

# SAN DIEGO ASSOCIATION OF GEOLOGISTS

[www.sandiegogeologists.org](http://www.sandiegogeologists.org)

## SDAG MEETING ANNOUNCEMENT

**WEDNESDAY, August 20, 2014**

### **A Tale of Two Shields, The Canadian and Baltic Shields - Their Archean Rocks, Tectonic History, Beautiful Landscapes, and Melting Ice Sheets**

*Presented by:*

Dr. Monte Marshall  
Professor Emeritus, SDSU

**Where:** **Catalina Room (Southern end of MVCC) See Map on Page 2**

Marina Village Conference Center

1936 Quivira Way, San Diego, CA 92109

**When:** 5:30 pm – Social Hour

6:30 pm – Dinner

7:30 pm – Program

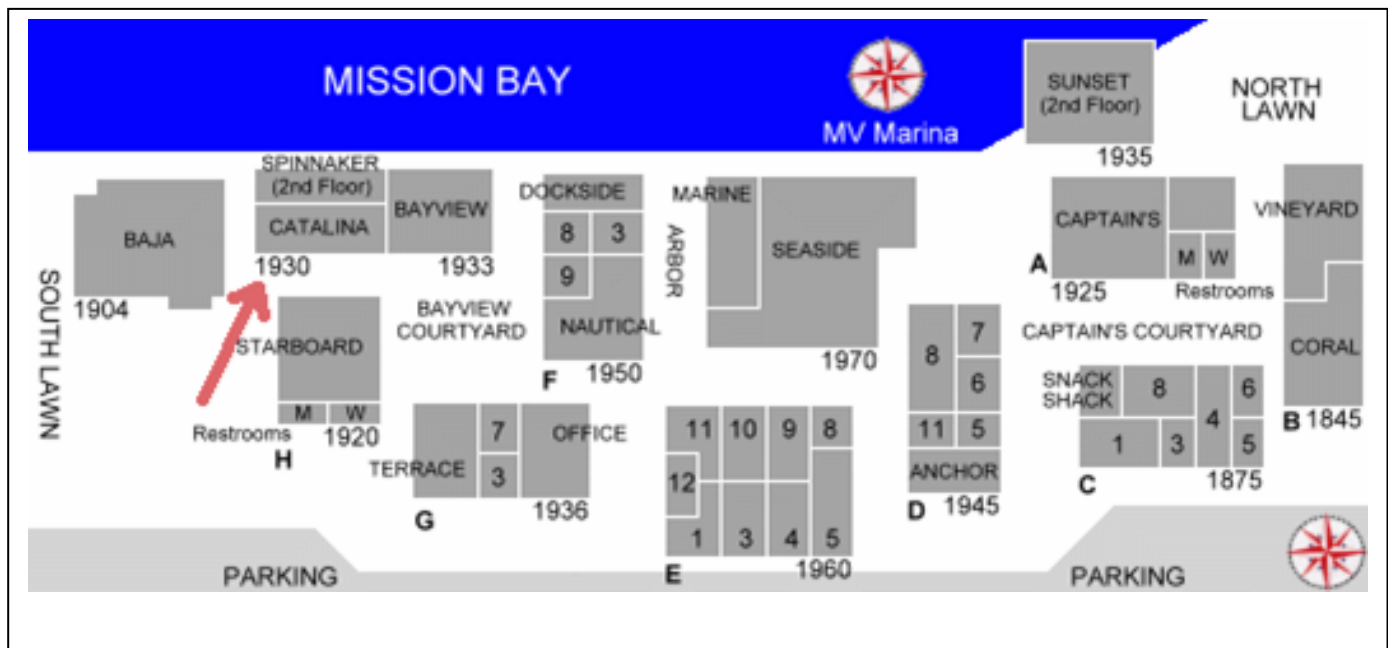
**Directions:** FROM INTERSTATE 5: Take the SEA WORLD DRIVE exit. From SEA WORLD DRIVE, take WEST MISSION BAY DRIVE on your right. When you see the large green sign that says QUIVIRA ROAD, get in the farthest left of the two left turn lanes. Turn left, go one very short block and turn left again. Drive about one half mile and MARINA VILLAGE will be on your right.

