

# PROCEEDINGS OF THE KECK GEOLOGY CONSORTIUM

Volume 36  
2023-2024 Projects

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## 2023-2024 Projects

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### Keck Geology Consortium Member Institutions:

*Amherst College, Beloit College, Carleton College, Colgate University, The College of Wooster, The Colorado College, Franklin & Marshall College, Macalester College, Pomona College, Trinity University, Union College, Washington & Lee University, Whitman College*

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## 2023-2024 GATEWAY PROJECTS

### GEOCHEMICAL CONTROLS ON URANIUM CONTAMINATION OF GROUNDWATER IN THE CENTRAL VALLEY AND HIGH PLAINS AQUIFER SYSTEMS

**Faculty:** BRADY ZIEGLER, Trinity University

**Peer Mentor:** MARK NICKELS, Trinity University

**Students:** YARELY CONTRERAS-JOYA, Hamilton College; ANNA HEIKES, Trinity University; HOLLY MIRALES, Hamilton College; AMBER NELSON, Amherst College

### THE IMPACT OF LARGE FLOODS ON FLUVIAL SYSTEMS IN NORTHERN YELLOWSTONE NATIONAL PARK

**Faculty:** LYMAN PERSICO, Whitman College

**Peer Mentor:** SARAH HOFFMAN, Whitman College

**Students:** KATALYN DENBY, Washington and Lee University; YOEL IZAGUIRRE, Carleton College; ANDREA KAUFER, Union College; SOPHIA POWERS, Macalester College; MIA SANCHEZ, Amherst College

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## 2023-2024 ADVANCED PROJECTS

### STRUCTURAL EVOLUTION OF A SEGMENTED NORMAL FAULT TRANSFER ZONE, SEVIER FAULT, SOUTHERN UTAH

**Faculty:** BEN SURPLESS, Trinity University

**Students:** DEMI DURHAM, Trinity University; PIERCE HAYTON, Colorado College; AUDREY JENNINGS, Trinity University; JACK MRACHEK, Purdue University; MORGAN SHARP, Whitman College

### YOUNG EYES ON OLD ROCKS: EVALUATING TECTONIC MODELS FOR NEOARCHEAN(?) BASIN FORMATION IN THE METAMORPHIC CORE OF THE BLACK HILLS, SOUTH DAKOTA

**Faculty:** TREVOR WALDIEN, South Dakota School of Mines

**Students:** REBECCA BRAUN, South Dakota School of Mines; LIAM FRY, Eckerd College; WILLA OBRINGER, Lake Superior State University; ALEXANDRA ROBINSON, Pomona College

## **2023-2024 ADVANCED PROJECTS – continued**

### **INTEGRATED STRATIGRAPHIC AND PALEOENVIRONMENTAL STUDY OF THE MIDDLE-LATE DEVONIAN CARBONATE TO BLACK SHALE TRANSITION IN THE MICHIGAN BASIN**

**Faculty:** JAY ZAMBITO, Beloit College; PETER VOICE, Western Michigan University

**Students:** TIFFANY BARKER-EDWARDS, University of Texas at San Antonio; MIKAYLA GIEHLER, Macalester College; JACK GUGINO, Miami University – Oxford; ISABEL JOHNSON, Beloit College; HOLIDAY O'BRYAN, Macalester College; CONNOR QUIROZ, California State University, Monterey Bay; LAM TRUONG, California State University Long Beach; AINSLEY WIESNER, The College of Wooster; MARCELLA WINGET, Hamilton College

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## Conference Presentations – California Gateway Project

- Contreras-Joya, Y., Heikes, A., Nickels, M., Mirales, H., Nelson, A., Mine, A., and Ziegler, B., 2023, Spatial and statistical analysis of uranium in the High Plains aquifer in comparison to the Central Valley aquifer, *in* Geological Society of America Abstracts with Programs. Vol. 55, No. 6, doi:[10.1130/abs/2023AM-390307](https://doi.org/10.1130/abs/2023AM-390307).
- Mirales, H., Nelson, A., Heikes, A., Contreras-Joya, Y., Ruiz, S., Mine, A., and Ziegler, B., 2023, Evaluating geochemical and microbial influences on uranium mobilization in Central Valley, California, *in* Geological Society of America Abstracts with Programs. Vol. 55, No. 6, doi:[10.1130/abs/2023AM-390308](https://doi.org/10.1130/abs/2023AM-390308).

