

**Kansas State University Department of Geology**  
**Summary of Outputs and Achievements**  
**Advisory Council Meeting**  
**27 January 2023**

**Congratulations to Karin Goldberg—promoted to Associate Professor!**



**Dr. Karin Goldberg** was promoted this year from Assistant to Associate Professor with tenure in recognition of her distinguished reputation in sedimentology, basin analysis, and petroleum geology, and her outstanding record of contribution to the Department of Geology through teaching, research, and service. Karin joined K-State in 2016, having previously held a professorship at the Institute of Geosciences of the Universidade Federal do Rio Grande do Sul, Porto Alegre, Brazil. She is recognized by her colleagues for the breadth of her research in which she integrates different analytical methods to address a variety of geological problems that range from the energy sector to medical geology. As

described by one of the external reviewers for her tenure application, *“Dr. Goldberg breaks into unknown territories to bring new insights to the geological community”*. But Karin also gives back in a big way to the department and the university through service. She is the chair of the Geology Undergrad Recruitment and Retention committee, participates in the A&S Diversity Committee, is a member of the university’s Anti-Racism Working Group, and Faculty Recruitment and Retention subcommittee. She also participates in Alianza, a faculty and staff organization that monitors and defends the rights of Hispanics, Latinos, and other minority groups at K-State. As observed by one external reviewer, Dr. Goldberg’s *“commitment to recruiting students from underrepresented groups, supporting the advancement of women in STEM fields and promotion of diversity, equity and inclusion indicate her current and future contributions to the Department of Geology extend far beyond the metrics used to determine if her record warrants her promotion to Associate Professor”*. In recognition of her efforts, she was inducted this year as an honorary faculty member into the Tri-Alpha Honorary Society, a group that recognizes first-generation student academic excellence. The award recognizes faculty members who advance first-generation student success and serve as exceptional role models (<https://www.k-state.edu/today/announcement/?id=85966>). One of Karin’s external reviewers wrote, [She] *should be regarded as a significant asset to the Department, and to the University’s mission to foster STEM-oriented graduates—and she is!* Congratulations, Karin!

## Matt Totten Retires

**Dr. Matthew Totten** retired in August 2022, after 17 years of service to the Department of Geology and Kansas State University.

Matt joined the university faculty as an associate professor in June, 2005, following 13 years of service at the University of New Orleans. He received a bachelor's degree in geology in 1977 from the University of Kansas, and a M.S. in geology from the University of Oklahoma in 1979. He worked as a petroleum geologist in Wichita, Kansas, for ten years before returning to the University of Oklahoma, earning a Ph.D. degree in Geology in 1992.



Matt was active in the graduate program while at Kansas State, supervising 43 graduate students. Combined with the 15 students supervised in New Orleans, this resulted in 58 students supervised in his 30-year academic career. Many have gone on to successful careers in industry, and several have finished their doctorate degrees. Dr. Totten taught a number of courses for undergraduate and graduate students, including Petroleum Geology, Subsurface Methods, Formation Evaluation, but also Earth in Action and Earth through time for non-geology majors. His graduate courses were known for using state of the art computer software utilized in industry. He was instrumental in acquiring donations of this software to KSU, valued in the millions of dollars. He was awarded the Coombs award for excellence in teaching from the Department of Geology in 2007. Dr. Totten's research concentrated on diagenesis of fine-grained sedimentary rocks, and the identification and prediction of reservoir conditions in mid-continent petroleum basins. His work established a connection between clay-mineral transformations and the growth of silt-sized quartz, as well as documenting heavy-mineral controls on the trace element geochemistry of shales. His work in the western Kansas petroleum basin has contributed to the understanding of dolomitization on reservoir conditions, and the recognition of these conditions using geophysical methods.

## Professor Emeritus, Al Archer, passes away

It is with deep sadness that we inform you about the passing of Professor Emeritus **Allen Archer** (<https://www.legacy.com/us/obituaries/name/allen-archer-obituary?id=36219876>).

Dr. Allen Archer was an active member of the department of Geology for 27 years, until he retired in Fall 2015. Allen received a BSc from Oregon State University in 1976 and an MSc from Indiana University in 1979. He earned his PhD in 1983, also from Indiana University. Dr. Archer was hired as an Assistant Professor at Kansas State University in 1989 and was promoted to Associate Professor in 1996. Allen contributed to the success of the Department of Geology in a variety of ways. He taught classes in sedimentation and stratigraphy and served as faculty

advisor for several undergraduate geology clubs. He also helped lead the way in translating introductory geology courses into the online environment.

Allen was well known for his research on modern and ancient hypertidal depositional systems, an interest that grew out of trying to understand the structures within shales that cause shale slopes to fail. He made seven trips of the mouth of the Amazon River (1989 – 2008), six trips to the Cook Inlet area of south-central Alaska (2001 – 2008), four trips to Europe (1989-2012 to examine high tidal areas in the Severn Estuary and around Mont Saint Michel in France). He also conducted field work in Shanghai, China (2001 – 2005) and six trips to Patagonia (2002) along the Atlantic coast of southern Argentina.



