



# SDAG

## *President's Corner*

Hello SDAG Members!

Hope you are all happy and healthy!

A big thank you to everyone that attended the meeting last month. Especially Tracy Sizemore, who exceeded expectations and we are grateful for his effort! What a cool talk. We were also able to raise approximately \$150 for the Walawender fund!

This month we welcome Monte Marshall back to the SDAG stage!

There isn't much I can say to our membership about Monte that isn't already canon. The man has been a part of San Diego geology since graduating with his bachelors in 1966 (his second, by the way). He is a prolific writer who's publishing history includes a multitude of academic papers, journals, and field trip guide books.

I hope everybody joins us this month to hear Monte speak on:

**"The Earth's Magnetic Field – Now, and Thanks to Paleomagnetism, In the Past".**

Our Vice President, John Teasely, will be at the helm this month as I am off to Vietnam!

Everybody be nice to him.

Please don't forget to fill out and send in your membership forms  
(and sponsorship forms, too)!

Cheers,

Luke Weidman

President, 2023



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## Meeting Announcement

**DATE:** Wednesday February 22nd 2023

**TIME:**

**6:00 PM** - HAPPY HOUR  
**6:45 PM** - DINNER - MEXICAN BUFFET  
**7:45 PM** - ANNOUNCEMENTS  
**8:00 PM** - MEETING BEGINS  
**9:00 PM** - MEETING ADJOURNS



**LOCATION:** CASA GUADALAJARA - OLD TOWN

**MEMBERS:** \$45.00 **NONMEMBERS:** \$50.00 **STUDENTS:** \$30.00

**IMPORTANT:**

- **REGISTRATION** will **CLOSE** on Monday at 12 PM so that we can give the restaurant our final count by Monday at 2 PM.
- **WALK- INS** are still welcome but you will need to order from the restaurant menu if you would like dinner.
- **CANCELLATIONS:** If you would like to cancel, pls do so by Monday at 12 PM. Please keep in mind that we still need to pay for confirmed no shows.
- **LATE CANCELLATIONS** I will try my best to sell it to a walk-in ( assuming we have any) but this is not guaranteed. If we are unable to transfer, we ask that you still pay for your reservation so it does not come out of SDAG Funds.



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*Title:* **THE EARTH'S MAGNETIC FIELD-- NOW AND, THANKS TO PALEOMAGNETISM, IN THE PAST**

*Abstract:* Of the three forces we encounter in everyday life--gravity, electricity, and magnetism, magnetism is probably the most complicated. A single particle will have a gravity field, whose lines of force extend radially outward. A single charged particle will have an electric field with the same shape. But if the charge is moving, or even spinning, it will generate a magnetic field whose shape/force lines are much more complicated. If a charged particle spins or moves in a circle it causes the simplest magnetic field, a dipole, with north and south poles. And the force lines arc between the two poles. There is no such thing as a magnetic monopole.

In the first part of this talk we will examine the current dipolar shape of the geomagnetic field and the interaction of electric currents with the convection cells of the liquid iron in the outer core that cause it. We will see that the current geomagnetic field isn't a perfect dipole, that its axis doesn't coincide with the earth's rotation axis, and that compass directions change on almost a yearly basis.

The second part of the talk will deal with the nuts and bolts of paleomagnetism. As the name suggests, this is the branch of geophysics that attempts to learn the shape, intensity, and changes of the geomagnetic field long before the first compass was invented. Like most everything in geology, the evidence/record lies in the rocks! The direction and intensity of ancient geomagnetic fields can be recorded by certain magnetic minerals in a rock, especially magnetite and hematite. But the magnetic record in a rock can have an overprint or be completely erased, e.g., if a magnetite crystal rusts or the rock is near a lightning stroke. And the process of erasing overprints isn't simple and sometimes the



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primary magnetism can't be separated from a later remagnetization. The last part will describe the most spectacular and consequential features of the geomagnetic field—its polarity reversals. The north and south magnetic poles switch places. If that happened now, compasses would point south. This change takes only about 10,000 years, and during the switch the field strength decreases to about one tenth of its normal value, and they occur at random. This last feature of the reversals proved to be critical for proving seafloor spreading and for their current use in dating rocks.