FROM INTERSTATE 8: Take the WEST MISSION BAY DRIVE exit to the right. You will be on INGRAHAM STREET for a short distance from which you will take the next exit marked WEST MISSION BAY DRIVE on your right. When you see the large green sign that says QUIVIRA ROAD, get in the farthest left of the two left turn lanes. Turn left, go one very short block and turn left again. Drive about one half mile and MARINA VILLAGE will be on your right.

**Dinner:** Hawaiian Buffet (Teriyaki Pork Ribs and Chicken, Vegetarian Stir Fry, etc). Beverage Station, Dessert, Cash Only Bar (aka the Walawender Tavern)

**Cost:** \$30 per person, \$5 discount for members, STUDENTS and PROFESSORS: \$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, Monday, August 18th. Reservations well in advance of the deadline are MUCH appreciated.



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

## **ABSTRACT**

With increasingly good geochemical and paleomagnetic data and zircon age dating, our understanding of the evolution of continents and supercontinents has greatly expanded in recent decades. About 80 % of continental crust was created in the Precambrian, and every continent has patches of Archean crust that are sutured together with crust that was created in Proterozoic orogenies. Because they are cooler and have thicker lithospheric mantles than the younger crust, these areas are stronger and less deformable and are called cratons. Any Phanerozoic sedimentary rocks deposited on them are usually fairly flat lying. Regions of the cratons where the Precambrian igneous and metamorphic rocks are exposed at the surface are called shields.

One of the largest and best exposed shields is the Canadian Shield. It extends from the famed Northwest Passage down to the Great Lakes and from west of Hudson Bay to almost all of the coastal/exposed areas of Greenland. Across the Atlantic lies another shield, the Baltic Shield. It is exposed in northern Norway, Sweden, Finland, and in very northwestern Russia between St. Petersburg and the Arctic Ocean. The Baltic Shield is no stranger to North America and the Canadian Shield. It lay next to Greenland in the paleogeographic reconstruction of all three past supercontinents—Pangea, Rodinia, and Nuna/Columbia. Greenland itself is really part of North America. Based on the linear marine magnetic anomalies, the step-wise opening of the North Atlantic during the breakup of Pangea was somewhat complicated. Greenland only rifted from Baffin Island and Labrador during the interval 90 Ma--40 Ma. The Labrador Sea and Baffin Bay were created in those 50 My. At 55 Ma some spreading between Greenland and Northern Europe began and by 40 Ma the current North Atlantic spreading center was firmly established.

The oldest rocks found so far in the Baltic Shield are 3.5-3.7 Ga granitic orthogneisses. The largest and best preserved region of early Archean continental crust in the world is the Itsaq Gneiss Complex in Greenland and contains rocks dated at 3.8-3.9 Ga. However, the oldest rocks on earth, found to date, are the Acasta Gneiss found near Great Slave Lake in the Northwest Territory of Canada and dated at 4.0 Ga. As you might expect, we have the Canadian Shield to thank for the oldest rocks in the United States. Just before it dives under the Paleozoic sedimentary rocks in SW

Minnesota, the shield contains gneisses dated at 3.5 Ga! There are only 25 to 30 places in all the world's shields that are known to contain Paleoproterozoic (3200-3600 Ma) or older rocks!