## Research and Impact Highlights

### New insights into streamflow generation in intermittent streams

Intermittent streams account for up to 50% of global stream discharge and account for as much as 80% of global stream length. However, they are highly sensitive to environmental disturbances. Protecting these vulnerable water resources requires understanding mechanisms behind streamflow generation, but that understanding is lacking in many regions, including merokarst terrains, which exist across significant stretches of central North America. Newly



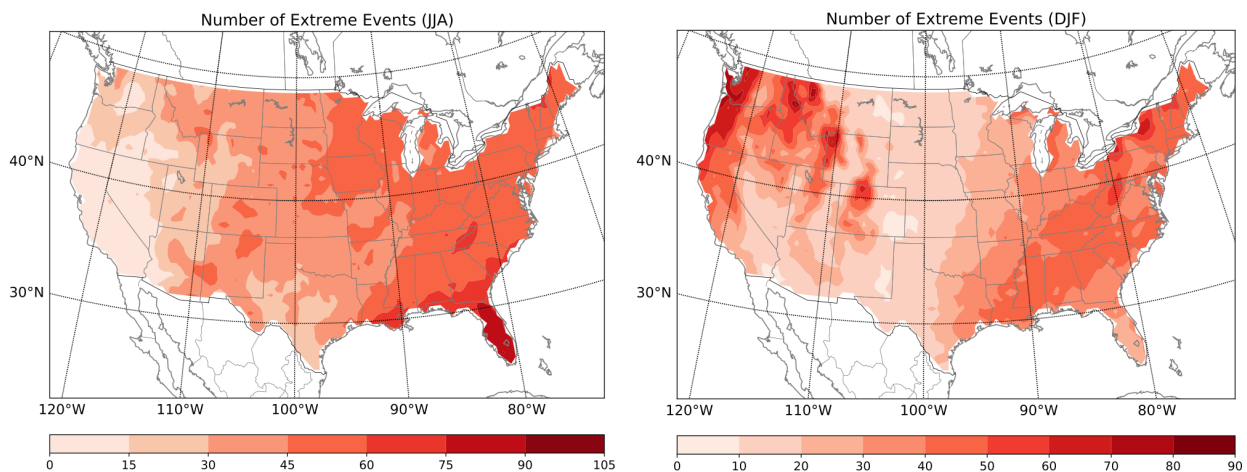
published research by Camden Hatley (pictured below) and other students in **Dr. Matthew Kirk's** research group helps fill this knowledge gap. Focusing on a merokarst watershed at Konza Prairie, the team combined high frequency stream, groundwater, and precipitation sampling with mixing calculation, stream discharge measurements, and groundwater head data to identify sources and timings of streamflow generation. Their results show that the stream water is overwhelmingly composed of groundwater discharge

*Photo left: Recent Geology MS graduate **Camden Hatley** sampling stream water at Konza Prairie. Camden is now working on his PhD at the Kansas Geological Survey with Dr. Erin Seybold. Other Geology students involved include **Brooklyn Armijo** (MS, 2022; now with KDHE), **Katherine Andrews** (MS, 2021; groundwater consulting in HI), and **Christa Anhold** (current MS student).*

from limestones (>95%) even during wet periods in contrast to many non-karstic watersheds. Contributions of individual limestone units vary over time in response to differences in their properties, which works to extend streamflow during dry periods. Moreover, the findings indicate that there is a critical threshold of groundwater storage that must be obtained before the aquifers fully connect to the stream, creating a threshold phenomenon that helps determine the onset of streamflow. Taken together, the results significantly advance our understanding merokarst hydrogeology and intermittent streams and provide a stronger foundation for understanding how these systems will be impacted by environmental changes.

### Analyzing extreme events using complex network theory

Water is a crucial element of the Earth hydrologic system. It is inseparable from life, essential for all living organisms, and plays a vital role in controlling photosynthesis rate and productivity of vegetation. In the past several decades, due to global population growth, demand for water substantially increased to support agricultural, industrial, and drinking water needs, which consequently caused surface and subsurface water resources to become unsustainable. **Dr. Behzad Ghanbarian** recently hired a postdoc, **Dr. Tayeb Jamali**, to analyze hydrologic and climatic data at the national scale. Using complex network theory and event synchronization method, Tayeb is currently analyzing the precipitation data collected between 1979 and 2021 all over the US. Analyses presented in Fig. 1 show the number of extreme events for two summer and winter seasons. We also analyzed extreme events by year and found that the number of extreme events has been increasing in accord with climate change and global warming.



*Fig. 1. The number of extreme events determined using the event synchronization method for two summer (JJA) and winter (DJF) seasons.*

## Health risks to local populations from uranium in black shales, the Chattanooga / Woodford

**Dr. Karin Goldberg's** Chattanooga / Woodford project took her and two students (undergrad **Demetri Willis** and master's student **Eunice Eme**) to Alabama and Tennessee over the summer. The rock successions there are more like those found in Oklahoma than in Kansas, with organic and siliceous shales, and radiolarites. But differently from OK, the occurrence of the infaunal brachiopod *Lingula* suggests more oxygenated conditions, and the abundant occurrence of conodonts in the black shales suggests shallower



*Demetri, Karin and Eunice in Fort Payne, Alabama*

waters. The high organic content of mudrocks, and abundance of radiolarians, *Tasmanites* and phosphate nodules point to a high primary productivity environment. Sedimentological data gathered in the four studied locations reveal that, contrary to the traditional sedimentological view that laminated black shales accumulate in a low-energy, anoxic basin, depositional conditions were much more diverse and complex in the Upper Devonian epicontinental sea. These shales show several sedimentological features (e.g. current-ripple and hummocky cross-lamination, lags composed of reworked phosphate bioclasts and nodules, shells and conodonts) that indicate that they were deposited in relatively shallow waters as a result of flocculated mud transported by bottom currents and sediment-gravity flows.

