SAN DIEGO ASSOCIATION OF GEOLOGISTS

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SDAG MEETING ANNOUNCEMENT

WEDNESDAY July 21st

6:30 PM - Happy Hour
7:00 PM - Meeting Begins

*** VIRTUAL MEETING ***

Join Zoom Meeting

https://us02web.zoom.us/j/85798184239?pwd=SHl4S3FlRTVVV1hQM0pJekZ1MUxZdz09

Meeting ID: 857 9818 4239
Passcode: 461844

Note:

Our next meeting will be IN PERSON. FINALLY!!!!!!

GUEST SPEAKERS
SDAG 2020 SCHOLARSHIP RECIPIENTS

TITLE:
Analysis of Arctic Beaufort Sea Cores using XRD Methods: Can Dolomite tell us Anything?

BY: Athena Catanzaro

TITLE:
Lake Cahuilla and its effects on the SSAF system.

BY: Ryley Hill
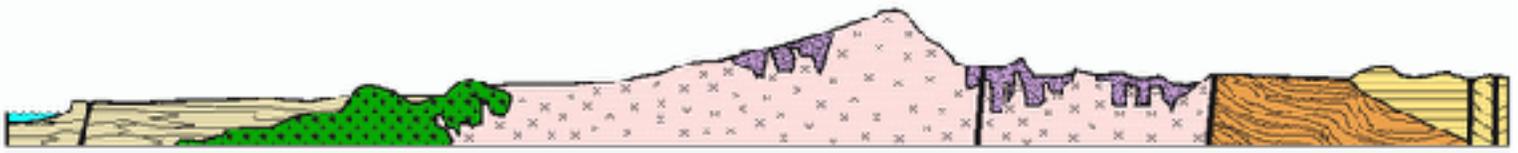
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ABSTRACT

Athena Catanzaro

TITLE: Analysis of Arctic Beaufort Sea Cores using XRD Methods: Can Dolomite tell us Anything?

A proposed deglacial history for the Beaufort margin continental slope in the western arctic has defined multiple ice-rafting and meltwater discharge events recorded in the region's stratigraphy. At the time of the late Wisconsin glaciation, the Laurentide Ice Sheet (LIS) extended from the Brooks Range up to the Canadian Arctic Archipelago. As the LIS retreated, discharge was routed by three major ice streams: the Mackenzie, Amundsen Gulf, and M'Clure Straight. Magnetic anomalies in sediment cores retrieved from the area in 2013 aboard the *USCGC Healy* correlate to Ice-rafted debris (IRD) layers that were deposited during the LIS retreat. Recent studies from the Arctic Ocean suggest that the presence of dolomite in marine sediment is an indicator of IRD deposits and could possibly identify the ice stream source. The purpose of this study was to use x-ray diffraction (XRD) to test the hypothesis that the presence of dolomite in a sample correlates to IRD and could differentiate between a Mackenzie River or Amundsen Gulf source. We also attempted to eliminate the common assumptions with XRD sample prep of sample amount and grain orientation, by normalizing the data in a variety of ways (normalizing to the largest dolomite peak in the core, to the 4.26 Å quartz peak, and also calculating the area of each dolomite peak). A total of 15 samples from two sediment cores (JPC25 and JPC 15/27) were analyzed based on the interpretations of Klotsko et al. (2019). Our results suggest that 1. the presence of dolomite in sediment along the continental slope does not correlate solely to IRD and cannot be used to confidently identify a source area and 2. Normalized data plotted alongside dolomite relative peak intensities show the same trends. The second result suggests that using relative peak intensities is a sufficient way to view and interpret the data.

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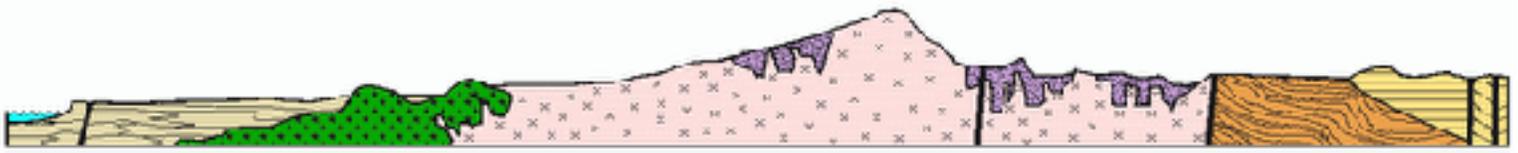
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SPEAKER BIO

Athena Catanzaro

Athena withdrew from years in the construction industry in 2015 to begin school at Palomar College. After graduating with an Associates degree in Geology, she worked for a year on a drone grant funded by the NSF where she analyzed GIS data, and aided in publishing an introductory GIS Lab Manual. While at Palomar College, Athena completed a self-guided study on mineralogy and use of the cross-polarizing microscope to identify minerals. She then began her bachelor's studies at SDSU in 2019 and graduated in 2021 with a degree in general geology. The research presented will be the culmination of her senior thesis. Athena has been an active member of SDAG since 2016 and is currently our Treasurer. She will be starting her master's degree at SDSU in the Fall and continue to serve the San Diego Association of Geologists.

ABSTRACT

Ryley Hill

TITLE: Lake Cahuilla and its effects on the SSAF system.

