

Kansas State University Department of Geology

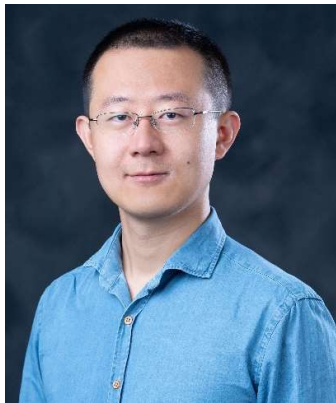
Summary of Outputs and Achievements

Advisory Council Meeting

11 October 2024

K-State Geology welcomes Dr. Huan Cui

Dr. Huan Cui joined the Department of Geology at K-State this fall as our new Assistant Professor in sedimentology and stratigraphy. Dr. Cui is a multidisciplinary researcher who integrates traditional fieldwork in sedimentology and stratigraphy with geochemistry and paleontology to investigate global and planetary changes in deep time. In recent years he has focused on carbon and sulfur cycles in deep time, which has implications for paleoclimatic changes and biospheric evolution at a planetary scale



Dr. Cui has a bachelor's degree in Geology from Southwest Petroleum University, School of Geosciences and Technology, Chengdu, China, where he completed a thesis on *Integrated Facies and Reservoir Characterization*. He obtained his Ph.D. in Geology in 2015 from the University of Maryland, College Park, working on *Authigenesis, Biomineralization, and Carbon-Sulfur Cycling in the Ediacaran Ocean*. He subsequently completed a series of postdoctoral research positions in Wisconsin (2016-2018), Brussels (2018-2020), and Paris (2020-2022). He comes to us from Mississippi State University, where he was an Assistant Professor. I'm sure you will all join me in welcoming Dr. Cui to the Wildcat Family!

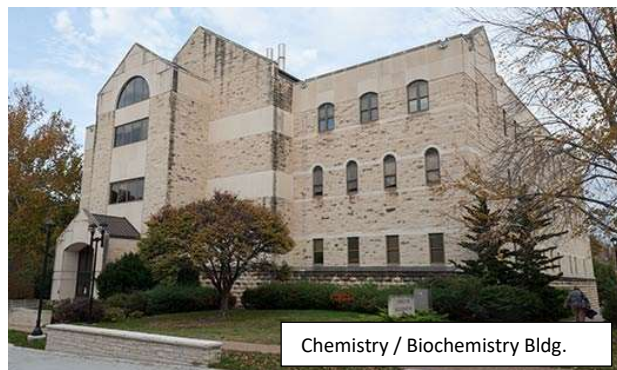
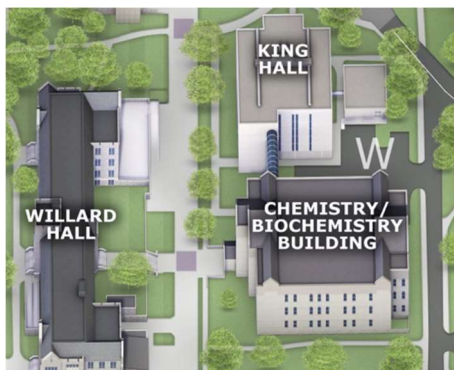
Behzad Ghanbarian leaves K-State Geology for new position at University of Texas, Arlington

Dr. Behzad Ghanbarian resigned from K-State over the summer (2024) to take up a new position at the University of Texas at Arlington. Behzad joined K-State in 2017, having come to us from the Department of Petroleum and Geosystems Engineering at the University of Texas at Austin, where he was a postdoctoral fellow. While at K-State, Behzad taught courses in Engineering Geology, Quantitative Geoscience, and Hydrogeology and mentored numerous graduate students to degree completion, many of whom have gone on to PhD



programs at other universities. In addition, he published over 50 papers, as well as a book on the *Physics of Fluid Flow and Transport in Unconventional Reservoir Rocks*. We wish Behzad all the best in his new position.

A new chapter for geology – update on relocation plans



After 68 years in Thompson Hall, we are gradually moving towards a new chapter and a new home for the geology department at Kansas State University. The faculty are working with designers, architects, and engineers from companies external to K-State, and representatives from K-State Facilities and the College of Arts and Sciences, to relocate geology to renovated and refurbished spaces in the science hub in the center of the Manhattan campus. The main faculty, administrative, and academic home for the department will be in the north wing of Willard Hall. In addition to housing offices for faculty, main department administration, GRAs, visiting scientists, and postdocs, Willard Hall will house instructional spaces for the introductory geology lab, instrumentation and demonstration room (to be used by the intro lab, other geology classes, visiting student groups, outreach activities, etc), and computing lab. The main department will be accessed via a new east entrance lobby from a themed courtyard. The main research lab spaces will be relocated to the east of Willard Hall across the pedestrianized area in CBC, the chemistry and biochemistry building. CBC will also house GTA offices and meeting rooms and an instructional space for geochemistry lab classes. Immediately to the north and connected to CBC, King Hall will house an instructional space for advanced geology lectures and labs, and further research lab spaces to include sample staging and rock processing facilities.

We look forward to this new chapter for geology with improved facilities and infrastructure for teaching and research.

Research and Impact Highlights



Image from Clark-Heusemann

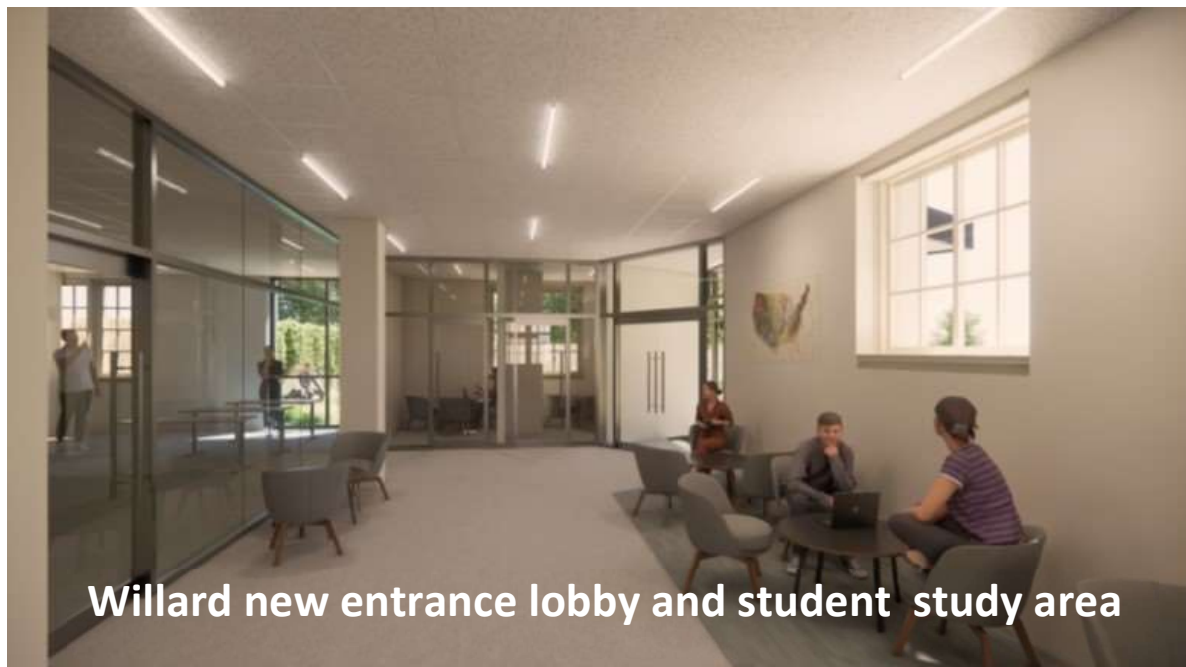


Image from Clark-Heusemann

Research highlights from Matt Brueseke...

Hello everyone! My student mentees and I continue to do research on issues related to intraplate volcanism and links between magmatism and Cu-Au-Ag mineralization. Current BS student **Brayden Shoemaker** was awarded a K-State Mark Chapman Scholars Program scholarship for research at Teton Pass (WY/ID) this past summer. Brayden is focusing on why an enigmatic package of rhyolites erupted, at ~8 Ma, at this location. MS student **Wyatt Everhart** and I also spent time this past summer sampling Eocene to Oligocene basaltic intrusions and lavas around the Gravelly Range (southwest MT), with the goal of relating this magmatism to enigmatic extensional tectonics in the region. I also want to welcome three new MS students: **Megan Melgren, Logan Erichsen, and Drew Hindall**. Megan is going to work on small-volume basalt magmatism north of the Snake River plain (ID), Logan on beryllium, a critical mineral, chemistry/mobility in aquamarines and beryls from Mt. Antero (CO), and Drew, on rhyolite melt generation in NM (co-advised by **Pamela Kempton** and me). Finally, I want to say “thanks!!!” to all our alumni who have supported our K-State Geology field trips/field funding over the years. **Joel Spencer** and I were finally able to take a group of students to Hawaii for GEOL 740 (Regional Geology). We originally planned this back in spring 2020, but the COVID-19 pandemic had other plans. We had a great group of students, and this trip will always be a career highlight!



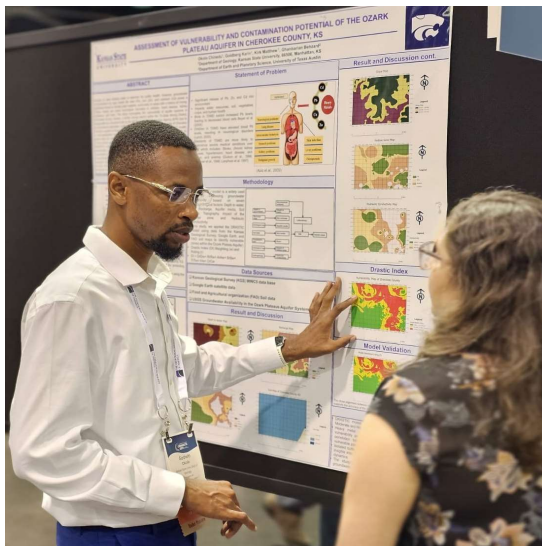
MSc student Wyatt Everhart and BSc student Brayden Shoemaker (in purple) taking notes on a rhyolite dike being sampled at Teton Pass, WY. Brayden is studying the volcanology and petrology of Miocene rhyolites at this location.