During the course of this research, Dr. Goldberg verified that these rocks have very high concentrations of uranium, 3-10 ppm for black shales from Kansas and 9-181 ppm for black shales from Oklahoma. This sparked her interest in assessing the geological risks to local populations in the Cherokee Basin in southeastern Kansas, where the rock succession contains more than 20 organic-rich layers and coals interbedded with carbonate rocks. In this area groundwater in the Ozark aquifer may contain uranium levels above the safe drinking limit established by the EPA (30  $\mu\text{g/L}$ , or 30 ppb) and pose a significant and underappreciated risk to human and animal health. Weathering processes can oxidize the uranium bound to the organic-rich rocks to a more soluble form, and U can be transported in aqueous solution and/or complexed with  $\text{CO}_3$  (from the dissolution of interbedded carbonates), contaminating the groundwater that supplies water wells. Consumption of this water may potentially be a risk for developing kidney disease or cancer in the rural population, which is guiding Dr. Goldberg's new research trajectory into Medical Geology.

## Temporal Evolution of the Swell and Magmatic Fluxes Along the Louisville Hotspot Chain

Louisville is “the other” long-lived hotspot track in the Pacific Ocean (Figure 1), with Hawaii being the most classical example of a hotspot chain, not only in the Pacific, but in general. **Dr. Claudia Adam** and her student **Madison Smith** have been leading research on the temporal evolution of the swell and magmatic fluxes ( $Q_s$  and  $Q_m$ , respectively) along the Louisville hotspot chain, from volcano ages and bathymetry data. The overall Louisville magmatism flux,  $Q_m$ , appears nearly constant, that is, Louisville plume activity has exhibited remarkably little variation over the past 30 m.y., in agreement with geochemical data. These results are also in agreement with recent studies along Hawaii, which show that the magmatic flux,  $Q_m$ , increase is due to plume migration toward a more fertile mantle reservoir. This means that, in general, long-term variations in  $Q_m$  relate to variations in the deep source of the plume. Along Louisville, we find short-term variations occurring with a periodicity of  $\sim 5\text{--}10$  m.y. in both  $Q_m$  and  $Q_s$ , similar to the short-term variations observed along Hawaii by former studies. As these variations occur along hotspot chains associated with either a heterogenous or homogeneous chemical signature, they must be created by shallow phenomena. The tilt of the plume conduit by large-scale mantle advection is our preferred model, as it can account for both the geophysical and geochemical observations. In other words, the integration of geophysical and geochemical data allows to better constrain deep phenomena.

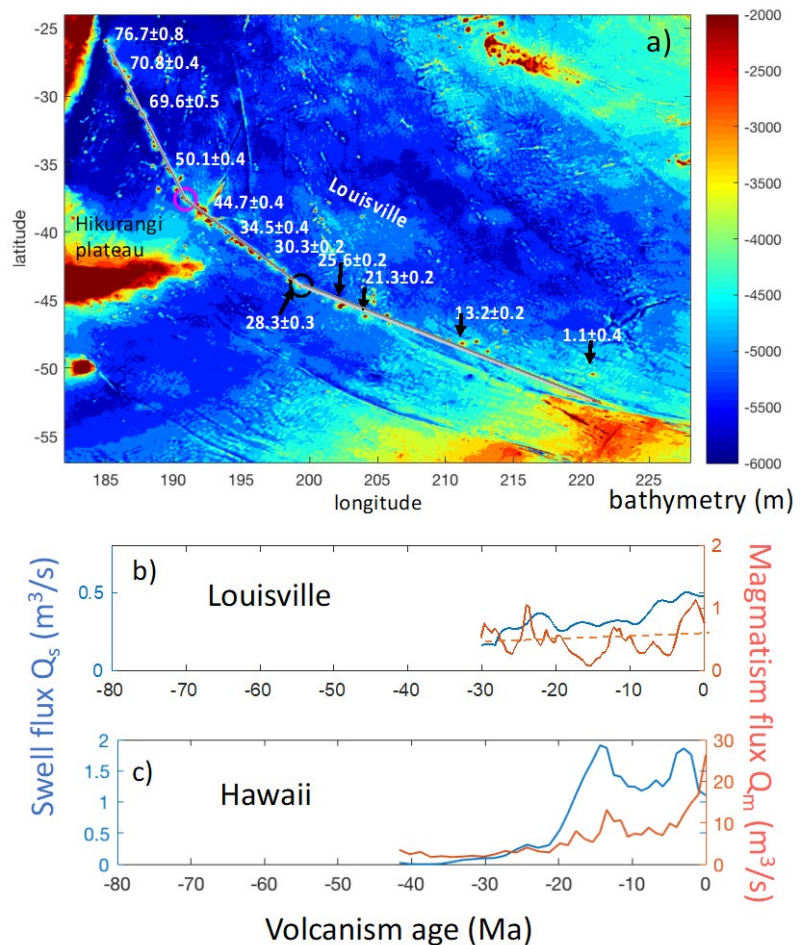


Figure above: Bathymetry and volcanoes ages along the Louisville hotspot chain (a). Temporal evolution of the swell and magmatic fluxes along the Louisville (b) and Hawaii (c) hotspot chains.

