

# SAN DIEGO ASSOCIATION OF GEOLOGISTS

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

## SDAG MEETING ANNOUNCEMENT

**WEDNESDAY  
JAN/19/2022**

**6:30 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?)

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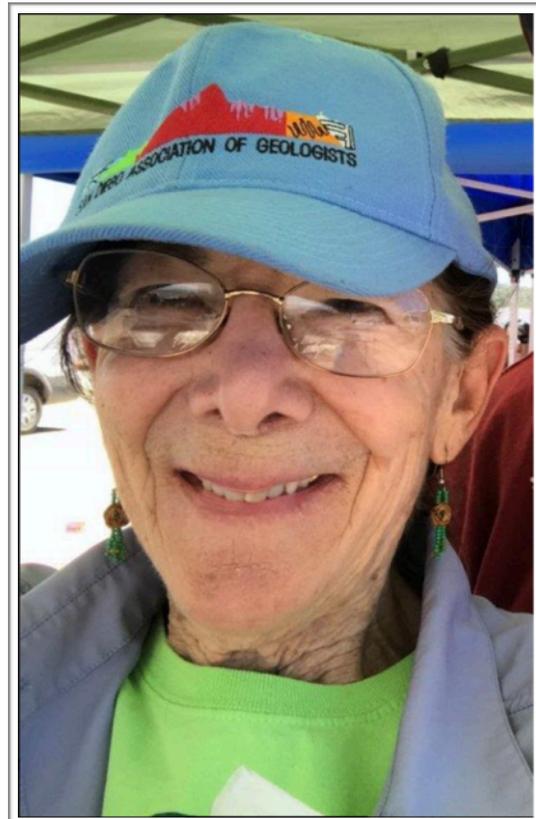
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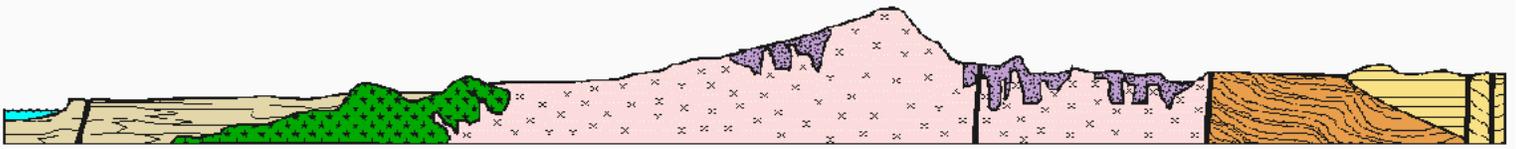
**TITLE:**

Extending the Busch-Miller (2016) Hypothesis: Acid Rain from K-Pg Bolide Impact Chemically Altered Exposed Igneous Rocks in San Diego County

**BY:**

**Eleanora (Norrie) Robbins, PhD**  
USGS - Retired / SDSU - Retired





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### ABSTRACT

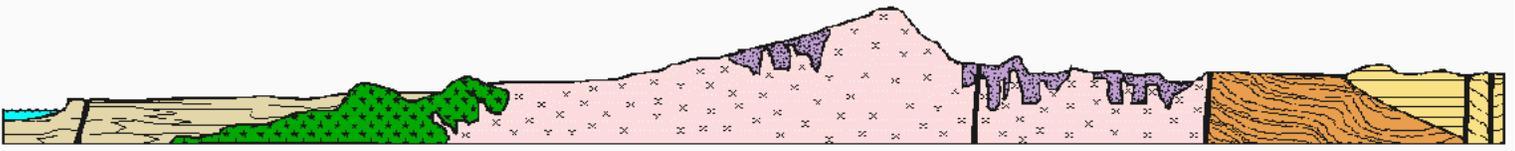
Busch and Miller (2016) recognized that Paleocene sediments in California are characterized by the presence of kaolinite. They hypothesized that the K-Pg bolide that impacted anhydrite beds in Yucatan created worldwide acid rain, resulting in intense weathering of exposed rocks and sediments, thus forming kaolinite. They assessed kaolinite in the Simi Conglomerate, Silverado and Goler Formations, and the basal units of the Lone, Walker, and Maniobra Formations. Their hypothesis suggests that kaolinite may provide a good search image for the boundary.