Geology critical to understanding groundwater contamination

Dr. Karin Goldberg has wrapped up two of the projects she was involved with and continued the research with the master's students she is still supervising remotely, having moved to Colorado over the summer. Her research with graduate student **Fidelis Onwuagba** in southeastern Kansas revealed the presence of several contaminants in domestic well water, including nitrate, manganese, and mercury, with concentrations exceeding the EPA and WHO safe limits for drinking water, linked with various types of cancer. High concentrations of Mn, Fe, Hg, particularly in Cherokee and Crawford Counties, near the Tri-State Mining District, suggest that contamination by these metals might be a consequence of mining activities.



Karin in a town hall meeting in Russell.



Godwin presenting his poster at GSA

Dr. Goldberg's project in Russell, Ellsworth and Lincoln Counties is underway. Master's student **Luke Romang** concluded the geochemical analysis of water samples from 57 domestic wells, and measured radon concentration in 42 residences in the three counties. Dr. Goldberg's team is currently interpreting the potential links between some contaminants and the geology, land use, and cancer incidence in the studied counties.

These results inspired her ongoing project with master's student **Chinedu Godwin Okolo**, who is investigating the vulnerability and contamination potential of the Ozark Plateau Aquifer in Cherokee Co. using the DRASTIC model, a method that considers several hydrogeological parameters to evaluate aquifer vulnerability.



Luke collecting water samples.

The role of polyphase deformation in gold endowment

Over the past decade, through active research and consulting activities, **Dr. Brice Lacroix** has visited many gold deposits worldwide (East Africa, Europe, South and North America) to understand the grade distribution at deposit scale. One of the most important results of this long-lasting research is the development of a new structural method: the RIPPORE Method (Resolving Interference Pattern to Predict ORE shoot). This method has been applied to an actively explored gold deposit in Guyana in 2021. Through an aggressive drilling campaign and resource modeling, the exploration company has confirmed the grade distribution predicted with the RIPPORE method. This method is expected to be published in 2025.

The 'Geo-Path' to a career in hydrogeology

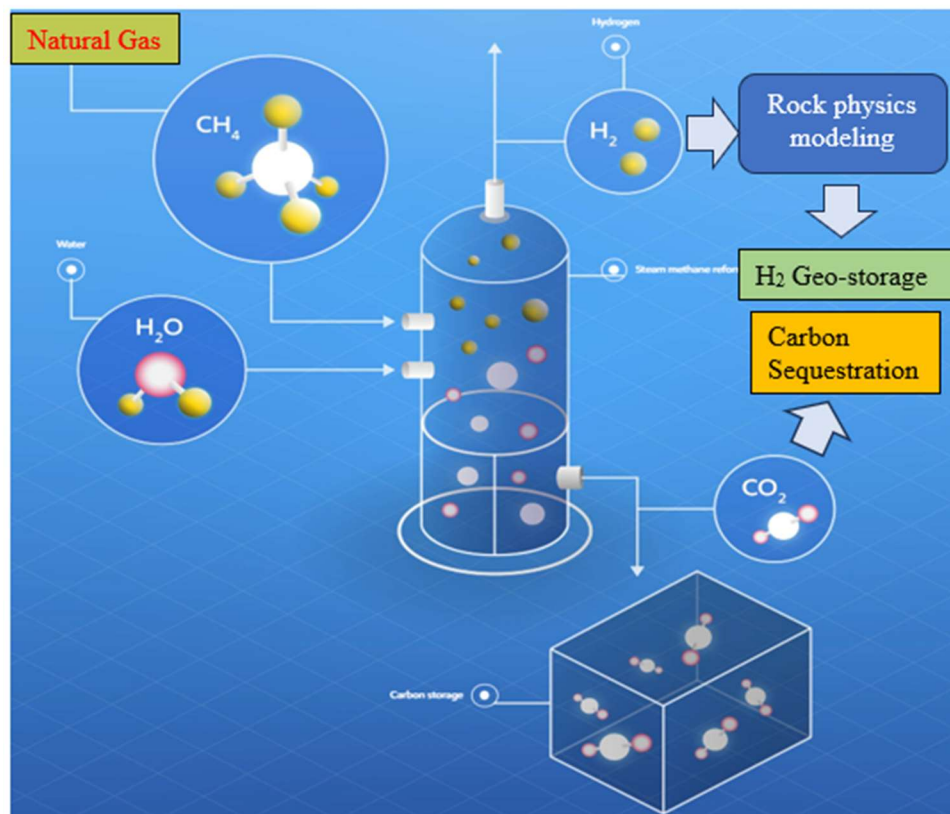
Year two of **Dr. Matt Kirk's** Kansas Groundwater Geopaths Project is in full swing. This year we have 20 undergraduate participants from K-State and Barton and Dodge City community colleges, bringing the total number of student participants for the program to 37 overall. Program results have been bad for water quality but good for geoscience recruiting. From 2020 to 2023, we sampled about 90 private (i.e., domestic) water wells, and about half of them produced groundwater with unsafe nitrate concentrations. During September 13th and 14th, we sampled about 40 more wells, expanding our study area to the south and west portions of the Great Bend Prairie Aquifer. Analysis of those samples is currently in progress. Well owners have been very grateful for our help and student evaluations indicate the program is helping students see geoscience careers in a new positive light.



Matt Kirk with Geopaths students in the field

Raef explores the deep blue...world of hydrogen storage!

Dr. Abdelomoneam Raef and his students launched seismic and fluid replacement modeling focused on investigating blue-hydrogen geo-storage feasibility in saline aquifer with example case studies of the Utsira sands, North Sea, for clastic saline aquifer and the Wellington Field Mississippian carbonates of Sumner County, KS. This research aims to quantify changes in elastic properties in a hydrogen storage scenario, where blue hydrogen geo-storage is envisaged with concurrent CO₂ sequestration. Such research is strongly relevant to foreseeable reforming of natural gas to produce blue hydrogen while sequestering CO₂, which is a byproduct of natural gas steam reforming, for net-zero emissions H₂ energy. Some strides on this track include a comparative modeling for CO₂ and hydrogen replacing brine in a saline aquifer.



Blue hydrogen from steam reforming of methane (CH₄), rock physics modeling aims at estimating simulated H₂-injection effects on the elastic properties of reservoir/aquifer rocks.

Another research theme of Dr. Raef's group is seismic inversion-based reservoir characterization of the Viola carbonate reservoir of Morrison Northeast Field. This reservoir poses amplitude interpretation challenges related to amplitude tuning effects that are complicating the understanding of seismic amplitude variation in relation to reservoir quality aspects. Simulated annealing approach of seismic inversion resulted in good quality acoustic impedance estimates correlating with drilling results and are expected to guide future field development plan.

Expanding the field opportunities for our students: Regional Geology (GEOL 740) on the Big Island of Hawai'i



Up high at ~9,000 ft: The 2022 Mauna Loa lava and a mapping project on the volcano!



Kīlauea: hiking Kīlauea Iki 1959 eruption crater; studying 1970s eruption pahoehoe lobes



At sea level: Pu'u Mahana tuff ring and olivine beach; studying coastal processes



With generous support from the Beck foundation account, **Drs. Brueseke** and **Spencer** have been running the Regional Geology class for the last several years. Early this summer we were finally able to take the class to the Big Island of Hawai'i (originally planned for May 2020 but canceled due to COVID-19). In the Spring 2024 semester our students researched, presented, and developed projects on a variety of topics relevant to Hawaiian regional geology, including volcanism, mantle plumes, seismicity, island formation, glaciation, hydrogeology, tropical climate, changes in atmospheric gases, mass movements, and coastal processes. On Hawai'i the students became the topic experts when we visited this fascinating island!



Field camp a 'peak' experience on multiple levels

Brice Lacroix has also been spearheading the Geology Department's international field camp, in collaboration with Université de Franche-Comté, a collaboration that is now in its fourth year. The student experience includes two mapping projects, a petrological study, and a geo-traverse in the Alps-Jura—as well as exposure to French culture and cuisine!

Brice (far right) with the 2024 K-State Geology students attending field camp in France.



