:15 pm - Dinner
7:00 pm - Program
- Dinner:** Pizza-Salad Buffet. Cash bar
- Cost:** \$30 per person, \$5 discount for members, STUDENTS: \$15. Add \$5 if you did not make a reservation.
- Reservations:** Make your reservation **online** at www.sandiegogeologists.org **no later than noon, Monday March 20th**. Reservations cannot be guaranteed after Monday at noon; but are always preferred over walk ins. **EARLY reservations well before the deadline are MUCH appreciated!**
- Directions:** FROM INTERSTATE 15: Take Exit 10 or Clairemont Mesa Blvd west towards Ruffin Road. Make a left onto Ruffin Road and make the first right into the strip mall. The restaurant is visible from the street (see the Map).

FROM HIGHWAY 163: Take exit 8 for Clairemont Mesa Blvd and head east for 0.7 miles. The restaurant is in the strip mall at the intersection of Ruffin Road and Clairemont Mesa Blvd. (see the map)

Map:



ABSTRACTS

Understanding the Licensure Laws and Responsibilities of the Licensee

Presented by: **Laurie Racca, PG**

The California Board for Professional Engineers, Land Surveyors, and Geologists (BPELSG) is charged with safeguarding the life, health, property, and public welfare by regulating the practices of professional engineering, land surveying, geology, and geophysics. Knowledge of the laws and regulations that govern licensed professionals in California is essential to ensuring that critical work is done by qualified professionals.

BSPELG is inviting you to have an informal “round table discussion” focused on the recent changes to the licensing laws and regulations (2017 update), a review of key concepts regarding professional licensure, and the importance of mentoring young professionals. Some of the topics that we will cover include: promoting understanding of the difference between a practice licensing act (such as the PG license) and a title licensing act (such as the CEG or CHG specialty licenses), keeping our licensing tests current with the state of practice by the different licensees, and keeping our procedures and statutory obligations current too. It is our belief that we need more frequent feedback from stakeholders about these issues as well as greater participation by our licensees for activities pursued by the Board that impact our respective futures.

Laurie Racca, PG, is the Senior Registrar for Geology and Geophysics at BSPELG. Her 25+ years of experience includes working in private environmental and geotechnical consulting, providing regulatory agency oversight of large military and civilian environmental cleanups for the Department of Toxic Substances Control, and investigating fraud, waste and abuse as part of the Office of Enforcement at the State Water Resources Control Board.

San Diego Earthquake Hazard: Geotechnical Synthesis

Presented by: **Luke Weidman** (Credit to Jillian Maloney and Tom Rockwell)

With a population of ~1.3 million, the City of San Diego is the third largest city in California, and it is traversed by the Holocene-active Rose Canyon Fault Zone (RCFZ). The Rose Canyon Fault is a strike-slip fault with a slip rate of 1-2 mm/yr and the potential to produce a M6.9 event. This project focuses on the strands of the RCFZ that traverse through the downtown area, which is the economic center of the city. The seismic hazard of the RCFZ has a direct impact on development in and around the city via the Alquist-Priolo Earthquake Fault Zoning Act, which regulates locations of structures for human occupancy. As a result, geotechnical firms in San Diego have been conducting many private, small-scale studies and investigations of the local fault architecture since the 1980s and have amassed an impressive amount of data. However, each report is plot or parcel specific and, at most, will only reference data from neighboring parcels. As there exists no resource where all of the data can be studied at once, reports are commonly studied independently. This project synthesizes the existing geotechnical data into a comprehensive geodatabase in an effort to show the current fault geometry within the city and provide insight to the evolution of the RCFZ.

Historically, geotechnical companies are hesitant to share results of fault studies and field investigations with each other, as the data is proprietary. Recently, however, several geologists and engineers within the professional community have called for a combined resource and many of San Diego's geotechnical firms have contributed data, including Geocon, Kleinfelder, Leighton & Associates, CTE, and URS/AECOM. This project compiles the data as a means to contribute to and improve upon the community fault model and give the city an accurate model for use in updating its seismic safety element. The geodatabase also aids the science community by helping to establish the variety of fault characteristics and complexities along strike, illuminate recurrence intervals or patterns of multi-segment ruptures, and provide evidence for long term slip rate. To date, we have collected over 500 geotechnical reports, and locations of all trenches, borings, and CPT soundings are being compiled in a GIS database.