## Petrological updates from Dr. B

Hello everyone, in the midst of year three of the COVID-19 pandemic! Thankfully, things seem to generally be “normal” around here, though it is clear that the current group of K-State students have had a very different high school (and to an extent, college) experience than everyone that’s come through K-State before. My students and I are continuing our work on intraplate volcanism. Our current primary focus is on better understanding the petrogenesis of Cenozoic volcanic rocks in southwest MT and northwest WY, and how these magmatic products are linked to Yellowstone hotspot-induced lithosphere extension (via NSF funding). Progress moves forward on an Alaskan-based project dealing with how magmatism occurs along subducting slab tears and how slab-tearing can be used to document microplate collision. I’m also turning our attention back to northern Great Basin (USA) rhyolites, via a project focused on lithium, an important “critical mineral” (yes, it’s only an element; “critical mineral” is unfortunately used for both elements and actual minerals). The largest Li deposits on Earth are centered on caldera lakes, where the Li (found in lacustrine clays) was originally derived from Li-rich rhyolites. Understanding how much Li is actually in rhyolite lavas and tuffs, and if these represent melts of specific crustal types, is critical for exploration. Thus, we are starting to evaluate Li concentrations in rhyolite glass and quartz/feldspar-hosted melt inclusions via Laser Ablation Inductively Coupled Plasma Mass Spectrometry (LA-ICP-MS). Unfortunately, given the state of Thompson Hall, we will be doing the analyses at the University of Arkansas.

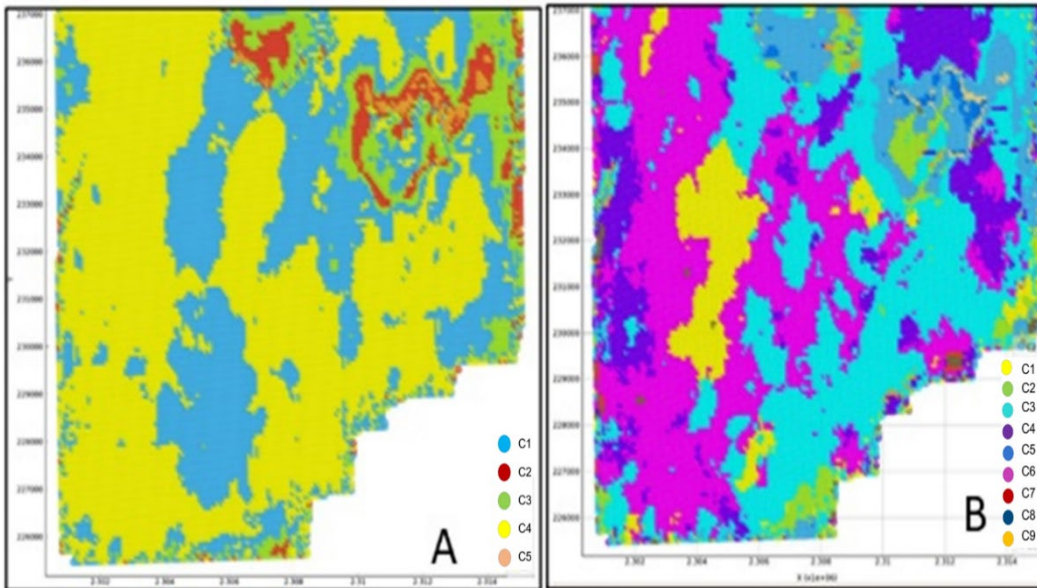


**Figure left:** “Hey Bear” volcano, located just north of Dubois Wyoming at ~11,500’ elevation. This volcano is a nice example of the intraplate volcanism, adjacent to Yellowstone, that we are studying. “Hey Bear” volcano is a scoria cone that erupted at ~1.4 Ma, based on our new geochronology. It directly overlies Eocene (over Eocene (~50 million-year-old) lavas and volcaniclastic strata, all of which were recently glaciated.

## Characterizing seismic lithofacies using machine learning

The main emphasis of the exploration and development seismology research is on lithofacies seismic characterization based on advanced machine learning methods, utilizing input of a suite of 3D seismic attributes. The results of this research area have been presented in the 2022 meeting of the society of exploration Geophysicists (SEG), Houston, Texas. This research paves the way for generalized machine learning models for carbonates reservoirs characterization of