Tiny sponge spicules ultimately responsible for the Flint Hills

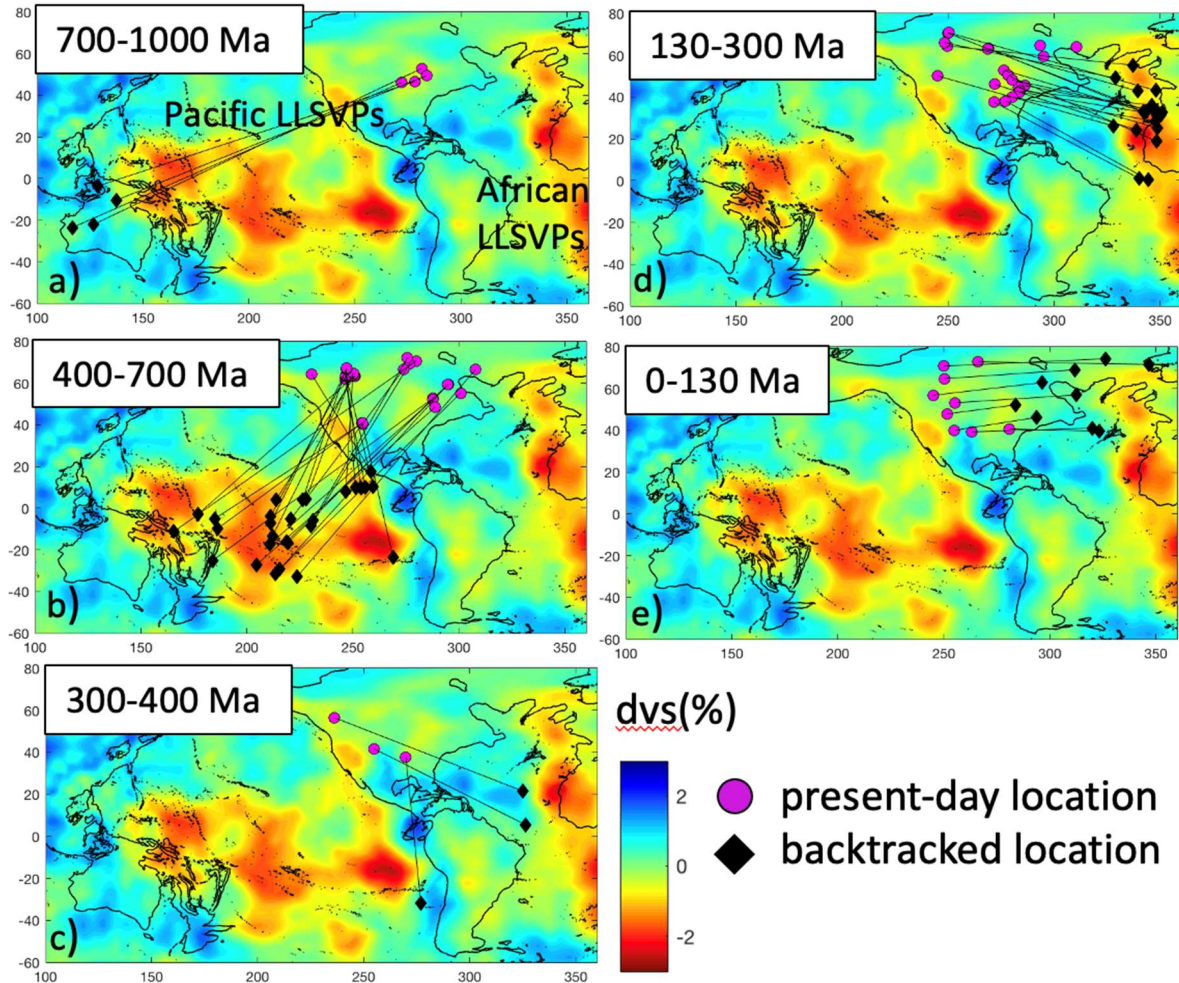


Dr. Karin Goldberg and her master's student **Minindu Gedara** concluded that the silica nodules in the Florence Limestone were formed shortly after deposition by the percolation of silica-rich solutions along burrow networks, resulting in the precipitation of opaline silica, followed by chert, chalcedony and finally megaquartz. Silicifying solutions were derived from the dissolution of siliceous organisms, augmented by highly evaporite conditions.

Claudia and Kimberlites (who says geophysicists don't like igneous rocks)

Kimberlites are rare and intriguing volcanic rocks. They sometimes carry diamonds, which make them economically interesting. The origin of kimberlites is still not elucidated, and most common hypotheses include (i) fluids from subducted oceanic slabs, (ii) small-scale mantle convection (i.e., a circulatory current induced by lithosphere thickness variations), (iii) mantle plumes, and (iv) large low shear velocity provinces (LLSVPs hereafter). LLSVPs are seismically slow regions located near the core-mantle boundary (see red regions on the figure below). This means that they are compositionally different and/or hotter. To bring new insights into this hypothesis, **Dr. Claudia Adam** has been backtracking the North American kimberlites positions, i.e., we compute the position where the North American continent was when the kimberlites were emplaced (black diamonds on the figure). We show that most of the older kimberlites (ages 130 -1000 Ma) were emplaced over LLSVPs and that there is a temporal evolution in their emplacement, with the older kimberlites (ages 400-700) being emplaced of the Pacific LLSVPs, and kimberlites with ages between 130 and 300 Ma being emplaced over the African LLSVPs. More importantly, we show that the “quiet periods”, i.e., the periods when few kimberlites

were emplaced in North America occur when the North American plate drifted from the Pacific LLSVPs to the Atlantic LLSVPs. This shows that LLVPs are at the origin of kimberlites emplacement and that they play a major role in stabilizing the mantle flow.

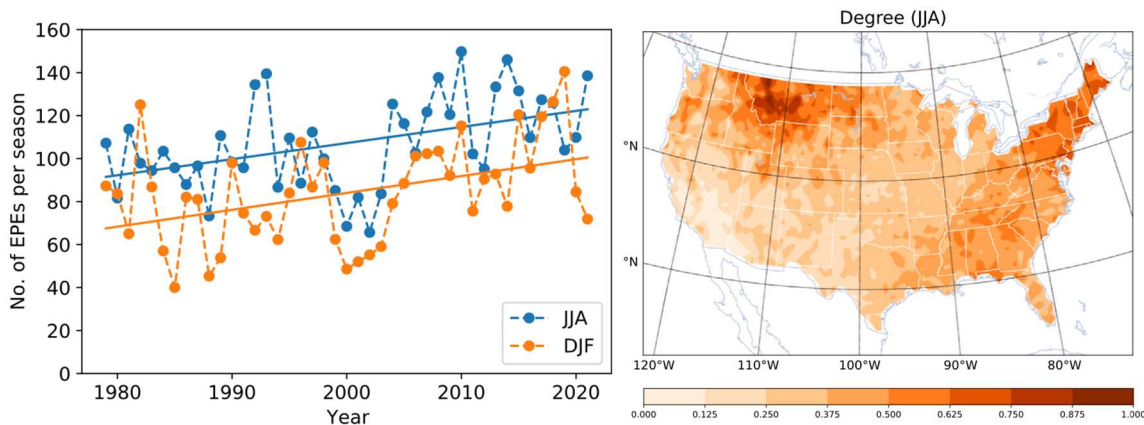


Colormap: SAVANI tomography model at depth ~ 2800 km (Auer et al., 2014), showing the LLSVP locations (regions in red, associated with negative seismic velocity anomalies, dvs). The present-day and backtracked locations of kimberlites are displayed by purple circles and black diamonds, respectively. Panels a-e show the reconstruction for different time periods.

Extreme precipitation events in US increasing in both winter and summer

Through an international collaboration with Prof. Juergen Kurths from Potsdam Institute for Climate Impact Research, Germany, the **Behzad Ghanbarian** and the Porous Media Research Lab hired a postdoc, Tayeb Jamali, with a PhD in physics to analyze spatiotemporal patterns of extreme precipitation events in the Contiguous United States. Tayeb employed modern statistical physics and more specifically complex network theory (also known as graph theory) and found interesting results published in the Journal of Hydrology. We found that the number of extreme precipitation events increased in both summer and winter seasons (Figure below). In summers,

we detected a hub (super node) with many links in the state of Montana. This means Montana plays a key role in extreme precipitation event synchronization in the US. In winters, Appalachian Highlands in Northeast had high degrees, as well as the Pacific Border province and Cascade-Sierra Mountains (results not shown).

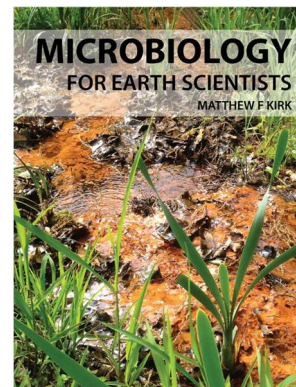


(left) Number of extreme precipitation events versus year for the summer (JJA) and winter (DJF) seasons, and (right) degree distribution within the Contiguous United States for the summer season (after Jamali et al. (2023)).

Matt Kirk publishes a new textbook, *Microbiology for Earth Scientists*

To help promote geoscience education, Matt recently published an open-access book, *Microbiology for Earth Scientists*. Matt created this resource to show readers, particularly undergraduate students, the importance of microbiology to their field while providing a reference text that is free for all to use. The book is free to download here:

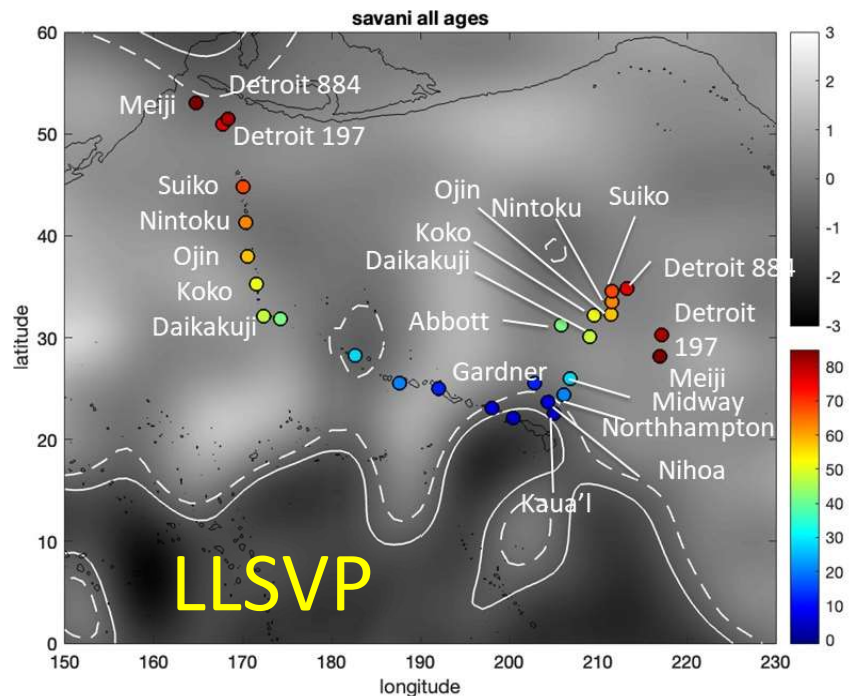
<https://newprairiepress.org/ebooks/53/>



