



## SAN DIEGO ASSOCIATION OF GEOLOGISTS

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

### *SDAG MEETING ANNOUNCEMENT*

*WEDNESDAY March-17th-2021*

6:00 PM - Happy Hour

7:00 PM - Meeting Begins

*\*\*\* VIRTUAL MEETING \*\*\**

*Join Zoom Meeting*

[https://us02web.zoom.us/j/  
85798184239?](https://us02web.zoom.us/j/85798184239?)

[pwd=SHI4S3FIRTVVV1hQM0pJekZ  
1MUxZdz09](https://us02web.zoom.us/j/85798184239?pwd=SHI4S3FIRTVVV1hQM0pJekZ1MUxZdz09)

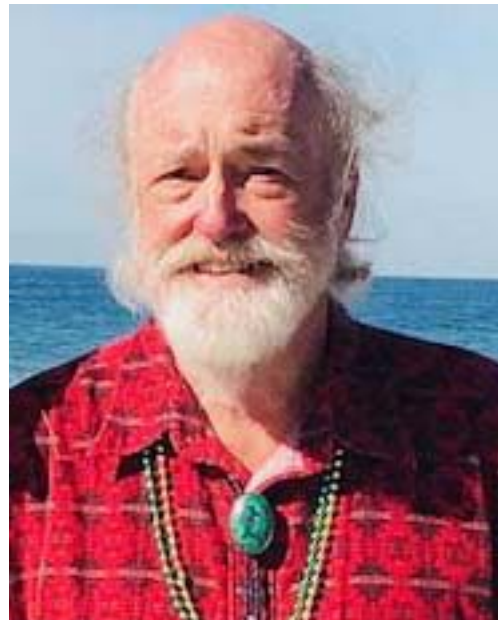
Meeting ID: 857 9818 4239

Passcode: 461844

*Note:*

The same link will be used for all  
2021 meetings  
Hosted by SDAG

**TITLE: Sediment Transport in the  
San Francisco Bay Estuarine System**



**Barry Keller PhD, PG CHD**



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San Francisco Bay is a well known scenic attraction in California, and particularly well known is Golden Gate Bridge. San Francisco Bay is also the outlet of Sacramento River, including its major tributary, San Joaquin River, with discharge to the ocean at Golden Gate. Geologically, the very large drainage area of these rivers includes plutonic and volcanic rocks of the Sierra Nevada and southern Cascade ranges and Franciscan formation and Cretaceous to Tertiary sedimentary rocks of the Coast Ranges. In the area of San Francisco Bay and Peninsula, three crustal structural blocks are separated by strike slip faults: an eastern East Bay Hills block, east of the Hayward fault, San Francisco Bay block, between Hayward fault and San Andreas fault, and Salinian block west of San Andreas fault. Both the eastern and western blocks have Tertiary marine sedimentary rocks overlying older basement, while the central block has only Plio-Pleistocene sediments over Franciscan basement.

All of these geologic areas in the large drainage are source areas for unconsolidated sediment in the estuary. In addition to deposition inside the Bay, an arcuate ebb tidal delta sand bar, called San Francisco Bar, is deposited on the ocean floor west of Golden Gate. Volumetrically, the fresh water flow of the rivers is normally miniscule compared to tidal flows from the ocean through Golden Gate, with tidal water level fluctuations extending nominally to the "I" Street bridge in downtown Sacramento. Sand to be sold for construction use is dredged from central San Francisco and has historically also been mined near Carquinez Strait. I have consulted with the sand mining companies regarding the sand deposits and regarding discharges of sand washing water (to lower chloride for use in reinforced concrete) to the Bay. Twenty or thirty years ago, extreme erosion of south Ocean Beach on the ocean coast of San Francisco prompted concern that sand mining might cause this erosion. My study of the lithologic character of the sand in various locations throughout the region indicated that this was not the case. In fact, much of the sand in the mining areas of Central San Francisco Bay is derived from the vicinity of Golden Gate itself, transported by inward flowing tidal currents, deposited as a flood tidal delta, while the south Ocean Beach sands is eroded from nearby cliffs.

### ABSTRACT



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### ABSTRACT (Continued...)

In Quaternary time, sea level fluctuations resulted in the San Francisco Bay alternating between being a marine estuary, as at present, and an on-land river canyon. Sediment deposition, as documented in borings for Bay bridge construction, included intervals of both marine and non-marine conditions. The lowest sea level stand, at the Last Glacial Maximum (LGM - about 17ka) was approximately 120 m lower than at present. This is also the depth of the deepest part of the channel at Golden Gate, so that apparently was the bed of Sacramento River. However, farther offshore, the bottom is much shallower, with the sea floor covered by younger sediment (including San Francisco Bar), and the depth of -120 m is not reached again until west of the Farallon Islands. This suggests that there must be a buried paleo channel on the sea floor, but it has never been located.