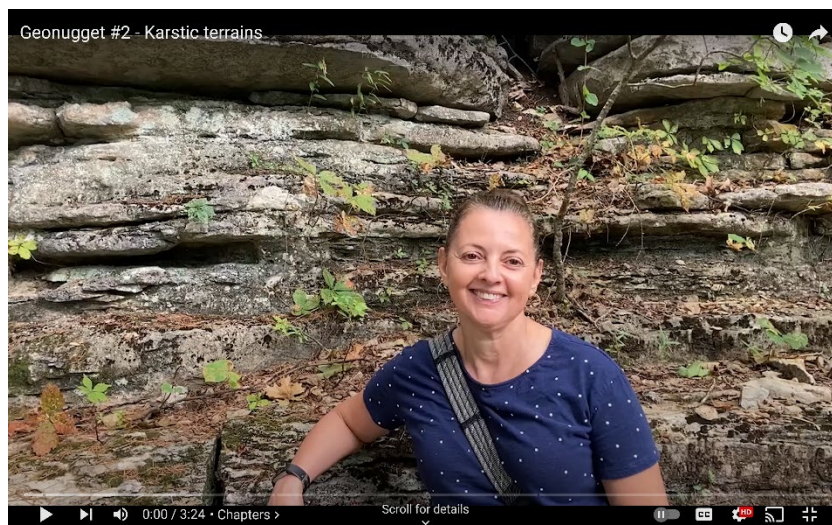
similar geological setting in Kansas and elsewhere. A developing sub-theme of this research area is impact of thin layer waveform changes on seismic attributes; ongoing project is expected to shed light on the identification of thin layer seismic signatures in 3D seismic reflection data.



*Seismic carbonate-facies maps of the Mississippian reservoir based on hierarchical analysis model, Wellington field before (A) and after (B) resolution enhancement.*

### More Geonuggets!

Dr. Karin Goldberg has completed two more Geonuggets videos. Geonugget #2 is on karstic terrains (<https://www.youtube.com/watch?v=Af98C95ON0o>). Geonugget #3 is on oil rigs (<https://www.youtube.com/watch?v=ReRbxd1FsbI&t=12s>). Check 'em out and share the link with friends, colleagues and prospective students. They're pure gold!





## Geomorphology class investigates chronology of Kaw Lake

Over the years, a number of geology faculty have become interested in the timing of the Pleistocene Kansan glaciation and the development of Kaw Lake, including publications and published abstracts by the likes of Mudge, Beck, and Oviatt. Kaw Lake developed as a result of the damming of the valley of the Kansas River by the continental ice sheet as it reached its maximum extent in the corner of northeastern Kansas just south of Wamego; the backed-up tributaries reached Abilene and nearly as far as Salina to the west and to Marysville to the north. Bluemont Hill (better known today as Manhattan Hill) – the remnant of the bedrock spur originally connected to “KS” hill – prevented erosion of Kaw Lake sediments where they reside today in a buried valley on which much of Kansas State University sits. This fall Dr. Spencer’s geomorphology class took up the challenge to further the investigation of Kaw Lake and in small groups processed lacustrine silt samples from a core taken just north of the football stadium in 2008. They extracted feldspar minerals from the core samples and analyzed them using luminescence dating techniques in the labs in the geology department. Results of the class projects are preliminary but do suggest significant antiquity of the Kaw Lake sediments – and hence the Kansan glaciation – of several 100,000 years.

## Geodynamic evolution of the Franciscan Complex of Central California

Since 2016, **Dr. Brice Lacroix** has adopted a multi-disciplinary approach integrating geological mapping, peak temperature mapping assisted by Raman spectroscopy, petrography, and low-temperature thermochronometry to document the geodynamic evolution of the Franciscan Complex within Central California. This project has involved the contribution of three graduate (**Jacob Hughes, Christine Ward and William Jarvis**) students and one undergrad (**Ben Walters**) student. Three students (William Jarvis, Ben Walters and Alex Bearden) have been trained to geological mapping in complex setting through USGS EDMAP program. Part of the results have been recently disseminated in a GEOLOGY paper, Lacroix et al. (2022) <https://doi.org/10.1130/G49882.1>