The changing mantle source of the Emperor – Hawaiian plume

The Emperor Seamount chain (47-86 Ma) is less well studied than its younger counterpart, the Hawaiian Islands (i.e., < 6 Ma). **Pamela Kempton**, in collaboration with **Claudia Adam** and Dr. Andy Saunders (University of Leicester, UK), is working to improve this situation. New isotopic and trace element data for six seamounts are being used to constrain both magmatic processes, such as depth and degree of partial melting, and variations in mantle source composition. The data indicate that the Emperor seamounts differ from the younger Hawaiian Islands in the predominance of isotopically depleted components, i.e., mantle from which basaltic melts were extracted hundreds of millions of years ago. One of these depleted components is unique to the Emperor chain. Out geochemical modeling suggests that this

component originated deep within the mantle, possibly as a sheath surrounding the ancestral Hawaiian plume stem. Sampling of this depleted component, rare today along the Hawaiian plume track, is consistent with global plate reconstructions from 85 to 69 Ma, which show the Emperor plume was adjacent to a mid-ocean ridge at the time. The thinner lithosphere facilitated melting of the high ϵ_{Hf} depleted plume sheath. After ~ 75 Ma, the plume separated from the ridge and was located beneath increasingly older, thicker lithosphere, making it difficult to sample this more refractory component. Moreover, backtracked locations of Emperor seamounts lie up to 15° latitude north of the Pacific Large Low Shear Velocity Province (LLSVP), which is currently believed to be the source of all major deep-mantle plumes. This indicates that, despite conventional wisdom, the ancestral Emperor-Hawaiian plume was either not associated with the Pacific LLSVP or that the earliest stages of the plume were deflected northward by density transitions in the mantle and /or plume-ridge interactions.



Correlation between the backtracked Emperor-Hawaii volcanoes (colored dots on the right) and the LLSVP locations; the current locations of the Emperor – Hawaiian seamounts and islands are shown on the left. The gray map shows the tomography model at the core-mantle boundary at $\sim 2,800$ km depth. The full and dashed white lines represent the $\text{dvs}=-2\%$ and -1% isolines respectively. The colorscale represent the age of volcanoes.

Luminescence? Yes 'P's! - phytoliths, paleoseismology, paleoliquifaction, and paleohydrology

Over the past year **Joel Spencer's** luminescence lab has continued research on novel applications and technique development of trapped-charge luminescence phenomena and Earth surface Quaternary geochronological techniques. In collaboration with colleagues in the UK and Poland, work has continued analyzing opal phytoliths and a host of other biogenic silica samples. Current analyses are helping understand how the luminescence from biogenic silica compares to that of more familiar quartz and feldspar minerals, as we move towards goals of being able to constrain formation age, sedimentary depositional age, and wildfire exposure of opal phytoliths.

Collaboration on a series of paleoseismic projects continues with Turkish colleagues from Dokuz Eylül University (DEU), İzmir, where luminescence data is being used to constrain Late Pleistocene to Holocene movement of numerous faults in and around the İzmir region in western Turkey. Following his visit to the luminescence lab as a PhD student in 2015, Dr. Mustafa Softa from DEU is again a visitor to the lab in 2024. We are working together on a variety of projects including technique development to use luminescence to date exposed rock surfaces and apply this to fault scarps to constrain fault movement.

Similarly in the active tectonics / paleoseismic area, in collaboration with Drs. Tandi Bidgoli (Cal. State U. San Bernadino) and Francisco Gomez (U. Missouri), we are using luminescence to help confirm whether features observed in a series of Holocene alluvial terraces in north-central Missouri – otherwise known as the Grand River Tectonic Zone – are in fact evidence of Holocene paleoliquifaction.



Like other recent students in the Spencer lab, new MS student **Quillen Thornton** will focus his research on northwestern Montana. However, rather than studying landforms left by the Cordilleran Ice Sheet, Quillen will be investigating the paleohydrology of the Camas prairie ripples. The Camas prairie is well-known for large fields of Late Pleistocene giant current ripples, created during one of the many times Glacial Lake Missoula drained when its ice dam with the Cordilleran Ice Sheet failed. These giant current ripples are large-to-very-large, subaqueous gravel dunes and antidunes (wavelengths of 90 to 951 m, heights from 0.3 to 17 m). The age of these are features are unknown, and establishing chronological control will help understand the geochronology of Glacial Lake Missoula drainage events.

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Publications (not peer-reviewed)

Gambill, I., Zipper, S., **Kirk, M.**, Seybold, E. (2024) Exploring drivers of groundwater recharge at Konza Prairie (Flint Hills region, Kansas, USA) using transfer function noise models. *Kansas Geological Survey, Open-file Report* no. 2024-6, <https://www.kgs.ku.edu/Publications/OFR/2024/OFR2024-6.pdf>

Books

Kirk, M.F. (2023) *Microbiology for Earth Scientists*. *New Prairie Press*. ISBN: 978-1-944548-51-3, Available from: <https://newprairiepress.org/ebooks/53/>

Invited Presentations and Lectures

Adam C. Modelling the stress field along rifts from tomography models. Department of Geological Sciences, University of Missouri, November 2024

Brueseke, M.E. Investigating <10 Ma off-axis magmatism in northwest Wyoming and southwest Montana (U.S.A.): Yellowstone hotspot - lithosphere interactions at the leading edge of the Snake River Plain: University of Texas – San Antonio Earth and Planetary Sciences Seminar Series, October 2023.

Brueseke, M.E. Investigating <10 Ma off-axis magmatism in northwest Wyoming and southwest Montana (U.S.A.): Yellowstone hotspot - lithosphere interactions at the leading edge of the Snake River Plain: New Mexico Tech NMBGMR/EES seminar series, April 2024

Brueseke, M.E. Investigating <10 Ma off-axis magmatism in northwest Wyoming and southwest Montana (U.S.A.): Yellowstone hotspot - lithosphere interactions at the leading edge of the Snake River Plain: University of Iowa Earth and Environmental Sciences Seminar Series, Feb. 2024.

Ghanbarian, B. Complex network analysis of extreme precipitation and temperature events in the United States, Physics Department, Kansas State University, Nov. 2023

Ghanbarian, B. Challenges and advances in earth, energy and environment: Multidisciplinary approaches, Earth and Environmental Science Department, University of Texas at Arlington, Jan. 2024

Ghanbarian, B. Conservative solute transport in porous media: Pore- and field-scale particle tracking simulations, INTERA, Richland WA, Feb. 2024

Lacroix, B. The Enigma of the Nacimiento Block of Central California: Where Is the Slabless Window? In-person talk at the GeoResources, University of Lorraine, Nancy, France, Feb. 2024

Lacroix, B. Role of Polyphase deformation in Gold endowment: Example from orogenic Gold Systems from Guiana Shield, South America? In-person talk at the University of Lausanne, Switzerland, April. 2024

- Lacroix, B.** The Enigma of the Nacimiento Block of Central California: Where Is the Slabless Window? In-person talk at the University of Pau, France, April. 2024
- Cui, H.** Environmental geology can rock your world. Seminar for K-State Environmental Science students, Sept. 2024
- Kirk, M.** Iron bacteria in wells: causes, diagnosis, and treatment. *KDHE Geology and Well Technology Seminar*. Wichita, KS. Oct. 2024.
- Kirk, M.** Groundwater contamination in agricultural landscapes: a problem and an opportunity. *Kansas Environment Conference*. Wichita, KS. Aug. 2024.
- Kirk, M.** Impact of woody encroachment on the fate of soil CO₂ in merokarst watersheds. University of Kansas Department of Geology, Department seminar. Nov. 2023.
- Sullivan, PL, Bixby, L, Moreno, V, Jarecke, KM, Sadayappan, K, Keen, R, Guthrie, A, de Souza, LFT, Hauser, E, Zhang, X, Ajami, H, Barnard, HR, Billings, SA, Flores, Hirmas, D, A, **Kirk, MF**, Li, L, Nippert, JB, Singha, K Constraining the belowground ecohydrologic consequences of land cover change (Invited). Annual meeting of the *American Geophysical Union*. Dec. 2023.

Conferences: Presentations, Abstracts, and Field Trip Leaders

- Adam C. and Kempton, P.D.** (2023). Secular variation in kimberlite formation: the variable connection to LLSVPs, American Geophysical Union Annual Meeting, San Francisco, 11-15 December 2023, DOI <https://doi.org/10.29173/ikc4191>
- Adam, C., Kempton, P.D.,** and *Lee, E. (2024). Secular variation in kimberlite formation: the variable connection to LLSVPs, 12th International Kimberlite Conference Extended Abstract No. 12th International Kimberlite Conference, 8-12 July 2024, Yellowknife, Canada
- *Alcantar-Velasquez, E., *Nece, B., *Armijo, B., Alliband, A., Avocat, H., Sloan, R., Rogers, S., **Kirk, M.F.** (2023). Nitrate contamination in groundwater from private wells in south-central Kansas. Kansas Governor's Water Conference, Manhattan, KS.
- Altıneşik, A., Softa, M., Akgün, E., Yüksel, M., **Spencer, J.Q.G.**, Topal, S., Gürgöze, S., Sözbilir, H., Aksoy, E. (2024). Chronological Assessment of Elevated Terraces in the Şiro Valley Controlled by the Eastern Anatolian Fault Zone-Pütürge Segment Utilizing the OSL Technique (Optically Stimulated Luminescence): Preliminary Observations. 76th Geological Congress of Türkiye with International Participation, 15-19 April, Ankara, Türkiye.
- *Anhold, C., *Hatley, C., *Alcantar-Velasquez, E., Rana, S, Burgin, A.J., Sullivan, P.L., Nippert, J.B., Happell, J, Macpherson, G.L., **Kirk, M.F.** (2023). Impacts of woody encroachment on

the fate of soil CO₂ in grassland watersheds. Kansas Governor's Water Conference, Manhattan, KS.

Bagheri, A. Patrignani, A., **Ghanbarian, B.** and Pourkargar, D. B. (2024). A physics-informed machine learning approach to predict soil water content for agricultural decision-making. American Control Conference (ACC), Toronto Canada, July 8-12.