The K-Pg event has been identified in 107 sites (so far) around the world. The sites in San Diego County where the K-Pg might be encountered are the Lusardi Fm in places like Poway, Alpine, Carlsbad, 4S Ranch, as well as Mission Trails Regional Park and Camp Pendleton.

Working on Camp Pendleton in 2012, Andy Pigniolo, Greg Cranham, Bill Elliott, and I published our study of the Piedra de Lumbre chert (PDL) in the SDAG 'Waiting for Tsunami' guidebook. The chert and its enclosing 'porcellanite' have clasts of quartz that makes this unit archeologically distinct. While the PDL was a hot spring deposit, there still isn't a great explanation for the presence of the distinctive scattered quartz clasts. This unit, indurated by silica, sits on the Late Cretaceous Williams Fm. Neither chemistry nor clay mineralogy of the porcellanite have been analyzed, but kaolinite is a possibility.

The Lusardi Fm is turning out to present another silica mystery. The Lusardi has no fossils and sits directly on granitic rocks of the Late Cretaceous Peninsular Range Batholith (PRB). In Alpine and Poway, the outcrops are so sinuous that it has been easy to explain them as fluvial, even though there are giant boulders in the otherwise arkosic sandstone; Peterson (1971) defined these Lusardi beds as having been created in very fast flowing turbulent rivers. Torrential rainfall and mudflows could account for these. The rainfall has been estimated to have lasted between a few months to a few years. That sounds like enough water to have moved boulders creating the Lusardi Fm, which is then potentially a deposit of the aftermath of the K-Pg impact. Other outcrops in Carlsbad and 4S Ranch are more discrete in their distribution and could have been formed by mass wasting events.

Our current study is one of reconnaissance of the Lusardi Fm. The boulders are PRB granitics and Santiago Peak Volcanics (SPV) andesite. Boulders, cobbles, and pebbles have distinct white weathering rims, some of which resemble the porcellanite at Camp Pendleton. Neither chemistry nor clay mineralogy have been assessed yet, but kaolinite is a possibility.



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### ABSTRACT (CONTINUED)

The Lusardi Fm contains clasts that are easy to mistake for flint. Indeed, 'pawii' is the Kumeyaay word for arrowhead, flint, and chert, and the source of the name of the City of Poway. These clasts are siliceous, flow-banded, and black. The rock type is so distinct in archaeological lithic assemblages that it has its own designation, 'Lusardi Fm Volcanic.' Outcrops of the obvious source of this finely crenulated flow-banded SPV welded tuff were pointed out by Monte Marshall on the 2020 SDAG field trip up Iron Mt., about 6 km due east of our Poway study site.

The idea that the K-Pg was a time of intense acid rain that kaolinitized the rocks sitting at the surface at that time is so intriguing that our study is focused on being a test of this hypothesis. Someone with XRD and clay mineralogy expertise or desire to become an expert is needed to advance the research.

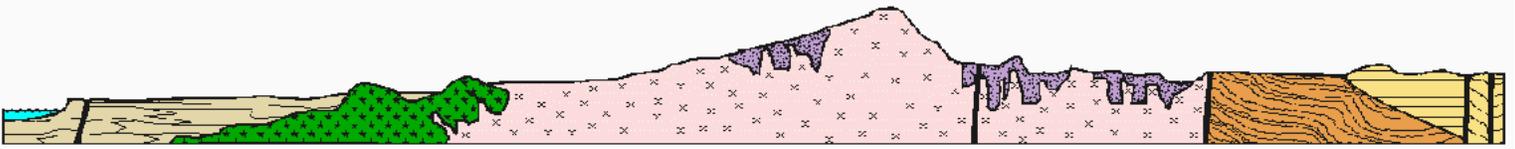
### SPEAKER BIO

### Our Very Own Eleanora (Norrie) Robbins !!!

Eleanora (Norrie) Robbins, PhD, is a economic biogeologist (palynology and geomicrobiology) retired from the USGS (1967-2001) and SDSU (2001-2015). Norrie started her geological career with the Tanzania Geological Survey (1964-1966) as a Peace Corps Volunteer. For her vacation in 1965, she volunteered as a field mapper for Louis Leakey at the Olorgesailie prehistoric hand-axe site in Kenya, thereby learning how useful geologists can be to archaeologists.