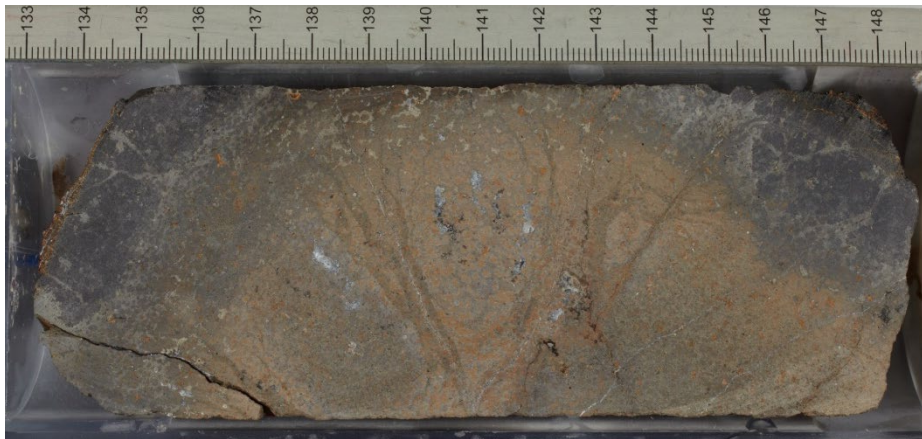


## Understanding how the ocean crust ages: basalts from the South Atlantic

**Dr. Pamela Kempton** participated in a two-month long research cruise this spring, sailing as an igneous petrologist on International Ocean Discovery Program (IODP) Expedition 390 ([https://iodp.tamu.edu/scienceops/expeditions/south\\_atlantic\\_transect.html](https://iodp.tamu.edu/scienceops/expeditions/south_atlantic_transect.html)). The cruise is part of a multi-expedition effort to recover cores from the ocean floor along a transect of the South Atlantic. IODP expeditions are international initiatives that take years to plan. Expedition 390 was originally scheduled to sail in 2020, but the COVID-19 pandemic made international travel impossible for most people, so the cruise was rescheduled and sailed from April to May 2022. The scientific objectives for the cruise are multi-disciplinary, ranging from better understanding of the timing, duration, and extent of fluid-rock exchange within basaltic basement to investigating evidence for ocean circulation patterns in response to rapid climate change found in the overlying sediments. Collectively, Expeditions 390, 393 and 395 recovered drill cores from a transect of seven sites located at approximately 30°S between the mid-Atlantic Ridge and the eastern margin of the Rio Grande Rise off the eastern margin of South America, with rocks ranging from 7 to 61 m.y. old. Pamela, and her graduate student **Adrien Van Wagenen**, will be working on variations in the Cu isotope composition of the basaltic basement rocks to better understand how ocean crust alters over time along the ~60 m.y. long time span of the transect.



*Pamela draws the splitting lines on the core*



Typical pillow basalt from IODP Expedition 390

## **Publications (peer reviewed)**

- Adam, C.,** \*Smith, M. N., **Kempton, P. D.,** & **Brueseke, M.** (2022). Temporal evolution of the swell and magmatic fluxes along the Louisville hotspot chain. *Geochemistry, Geophysics, Geosystems*, 23, e2022GC010568. <https://doi.org/10.1029/2022GC010568> (3) Invited seminars
- Adam, C.,** Vidal, V., Grosse, P., & Ichihara, M. (2022). Correlations between subduction of linear oceanic features and arc volcanism volume around the Pacific basin. *Geochemistry, Geophysics, Geosystems*, 23, e2022GC010553. <https://doi.org/10.1029/2022GC010553>
- \*Adeyemi, B., **Ghanbarian, B.,** Winter, C. L., & King, P. R. (2022). Determining effective permeability at reservoir scale: Application of critical path analysis. *Advances in Water Resources* 159, 104096.
- Azadi, S., Nozari, H., **Ghanbarian, B.,** & Marofi, S. (2022). Optimizing cropping pattern to improve the performance of irrigation network using system dynamics—Powell algorithm. *Environmental Science and Pollution Research*, 1-13.
- Brueseke, M.E.,** Benowitz, J.A., \*Bearden, A.T., Mann, M.E., and Miggins, D.P. (2022). Subduction disruption, slab tears: ca. 1 Ma true collision of an ~30-km-thick oceanic plateau segment recorded by Yakutat slab nascent tear magmatism: *Terra Nova*. 00, 1–9. <https://doi.org/10.1111/ter.12628>
- Choi, B.Y., Park, J., Ham, B., **Kirk, M.F.,** Kwon, M.J. (2022). Effect of CO<sub>2</sub> on biogeochemical reactions and microbial community composition in bioreactors with deep groundwater and basalt. *Science of the Total Environment* v. 807, part 2, 150803. <https://www.sciencedirect.com/science/article/pii/S0048969721058812>
- Faramarzi-Palangar, M., Mirzaei-Paiaman, A., Ghoreishi, S. A., & **Ghanbarian, B.** (2022). Wettability of Carbonate Reservoir Rocks: A Comparative Analysis. *Applied Sciences*, 12(1), 131.
- \*Fenner, E.R., **Brueseke, M.E.,** Shaulis, B.J., 2022, Archetypal Au-bearing silica sinter from the Miocene Milestone deposit, Idaho, USA: *Mineralium Deposita*. <https://doi.org/10.1007/s00126-022-01117-z>
- Gaur, A., Xiang., W., Nepal, A., Chen, P., **Lacroix, B.,** Sorensen, C., & Das, S. (2021) Graphene Aerosol Gel Ink for Printing Micro-Supercapacitors. *ACS Applied Energy*. <https://doi.org/10.1021/acsaem.1c00919>
- Ghanbarian, B.,** & Pachepsky, Y. (2022). Machine learning in vadose zone hydrology: A flashback. *Vadose Zone Journal* 21, e20212.
- Ghanbarian, B.,** & Skaggs, T. H. (2022). Soil water retention curve inflection point: Insight into soil structure from percolation theory. *Soil Science Society of America Journal*, 86, 338-344.