Benowitz, J., Pavlis, T., **Brueseke, M.**, Trop, J., Elder, W.P. (2024). Extended innings: mid-Cretaceous (starting at ~110 Ma) orogenesis in the Intermontane Terrane after the Insular Terrane hits the northern-North American western margin: Geological Society of America Abstracts with Programs. Vol. 56, No. 5.

*Bosikun, K., Jamali, T., **Ghanbarian, B.**, Kurths, J. (2023). Complex network analysis of extreme temperature events in the United States. American Geophysical Union Fall Meeting, San Francisco CA, 11-15 December.

*Broley, K. and **Brueseke, M.** (2024). Metallogenic constraints on North American central Cordillera Eocene paleo-tomography: The magmatic affinity of the Absaroka and central Idaho Challis volcanic provinces: Geological Society of America Abstracts with Programs. Vol. 56, No. 5.

Brueseke, M. Session Co-Convener, T171. Oblique Motion on the North American Cordilleran Margin I and II: Jurassic to Paleogene (GSA Connects 2024 Annual Meeting; two separate oral sessions and one poster session)

Brueseke, M., *Hasten, Z.E.L., Hames, W., Saunders, J., and Larson, P. (2024). Miocene magmatism in the Silver City District, Owhyee Mountains, Idaho (USA): Origin and implications for flood basalt magmatism linked to the inception of the Yellowstone hotspot and Au-Ag epithermal precious metal mineralization: Geological Society of America Abstracts with Programs. Vol. 56, No. 5.

Carter, E., Brugess, R., Coggon, R., Evans, A., Harris, M., Albers, E., **Kempton, P.**, Belgrano, T., Jonnalagadda, M., O'Driscoll, B., Clay, P. and Expedition 390/393 Scientists. (2024). Assessing iodine in calcite as a fluid redox proxy across the South Atlantic Transect. The South Atlantic Transect 2nd Post-Expedition Meeting, Reykjavik, Iceland, 25-30 May

*Chakravarty, M., Langston, A.L., **Spencer, J.Q.G.** (2024). Illuminating the past: OSL dating unveils Kings Creek's dynamic evolution and human impact. Association of American Geographers, 16-20 April, Honolulu, HI.

Coggon, R.M., Ligton, J., Evans, A., Grant, L., Teagle, D.A.H., Harris, M., Carter, E., Albers, E., Belgrano, T., Jonnalagadda, M., **Kempton, P.D.** (2023). Carbon-Uptake During Ridge Flank Hydrothermal Exchange in 7-61 Ma Upper Ocean Crust Across the South Atlantic Transect - IODP Expeditions 390 and 393. OS13D-1313 American Geophysical Union Annual Meeting, San Francisco, 11-15 December 2023

- Coggon, R.M., Lington, J., Evans, A.D., Grant, L.J.C., Teagle, D.A.H., Harris, M., Carter, E.J., Albers, E., Belgrano, T.M., Jonnalagadda, M., **Kempton, P.D.** and The South Atlantic Transect IODP Expedition 390 & 393 Scientists (2024). Carbon-uptake during ridge flank hydrothermal exchange in 7-61 Ma upper ocean crust across the South Atlantic Transect. The South Atlantic Transect 2nd Post-Expedition Meeting, Reykjavik, Iceland, 25-30 May
- Dea, H.I., Kazarina, A., Urban, A., Sarto, M.M., Thomas, S.G., Loecke, T., **Kirk, M.F.**, Rice, C., Houseman, G.R., Greer, M.J., Sikes, B.A., Lee, S., Jumpponen, A. (2024) Post-agricultural prairie soil microbial community resilience across the steep precipitation gradient in Kansas, USA. Natural Areas Conference, Manhattan, KS.
- *Eme, C., **Goldberg, K.** and **Ghanbarian, B.** (2023). Application of tipping point analysis to refine sequence stratigraphic surfaces in the Chattanooga formation in Tennessee and Alabama. American Geophysical Union Fall Meeting, San Francisco CA, 11-15 December.
- Evans, A., Coggon, R.M., Harris, M., Carter, E., Albers, E., Belgrano, T., Jonnalagadda, M., Grant, L., **Kempton, P.D.**, Teagle, D.A.H., (2023) Progressive evolution of hydrothermal vein characteristics in upper oceanic crust: Evidence from the South Atlantic Transect. OS13D-1314 American Geophysical Union Annual Meeting, San Francisco, 11-15 December 2023
- Evans, A.D., Coggon, R.M., Harris, M., Carter, E.J., Albers, E., Guérin, G.M., Belgrano, T.M., Jonnalagadda, M., Grant, L.J.C., **Kempton, P.D.**, Sanderson, D.J., Milton, J.A., Henstock, T.J., Alt, J.C., and Teagle, D.A.H. (2024) Basalt-hosted hydrothermal veins record dynamic interplay between ocean plate cooling and global conditions. The South Atlantic Transect 2nd Post-Expedition Meeting, Reykjavik, Iceland, 25-30 May
- *Everhart, W., **Brueseke, M.**, *Broley, K. (2024). Incompatible element constraints on mantle source changes of Eocene-Oligocene basalts from the Dillon volcanic field, southwest Montana (USA): Geological Society of America Abstracts with Programs. Vol. 56, No. 5.
- *Falowo, M. and **Raef, A.** (2024). Rock physics models in pore-fluid replacement in a saline aquifer: comparative study of Hydrogen and CO2 variable saturations, AAPG Mid-Continent, Fort Hays State University, Hays October 18-19, 2024.
- Gomez, F., Polun, S., Bidgoli, T. S., **Spencer, J.Q.G.**, Vaughn, J., Ray, D., Sandvol, E., Cahalan, L., Achey, A. (2024). Paleoseismic investigation of the Grand River Tectonic Zone, north-central Missouri. Joint 58th Annual North-Central/58th Annual South-Central Geological Society of America Section Meeting, 21-23 April, Springfield, MO.
- Gomez, F., Polun, S., Bidgoli, T. S., Spencer, J.Q.G., Vaughn, J., Ray, D., Sandvol, E., Cahalan, L., Achey, A. (2024). Paleoseismic investigation of the Grand River Tectonic Zone, north-central Missouri. Joint 58th Annual North-Central/58th Annual South-Central Geological Society of America Section Meeting, 21-23 April, Springfield, MO.

- Gür, B., Sözbilir, H., Mimaroglu, S., Öz, A.K., Softa, M., **Spencer, J.Q.G.**, Özkaymak, Ç., Utku, M., Yüksel, M., Avcı, E., Özdağ, Ö.C., Baltutan, E.F. (2024). Research of Ancient Earthquake Traces In The Ancient Cities of İzmir Province With A Multidisciplinary Approach: First Findings. 76th Geological Congress of Türkiye with International Participation, 15-19 April, Ankara, Türkiye.
- Guthrie, A., Sullivan, P.L., **Kirk, M.F.**, Loecke, T.D., Rice, C.W., Sikes, B.A., Unruh, M., de Souza, L.F.T., Hirmas, D., Li, L., Ajami, H., Singha, K., Klamm, L.M., Billings, S.A. (2023) Surficial soil changes and precipitation patterns interact to govern propagation of deep soil solutes produced by weathering. American Geophysical Union Annual Meeting, 11-15 December.
- *Gyasi, E. and **Raef, A.** (2024). Post-stack Seismic inversion in reservoir quality assessment: petrophysical aspects of acoustic impedance, American Association of Petroleum Geologists, Mid-Continent, Fort Hays State University, Hays, KS, 18-19 October.
- Harris, M., Carter, E., Evans, A., Albers, E., Belgrano, T., **Kempton, P.**, Jonnalagadda, M., Coggon, R., Teagle, D., Sylvan, J., Reece, J., Estes, E., Williams, T. and The South Atlantic Transect IODP Expedition 390 & 393 Scientists (2024) Investigating Hydrothermal Alteration During the Aging of the Ocean Crust: Insights from The South Atlantic Transect IODP Expeditions 390/393. The South Atlantic Transect 2nd Post-Expedition Meeting, Reykjavik, Iceland, 25-30 May
- Harris, M., Elliot, C., Evans, A., Albers, E., Belgrano, T., **Kempton, P.D.**, Jonnalagadda, M., Coggon, R.M., Teagle, D.A.H., Reece, J.S., Sylvan, J.B., Estes, E.R., Williams, T. (2023) Investigating Hydrothermal Alteration During the Aging of the Ocean Crust: Insights from The South Atlantic Transect IODP Expeditions 390/393. OS12A-01 American Geophysical Union Annual Meeting, San Francisco, 11-15 December.
- Hojnacki, V., Passchier, S. and the South Atlantic Transect IODP Expedition 390 & 393 Scientists (**P. Kempton**, participant). (2023). Changes in Terrigenous and Carbonate Sortable Silt in the Southern Atlantic at the Eocene-Oligocene Transition. American Geophysical Union Annual Meeting, San Francisco, 11-15 December
- Hong, G. and the South Atlantic Transect IODP Expeditions 390 & 393 Scientists (**P. Kempton**, participant) (2023). Composition and Microstructure of Magnetic Minerals within Basaltic Cores of the South Atlantic Transect (SAT) and their Correlation with Rock Magnetic Properties. American Geophysical Union Annual Meeting, San Francisco, 11-15 December
- Hunt, A. and **Ghanbarian, B.** (2024). Maximizing the net primary productivity of ecosystems in order to predict evapotranspiration as a function of climate variables. Water Science Conference, American Geophysical Union Water Science Conference, Saint Paul MN, 24-27 June.

