

# SAN DIEGO ASSOCIATION OF GEOLOGISTS

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## SDAG MEETING ANNOUNCEMENT

**WEDNESDAY, APRIL 24, 2013**

### STUDENT SCHOLARSHIP PRESENTATIONS

*Presented by*

**Will Lee**

*University of San Diego*

**Erik Haaker**

*San Diego State University*

**Bobby Harrington**

*University of San Diego*

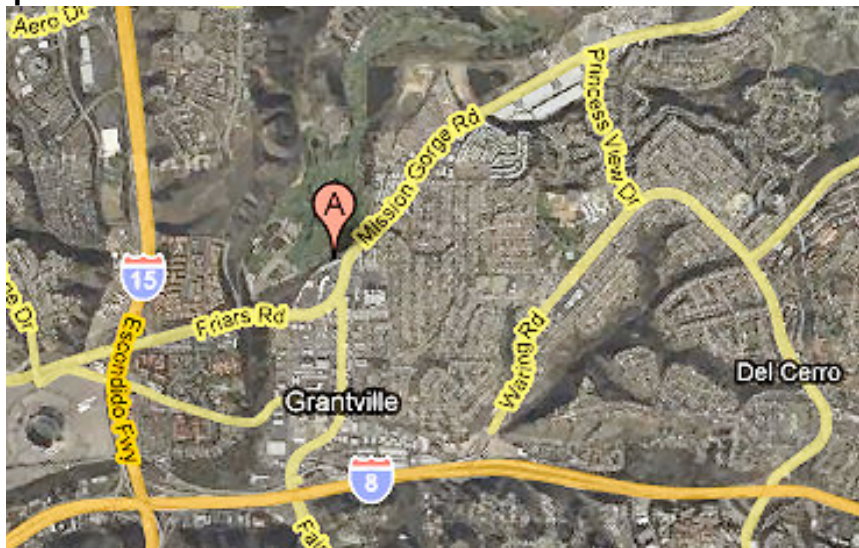
**Where:** **Emiliano's Mexican Restaurant** (Overlooking Admiral Baker Golf Course)  
6690 Mission Gorge Road, San Diego, CA 92120  
(619) 284-2460

**When:** 5:30 pm – Social Hour  
6:30 pm – Dinner  
7:15 pm – Program

**Dinner:** Mexicano fantastico. Beverage station. 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](http://www.sandiegogeologists.org) **no later than noon, Friday, April 19th.**



**RESERVATIONS CANNOT BE GUARANTEED AFTER FRIDAY AT 12 NOON,  
BUT THEY ARE ALWAYS PREFERRED OVER WALK-INS**

## **SPEAKER ABSTRACTS**

**Mr. William Lee**  
*University of San Diego*

### **Bioavailability and Natural Pollution of Heavy Metals Bahia de Magdalena, Baja California, Mexico**

In the pristine environment of Bahia de Magdalena, Baja California, elevated concentrations of heavy metals have been reported in the biota within the bay, such as sea grasses, blue crabs, and marine turtles. While the hypothesized source of these metals has emphasized anthropogenic inputs from a local fish cannery, geologic enrichment of metals from natural ophiolite formations in the Puerto Magdalena region may be an increasingly feasible source. Total (XRF) chromium and nickel concentrations (max 4,450 ppm and 2,396 ppm, respectively) in rock and soil are orders of magnitude higher than average concentrations in the crust and the beach sands directly impacted by waste discharge from the cannery (mean Cr, 55ppm and mean Ni 17ppm at cannery). Bioavailable (HNO<sub>3</sub> acid extracted) metals differ between rock and soil versus cannery-impacted sites. Most notably, Ni is very bioavailable (mean 70% total Ni extracted) in pristine ophiolite areas, but almost completely unavailable at cannery-impacted sites. In contrast, Zn is slightly more bioavailable at the impacted cannery site (mean 55% Zn extracted) than the ophiolite rocks (mean 45% Zn extracted). In addition, these results suggest that while metals, such as Cu, Fe, and Mn, have been previously studied in the biota of the bay, other heavy metals such as Ni and Cr should be included in future biological studies within Bahia de Magdalena.