During the Tertiary the average interval between reversals was about 200,000 years, but some polarity intervals lasted for only a few tens of thousands years, while other intervals lasted for a million years. The last geomagnetic reversal was about 800,000 years ago. During the sixties a combination of paleomagnetic measurements and K-Ar dating established the time intervals when the field was normal, like now, and when it was reversed (when compasses would have pointed south). The geomagnetic reversals and their timing were at first only of interest to the handful of scientists studying the earth's core. But in 1969 they were essential in proving that continental drift/seafloor spreading was real, and that ushered in the era of plate tectonics! The proof of seafloor spreading was the exact match between the geomagnetic reversal time scale and the pattern of unusual linear magnetic anomalies in the world's oceans. A few oceanographers had been mapping them for some years, but, like the reversal time scale, they were initially considered to be of minor importance! Oceanic spreading centers, like the mid-Atlantic Ridge and the east Pacific rise, are like two-headed tape recorders. As the basaltic lava that erupts in their central valley solidifies, it becomes magnetized in the direction of the ambient geomagnetic field, whether normal or reverse. As the two sides of the ridge or rise move away from one another, the pattern of normal and reversed oceanic crust on one side is the mirror image of that on the other side. Because the geomagnetic reversals are random, the pattern of the linear oceanic magnetic anomalies is exactly like a bar-code.







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When ship-towed magnetometers are over normally magnetized crust, the magnetic field of the crust reinforces the geomagnetic field and causes a positive magnetic anomaly, and vice-versa.

The last contribution of paleomagnetism to be discussed is its use in determining the latitude and azimuthal orientation of the place where the sampled rocks formed/got magnetized.

## *Speaker Biography*



### **MONTE MARSHALL**

Professor, Emeritus, of Geology and Geophysics  
San Diego State University

I'm a fourth generation San Diegan and was born in Mercy Hospital. I attended Villanova University, in the suburbs of Philadelphia, where I majored in philosophy and minored in astronomy and got my bachelor's degree in 1961. Upon returning to San Diego, I enrolled at San Diego State as an astronomy major, but was lured into geology by a charismatic geology professor. I received my second bachelor's degree in geology and geophysics in 1966.

I did my senior thesis under a professor at Scripps on the paleomagnetism of some sandstones in the Transverse Ranges. I started my PhD studies at Stanford in geology and geophysics in 1966 and, after two years of course work, I did my research on the magnetic properties of seafloor basalts. Allan Cox, who was one of the 'fathers' of paleomagnetism, was my advisor. I am probably one of the few people still alive who sat in a large auditorium



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## *Speaker Biography*

at an AGU convention on a December day in 1969 and watched a series of talks that conclusively proved that seafloor spreading/plate tectonics was real!

We looked at one another and knew that we had just experienced a revolution in earth science! After graduating in 1971, I continued my paleomagnetic research at the USGS paleomag lab in Menlo Park. I really wanted to teach and so, after 6 months of biking around western Europe, I joined the SDSU geology department in 1975. My main courses were geophysics, structural and petroleum geology, and paleomagnetism and plate tectonics.



With my students I conducted paleomagnetic studies in southern California and gravity studies of the faults in metropolitan San Diego. I had three sabbatical years—in France, Russia, and the Czech Republic. I retired in 2004.

My academic life has continued by giving geology talks (the locally most memorable was a series of “what neat geology did Monte see on his last international trip?” )

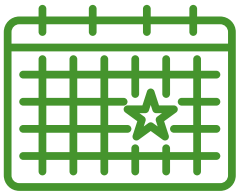
I teach the Natural History Museum’s docents and hiking guides geology every year. And, I have written many papers for our field trip guidebooks. I am just finishing a paper on the geology of the White-Inyo Mountains for the guidebook on our trip to the Owens Valley--our last trip before the covid shutdown.