Watershed Runoff and Sediment Resuspension: Factors Affecting Turbidity and Sedimentation in Bays with Coral Reefs, St. John, USVI

Presented by: **Stephen Campbell** (Credit to Sarah Gray, James Whinney, Carlos Ramos-Scharron, Sean Campbell & Matthew C. LaFevor)

In the US Virgin Islands (USVI), land-based (terrigenous) sedimentation has been identified as a major cause of coral stress. Development, such as the building of unpaved roads in steep coastal watersheds, has increased sediment yields and marine terrigenous sedimentation by up to an order of magnitude above background levels. When ephemeral streams are activated during storm events on St. John, the transport land-based sediment to the marine environment results in the formation of sediment plumes. Once the plumes dissipate and the sediment is deposited on the seafloor, resuspension of benthic sediments can further increase turbidity and deposition. However, isolating the relative contributions of runoff and resuspension to turbidity and deposition using conventional sediment trap monitoring has proven difficult. Here we describe the spatial and temporal variability of marine sediment dynamics in response to runoff and resuspension events in St. John, and compare time-integrated (~26-day) sediment trap monitoring to high-resolution (10-min) nephelometer monitoring approaches. Between late July 2013 and January 2014, nephelometers were deployed beside sediment traps at three reef and five shoreline sites next to ephemeral stream outfalls equipped with a water level sensor (10-min resolution) and peak crest gauges (~13-day resolution). At each instrument site benthic sediment samples were collected every ~26 days. Monthly mean sediment trap accumulation rates and nephelometer data were strongly correlated.

While runoff events resulted in high-magnitude spikes in turbidity and deposition, which were up to 900 and 17,000 times background, respectively, they were short-lived (hours). Resuspension-induced spikes in turbidity and deposition were lower in magnitude but of longer duration (days-weeks), particularly at sites with finer-grained benthic sediments, and were associated with increased wave height during low tides. While the relative contribution of runoff and resuspension to turbidity and deposition were spatially variable between our study sites, overall, resuspension contributed at least 7 times more to turbidity and 3 times more deposition than runoff during the 2013 rainy season. Though previous studies have measured marine sedimentation over months-centuries in St. John, no studies have monitored turbidity or the relative contributions to turbidity and deposition from runoff and resuspension at the time scale of minutes-days. Understanding the relative contribution of runoff vs. resuspension to marine turbidity and deposition is important to effectively manage land-based sedimentation, marine development, as well as evaluate the effectiveness of watershed restoration programs which aim to reduce marine terrigenous sedimentation.

Archaeointensity Study on Armenian Archaeological Pottery Sherds from ~6000-1000 BCE

*Presented by: **Carlos Anguiano***

Documenting the behavior of the ancient geomagnetic field is crucial to understanding the dynamics that occur within the bowels of the Earth, as well as the field's interaction with the biosphere, atmosphere, and solar radiation. This is naturally carried out by magnetic iron bearing minerals that are able to record the intensity and direction of Earth's magnetic field over billions of years. Importantly, such records are retrieved by paleomagnetists who seek to improve the spatial distribution and temporal span of paleointensity data. Compiling new data from different regions and periods is necessary to improve the global database, allowing one to develop new field models essential for studying the geomagnetic field. In this study, archaeological pottery sherds from different sites in Armenia, a region that lacks absolute paleointensity data, were used to determine the intensity of Earth's magnetic field during the Stone Age, Bronze Age, and Iron Age. Specifically, the IZZI protocol, a successful and robust paleointensity experiment was used. This optimal stepwise heating experiment allows one to detect any sort of unreliable data, such as non-ideal behavior caused by alteration and failure of the law of reciprocity. A total of seventy-two specimens, three specimens per sample (twenty-four samples), were subjected to paleointensity experiment, followed by careful assessment using a strict selection criteria. Twenty-four specimens exhibited ideal behavior, which makes us confident of obtaining a number of robust paleointensity data with further study from these sites. Our new results will provide effective constraints on the variation of the geomagnetic field intensity between 6000-1000 BCE within Armenia.