- Ghanbarian, B.** (2022). Estimating the scale dependence of permeability at pore and core scales: Incorporating effects of porosity and finite size. *Advances in Water Resources* 161, 104123.
- Ghanbarian, B.** (2022). Scale dependence of tortuosity and diffusion: Finite-size scaling analysis. *Journal of Contaminant Hydrology* 245, 103953.
- \*Hatley, C.M., \*Armijo, B., \*Andrews, K., \*Anhold, C., Nippert, J.B., **Kirk, M.F.** (published online Nov 2022) Intermittent streamflow generation in a merokarst headwater catchment. *Environmental Science Advances*.  
<https://pubs.rsc.org/en/content/articlelanding/2023/va/d2va00191h>
- Hoareau, G., Crognier, N., **Lacroix, B.**, Aubourg, C., Roberts, N., Niemi, N., Branellec, Beaudoin, N., M., Suarez-Ruiz. (2021) Combination of  $\Delta 47$  and U-Pb dating in tectonic calcite veins unravel the last pulses related to the Pyrenean Shortening (Spain). *Earth and Planetary Science Letters*, 2021, vol. 553, p. 116636. <https://doi.org/10.1016/j.epsl.2020.116636>
- Kempton, P.D.**, Spence, A., Downes, H., Blichert-Toft, J., Bryce, J.G., Hegner, E., Vroon, P.Z. (2021) Isotopic evolution of prehistoric magma sources of Mt. Etna, Sicily: Insights from the Valle Del Bove. *Contributions to Mineralogy and Petrology* (impact factor 3.8)
- Kempton, P.D.**, Mathur, R., Harmon, R.S., Bell, A., Hoefs, J., & Shaulis, B. (2022) Cu-isotope evidence for subduction modification of lithospheric mantle. *Geochemistry, Geophysics, Geosystems*, 23, e2022GC010436. <https://doi.org/10.1029/2022GC010436>
- \*Kumar, R., Hosseinzadehtaher, M., Hein, N., Shadmand, M., Jagadish, S.V.K., & **Ghanbarian, B.** (2022). Challenges and advances in measuring sap flow in agriculture and agroforestry: A review with focus on nuclear magnetic resonance. *Frontiers in Plant Science* 13, 1036078.
- Lacroix, B.**, Lahfid, A., \*Ward, C., Chapman, A., Niemi, W., \*Jarvis, N., & **Kempton, P.** (2022). Raman thermometry and (U-Th)/He thermochronometry reveal Neogene transpressional exhumation in the Nacimiento block of central California, USA. *Geology*. <https://doi.org/10.1130/G49882.1>
- Li, B. & **Goldberg, K.** (2022) Diagenesis and reservoir quality of Cambrian carbonates in the Tarim Basin, northwestern China. *Journal of Asian Earth Sciences* 223, 104972
- Mahan, S.A., Rittenour, T.M., Nelson, M.S., Ataee, N., Brown, N., DeWitt, R., Durcan, J., Evans, M., Feathers, J., Frouin, M., Guérin, G., Heyidari, M., Huot, S., Jain, M., Keen-Zebert, A., Li, B., López, G., Neudorf, C., Porat, N., Rodrigues, K., Sawakuchi, A.O., **Spencer, J.Q.G.**, & Thomsen, K. (2022). Guide for interpreting and reporting luminescence dating results. *GSA Bulletin*. <https://doi.org/10.1130/B36404.1>
- Mirzaei-Paiaman, A., & **Ghanbarian, B.** (2022). A new method for characterizing dynamic reservoir quality: Implications for quality maps and rock type classification. *Journal of Petroleum Science and Engineering* 218, 111049.

Park, K., Kim C.Y., **Kirk, M.F.**, Chae, G., Kwon, M.J. (accepted Dec 2022). Effects of natural non-volcanic CO<sub>2</sub> leakage on soil microbial community composition and diversity. *Science of the Total Environment*.

\*Rivera Waterman, B., Alcantar, G., Thomas, S.G., **Kirk M.F.** (2022). Spatiotemporal variation in runoff and baseflow in watersheds located across a regional precipitation gradient. *Journal of Hydrology Regional Studies* 41, 101071.  
<https://www.sciencedirect.com/science/article/pii/S2214581822000842>

Sengöçmen Geçkin, B., Sözbilir, H., Özkaymak, Ç., Softa, M., **Spencer, J.Q.G.**, Şahiner, E., Meriç, N., & Deliormanlı, A.H. (2022). Evidence of surface rupture associated with historical earthquakes on the Gülbahçe Fault Zone (İzmir, Türkiye) and its application for determination of the surface fault-rupture hazard zone. *Natural Hazards* 114, 2189-2218.

Vanardois, J., Lahfid, A., Trap, P., **Lacroix, B.**, Guillou-Frottier, L., Roger, F., Marquer, D., Paquette, J.L., & Melleton, J. (2022). Preservation of a pre-collision high thermal gradient in an orogenic basin. The geodynamic evolution of the Servoz basin of the Aiguilles-Rouges massif (Western Alps). *Swiss Journal of Geosciences*.  
<https://doi.org/10.1186/s00015-022-00423-y>

Wang, X., Yu, X., Berg, M., Chen, P., **Lacroix, B.**, & Lei, S. (2021). Characterization of Curved Waveguides with Different Radii inside Silicon Written by Shaped Nanosecond Laser Beam. *Optics Letters*. <https://doi.org/10.1364/OE.419074>

\* denotes K-State Geology student or post-doc

## **Book chapters**

Alvarenga, R.S., Iacopini, D., Kuchle, J., **Goldberg, K.** & Kneller, B. (2022). Seismic facies and geobody characterization in the pre-salt rift section: the Lagoa Feia Group, Campos Basin, offshore Brazil. In: *Interpreting Subsurface Seismic Data*, <https://doi.org/10.1016/B978-0-12-818562-9.00008-X>