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*Mark your Calendar!*

Our next meeting will be **IN PERSON** and will take place on: **WEDNESDAY, APRIL 19th.**

## *Executive Committee*

**PRESIDENT:** Luke Weidman.

lcweidman@gmail.com

**VICE-PRESIDENT:** John Teasley

jtea@cox.net

**SECRETARY:** Mariana Aguilar

petishu@gmail.com

**TREASURER:** Neil Seitz

neilseitz@hotmail.com

Aventurine  
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reaping the  
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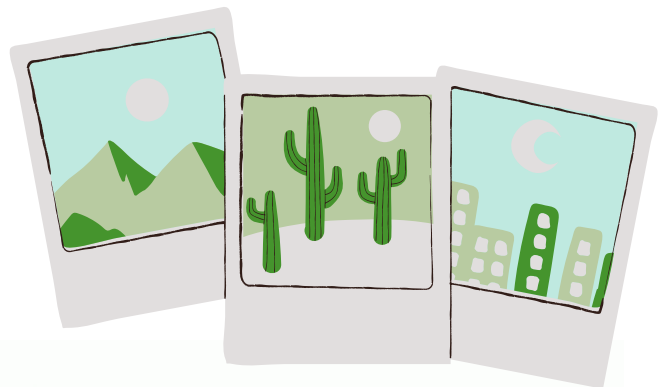


## *Call for Photos*

Any recent field tips or exciting outings?

SHOW OFF YOUR PICTURES!

Please Submit to: petishu@gmail.com



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## ***2023 MEMBERSHIPS***



It is that time of the year again! Time to renew our SDAG Memberships.

We ask that you take the time to renew your membership for 2023 and if you have not renewed it in a while, this is a great time to resume!

We have made it even easier for you to renew! - now you can fill the form on our website and submit payment electronically! So, if you are anything like me (hardly ever make it to the mailbox) this just makes it so convenient!

If you prefer to to renew with a check, there are 2 ways:

1. We will have forms at the check in table at our next meeting.
2. You can download the form using the link below and mail it or bring it to the meeting.

Your membership dues help fund scholarships, publications and, on occasion, cover some of the cost of the meetings. Your contributions are so important to us !

PLEASE RENEW.

**ELECTRONIC MEMBERSHIP RENEWAL**

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## Research Tool

A comprehensive listing of all papers published by SDAG, whether as annual field trip guidebooks or special publications, is available on our website.

Entries are sorted by primary author, or chronologically by date of publication, starting with our first guidebook in 1972 out to Calico and the Mojave Desert, and finally up to the San Diego's Back Country in 2022.

The papers can be accessed or downloaded as .pdf files. They are fully searchable in Adobe Reader or Acrobat, so if you are researching a topic, "oikocryst" for example, you can search for that keyword. This listing will be updated as new books are published. Thanks to Greg Cranham and Hargis + Associates, Inc., for making this possible. See the links below:

**[SEARCH BY AUTHOR](#)**

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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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## ***SDAG PUBLICATIONS***



We have many wonderful publications available for sale!

Please visit the **SDAG WEBSITE** for more details.

## *Sponsorships*

San Diego Geological Society, Inc. (SDGS), is a public benefit 501(c)3 nonprofit educational corporation. Your donations are tax deductible.

Your Sponsorship will include a complimentary SDAG membership, and delivery of the monthly SDAG newsletter and announcements to the email address given.

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.

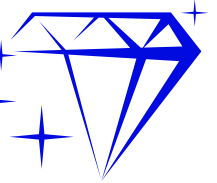
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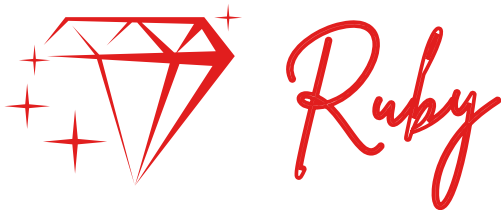


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- Sherry & Marty Bloom
- Joel R. Bryant – San Diego Elder Abuse Attorney
- Dr. Vic Camp
- Larry Cann
- Joe Corones
- Greg Cranham – Consulting Geologist
- Dawson & Rosenthal, P.C.
- Doan Law Firm
- Dr. Margaret R. Eggers, CHG - Eggers Environmental, Inc.
- Estey & Bomberger, LLP
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