**Mr. Erik Haaker**  
*San Diego State University*

### **Neotectonic Uplift of Coastal Marine Terraces, San Diego and Orange Counties, CA: Testing the Oceanside Blind Thrust Model**

An active, blind thrust system off coastal San Diego Orange Counties has recently been identified by Rivero et al. (2000), and is believed to be the result of tectonic inversion of Miocene extensional detachment faults. Specifically, the Oceanside blind thrust (OBT), mapped from the U.S. International Border to Laguna Beach using migrated seismic reflection data, is interpreted based on the observation of deformed and folded late Quaternary ocean floor sediments. However, it has not been established whether or not the Oceanside thrust extends onshore, as interpreted by Rivero et al. (2000), or whether it is truncated by the Rose Canyon-Newport Inglewood fault zone (RCNI). An onshore continuation model, where San Diego county rests on the hanging wall of a blind thrust, would significantly increase the maximum potential rupture area for the NIRC/Oceanside thrust system, which in turn would increase the moment magnitude of potential earthquakes and would have significant impact on seismic hazard assessments for areas within and around coastal San Diego County.

Rivero et al. (2000) attributed the uplift of Quaternary marine terraces throughout coastal San Diego County and southern Orange County to be the result of slip on the OBT. Marine Terrace elevations along coastal San Diego County are a function of tectonic uplift and sea level fluctuation through time. The shoreline angle elevations of these marine terraces closely approximate sea levels during the interglacial high-stands responsible for their formation. However, slip on a blind thrust should produce predictable patterns of folding of the terrace sequence that can be quantified with detailed mapping. In contrast, flat-lying terraces, although uplifted, would be better explained by rift-shoulder

uplift, as ascribed by Mueller et al. (2009). In this study, I have remapped the terraces from San Clemente to Oceanside, surveying the paleo-shoreline and terrace remnants with a Trimble GeoXH GPS system, accurate to about 10 cm. Based on this new work, all terraces younger than about a million years appear to be dead flat for the entire length of Camp Pendleton, and their elevations agree well with those documented for terraces between San Diego and Oceanside (Kern and Rockwell, 1992). Based on the observations, it appears that either the OBT is no longer active (past 1 Ma) or that it is truncated by the RCNI fault zone and is likely incapable of generating large magnitude earthquakes. In either case, this is good news for the greater San Diego region.

**Mr. Bobby Harrington**  
*University of San Diego*

**Ridge to reef assessment of metal concentration and mineralogy in rocks and sediments on St. John, U.S. Virgin Islands**

Land development on the island of St. John, US Virgin Islands is increasing terrigenous sediment loads into coastal bays and this is adversely affecting its sensitive, near-shore coral reef systems. Accelerated erosion of by-products originating from igneous bedrock may contribute metal-rich sediment to ephemeral streams and bays around St. John. In order to determine how development is affecting the production and transportation of land-based metals from watersheds to reef environments, we compare the chemistry and mineralogy of bedrock and sediment of both an undeveloped and a developed watershed and their corresponding bays. Both watersheds are comprised of bedrock of similar lithology (Water Island Formation: plagioclase and basalt). Our study objectives are to: 1) determine what metal elements could serve as reliable, stable geochemical tracers to track the transport of land-derived sediments to reefs; 2) document the total change in metal concentrations from in-situ bedrock and sediment along travel paths as the sediment gets transported from the watersheds to the reefs; and 3) estimate erosion rates from active sediment sources and metal accumulation rates within the marine environment.

Whole rock, soil, stream, shore and reef sediment samples were collected from both study areas to represent a ridge to reef progression of material as it is eroded from the bedrock and transported to the reefs. Samples of in-situ rock and sediments were collected by hand, while material representing sediment being eroded from the watersheds and settling in the ephemeral streams and bays was captured by terrestrial and marine sediment traps. Major and trace element concentrations and the mineralogy of rock and sediments were analyzed using X-ray fluorescence, petrography and X-ray diffraction.