New Geodetic Measurements of Crustal Deformation in Southern California from the Sentinel-1 Mission

*Presented by: **Nick Lau***

The new Sentinel-1 Interferometric Synthetic Aperture Radar (InSAR) mission, launched the European Space Agency in April 2014, demonstrates unprecedented spatial coverage and fine temporal resolution, enabling precise estimation of secular and transient crustal deformation. Interferometric measurements provide a description of the displacements on the Earth's surface relative to the satellite's line of sight. In this study, I process a large data set comprised of interferograms from multiple overlapping descending and ascending InSAR tracks to form a mosaic of displacement measurements covering all of Southern California. We can then isolate low-amplitude

deformation signals by estimating and removing contributions from the ionosphere and troposphere, and compute mean line-of-sight crustal velocities over the two-year period between 2015 and 2017. Average line-of-sight velocities from different InSAR look angles can be combined with independent measurements of horizontal surface velocities obtained from the continuous Global Positioning System (cGPS) network to estimate a three-dimensional velocity field. A complete description of surface motions provided by the combination of these data sets would enhance our understanding of the crustal deformation processes in the seismically active regions of Southern California.

UPCOMING MEETINGS

Meetings are usually held on the 3rd Wednesday of the month but may change to accommodate the speaker and meeting place schedules. Check the SDAG web site for updates.

April 19, 2017	John Minch <u>The Greater Hanshin (Kobi) Earthquake</u>
May 17, 2017	John Wallace and Pat Shires <u>Sycamore-Ranchito Landslide — Santa Barbara</u>
June 21, 2017	Jorge Ledesma <u>Baja California, Mexico</u>

2017 SDAG EXECUTIVE COMMITTEE

PRESIDENT – Rupert Adams, adams@geoconinc.com

VICE PRESIDENT - Chris Livesey, liveseychris@yahoo.com

SECRETARY – Ken Haase, secretary@sandiegogeologists.org

TREASURER – Adam Avakian, adam.avakian@aecom.com

PUBLICATIONS – Lowell Lindsay; *Sunbelt Publications*; Ph: (619) 258-4911, x111; fax:(619) 258-4916; llindsay@sunbeltpub.com

WEBMASTER – Carolyn Glockhoff; *Caro-Lion Enterprises*, Ph: (858) 549-3396; carolyn@caro-lion.com

SDAG PRESIDENT'S CORNER

Greetings SDAG members!

February was another successful month for SDAG, thanks to Wes Danskin, Geoff Cromwell and Scott Rugh who delivered an outstanding presentation at Phil's BBQ for the monthly meeting. They came through again this past weekend, with an excellent OSW at the new USGS well site in Chula Vista, briefing everyone on the details of drilling and installing a 2500 foot multi-stage water monitoring well

March is student presentation month. This year there are four recipients of SDAG scholarships who will be presenting their work at a new venue that I believe we have not used before, at least not for a very long time. In order to get a meeting slot at Giovanni's Italian Restaurant, located at the intersection of Ruffin Road and Clairemont Mesa Blvd., I moved the meeting to March 22, the fourth Wednesday of the month. Also joining us is Laurie Racca from the State Board to give us the latest updates on the professional licensing process. As we have a total of 5 speakers, presentations will begin at 7pm sharp so we can try to wrap up at a reasonable time. Also on the docket will be an announcement on this year's field trip which slated for October, and we hope to have more concrete details in the newsletter for April.

Beyond March, John Minch will be regaling us on the Kobe earthquake in April, John Wallace and Pat Shires will be discussing their work on the Sycamore-Ranchito Landslide in May and Jorge Ledesma will be presenting his paper from last year's field trip guidebook in June. The annual joint meeting with South Coast Geological Society, which this year also includes members of the Southern California chapter of AEG, has been moved to July. The rest of the 2017 calendar is still coalescing, but will definitely include more great speakers and venues.

As always, please feel free to contact me at adams@geoconinc.com if you have questions, suggestions etc. regarding all matters SDAG related. I am particularly interested to hear if anyone has any suggestions for other OSW's. I am working on setting up a tour of a local Tourmaline mine, so please stay tuned for more information, which I should have soon.