- Jin, Q., Bowman, G., Harris, G., **Kirk, M.**, Sanford, R. (2024). A simplified Nernst equation for predicting redox potentials in groundwater. Goldschmidt annual meeting, Chicago, IL, 18-23 August.
- Jonnalagadda, M., Belgrano, T., Ryan, J.G., **Kempton, P.D.**, Evans, A., Grant, L.; Teagle, D.A.H., Coggon, R.M. (2023). Near-realtime shipboard geochemistry of MORB cores along the South Atlantic Transect by portable XRF. OS13D-1312 American Geophysical Union Annual Meeting, San Francisco, 11-15 December 2023
- Kempton, P.D.**, Barry, T., **Adam, C.**, and Saunders, A. (2024). Temporal variations of the oldest Emperor-Hawaiian plume signature influenced by interactions between both deep and shallow mantle sources. Geological Society of America Annual Meeting, 22-25 Sept 2024
- Kempton, P.D.**, Coggon, R., Taylor, R., Michalik, A., Milton, A., and The South Atlantic Transect IODP Expedition 390 and 393 Scientists (2023) Presence of a HIMU Mantle Plume Component beneath the South American Plate in the Vicinity of the Eastern Rio Grande Rise: IODP Exp 390/393, the South Atlantic Transect. American Geophysical Union Annual Meeting, San Francisco, 11-15 December 2023 DOI 10.1029/2023GC010033
- Kempton, P.D.**, Coggon, R.M., Millar, I., Michalik, A., Milton, A., Taylor, R. and The South Atlantic Transect IODP Expedition 390 and 393 Scientists. (2024) Presence of a HIMU Mantle Plume Component beneath the South American Plate in the Vicinity of the Eastern Rio Grande Rise: IODP Exp 390/393, the South Atlantic Transect. The South Atlantic Transect 2nd Post-Expedition Meeting, Reykjavik, Iceland, 25-30 May
- Kim, S., Yang, K., Kaplan, M.R., Tamborrino, L., Wang, Y., Aizawa, M. and the South Atlantic Transect IODP Expedition 390 & 393 Scientists (**P. Kempton**, participant). (2023). Reconstruction of paleoclimate and source changes based on clay minerals in the South Atlantic Transect: IODP Expedition 390. American Geophysical Union Annual Meeting, San Francisco, 11-15 December
- *King, M.A. and **Raef, A.** (2024). Ultrasonic P- and S-wave velocity measurements in the subsurface characterization of the Mississippian carbonate reservoir rocks, American Association of Petroleum Geologists, Mid-Continent, Fort Hays State University, Hays 18-19 October
- Kıralli, S., Softa, M., Sözbilir, H., Şahiner, E., **Spencer, J.Q.G.**, Yüksel, M., Akçar, N., Yerli, B., Utku, M., Büyüktopçu, F.M., Deniz, F. (2023). Investigation of Paleo-earthquake using OSL Surface Dating on the Kalafat Fault (Kuşadası Fault Zone, Western Anatolia, Türkiye): Preliminary Finding. 76th Geological Congress of Türkiye with International Participation, 15-19 April, Ankara, Türkiye.
- Kirk, M.F.**, *Anhold, C.* *Hatley, C.* *Alcantar-Velasquez, E., Jarecke, K.M., Sadayappan, K., Keen, R., Sullivan, P.L., Nippert, J.B., Li, L. (2024) Proposed model for impacts of woody

encroachment on groundwater CO₂ and mineral weathering in grassland watersheds.
Goldschmidt annual meeting, Chicago, IL, 18-23 August

- Guertin, L. and the South Atlantic Transect IODP Expeditions 390 and 393 Scientists (**P. Kempton**, participant) (2024). Stitching Stories of Scientific Ocean Drilling: A Quilt Collection of the South Atlantic Transect (IODP Expeditions 390 and 393). American Geophysical Union Annual Meeting Ocean Sciences Meeting, New Orleans, LA, 18-23 February
- Lu, W., Hess, A., Oppo, D.W., and the South Atlantic Transect IODP Expeditions 390 & 393 Scientists (**P. Kempton**, participant) (2023). Deep-sea temperature change in the South Atlantic during the last deglaciation. American Geophysical Union Annual Meeting, San Francisco, 11-15 December
- *Lupini, I., **Kempton, P.D.**, Möller, A. and **Adam, C.** (2024).. A Geochronological Perspective on the Geodynamic Models of Kimberlite and Lamproite Magmatism in Kansas, 12th International Kimberlite Conference Extended Abstract No. 12IKC-182, Yellowknife, Canada, 8-12 July,
- McIntyre, A.J., Sexton, P.F., Anand, P. and the South Atlantic Transect IODP Expedition 390 & 393 Scientists (**P. Kempton**, participant) (2024). Reconstructing Paleogene Atlantic Ocean Circulation. NCAR Paleoclimate Society, May
- *Mindrup, Q., **Kempton, P.D.**, Mathur, R., Evans, A., Coggon, R.M. (2024). Primary sulfide globules in oceanic basalts and their impact on Cu, SAT 390/393. Geological Society of America Annual Meeting, 22-25 September
- *Mindrup, Q., **Kempton, P.D.**, Mathur, R., Evans, A., Coggon, R., and The South Atlantic Transect IODP Expedition 390 and 393 Scientists (2024) Primary sulfide globules in oceanic basalts and their impact on Cu, SAT 390/393. The South Atlantic Transect 2nd Post-Expedition Meeting, Reykjavik, Iceland, 25-30 May
- Moal-Darrigade, P., Ducassou, E., Giraudeau, J., Perello, M-C., and the South Atlantic Transect IODP Expedition 390 & 393 Scientists (**P. Kempton**, participant) (2023) Deciphering bottom water masses influence on abyssal sedimentation based on grain-size distribution: IODP Exp 390/393, the South Atlantic Transect. American Geophysical Union Annual Meeting, San Francisco, 11-15 December
- *Okolo, C., **Goldberg, K.**, **Kirk, M.**, **Ghanbarian, B.** (2024). Assessment of vulnerability and contamination potential of the Ozark Plateau Aquifer in Cherokee County, KS. GSA Connects 2024 Meeting, Anaheim, CA, 22-25 September
- *Oladoja, V., Jamali, T., **Ghanbarian, B.**, Kurths, J. (2023). Summer extreme precipitation patterns in North America: A complex network analysis. American Geophysical Union Fall Meeting, San Francisco CA, 11-15 December.

- *Olawale, L., Shafiee, O., Higgins, D., **Ghanbarian, B.** (2023). Multifractal detrended fluctuation analysis of photon intensity series in nano-structured porous media: A single molecule study. American Geophysical Union Fall Meeting, San Francisco CA, 11-15 December.
- *Olawale, L., Shafiee, O., Higgins, D., **Ghanbarian, B.** (2023). Single molecule studies of diffusion through nanoporous media. American Geophysical Union Fall Meeting, San Francisco CA, 11-15 December
- *Pruitt, J., Puthalath, S., Nippert, J.B., Sullivan, P.L, Li, L., **Kirk, M.F.** (2024) Variation in streamflow sources and composition in response to woody encroachment in grassland watersheds. Annual meeting of the Geological Society of America, Anaheim, CA, 22-25 September.
- Reece, J.S., Andonov, M.E., Rivera, A., Thompson, M. and the South Atlantic Transect IODP Expedition 390 & 393 Scientists (**P. Kempton**, participant) (2023). Modelling of porosity evolution and mechanical compaction in sediments along the South Atlantic Transect. IODP Expeditions 390 and 393. American Geophysical Union Annual Meeting, San Francisco, 11-15 December
- *Rickert, J., Tatitscheff, B., Kocsis, L., Vennemann, T., **Lacroix, B.**, Möller, A. (2024). Absolute Timing and Related Fluid-Flow associated with the Washita Valley Fault-System. Geological Society of America Meeting, Anaheim, CA, 21-25 Sept,
- Ryan, J.G., French, J., Walters, K., Santiago-Ramos, D., Jonnalagadda, M., Belgrano, T., **Kempton, P.D.**, Coggon, R.M., Sylvan, J.B., Teagle, D.A.H., Reece, J.S., Williams, T., Estes, E.R., (2023) Evolving Geochemical Signatures in Slow-Spreading Ocean Crust from 0-61 Ma: Insights from Recovered Basalts of the South Atlantic Transect. OS13D-1311 American Geophysical Union Annual Meeting, San Francisco, 11-15 December
- Sadayappan, K., Keen, R., Jarecke, K., Moreno, V., Nippert, J., **Kirk, M.F.**, Sullivan, P., Li, L. (2023) Enhanced carbonate weathering in woody encroached grasslands. Annual meeting of the American Geophysical Union, San Francisco, CA, 11-15 December
- *Senevirathna, S., **Ghanbarian, B.**, Zemlyanova, A., and Hu, Q., (2023). Scaling counter-current spontaneous imbibition: Fractional Richards' equation and non-Boltzmann transformation. American Geophysical Union Fall Meeting, San Francisco CA, 11-15 December
- Shchepetkina, A., Moal-Darrigade, P., Pekar, S., Williams, T. and the South Atlantic Transect IODP Expedition 390 & 393 Scientists (**P. Kempton**, participant) (2023). Estimating CaCO₃ content based on natural gamma ray (NGR) in deep-ocean sediment cores: IODP Exp 390/393, the South Atlantic Transect. American Geophysical Union Annual Meeting, San Francisco, 11-15 December
- Softa, M., Sözbilir, H., Şahiner, E., Yüksel, E., **Spencer, J.Q.G.**, Akçar, N., Utku, M., Çakır, R., Yerli, B., Büyüktopçu, F.M., Deniz, F. (2023). "A new Approach to Dating Technique Performed

on the Paleoseismology Studies in Western Anatolia: Luminescence Surface Exposure Dating”, Geoscience Colloquium on the 100th Anniversary of the Turkish Republic “Western Anatolia”, İzmir, Turkey, 26-28 October

Softa, M., Sözbilir, H., Utku, M., Çakır, R., Şahiner, E., Yüksel, E., **Spencer, J.Q.G.**, Akçar, N., Yerli, B., Büyüktopçu, F.M., Deniz, F. (2023). “The Use of Luminescence Surface Exposure Dating Performed on the Kalafat and Yavansu Fault in Paleoseismological Studies: Preliminary Results”, Earthquake Symposium: Exploring All Aspects, Edirne, Turkey, 19-20 October

Sylvan, J.B., Estes, E.R., Wang, Y., D'Angelo, T., Wee, S.Y., Gilhooly III, W.P., Ramos, D.S., , Villa, A., and The South Atlantic Transect IODP Expedition 390 & 393 Scientists (**P. Kempton**, participant) (2023) Microbial processes indicated by porewater geochemistry along the International Ocean Discovery Program South Atlantic Transect. American Geophysical Union Annual Meeting, San Francisco, 11-25 December

Wang, Y., Nielsen, S., Costa, K., McIntyre, A. and the South Atlantic Transect IODP Expedition 390 & 393 Scientists (**P. Kempton**, participant). (2023) Paleogene ocean redox changes from the western South Atlantic: reconstructions from IODP 390 and 393. American Geophysical Union Annual Meeting, San Francisco, 11-15 December

*Zhang, T., Hu, Q., **Ghanbarian, B.**, Elsworth, D., and Lu, Z. (2023). An integrated technique for rapid gas permeability measurement of tight rock media. American Geophysical Union Fall Meeting, San Francisco CA, 11-15 December.