Analyses of bedrock samples reveal mineral and elemental compositions typical of basalt and plagioclase. In hydrothermally altered bedrock Ba and K concentrations elevated above non-hydrothermally altered bedrock are detected. A chemical weathering index of bedrock and adjacent C and B soil horizons suggests that some major elements, such as Ca, K and Na, are chemically weathering from bedrock and soils. However, some major and trace elements that derive from terrigenous sources (FeO, Al<sub>2</sub>O<sub>3</sub>, TiO<sub>2</sub>, Cu, Zr) resist chemical weathering and are transported to the shore and reef within eroded terrestrial sediment. The concentrations of these metals in marine trap sediments are strongly correlated with percent terrigenous material ( $R^2 = 0.80 - 0.94$ ,  $p < 0.0001$ ). This suggests these elements can be used as tracers for sediment derived from terrestrial environments. Watershed terrestrial metals concentrations do not show a consistent pattern of change from ridge to reef, but are generally higher in the watershed than the shore and reef sites. Higher concentrations (5 to 50 times higher depending on the element) of terrigenous derived metals are detected below the developed watershed compared to the undeveloped watershed. These data support previous research showing higher rates of terrigenous sedimentation in the marine environments of

developed bays. These geochemical data will be compared to a watershed-scale erosion analysis of both study areas to quantify metal flux rates in this type of sub-tropical island system.

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## **SPEAKER BIOS**

**Mr. William Lee** is currently a senior at the University of San Diego studying Environmental Studies and Chemistry. He is originally from Honolulu, Hawaii, but has lived in San Diego for the past four years studying, working, and conducting research. Last summer, he worked with Dr. Bethany O’Shea examining the mobility of heavy metals in various geo-matrices from Magdalena Bay, Mexico. In addition to academic work, William also enjoys traveling, surfing, reading, meditating, and constantly trying new things. His future plan is oriented towards a career path that combines medicine, environmental science, and public health in underdeveloped areas of the world.

**Mr. Erik Haaker** received his B.S. in geology with an emphasis in engineering at San Diego State University in the spring of 2012. Currently earning his M.S. in geology, working under Dr. Thomas Rockwell, Erik has coursework centered on his pursuit of a career in geology and geotechnical engineering in which he has 3.5 years of experience. His current academic pursuits involve coursework in geotechnical/earthquake engineering, hydrogeology/geochemistry, geomorphology, and paleoseismology. His current thesis work revolves around testing for the presence and/or activity of an unconfirmed seismic source, the Oceanside Blind Thrust, underneath the coastal zone of San Diego and southern Orange counties by studying the morphology of uplifted marine terraces spanning the coastline. In addition to his professional and academic pursuits, Mr. Haaker enjoys hiking, mountain biking, backpacking, and anything having to with the outdoors.

**Mr. Robert Harrington** was born and raised in Maine. After high school, he served in the U.S. Navy for six years. Upon leaving the military, Robert attended The University of Maine where he received his B.S. degree in Earth Science. He then moved to San Diego where he started his M.S. in marine science at the University of San Diego with Dr. Sarah Gray in 2010. His thesis work is a ridge to reef assessment of mineralogy and chemistry of soils and bedrock, which show links between bay sediments and their watershed source of origin. He plans to defend his thesis this summer, and find employment as an environmental consultant or laboratory technician.



## SDAG MEETING SCHEDULE - Mark Your Calendars!

Meetings are usually on the 3<sup>rd</sup> Wednesday of the month but may change to accommodate speaker and meeting place schedules. Check here for updates.

May 15 <sup>th</sup> , 2013	<b>Jonathan Goodmacher - GSA Expedition to the Scotia Arc and Antarctic Peninsula</b>
June 19 <sup>th</sup> , 2013	<b>Pat Abbot (Joint Meeting with SCGS)</b>
July 17 <sup>th</sup> , 2013	<b>Jill Krezoski - Mars</b>



### 2013 EXECUTIVE COMMITTEE

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## **PRESIDENT'S CORNER**

Hi Everyone:

Spring has sprung, and I hope you all are having a wonderful season!