I look forward to seeing everyone again on the 22nd at Giovanni's!

Regards,



Rupert Adams PG, CEG | *Sr. Project Geologist/SDAG President*

GEOCON INCORPORATED

6960 Flanders Drive, San Diego, California 92121
P|858.558.6900 ext. 234 M|858.260.1214

adams@geoconinc.com / www.geoconinc.com / [Facebook](#) / [Linkedin](#)

ANNOUNCEMENTS

Call for Papers, Speakers, and Spectators

SDAG Fall 2017 Fieldtrip

San Diego is a county with abundant points of interest. There is active faulting, landslides, great weather, and mountains that over look majestic landscapes. Julian, California encompasses all of these traits and more! The 2017 fieldtrip will focus on points of interest in the region, including gold mining and faulting; however the trip is in the early stages of planning and is subject to change in direction and core focus. Thus, submit your abstracts, articles, and ideas early!

Presentation

Picacho and the Cargo Muchachos

Presented by: Todd Wirths at the Anza-Borrego Desert Natural History Association

Our very own Todd Wirths will be presenting at the ABDNHA Library in Borrego Springs, CA on the evening of Saturday March 4, 2017. The talk will cover Picacho and Cargo Muchachos and highlight the SDAG/Sunbelt published Picacho and The Cargo Muchachos: Gold, Guns, and Geology of Eastern Imperial County, California The talk will take place from 6:30 pm to 7:30 pm.

Visit their webpage for more info: <http://www.abdnha.org/calendar1.htm>

NATURAL DISASTERS

PORTUGAL AND AZORES ISLANDS Geology 303

Applications are now OPEN!

Apply here: sdsu.edu/AztecsAbroad



June 2 – 30, 2017

\$2,640



**Fulfills GE Explorations
Requirement**

**Scholarships
available**



Cost includes

Accommodations, RT airfare Azores-Lisbon,
all excursions, transport within
Portugal/Azores, breakfasts, and 5 group
meals. Price does not include RT US to
Portugal airfare

**Application deadline :
March 15, 2017**

**Dates Abroad: June 2 – June 30
Course dates: June 2 – July 7**

**Information:
mcrawford@mail.sdsu.edu**



**SAN DIEGO STATE
UNIVERSITY**

*College of Sciences
International*

31st Annual Desert Symposium and Field Trip

Eastern California Shear Zone (ECSZ) Changes in Altitude

Symposium: April 14 – 15, 2017

Field Trip: April 16 – 17, 2017 (This year the field trip will return to Desert Studies Center each night)

Share your desert research through an oral presentation or poster. The Desert Symposium is open to research presentations related to any area of desert studies. Students are especially encouraged to present and compete for the Adams Best Student Presentation Awards.

Abstract deadline for presentations is January 20, 2017

Manuscript Deadline for 2017 Symposium Volume is February 20, 2017. Examples of manuscript format can be viewed in the 2016 Symposium volume at:

<http://goo.gl/vBjXbW>

Or see instructions for Authors on the DSD website. Additional information can be found by visiting California State University Fullerton

For expedited updates contact desertstudiescenter@fullerton.edu to join the email distribution list

NEW Interactive Fault Map for San Diego

As part of the update for the San Diego-Tijuana Earthquake Planning Scenario, Working Group No. 1's "Fault Map Subcommittee" has completed the first publicly available bi-national active and potentially active fault map. This interactive GIS map includes the first publicly available active and potentially fault map locations from the City of San Diego. The City of San Diego fault locations and activity of faults are based chiefly on interpretation of information contained in geologic reports by private consultants. The City of San Diego identifies active faults as Holocene ($\leq 11,000$ yr) and potentially active as Quaternary (up to 1.6my). City of San Diego fault investigations are ongoing that may require future revision of this map. This map is not a substitute for a site specific fault investigation. The map also includes an updated fault map layer from the State CGS. CGS suggests users defer to the City of San Diego fault data, where marked, for increased accuracy. The map also integrated the faults south of the border for a bi-national cross border view. You can expand the map legend on the left side to see the fault ages and sources for each layer that can be turned on or off for the map view. You can select from 1 of 12 base maps. You can click on the fault line on the map to see the meta-data source. This map includes the yellow dashed SURFACE FAULT RUPTURE location layer that will be used for the infrastructure, social, and economic impacts and emergency response for the update to the Earthquake Scenario. In addition, active and potentially active fault investigation locations from private companies are planned to be added to this map as a resource. This map is an on-going project and resource as our knowledge increases about local active and potentially active faults.