Finally, a few words about the beautiful blue-green ice that remains in the far north of the Canadian Shield area. The ice cap that covers 98% of Greenland and reaches a thickness of two miles in its center contains about 10 percent of the earth's fresh water. Antarctica has most of the rest. The velocity of the ice flowing out of some of the fjords has increased greatly in the last century. Jakobshavn, on the southwest coast, is its most prolific iceberg producer—it probably produced the iceberg that sank the Titanic. When we approached, so much ice was entering the sea that our icebreaker couldn't enter the harbor! But Baffin Island, which was probably covered with ice a few thousand years ago, now has only a few isolated ice caps that feed small glaciers that flow down to the sea. The Arctic is warming more quickly than the Antarctic and ironically the number of tourists (who, in part, want "to see the ice before it melts") is also increasing rapidly! Ships burn a lot of fuel. I have visited parts of these areas in recent years and will show you the landscape, largely fashioned by the recent Ice Age, and vegetative cover—tundra in the far north and stunted forests (taiga) to the south. You will see polar bears and killer whales frolicking at the bow of our ice breaker. And you will see what some of the oldest rocks in the world look like. For the most part they are gneisses and their foliation is often flat-lying, but at times is contorted into folds whose wavelengths range from centimeters to entire hill sides. The dark rocks are often laced with bands of beautiful pink granite that has either been intruded as veins or formed in place as migmatites. One of the most moving moments for me was when I stood on the western edge of Greenland's ice cap, now a hundred miles inland from the Labrador Sea, and visualized how much ice had melted in just a few thousand years, and how much more the ice cap may continue to shrink in years to come!

## **SPEAKER BIO**

Those of you who have read my recent articles or attended my recent talks, know that I have become interested in deep space and deep time in my declining years. So, I've decided to write this biography in that vein!

I was born on a sunny Sunday morning in April, in Mercy Hospital, San Diego. But I had birth complications and the physicians had to use tongs to pull my head out first. My mother told me that she cried when she saw my somewhat misshapen head laced with tongue bruise marks! I doubt that she realized that my birth trauma was partially due to the most important anatomical change in hominid evolution—the five-fold increase in the size of our brains/skulls, since we split from chimpanzees about 7 million years ago! Since that day, advances in biology, especially molecular biology and genetics, new fossil finds in Africa, and much more accurate geochronology have opened amazing chapters in our evolution.

By 4 Ma a group of African apes, the Australopithecines (Remember Lucy?) began to use their hind limbs less for tree climbing and more for walking. Around 3 Ma the first hominids of our genus appeared, *Homo habilis*. They were full-time bipedals, made primitive stone tools, and began losing much of their body hair. There have been some 20 species of *Homo* and those extant at 1.5 Ma had learned the controlled use of fire, made more sophisticated stone tools, and developed black skin since they no longer had much fur to protect them from the sun. At about 200 ka, a species, *Homo sapiens*, appeared in the forests and grasslands of Africa that had an anatomy very similar to ours. In fact, the study of mitochondrial DNA has shown that everyone on earth today is the descendant of one *Homo sapiens* woman, called the "mitochondrial Eve"! Successive innovations in culture and lifestyle and a change in the climate of northern Africa led to waves of migration out of northeast Africa and up into Europe and Asia at 60 ka. But the wonder doesn't end here!

Anthropologists had been finding the bones of other hominids mixed with those of our ancestors in caves in Europe and Asia. In Europe it was Neanderthal man and in the Middle East it was the Denisovans. Since they were considered a different species, and therefore mating should only produce at most a single generation of sterile hybrids, their disappearance shortly after 'we' arrived was assumed to be their elimination/genocide by our 'superior' technology and intelligence. More modern research and genetics suggests that our merging was more peaceful—AND that everyone on earth, except the sub-Saharan Africans, have 1-5 % Neanderthal genes and as-yet-not-precisely quantified percentage of Denisovan genes! The National Geographic/IBM have collected and analyzed the DNA of 500,000 people all over the world (including MM). Wouldn't my mother be surprised to learn that her poor, bruised baby was two percent Neanderthal, about three percent Denisovan, and that our early African ancestors spent some time in the Middle East, then pulled up stakes and moved to NW Europe, Ireland, and the British Isles about 10 thousand years ago! And....., as they say, the rest is history :>) - *Montek the Terrible*

## SDAG MEETING SCHEDULE

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

|                    |   |
|--------------------|---|
| September 17, 2014 | Jill Krezoski – The Mineralogy of Mars  |
| October 2014       | Field Trip!!! (Announcement Coming SOON)  |
| November 19, 2014  | Vic Camp – Mid-Miocene Flood-Basalt Volcanism in the Columbia River Province, Mantle Upwelling and Basin and Range Extension. |