Last month's meeting featured a wonderful and much anticipated presentation by Dr. Mario Caputo on eolian sedimentology at the beautiful Bali Hai. Thank you for Dr. Caputo for making time to speak to us!

This month we have our traditional student presentations. We have the three recipients of our yearly scholarships lined up to speak to us about their projects at the ever-popular Emeliano's. I hope to see you all there!

Cari Gomes  
2013 SDAG President



## **ANNOUNCEMENTS**

**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.

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**CALL FOR PHOTOS!** SDAG invites members to submit photographs of an interesting geologic feature for publication in a new section of the newsletter – “Photo of the Month”. Please submit your photo along with a caption to the SDAG secretary via email.

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**SDAG MEMEBERS FEATURED IN DEZERT MAGAZINE** Check out the Winter 2013 issue of Dezert Magazine - available online as well as in print - to see articles by SDAG notables Todd Wirths ("Picacho, the Golden Road", page 64) and Diana Lindsay ("Hike Palo Verde Canyon to the Moly Mine", page 80). Go to <http://dezertmagazine.com/dezert-magazine-archives/>

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**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 (40 years ago ) to all things Picacho in 2011. 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:

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## **JOB OPENINGS**

**EXPERIENCED CHEMIST FOR DATA REVIEW** H&P is looking for an experienced analytical chemist for a part time position to review analytical data reports. The position requires a complete understanding of EPA Methods and other regulatory methodology in compliance with Quality Assurance Programs and SOP's to validate and review data for accuracy. Experience and working knowledge of LIMS Systems will also be required. This position is located in our Carlsbad, CA office.

This chemist will perform a comprehensive review of all analytical data generated by the various testing methods in our fixed base and mobile analytical laboratories and will confirm that all quality assurance objectives have been met prior to releasing analytical data to clients and end user of the data to ensure it's quality as well as support all facets of the data review process.

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- A working knowledge of EPA Method 8260B, TO-15 and other EPA Methods
- Experience with LIMS system.

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michele.luna@handpmsg.com or fax resume to 760-804-9159.



## **SEEKING JOB OPPORTUNITIES**

**Qualifications Summary and Objective:** I have 14 years experience directing surface water quality monitoring programs with a proven record of excelling in monitoring plan implementation, quality control, public notification and continuous improvement in operational effectiveness and efficiency. I have built and maintained relationships with key staff in academia, industry, and all levels of government in San Diego and California. I have a widely applicable skill set which includes: analytical thinking, communication and writing skills, data analysis and management, inter and intra-agency project coordination, and staff supervision and training. My objective is to obtain a career position with an industry leader where I can contribute my skills to build the success of my employer as well grow professionally. Detailed work experience, education and more at [www.linkedin.com/in/cbclifton2010](http://www.linkedin.com/in/cbclifton2010). Email [cbc2006@cox.net](mailto:cbc2006@cox.net) or 619-964-1776.

Contact: Clay Clifton

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**ENGINEERING GEOLOGIST-** California PG, MS Geology, over 13 years of applied geotechnical experience, proficient in geotechnical investigations, hazard evaluations, geophysical surveys, construction management and quality control, engineering analyses, special interest in earthquake-hazard and seismic design related applications, strong problem-solving and organizational skills. Detailed resume upon request: Anna, 201-407-7461, [Afyodorova103@gmail.com](mailto:Afyodorova103@gmail.com)

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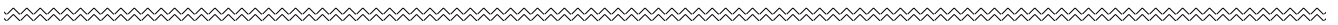
**ENTRY-LEVEL ENVIRONMENTAL SCIENTIST** - I am a recent UCSB graduate with a double major in Environmental Studies (BS) and Geology (BS, Earth Systems emphasis) who is looking to begin a career in environmental consulting. I have prior lab experience in both professional and academic settings. I am looking to establish myself with a passionate and hard working environmental firm in the San Diego region. For further information about my credentials and work experience please contact Georgi Chertkov at [georgichertkov@gmail.com](mailto:georgichertkov@gmail.com) or call me at 505-412-3107.

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