The link is available at: http://www.sandiegogeologists.org/Faults_map.html

I would like to thank Carolyn Glockhoff for her endless GIS work, Jim Quinn and the City for providing their data and time, Jerry Treiman with CGS for his time preparing the Surface Rupture and providing their new State fault data layer, and Luis Mendoza at CICESE for providing the faults south of the border. Please contact Diane Murbach (dianemurbach@gmail.com), Chair for the SD-TJ Earthquake Scenario Working Group #1 - Earth Science, if you have any questions, or see any errors on this new fault map.

Diane Murbach (619) 865-4333

Engineering Geologist, C.E.G.

www.murbachgeotech.com

Dear members and friends of the EERI San Diego Chapter,

Happy New Year 2017! Our best wishes for this new year!

The Earthquake Engineering Research Institute (EERI) San Diego Chapter, the University of California San Diego (UCSD) Extension and the GeoInstitute San Diego Chapter are organizing the 2nd Workshop on Geotechnical Earthquake Engineering with the topic "Dealing with the Consequences of Liquefaction" on Wednesday-Thursday, March 29-30, 2017 in UCSD campus, San Diego, California. As you may remember, the first workshop in 2014 was a success with almost 300 attendees (<https://sandiego.eeri.org/?p=203>).

The second workshop will honor the lifetime achievements and contributions of Prof. Kenji Ishihara to the field of geotechnical earthquake engineering. An afternoon session of the second day of the workshop (Thursday, March 30, 2017) will be devoted to honor Prof. Ishihara and the session will be hosted by Prof. I.M. Idriss. We will have distinguished speakers from US, Japan, New Zealand, Europe and South America sharing with us their experiences with liquefaction mitigation, recent major earthquakes and highlighting the contributions of Prof. Kenji Ishihara. A one-day short course before the workshop on Tuesday, March 28 is also offered.

We would much appreciate your participation in this workshop and 1-day short course. Registration is available in these webpages <https://sandiego.eeri.org/?p=821> and <https://sandiego.eeri.org/?p=903>

If you have any question, feedback or wish to sponsor this event, please feel free to contact the Chair of the Organizing Committee, Dr. Jorge Meneses, at jmenesesl@gmail.com

Thanks and looking forward to seeing you all in beautiful San Diego,

Jorge

President, EERI San Diego Chapter

See Prof. Kenji Ishihara's profile on the next page.

PROF. KENJI ISHIHARA



Prof. Kenji Ishihara was born in Chiba, Japan in 1934. He started his studies in Civil Engineering at the University of Tokyo, obtaining BS-degree in 1957, MS-degree in 1959, and Ph.D-degree in 1963. During one-year period from 1966 to 1967, he was a Visiting Research Associate at the University of Illinois in Urbana, U.S.A. under the guidance of late Professor R. B. Peck. He has been affiliated with the University of Tokyo since then, taking the position of professorship in geotechnical engineering since 1977. On his retirement from the University of Tokyo in 1995 he took up the position of Professor of Geotechnical Engineering at the Tokyo University of Science and then at Chuo University in 2001.

He served for ISSMFE as secretary of the Japanese National Committee for the period of 7 years between 1970 and 1976 during which time he attended the Executive Committee meeting of ISSMFE in Sydney, 1971 as a voting member representing the Japanese National Society. Since then, he often represented Japan in several Executive Committee Meetings of ISSMFE and those of Asian region. He acted as Vice-President of Asian region of ISSMFE during the period of 1989-1993.

His major research interest covers problems in soil dynamics associated with earthquakes, such as liquefaction of sandy deposits, and seismic stability of slopes and earth structures. He wrote about 250 papers on these subjects.