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## PRESIDENT'S CORNER

Greetings SDAG! With my sincerest apologies to those who toughed it out at our sideways July meeting I would like to provide a apropos quotation. Although it has been paraphrased many times by others, it is Spanish born, Harvard educated George Santayana who gets credit for:

*“Those who cannot remember the past are condemned to repeat it”*

I looked it up and found an entertaining corollary from Kurt Vonnegut:

*“I’ve got news for Mr. Santayana: we’re doomed to repeat the past no matter what.  
That’s what it is to be alive.”*

So it is August 1<sup>st</sup>, and I’m still alive! I’ll keep this particular corner short and sweet, as to not steal much thunder from what may be one of the most creative Speaker Biography and Talk Abstracts pasted into a newsletter in a long while. Maybe not since the last time Dr. Monte Marshall gave a San Diego Association of Geologists talk at least.

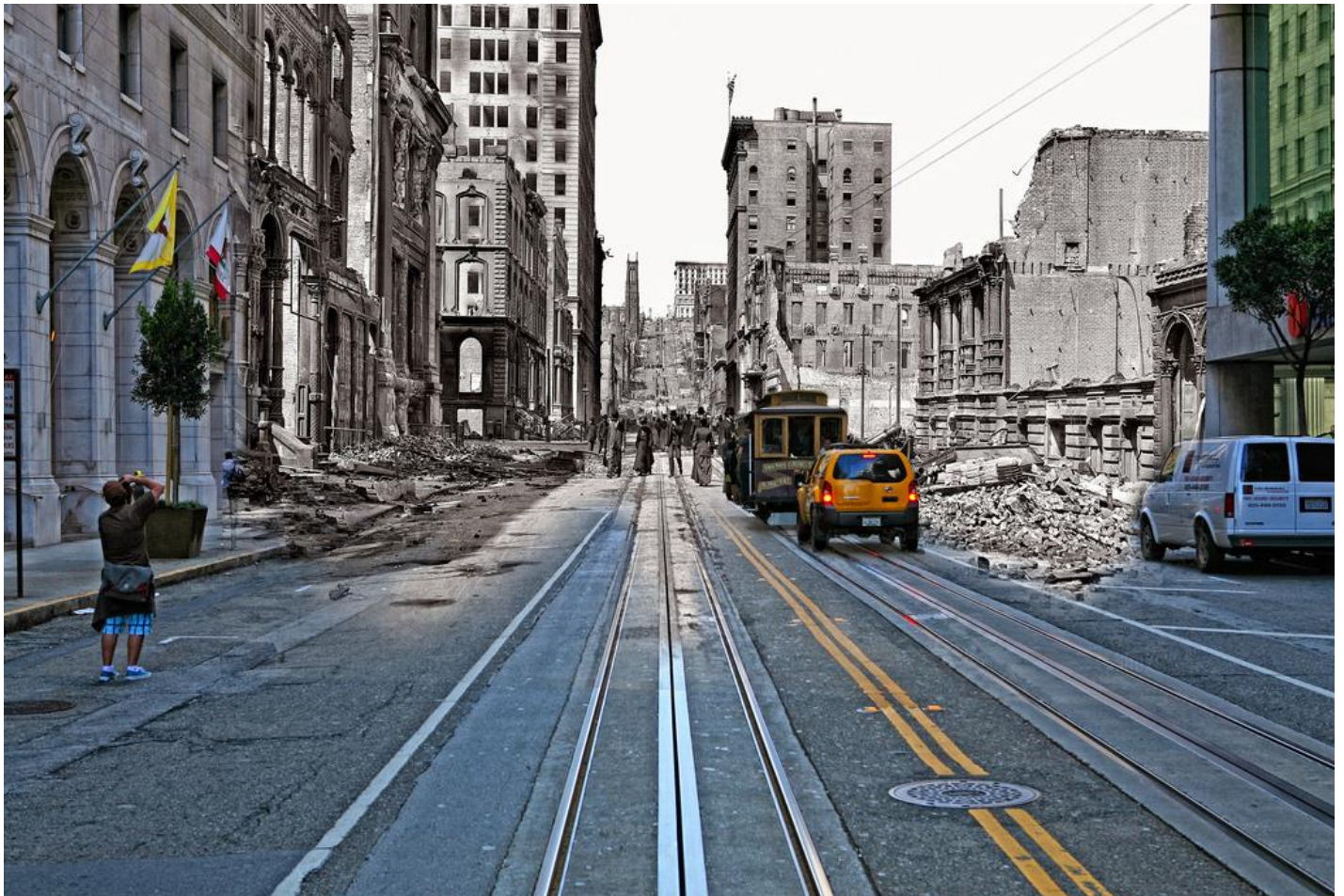
Brian J. Olson  
2014 SDAG President

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# Geology Photo of the Month

*Fade to 1906*  
*The San Francisco 1906 Earthquake ???*  
by  
Shawn Clover



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# **ANNOUNCEMENTS**

## **SDAG 2014 FIELD TRIP**

### **“Traversing a Transform Boundary – Regional Tectonics, San Diego to the Salton Trough” October 10 – 12, 2014**

On this field trip we will explore the interaction of the major faults of Southern California to accommodate for motion between the Pacific and North American Plates. We will consider the tectonic evolution of the region and observe resulting landforms.

More information on the field trip to follow!

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**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 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, through the Palms to the Pines, and finally up the San Luis Rey River in 2013. 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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## ANNOUNCEMENTS (con't)

### Geology Books for Sale

Local geologist has a large collection of historic books for sale on coastal geology, sedimentology, marine geology, and oceanography, many of which are out of print. If interested, please email the SDAG VP for contact information [geologyjen@yahoo.com](mailto:geologyjen@yahoo.com)

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THE GEOLOGICAL SOCIETY  