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## Conference Presentations – Yellowstone Gateway Project

- Denby, K., Izaguirre, Y., Kaufer, A., Powers, S., Sanchez, M., Hoffman, S., and Persico, L., 2024, A tale of two floods: comparing peak discharges of the 1918 and 2022 northern Yellowstone National Park floods, *in* Geological Society of America Abstracts with Programs. Vol. 56, No. 4, doi:[10.1130/abs/2024CD-399418](https://doi.org/10.1130/abs/2024CD-399418).
- Hoffman, S., and Persico, L.P., 2024, Reconstructing peak discharge variability of the June 2022 flood in northern Yellowstone National Park, *in* Geological Society of America Abstracts with Programs. Vol. 56, No. 4, doi:[10.1130/abs/2024CD-399728](https://doi.org/10.1130/abs/2024CD-399728).
- Persico, L.P., and Meyer, G., 2024, Exploring variability in peak discharge and erosion caused by the June 2022 atmospheric river flood in northern Yellowstone National Park, *in* Geological Society of America Abstracts with Programs. Vol. 56, No. 4, doi:[10.1130/abs/2024CD-399897](https://doi.org/10.1130/abs/2024CD-399897).

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## Short Contributions – Utah Advanced Project

### TESTING MODELS OF NORMAL FAULT PROPAGATION AND DAMAGE ZONE DEVELOPMENT

BENJAMIN SURPLESS, Trinity University

### ASSESSING GEOTHERMAL POTENTIAL USING 3D MODELING AND RESTORATION OF THE SEVIER FAULT SYSTEM, SOUTHERN UTAH

DEMI DURHAM, Trinity University

Project Advisor: Benjamin Surpless

### THE ROLE OF FAULT DAMAGE ZONES IN STRUCTURALLY CONTROLLED LANDSCAPE EVOLUTION, SEVIER FAULT ZONE, SOUTHERN UTAH

PIERCE HAYTON, Colorado College

Project Advisors: Tyler Grambling, Sarah Schanz

### COMPUTER MODELING OF NORMAL FAULT-RELATED DAMAGE ZONES: IMPLICATIONS FOR ESTIMATING GEOTHERMAL ENERGY POTENTIAL

AUDREY JENNINGS, Trinity University

Project Advisor: Benjamin Surpless

**GEOLOGICAL TIMELINE & EXTENSION OF MARTIAN FAULTING IN THE ALBA MONS REGION OF MARS**

JACK MRACHEK, Purdue University  
Project Advisor: Michael Eddy

**DAMAGE ZONE DEVELOPMENT AND CROSS-FAULT ASYMMETRY ON THE MT. CARMEL SEGMENT OF THE SEVIER NORMAL FAULT, SOUTHWEST UTAH**

MORGAN SHARP, Whitman College  
Project Advisor: Kevin Pogue

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**Short Contributions – Black Hills Advanced Project**

**POLYPHASE DEFORMATION OF NEOARCHEANPALEOPROTEROZOIC ROCKS IN THE BLACK HILLS, SOUTH DAKOTA**

TREVOR WALDIEN, South Dakota School of Mines and Technology

**DEFORMATION TEMPERATURE AND KINEMATICS OF THE DAKOTA TECTONIC ZONE WITHIN THE LITTLE ELK GRANITE IN THE BLACK HILLS, SOUTH DAKOTA, NEAR NEMO, SOUTH DAKOTA**

REBECCA BRAUN, South Dakota School of Mines and Technology  
Project Advisor: Trevor Waldien