Grants and Contracts

New

Kempton, P.D. *Petrologic studies of basalts from Leg309/393 South Atlantic Transect: (1) Cu isotope systematics of altered oceanic crust and (2) Investigation of mantle source variation along a 63 m.y. crustal flow line*, US Science Support Program for IODP (NSF-funded), includes three months' salary and assorted travel expenses, 2022-2023, supplemental travel award, **\$7,500**.

Spencer, J.Q.G. (PI), Bidgoli, T. Luminescence dating of sediment samples, 2024-2025, **\$1,350**.

Spencer, J.Q.G. (PI), Lund, P.T. Luminescence dating of a burnt felsic cobble, 2024-2025, **\$1,500**.

Spencer, J.Q.G. (International collaborator). “Investigation of Ancient Earthquake Traces in the Ancient Cities of Izmir Province with a Multidisciplinary Approach”. Dokuz Eylül University Research Foundation, 2024-2026, total funding **197,485 Turkish Lire**, ~**\$6,000** (PIs Barış Gür and others).

Sullivan, P. (PI), **Kirk, M.**, Nippert, J., Li, L. (Co-PIs). Collaborative Proposal: “How do changes in land cover and climate perturb grassland water and carbon cycles below-ground”. Sept. 1, 2024 – Aug. 31, 2026, KSU budget \$368,516; total budget \$1,106,890.

Active

Adam, C. (PI) Modelling the stress field along continental rifts from tomography models, American Chemical Society (ACS), The Petroleum Research Fund (PRF), 2021-2023 **\$70,000**

Adam, C. (PI) *Structure and dynamics of the subcontinental lithospheric mantle over the Central and Eastern North American continent, constrained by numerical modeling based on tomography models*, National Science Foundation (NSF), Geophysics, 2023-2026, **\$177,166**

Brueseke, M.E. (PI). Collaborative Research: Investigating out-of-sequence magmatism and mantle plume-lithosphere interactions adjacent to the Snake River plain (U.S.A.). NSF-Petrology, 9/1/2020 – 9/1/2024, **\$240,385**

Ghanbarian, B. (PI) Soil-based carbon dioxide sorption: Image analysis, numerical modeling, and deep learning, Environmental Molecular Sciences Laboratory, Pacific Northwest National Lab, Department of Energy, 2023-2025.

Ghanbarian, B. (PI) Geomechanical and mineralogical properties of limestone samples from Kansas, Kansas Department of Transportation, 2023-2025, **\$76,816**

Ghanbarian, B. (PI), Higgins, D (Co-PI) Molecular mechanisms of mass transport in shales, American Chemical Society-Petroleum Research Fund, 2022-2024, **\$110,000**

Goldberg, K. (PI). Addendum to ““Water quality and radon levels as a potential cause of cancer in Ellsworth, Lincoln and Russell counties, KS” . Johnson Cancer Research Center Innovative Research Award, Aug. 15 – Dec. 31, 2024, **\$5,180**.

Kempton, P.D. *Petrologic studies of basalts from Leg309/393 South Atlantic Transect: (1) Cu isotope systematics of altered oceanic crust and (2) Investigation of mantle source variation along a 63 m.y. crustal flow line*, US Science Support Program for IODP (NSF-funded), includes three months’ salary and assorted travel expenses, 2022-2023, **\$71,000**.

Kirk, M. (PI), Avocat, H. Cook, M., Alliband, A., Sloan, R. (Co-PIs). “NSF GP-IN: Introducing Community College and Pre-College Students to Geoscience through Groundwater Quality Monitoring”. Jan. 1, 2023 – Dec. 31, 2025, **\$363,254**.

Nippert, J. (PI), Smith, M., Gido, K., Baer, S., Zeglin, L. (Co-PIs); **M. Kirk** among senior personnel. “LTER: Manipulating drivers to assess grassland resilience”. 2020 – 2025, **\$7,122,000; \$15,000/yr** to Geology.

Spencer, J.Q.G. (collaborator). “FAULTOSL – Dating Fault Surfaces by Surface Luminescence Dating Technique: Developing a New Technique in Paleoseismological Studies and Testing Its Applicability on Active Faults in Turkey”. Dokuz Eylul University Research

Foundation, 2023-2025, total funding **583,618 Turkish Lire, ~\$31,000** (PIs Mustafa Softa and others).

Spencer, J.Q.G. (International Advisor). “Investigation of the Tectonic Activity of the East Anatolian Fault Zone (EAFZ)-Pütürge Segment in the Light of Dating the Uplifted Terraces Along the Şiro Valley and Tectonic Geomorphology”. TUBITAK Research Foundation, 2022-2024, total funding **936,648 Turkish Lire, ~\$28,000** (PIs Elif Akgün and others).

Spencer, J.Q.G. (International Advisor). “Determination of Paleoseismological Characteristics of Active Faults in Türkiye”. TUBITAK Research Foundation, 2023-2025, total funding **9,652,648 Turkish Lire, ~\$285,000** (PIs Hasan Sözbilir and others).

Spencer, J.Q.G. (collaborator). Investigation of paleoliquefaction of the Grand River Tectonic Zone (Central Missouri). USGS – Earthquake Hazard Program, 2022-2024, total funding **\$88,504** (PIs Francisco Gomez, Tandis Bidgoli, Sean Polun).

Spencer, J.Q.G. (PI), Pullen, A., Kroeger, E. OSL dating of aeolian loess deposits in the wind deflated areas of La Pampa, Argentina. Clemson University, 2022-2024, **\$4,050**.

Spencer, J.Q.G. (PI), Varner, T., Datta, S. OSL dating of very young fluvial deposits in the banks of the Meghna River, Bangladesh. University of Texas at San Antonio, 2022-2024, **\$2250**.

Spencer, J.Q.G. (PI), Oviatt, C.G., Bradbury, C.D. OSL dating of Lake Bonneville shoreline comprising reworked basaltic sands from Sunstone Knoll, Sevier Desert, Utah. Kansas State University, 2022-2024, **\$900**.

Spencer, J.Q.G. (PI), Layzell, T., and others. Luminescence dating for geologic mapping in Kansas project. USGS-STATEMAP/KGS, 2018-2024, **\$21,600**.

Spencer, J.Q.G. (PI), Luminescence dating of Bronze Age terraces, Sardis, Turkey. UWM/Harvard, 2019-2024, **\$9,900**.

Spencer, J.Q.G. (PI), Davies, C., Luminescence dating of loess samples from Kansas. UMKC, 2018-2024, **\$1,648**.

Spencer, J.Q.G. (PI), Davies, C., Luminescence dating of dune samples from Jordan. UMKC, 2018-2024, **\$2,884**.

Donations

Raef, A., IKON Science donation of 15-seat RokDoc 2024 software license (active/renewed)

Raef, A., SP global donation of 15-seat Network license for Kingdom 2023 seismic data interpretation and modeling software suite, and Petra 2023 for petroleum geology and well logs analysis. (active/renewed)

Faculty Awards and Recognition

Adam, C. FY24 Page Twiss Graduate Teaching Award

Cui, H., elected Voting Member, Subcommittee on Ediacaran Stratigraphy of the International Commission on Stratigraphy

Gad, S. FY24 Geology Department Undergraduate Teaching Award

Ghanbarian, B. Top 2% Scientists in the World (single-year and career categories), Stanford University, doi: 10.17632/btchxktyw.7, 2024

Ghanbarian, B. Graduate Faculty Mentor Honorable Mention, Graduate School, Kansas State University, 2024

Kempton, P.D., GSA MGPV Distinguished Geological Career Award selection committee member (3 yr term)

Kirk, M., elected Geological Society of America Fellow

Spencer, J.Q.G., affiliate faculty member, University of Glasgow and Scottish Universities Environmental Research Centre, 2023-2025

Student Grants, Awards and Recognition

Brayden Shoemaker (MSc; M. Brueseke, advisor) – K-State College of Arts and Sciences Mark Chapman Scholars Program: Volcanology and petrology of Miocene rhyolites, Teton Pass, WY/ID. \$5,000.