### 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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## PRESIDENT'S CORNER

Hello SDAG Members!

Happy New Year! I hope all are well and sticking to their resolutions!

Many thanks to everybody that came out in person to attended last month's meeting! It was a special one with SDAG turning 50 and all. A very big thank you to Dr. Tom Demere for providing us with support and a wonderful talk.

Unfortunately for the meeting this month we are back in on Zoom.

Buuut, fortunately we have our very own Norrie Robbbins speaking! Last November we had Larry Busch and Russ Miller come and talk about their thesis on the Lusardi Formation and its potential importance. Well, it seems Norrie taken with the idea and she is very excited to present her analysis of the Lusardi Formation.

So, join us on the 19<sup>th</sup> and show Norrie some love!

Cheers,

Luke Weidman

## 2022 EXECUTIVE COMMITTEE

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[lcweidman@gmail.com](mailto:lcweidman@gmail.com)

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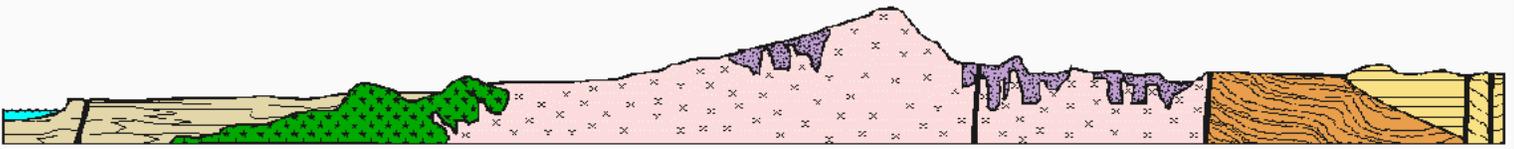
**TREASURER:**

Mariana Aguilar  
[petishu@gmail.com](mailto:petishu@gmail.com)

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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 in 2018, and finally up to the Temecula wine country for a return visit in 2020. 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.

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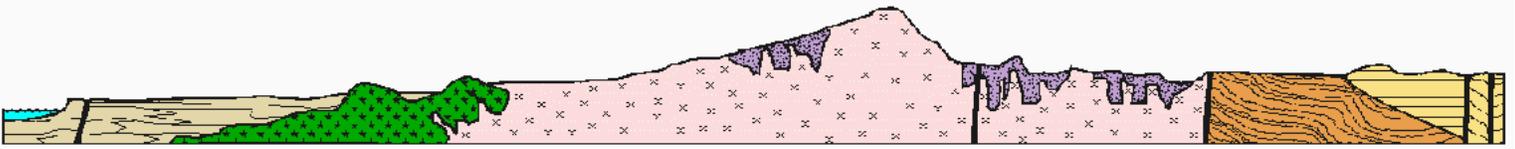
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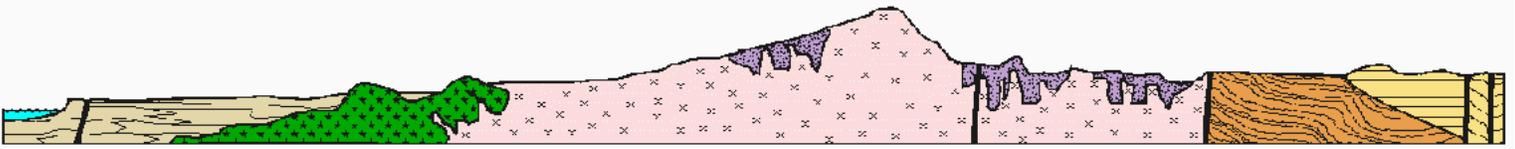
Athena Catanzaro

[athenacatanzaro@gmail.com](mailto:athenacatanzaro@gmail.com)

**A COUPLE PHOTOS  
FROM  
THE APRG  
DESERT RATS  
MOGOLLON RIM  
TRIP IN  
NOVEMBER**

**BY:  
JOHN TEASLY**





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