He has served on various occasions as consultant or adviser to UNESCO projects (Balkan region, India) and UNDP project (Chile, India, Iran). He has participated in the geotechnical investigations of earthquakes worldwide such as those in Romania (1977), Yugoslavia (1979), Chile (1985), Mexico (1985), Ecuador (1986), Soviet Armenia (1988), Soviet Tajik (1989), Philippines (1991) and Iran (1991). He is the author of the book “Fundamentals of Soil Dynamics” (1974) and the textbook “Soil Mechanics” (1988) both in Japanese. He recently published from Oxford Press an English book entitled “Soil Behaviour in Earthquake Geotechnics”

He has received the honor by being assigned on many occasions to deliver lectures worldwide including the theme lecture in the 11th ICSMFE in San Francisco and the 33rd Rankine Lecture of the British Geotechnical Society in 1993. He acted as chairman of the Technical Committee TC4 on Earthquake Geotechnical Engineering in ISSMFE for the two tenures of office from 1985 to 1993. His incessant endeavor in TC4 has led to the periodical holding of the International Conference on Earthquake Geotechnical Engineering of which the first in a series was held in Tokyo in 1995 and the second in Lisbon in 1999. He has also received honor by being awarded the H. B. Seed Gold Medal in 1998 from the American Society of Civil Engineers. For his significant contribution, title of Honorary Doctorate was given to him from Technical University of Bucharest, Romania in 1995 and from Istanbul Technical University, Turkey in 1999. In 2000, he was honored by being bestowed the most prestigious Japan Academy Prize. In 2010, he was elected to Foreign Associate of the United States Academy of Engineering.

In commemoration of his long-time contribution to the profession, the International Conference on Earthquake Geotechnical Engineering held in Istanbul by the efforts of Professors A. Ansal and M. Sakr, published two volumes of selected papers containing major publications by Prof. Kenji Ishihara.

CALL FOR ARTICLES

SDAG invites members to submit articles on their current research or an interesting project they are working on for publication in the monthly newsletter. The article should be no more than 1 page in length. Photos are welcomed; too. Please submit articles to the SDAG secretary via email.

PHOTO OF THE MONTH

A few photos from the trip to the OSW hosted by Wes Danskin at the USGS drill site. If you have a photo you would like to share with SDAG, send them to secretary@sandiegoeologists.org and we'll get them put into the newsletter!



SDAG RESEARCH TOOL

SDAG RESEARCH TOOL - A comprehensive listing of all papers published by SDAG, whether as annual field trip guidebooks or special publications, is now available on our website. Entries are sorted by primary author, or chronologically by date of publication, from our first guidebook in 1972, up the San Luis Rey River in 2013, from Coast to Cactus in 2014, and finally over the edge to the Coyote Mountains in 2015. These can be accessed or downloaded as .pdf files. They are fully searchable in Adobe Reader or Acrobat, so if you are researching a topic, "tsunami" for example, you can search for that keyword. This listing will be updated as new books are published. Thanks to Greg Peterson and Hargis + Associates, Inc., for making this possible. See the links below:

http://www.sandiegoeologists.org/SDAG_Pubs_authors.pdf

http://www.sandiegoeologists.org/SDAG_Pubs_chronological.pdf

REQUEST for 2017 SDAG/SDGS and PUBLICATION SPONSORS

On behalf of the San Diego Geological Society, Inc. (SDGS), a public benefit 501(c)3 nonprofit educational corporation, we would like to request tax deductible Donations for our San Diego Association of Geologists (SDAG) group. The list of paid Sponsors and the forms to become a Sponsor are located on the SDAG web site at: <http://www.sandiegoeologists.org/Sponsors.html>.

Your donation will further the SDGS mission to promote geology and related fields in the greater San Diego region, operating through the San Diego Association of Geologists (SDAG), a committee of SDGS. To achieve our primary educational objective, we organize frequent field trips and maintain a program of monthly meetings featuring speakers on current geological topics. We also publish field trip guidebooks and other publications related to geology and natural history. We encourage scholarship and research by awarding scholarships from the elementary through graduate levels. With your \$100 "EMERALD" donation, your name/business will be listed as a sponsor on the SDAG web site (<http://www.sandiegoeologists.org/>) and in the monthly SDAG meeting newsletters. With your \$500 "RUBY" or \$1,000 or more "DIAMOND" level donation, your business card will also be included on the SDAG web site and in the monthly SDAG meeting newsletters. In addition, as a "\$1,000 or more DIAMOND" level donation you will be presented with a thank you plaque.