The last major rupture on the southern San Andreas Fault (SSAF) occurred around 300 years ago. The open interval is well beyond the average recurrence interval of 180 ± 40 years documented by paleoseismic data, raising questions about mechanisms responsible for the current 'earthquake drought' on the SSAF system. Recent paleoseismic evidence shows that previous ruptures on the SSAF correlate with high-stands of the ancient Lake Cahuilla, a 236 km3 body of water adjacent to the SSAF. We investigate the effects of lake loading using a fully coupled 3D finite element model of a strike-slip fault in a poroelastic crust overlying a viscoelastic mantle. We use the history of water level changes in Lake Cahuilla for the last ~1000 years to calculate time-dependent Coulomb stress changes on the SSAF that are superimposed on the tectonic loading due to the long-term fault slip rate of ~17-19 mm/yr. The respective Coulomb stress perturbations are on the order of 0.3-0.7 MPa for a plausible range of the fault zone permeabilities, arguably large enough to trigger system-size events. The relatively high "hydrologic" stress perturbation is due in part to what we refer to as the "memory" effect whereby increases in pore pressure due to previous high stands are not completely diffused and constructively interfere with the undrained response due to subsequent increases in the lake level. We estimate that loading by the Lake Cahuilla modulated the interseismic stress accumulation by at least 7-16% at the seismogenic depth during several previous earthquake cycles. Our model indicates that the destabilizing effects of lake inundation are enhanced in the presence of a fault damage zone and lateral pore pressure diffusion.
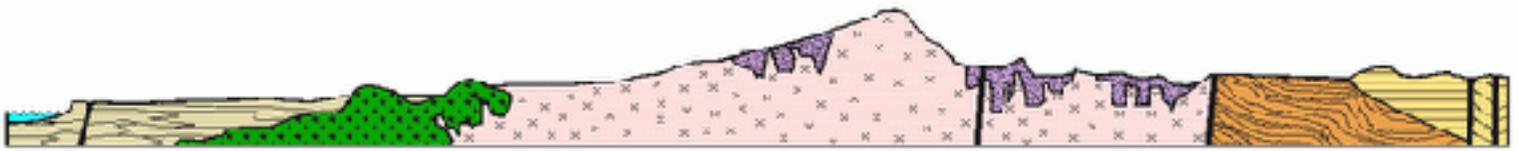
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SPEAKER BIO Ryley Hill	Ryley is a 3rd year PhD candidate in the joint doctoral program at UCSD/SDSU. He studied Physics/Math in his undergraduate degree at University of Nevada, Reno where he grew interest in geophysical problems. He now pursues understanding fluid interactions on faults with his advisor Matthew Weingarten at SDSU.
NEXT MEETING	### NEXT MEETING AUGUST 18 2021 SUPER EXCITED to announce our next meeting will be **IN PERSON!** Get ready to mix and mingle! Details to follow….
PRESIDENT'S CORNER	Hello SDAG Members! Many thanks to everybody that attended last month's meeting! Always a pleasure to join forces with SCGS! As always, a brief reminder to fill out and send in your 2021 memberships and, if you have the reserves, 2021 sponsorships. Don't forget to save the date for this year's field trip! October 23-24. For this month's meeting, we are excited to have our Scholarship winners present their research. Ryley Hill is a PhD candidate in geophysics at SDSU working with Allen Gontz. Athena Catanzaro, SDAG's treasurer, also attends SDSU and is finishing her BS under one of my old advisors Jillian Maloney. Looking forward to both talks by the next generation! We plan to return to in person meetings very soon. Maybe next month! Keep an eye on your emails. Cheers, Luke Weidman

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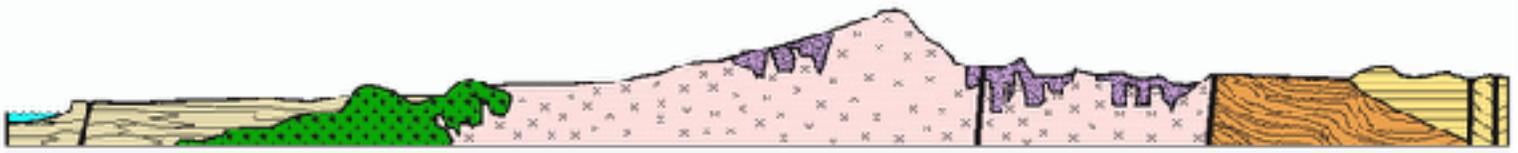
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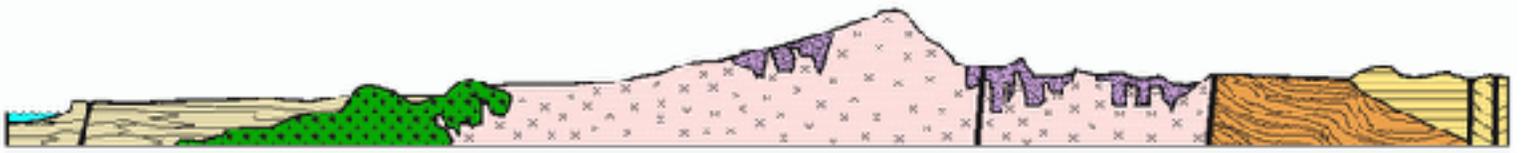
"Sculpted basalt of Fossil Falls, southern Owens Valley"
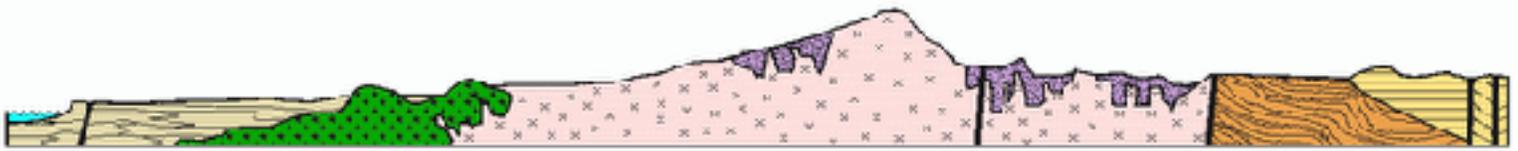
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