In spite of the missing paleo river channel, there is a great amount of seismic reflection data regarding the sediment-covered sea floor off Golden Gate, which is crossed by strands of the San Andreas fault system, and is believed to be the approximate epicenter of the 1906 earthquake. One interesting feature is a Holocene graben about 100 m deep between NNW trending fault strands, under the northern part of San Francisco Bar.

### SPEAKER BIO

#### *Our Very Own Berry Keller PhD, PG CHG*

Dr. Keller was born in San Diego, and has lived most of his life in California, with intervening stints in Washington State, France, and Chile. He has a BS in geology from Caltech, MS in geophysics from University of Washington, and PhD in geophysics from UCSB. His PhD topic was seismic and gravity modeling of the Santa Barbara area. He currently works as a consulting hydrogeologist, and for many years was on the Board of Water Commissioners of the City of Santa Barbara. He has worked for several years for commercial sand miners in San Francisco Bay and Monterey Bay. Dr. Keller also works frequently on environmental studies in Chile.



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*Did you miss last month's meeting? No Problem!!!*

Please **CLICK HERE** to watch a recording of last month's meeting. **PSWD: ^DK2UW0=**

**PLEASE NOTE:**

The recording starts at the beginning of Norrie Robbin's talk:

**Origin of Our Redbeds:**

Pigmentation by Chembiotic Oxidation of Detrital Magnetite in Red Brown Pleistocene Terrace Sandstones, San Diego, CA.

**REPLAY!**

**UPCOMING  
EVENTS**

*Next Meeting:* **Wednesday, April 21st 2021**

\*\*\*Meetings are usually held on the 3<sup>rd</sup> Wednesday of the month. This may change to accommodate the speaker and meeting place schedules. Please check the [SDAG website](http://www.sandiegogeologists.org) for updates.

**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.

**SDAG  
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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, starting with our first guidebook in 1972, from Coast to Cactus in 2014, and finally on the Julian 'Road to Gold' in 2017. 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, "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:

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### *PRESIDENT'S CORNER*

Hello SDAG Members!

Many thanks to all of the kind folks that attended last month's meeting. I was so happy to see so many familiar faces attend, but even more so to see the many new ones come and show their support for Norrie Robbins. Thanks again, Norrie, for a very cool talk! Similar to last month, we recorded the meeting and the link to the video is provided in this newsletter. We will also post the link to our website.

As always, a brief reminder to fill out and send in your 2021 memberships and, if you have the reserves, 2021 sponsorships. Keep an eye on your emails this month; we should have upcoming information for One Stop Wonders and this year's Field Trip!

This month's meeting brings our own Barry Keller to talk about sediment transport within San Francisco Bay's estuarine system. I am very excited for this one. When taking classes, sedimentology was immediately interesting to me (thanks, Mario Caputo) because of its direct evidence of old, or even ancient, environments and habitats. Now that I work in geotech, sands and silts have taken on a more litigious context. Thankfully, lawsuits against sand and silt never make it to court. Sediment always settles!

Cheers,

Luke Weidman

### *2021 EXECUTIVE COMMITTEE*

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*Any recent field trips or exciting outings?*  
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**PHOTO SUBMISSIONS**

**BIG THANKS** to all who shared the photos below!

**GLEN FOSS**

ZION, N.P.





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## *GLEN FOSS*

BRYCE CANYON, N.P.



## *JOHN TEASLEY*

TUFF HUNTING ON THE  
BRADSHAW TRAIL WITH  
JOE CORONES & JOE  
WALSH.

JAN/22-25/2021







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*JOHN TEASLEY*

FIELD RECONNAISSANCE  
TRIP TO SEARCH FOR  
THE EXTENT OF THE  
PEACH SPRINGS TUFF  
AND THE LAWLOR TUFF  
ARRANGED BY  
JOE CORONES.

JAN/22-25/2021

... "THAT WAS WHEN A  
BIG STORM HIT  
SOUTHERN CALIFORNIA,  
AND YES, WE GOT IT  
TOO!"...







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*BOB STROH*

GOOSENECKS STATE PARK, UTAH  
APGR FIELD TRIP IN SOUTHERN UTAH/SAN JUAN RIVER.  
SEPTEMBER 2020



*MARIANA AGUILAR*

PETRIFIED FOREST N.P.  
SEPTEMBER 2020





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### Request for 2021 SDAG/SDGS 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.

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.

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Sponsors as well as information on how to become a Sponsor are located on the SDAG web site at:

<http://www.sandiegogeologists.org/Sponsors.html>.

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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