Should you have any questions regarding a Sponsorship, please contact our non-profit SDGS Secretary (Diane Murbach) at 619-865-4333.



HARGIS+ASSOCIATES, INC.
HYDROGEOLOGY • ENGINEERING

Hargis + Associates, Inc. is an environmental consulting firm specializing in hydrogeology and engineering. We are headquartered in San Diego, California and have offices in Mesa and Tucson, Arizona. Our practice areas include all aspects of hydrogeology and engineering.

As a client service organization, we pride ourselves in being attentive and efficient in meeting our client's needs and solving their problems. In addition to our technical expertise, communication and responsive coordination are hallmarks of our reputation.

We invite you to explore our website to learn more about our firm and the services we provide. We welcome the opportunity to discuss our consulting expertise directly with you.

Contact: Dr. David R. Hargis



Mobile Geochemistry Inc.

H&P Mobile Geochemistry is an industry-leading provider of environmental lab services. With ten mobile labs and five direct push sampling trucks and unparalleled experience, H&P's repertoire of environmental lab services includes many forms of environmental lab sampling techniques all the way to on site field analysis services. H&P has successfully and accurately performed environmental lab services delivering quality results to our clients for over 16 years.

2470 Impala Dr., Carlsbad, CA 92010
(800) 834-9888

Contact: Louise Adams or Suzie Nawikas



TETRA TECH

complex world | CLEAR SOLUTIONS™

Tetra Tech is a leading provider of consulting, engineering, and technical services worldwide. We are a diverse company, including individuals with expertise in science, research, engineering, construction, and information technology. Our strength is in collectively providing integrated services—delivering the best solutions to meet our clients' needs.

<http://www.tetrattech.com>

Contact: Dave Bloom



Contact: Rupert Adams, CEG

Geocon Incorporated
6960 Flanders Drive, San Diego, CA 92121
P | 858.558.6900

www.geoconinc.com / [Facebook](#) / [Linkedin](#)

*San Diego / Riverside County / Palm Desert / Los Angeles /
Orange County / Bakersfield / Bay Area / Fairfield / Sacramento*



**EXCAVATING,
DEMOLITION, BREAKERS**

Atlas Excavating & Breakers has been providing operated equipment rentals and excavating services to contractors & geologists in San Diego and Riverside counties since 1991. We offer Mini Ex., 4x4 Backhoe & large excavators up to 75,000 pounds. "40 hour Haz Whopper" trained operator. Asphalt/concrete removal & replacement.

Contact: Barry Anderson

760-754-1337



**ENERGETIC
RESPONSIVE**

8(a) / SDB Certified

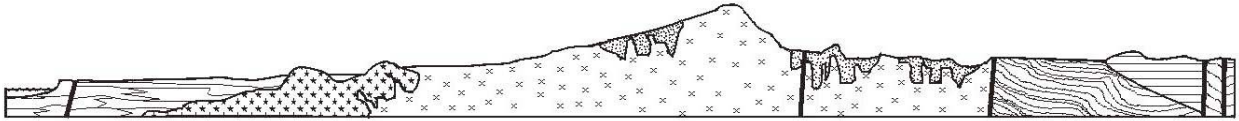
EXPERIENCED

858-275-6454

Trevet is a San Diego-based environmental engineering and consulting 8(a)-certified small business enterprise.

- [Dr. Pat Abbott](#) — SDSU Professor of Geology, Emeritus
- [John Minch](#)
- Marty and Sherry Bloom
- [James R. Ashby/Mission Geoscience, Inc.](#)
- Joe Corones
- Jennifer Morton — [Terramar Environmental](#)
- Greg Cranham — Consulting Geologist
- Monte and Diane Murbach — [Murbach Geotech](#)
- Damon DeYoung — Battelle
- [Pacific Drilling Co.](#)
- Dr. Margaret R. Eggers, CHG — [Eggers Environmental, Inc.](#)
- [Property Matrix—Property Management Software](#)
- Phil Farquharson — [Geology Guy](#)
- Les Reed—Geotechnical Exploration Inc.
- Carolyn Glockhoff — [Caro-Lion Enterprises](#)
- Rothman Creative (Fritz Rothman 619-278-1771)
- Cari Gomes
- Gerald Shiller
- Blayne Hartman — [Hartman Environmental Geoscience](#)
- [Scott Snyder](#)
- Rob Hawk
- [Southwest Geophysics, Inc.](#)
- Tom Lamb
- David and Jan Steller
- [Leighton Group](#)
- Dr. Anne Sturz
- Lowell A. Lindsay & Diana Lindsay — [Sunbelt Publications/AESE](#)
- Mary Walke
- Dr. Monte Marshall—SDSU Prof. of Geology & Geophysics, Emeritus
- Carole L. Ziegler