**KINEMATIC ANALYSIS OF SHEAR ZONES IN THE LITTLE ELK GRANITE, BLACK HILLS, SOUTH DAKOTA**

LIAM T. FRY, Eckerd College  
Project Advisor: Laura Wetzel

**ELUCIDATION OF AN UNDEFINED RELATIONSHIP: A STUDY OF THE BOXELDER CREEK QUARTZITE AND LITTLE ELK GRANITE TO DECIPHER PALEOPROTEROZOIC BASIN DEVELOPMENT IN THE BLACK HILLS, SOUTH DAKOTA**

WILLA OBRINGER, Lake Superior State University  
Project Advisors: Paul Kelso and Derek Wright

**U-PB ZIRCON DATING OF NEOARCHEAN ROCKS IN THE LITTLE ELK TERRANE, BLACK HILLS, SOUTH DAKOTA**

ALEX ROBINSON, Pomona College  
Project Advisor: Nicole Moore

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**Short Contributions – Michigan Basin Advanced Project**

**INTEGRATED STRATIGRAPHIC AND PALEOENVIRONMENTAL STUDY OF THE MIDDLE-LATE DEVONIAN CARBONATE TO BLACK SHALE TRANSITION IN THE MICHIGAN BASIN**

JAMES J. ZAMBITO IV, Beloit College; PETER J. VOICE, Western Michigan University

**CORRELATING THE TRAVERSE GROUP LIMESTONE FROM SUBSURFACE TO OUTCROP, MICHIGAN BASIN**

MARCELLA M. WINGET, Hamilton College

Project Advisor: Catherine C. Beck

**DIAGENESIS OF A PYRITIZED CONTACT OF THE MIDDLE TO LATE DEVONIAN TRANSITION FROM CARBONATE TO BLACK SHALE**

HOLIDAY R. O'BRYAN, Macalester College

Project Advisors: Kelly R. Macgregor and Jeff T. Thole

**AN ANALYSIS OF STRATIGRAPHIC, PALEOECOLOGIC, AND GEOCHEMICAL VARIABILITY IN THE "SQUAW BAY FORMATION," MICHIGAN BASIN**

AINSLEY S. WIESNER, The College of Wooster

Project Advisor: Shelley A. Judge

**GEOCHEMICAL ANALYSIS OF THE MIDDLE TO UPPER DEVONIAN ANTRIM SHALE, KROCKER 1-17 CORE, MICHIGAN BASIN**

MIKAYLA C. GIEHLER, Macalester College

Project Advisor: Kelly R. Macgregor

**EXPLORING THE SUITABILITY OF THE MIDDLE-LATE DEVONIAN ANTRIM SHALE, MICHIGAN BASIN, FOR ORGANIC CARBON ISOTOPIC ANALYSIS**

JACK P. GUGINO, Miami University

Project Advisor: Brian S. Currie

**MAGNETIC SUSCEPTIBILITY OF SEDIMENTARY STRATA IN THE LATE DEVONIAN ANTRIM FORMATION OF THE MICHIGAN BASIN**

TIFFANY BARKER-EDWARDS, University of Texas at San Antonio

Project Advisors: Peter J. Voice and James J. Zambito IV

**CHARACTERIZING THE SEDIMENT SOURCE OF THE ELLSWORTH FORMATION OF THE MICHIGAN BASIN USING LITHOSTRATIGRAPHY AND CHEMOSTRATIGRAPHY**

ISABEL R. JOHNSON, Beloit College

Project Advisor: James J. Zambito IV

**MODELING MARINE PALEOENVIRONMENTS OF THE ELLSWORTH PRODELTA DURING THE LATE DEVONIAN IN THE MICHIGAN BASIN**

CONNOR J. QUIROZ, California State University, Monterey Bay

Project Advisors: Peter J. Voice and James J. Zambito IV

**GEOLOGIC MAPPING OF ALPENA COUNTY, MICHIGAN**

LAM T. TRUONG, California State Long Beach University

Project Advisors: Peter J. Voice and James J. Zambito IV