Chinedu Godwin Okolo (MSc; K. Goldberg, advisor) – 2024 Climate, Water, and Equity Workshop Travel Grant - \$750

Chinedu Godwin Okolo (MSc; K. Goldberg, advisor) – Graduate Student Council Travel Award - \$400

Chinedu Godwin Okolo (MSc; K. Goldberg, advisor) – Geological Society of America Travel Award - \$300

Chinedu Godwin Okolo (MSc; K. Goldberg, advisor) – K-State Arts and Science Travel Award - \$400

Chinedu Godwin Okolo (MSc; K. Goldberg, advisor) – K-State Travel Award: \$950

Deborah Agbamu (MSc; B. Ghanbarian, advisor) – National Black Geoscientist Meeting, Honorable Mention for her presentation, 2024

Deborah Agbamu (MSc; B. Ghanbarian, advisor) – National Black Geoscientist Scholarship, 2024

Deborah Agbamu (MSc; B. Ghanbarian, advisor) – Kansas Geological Foundation scholarship, \$1,000

Emmanuel Gyasi (MSc; Abdelmoneam Raef, advisor) – Kansas Geological Foundation, \$1,000

Fidelis Onwuagba (MSc: K. Goldberg, advisor) –selected to represent K-State at the annual Capitol Graduate Research Summit (CGRS), presenting research to state legislators and the public at the State Capitol in the annual Capitol Graduate Research Summit

Fidelis Onwuagba (MSc: K. Goldberg, advisor) – First place for presentation in the Switch International Energy Case Competition (<https://switchon.org/case-competition>) out of 88 teams from across the world!!

Isabella Lupini (MSc; P. Kempton) – K-State College of Arts & Sciences travel grant, \$400.

James Rickert (MSc: B. Lacroix, advisor) – Student Research Grant - Kansas City Gem and Mineral Show (\$500)

James Rickert (MSc: B. Lacroix, advisor) – Geological Society of America Student Travel Grant (\$250)

James Rickert (MSc: B. Lacroix, advisor) – K-State College of Arts and Sciences Graduate Student Council Student Travel Grant (\$400)

Levi Pruitt (MSc: M. Kirk, advisor) – K-State Graduate Student Council travel award, \$200

Luke Romang (MSc: K. Goldberg, supervisor) – Johnson Cancer Research Center’s Cancer Research Award - \$7,500

Luqman Olawale (MSc; B. Ghanbarian, advisor) – Kansas Geological Foundation scholarship, \$1,000

Matilda King (MSc: Abdelmoneam Raef, advisor) – Association for Women Geoscientists (AWG) awarded, \$1000

Matilda King, (MSc: Abdelmoneam Raef, Advisor) – Geological Society of America Research Grant, \$2,500

Quillen Thornton (MSc: J. Spencer, advisor) – K-State College of Arts and Sciences Graduate Travel Award, \$400

Quinton Mindrup (BSc: P. Kempton, advisor) – K-State College of Arts and Sciences Undergraduate Research Award, \$1,250

Sami Villasana (BSc) – Kansas Geological Foundation scholarship, \$500

Wyatt Everhart (MSc: M. Brueseke, advisor) – Colorado Scientific Society Student Research Grant, \$500.

Wyatt Everhart (MSc: M. Brueseke, advisor) – Geological Society of America Student Research Grant, \$2,500.

Wyatt Everhart (MSc: M. Brueseke, advisor) – Geological Society of America travel grant, \$500.

Wyatt Everhart (MSc: M. Brueseke, advisor) – KSU Graduate student council travel award, \$400

Wyatt Everhart (MSc: M. Brueseke, advisor) – Tobacco Root Geological Society Scholarship, \$1,200.

Wyatt Everhart (MSc: M. Brueseke, advisor) – Wyoming Geological Association J.D. Love field scholarship, \$750.

Public Outreach Highlights

Rock Detectives: Unraveling the Stories Hidden in the Earth.

Graduate student, **Deborah Agbamu**, gave participants in K-State 4-H Discovery Days a rock ‘detective’ experience! The event, which was held from June 5-7, 2024, on the Kansas State University campus, is a college and career readiness opportunity for high school-aged youth. Deborah’s outreach session provided young people with an educational experience through hands-on activities that highlighted identification of rocks and minerals, understanding



rock properties, and processes of formation. She also included discussions about careers in geology, since most of

these students do not get the opportunity to take a geology course at high school level. The session lasted ~90 minutes, with four small groups, allowing for interactive participation and engagement.

“Reading” the rock record – a collaboration with Manhattan Public Library.

K-State graduate students, led by **Levi Pruitt**, collaborated with Laura Ransom, the Children’s Services Coordinator for Manhattan Public Library, to hold an educational event for young children (5 – 9 yrs old). Levi and his fellow graduate students, **Nelsy Orsio**, **James Rickert**, and **Connor Saari**, created four different knowledge-based activities geared towards 5–9-year-old children. The activities ranged from fossils identification to water purification, structural geology, and hydraulic fracturing. Laura Ransom kicked off the event by reading a children’s book about nature and the world around us. Then, the ~40 children were split into four different groups to complete the hands-on activities. Nelsy presented simulated hydraulic fracturing (‘fracking’) by blowing dyed water into gelatin with a straw. Levi taught the children about water quality and availability around Manhattan. In his activity, the children constructed simple water filtration devices from layering cotton balls, sand, gravel, and rocks placed into plastic water bottles. They then took muddy water and poured it over their filters, cleaning the water as it passed through the different layers. Using this analogy, the children were better able

to understand the significance of below-ground aquifers and how they help to clean and store the water they use at home! The Manhattan Public library was so pleased with the event they



have reached out asking for more!

Rocks and Rockets in its third year!

The Rocks and Rockets Outreach event, organized by K-State Geology grad Sarah Lamm and partially funded by the Kansas Geological Foundation, was attended by over 320 middle and high school students from the region around Colby, KS. Total attendance (~ 525) was up over 50% relative to last year! The event, which includes numerous hands-on interactive demonstrations, aims to promote the understanding of geology and space science among the public, especially students, in a rural region of northwestern Kansas. The event depends on the participation of over 40 volunteers, including students and faculty from Kansas State University, Fort Hays State University, the Kansas Geological Survey, the Kansas Biological Survey, Kansas Strong, the Cosmosphere, and the U.S. National Weather Service in Goodland. **Pamela Kempton** and K-State graduate students **Matthew Arana**, **Megan Megren**, **Chinedu (Godwin) Okolo**, and **Ethan Senne** ran the K-State Geology booth. They taught event participants (both children and adults) about the different sorts of minerals and rocks and how to identify them.

They also had fossils and gemstones on display and took advantage of the chance to speak with high school students about geoscience careers and the K-State Geology program.



Geology and dinosaurs a big hit at K-State Open House!



K-State Open House, the largest annual event hosted by the university, is aimed at engagement with the general public and prospective students. **Colleen Gura** organized the department's participation, with **Matt Brueseke** and graduate students **Emmanual Gyasi Matilda King**, and **Chinedu (Godwin) Okolo** staffing the Geology booth at the event (6 April 2024). The aim was to



increase awareness and interest in geosciences among high school students, their families, and community members as well as help prospective students explore career opportunities in the geosciences.

...and there's more!

Claudia Adam represented the Geology Department at a STEM recruitment event in September 2024 hosted by Department of Physics. High school students within an hour driving distance from campus were invited to the event, and 15 students participated. Claudia provided a 30-minute presentation describing our department and career opportunities in the geosciences. Claudia is also working with her two new master's students, **Medini Abeysinghe** and **Vivian Nechi**, to improve the experiments developed last year by **Tochukwu Onyebum** that demonstrate mantle convection and plate tectonics using plywood and corn syrup. The aim is to develop experiments that better simulate these critical Earth processes in a way that can be easily understood by the general public.

Graduate student **Kyle Broley** visited a middle school in Walters, Oklahoma (Jan. 2024), to meet with his former science teacher's class. Kyle discussed Geology as a career field, his MS research at K-State working on using Cu and Mo-porphyry systems to shed light on the causes of Eocene magmatism in the northern Rockies (USA), as well as his internship experiences with the EPA in Kansas City, MO. The latter led to a full-time position after he graduated in May 2024.

In addition to participating in K-State Open House, **Matt Brueseke** gave a public lecture on *The young volcanoes of northwest Wyoming: characteristics and causes* at the Dubois Museum (Fremont County, WY), 7/5/2024; was field trip leader for "Lava Mountain Geology Adventure Trek", 7/6/2024, a trip run through the Dubois Museum (WY) and focused on public geological

outreach <https://windriver.org/event/lava-mountain-geology-trek/>; continues to serve as the department's contact with Olathe North Geoscience Academy, and provides rock and identification for the general public.

Research by **Karin Goldberg** and her students have been exploring groundwater contamination in private wells and elevated radon levels as potential contributors to health challenges in Lincoln, Ellsworth and Russell counties. The work has sparked a lot of media attention:

- <https://www.kwch.com/2024/02/07/project-exploring-elevated-cancer-cases-lincoln-russell-counties/>
- <https://www.k-state.edu/media/newsreleases/2024-02/Johnson-Cancer-Research-Center-evaluates-cancer-risks-in-three-KS-counties.html>
- <https://www.ksn.com/news/health/cancer-concerns-spark-meetings-today-in-russell-and-lincoln-counties/>
- <https://sunflowerstateradio.com/2024/02/26/johnson-cancer-research-center-drives-crucial-cancer-research-initiative-in-russell-ellsworth-and-lincoln-counties/>
- <https://www.kwch.com/2024/02/26/k-state-conducting-cancer-research-3-kansas-counties/?outputType=amp>

Graduate students **Matilda King** and **Emmanuel Gyasi** gave presentations on how weathering and erosion contribute to the rock cycle, with a particular emphasis on sedimentary rocks at Durham Middle School in Texas, December 15th, 2023.

Graduate students **Chinedu (Godwin) Okolo**, **Fidelis Onwuagba**, and **Luke Romang** participated in an event at the Kansas Wetland Educational Center on 20 January 2024, organized in collaboration with the Kansas 4-H program. The event was aimed at high school students, focusing on the critical issue of nitrate contamination in groundwater, a pressing environmental concern in Kansas and many agricultural regions worldwide.

Joel Spencer and **Claudia Adam**, along with graduate students **Wyatt Everhart**, **Emmanuel Gyasi**, **Godwin Okolo**, **Tochukwu Onyebum**, **Levi Pruitt** and **James Rickert** participated in the Kansas Science Festival—a street festival held in downtown Manhattan (27 April 2024) that is designed to engage families and learners of all ages about various scientific disciplines. The event provided K-State Geology with an excellent platform for introducing the public to the fascinating world of geology.