Add yourself to this list - Sponsors, Corporate Sponsors, and Patrons provide a significant portion of SDGS's and SDAG's operating and scholarship budgets. SDGS is a 501(c)3 public benefit non-profit educational corporation. For more information, please see our Sponsorship Form.



SAN DIEGO ASSOCIATION OF GEOLOGISTS

www.sandiegogeologists.org

2017 MEMBERSHIP FORM

NAME: _____ DATE: _____

Please type or print clearly.

Home Address: _____

Work Address: _____

Please include company, university or other affiliation

Home E-mail Address: _____

Work E-mail Address: _____

NOTE: Your membership dues include delivery of the monthly SDAG newsletter and announcements to the email addresses given.

Phone: Home: _____ Work: _____ Cell: _____

Website: _____

Are you willing to serve as an **officer**? _____ Are you willing to volunteer as a **guest speaker**? _____

Field(s) of Interest: _____

Dues: _____ Student Member (email delivery only) \$ 5.00

(check choice) _____ Regular Member (email delivery only) \$ 25.00

_____ Donation Student Scholarships \$ _____

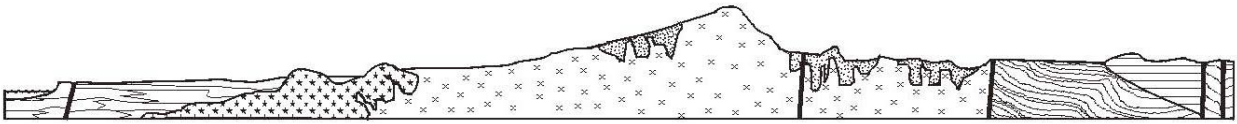
☐ New/Returning Member ☐ Continuing Member

Please enclose a check payable to SDAG, and mail to:

San Diego Association of Geologists (SDAG)

3130 N Evergreen Street

San Diego, CA 92110



SAN DIEGO ASSOCIATION OF GEOLOGISTS 2017 SPONSORSHIP FORM

NAME: _____ DATE: _____
(as you would like it to appear in Newsletter, Website, and Guidebook)

Please type or print clearly, and check ☒ preferred mailing address below.

☐ Residential Address: _____

☐ Office/School Address: _____

Website: _____

Home E-mail Address: _____

Work E-mail Address: _____

NOTE: Your Sponsorship includes a complimentary SDAG membership, and delivery of the monthly SDAG newsletter and announcements to the email addresses given.

Phone: Home: _____ Work: _____ Cell: _____

Donation Level and Consideration:

☐ **EMERALD \$100.00** (In addition to monthly recognition for your contribution, you are entitled to a free Internet "link" from SDAG Website. We also list all Sponsors in any publications printed this year)

☐ **RUBY \$500.00** (In addition to the above, you are entitled to an image of your business card in the monthly newsletter and SDAG Website)

☐ **DIAMOND \$1,000.00** (In addition to the above, you will receive a commemorative plaque in recognition for your most generous support of the organization)

New Member / Donor ☐ Continuing Member ☐ Change of mailing address: ☐

Are you interested to serve as an officer? _____ Willing to volunteer as a guest speaker? _____

Please make check payable to **San Diego Geological Society, Inc., a 501(c)3 public benefit nonprofit educational corporation (in order to claim a tax deduction), and mail to:**

San Diego Geological Society, Inc.
3130 North Evergreen St.
San Diego, California 92110 **Thank you!**

*Donations may also be made
at monthly meetings.*

Revised 12/01/2016