OF AMERICA®

The 2014 GSA Annual Meeting will be held from October 19th to the 22nd, 2014  
in Vancouver, BC Canada at the Vancouver Convention Centre

Information on the meeting can be found at  
<http://community.geosociety.org/gsa2014/home/>

The Abstract Deadline is: 29 July 2014  
Registration Deadline is: 15 September 2014

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for future reference:  
The 2015 GSA Annual Meeting will be November 1 - 4, 2015  
in Baltimore, MD, at the Baltimore Convention Center

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## **ICE COLD GOLD SEASON 2**

The first season of **ICE COLD GOLD** was but a glimpse of Greenland's power and potential. This season, the threats and rewards are multiplied. Nothing about Greenland is implied; a new world is about to be defined. In the ruby-packed second season of **ICE COLD GOLD**, our spirited team of American miners returns to the most remote mining location on the planet with its eyes on a prize. With possibly the world's largest ruby in the Arctic glinting within reach, Sixty Degree Resources stretches the logistical challenge of



returning to its deposit to life-threatening, thin extremes. In Greenland, some of the rules remain the same. The window to the mining season is tight, and with no roads within thousands of miles, Sixty Degree Resources must travel to the most remote mining region in the world by boat and helicopter to reach its deposit. Then, the team must sling in thousands of pounds of heavy-duty mining equipment to get the job done. Nearly killing themselves for what they believe, these ballsy American miners bare all their emotions in chapter two of this life-threatening journey. The odds are stacked against them - with time being their worst enemy - as they face 24-hour sunlight, massive glaciers, unknown wildlife and remote, uncharted territories no American miner ever has set foot on before.

*See Ice Cold Gold Thursdays at 10:00 pm on Animal Planet*

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## **Request for Sponsors: 2014 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 at our San Diego Association of Geologists (SDAG). The list of paid Sponsors and the forms to become a Sponsor are located on the SDAG web site at: <http://www.sandiegogeologists.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.sandiegogeologists.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.

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