***Peer-reviewed IODP Preliminary Report site chapters (attribution for the completed report is to the entire shipboard party, but the chapters listed below were authored by P.D. Kempton):***

IODP Exp 390, South Atlantic Transect, Site U1556, Chapter E. Igneous Petrology

IODP Exp 390, South Atlantic Transect, Site U1557, Chapter E. Igneous Petrology

IODP Exp 390, South Atlantic Transect, Site U1559, Chapter E. Igneous Petrology

IODP Exp 390, South Atlantic Transect, Site U1561, Chapter E. Igneous Petrology

IODP Exp 390, South Atlantic Transect, Site U1556, Chapter K. Basement Geochemistry

IODP Exp 390, South Atlantic Transect, Site U1557, Chapter K. Basement Geochemistry

## **Invited Presentations and Lectures**

- Brueseke, M.E.** (2022), Investigating the lost arc: Constraints on ~30 million years of diachronous magmatism along an arc - transform junction, Wrangell Arc, southern Alaska: Michigan State University EES Distinguished Speaker Series, 9/30/22.
- Brueseke, M.E.** (2022). 30 million years of magmatism along a flat-slab subduction-transform transition, Wrangell Arc, Alaska-Yukon. Alaska EarthScope and beyond: Synthesis Meeting. 4/25/2022.
- Ghanbarian, B.** (2022). Effect of scale on permeability in porous media, Geoscience Department, University of Cincinnati, OH. Dec. 2022.
- Ghanbarian, B.** (2022). Scale dependence of permeability in porous media, II LRAP Seminars Week, Federal University of Rio de Janeiro, Brazil. Nov. 2022.
- Ghanbarian, B.** (2022). Estimating permeability and its scale dependence in porous media, Featured Speaker at the Civil Engineering Graduate Seminar Invited Lecture Series, Kansas State University. Jan. 2022.
- Ghanbarian, B.** (2022). Applications of critical path analysis to modeling flow and transport in porous media, China Agricultural University. Jan. 2022.
- Goldberg, K.,** Abel, M., Petersohn, E., Ballico, M. & Martins, L. (2022). Energy - Women who move the O&G market; A female vision of the job market. Round table organized by the Post-Graduate Program in Geosciences, UFRGS (Brazil)
- Goldberg, K.** (2022). High-resolution sequence stratigraphy in mudrock-dominated successions: the Chattanooga/ Woodford Shale". Talk at the Society of Independent Professional Earth Scientists (SIPES), Wichita, KS
- Kempton, P.D.** (2023). Cu-isotope evidence for subduction modification of lithospheric mantle, University of Leicester, UK, 26 Jan 2023
- Kirk, M.F.** (2022). Merokarst as a hydrologic and geochemical buffer. University of Iowa Department of Earth and Environmental Sciences, Department Seminar. 22 April 2022
- Lacroix, B.** (2022). Mineral exploration within Tropical environment – Example from the Guiana Shield. University of Franche-Comté (France)
- Lacroix, B.** (2022). The of Mineral Exploration during the Energy Transition. Kansas GeoCAT.

## **Conferences: Presentations, Abstracts, and Field Trip Leaders**

- Adam C.,** Filippova A. I., \*Parmenter H., \*Kennedy S. (2022). Mantle dynamics and deformation over the Baikal Rift region, *American Geophysical Union Fall Meeting*, December 2022, Chicago, Illinois, poster
- Adam C.,** King, S. & Caddick, M. (2022). Mantle temperature and density anomalies: the influence of thermodynamic formulation, melt, and anelasticity, *American Geophysical Union Fall Meeting*, December 2022, Chicago, Illinois, poster

- \*Agbaje, T., **Ghanbarian, B.**, & Hyman, J. (2022). Effective permeability in matrix-fracture systems: Numerical simulation and theoretical modeling. *American Geophysical Union Fall Meeting*, Chicago IL, Dec. 12-16.
- \*Akomolafe, O., **Ghanbarian, B.**, & Hyman, J. (2022). Solute transport in fractured geological formations: Insights from particle tracking simulations. *American Geophysical Union Fall Meeting*, Chicago IL, Dec. 12-16.
- \*Armijo, B, Dotson, A, Randel, EJ, Hansen, J, Hathcock, K, & **Kirk, M.F.** (2021). Quality of Groundwater from Domestic Wells in the High Plains Aquifer, South-Central Kansas, USA. *Society for Advancement of Chicanos/Hispanics and Native Americans in Science*. Virtual, 25 October 2021
- \*Armijo, B, Dotson, A, Randel, EJ, Hansen, J, Hathcock, K, & **Kirk, M.F.** (2022). Quality of Groundwater from Domestic Wells in the High Plains Aquifer, South-Central Kansas, USA. *29th Annual Kansas Hydrology Seminar*
- \*Armijo, B, Matanis, A, Armijo, J, Cauley, S, Dotson, A, Randel, EJ, Hansen, J, Hathcock, K, & **Kirk, M.F.** (2021) Quality of Groundwater from Domestic Wells in the High Plains Aquifer, South-Central Kansas, USA. *Society Kansas Governor's Water Conference*. Virtual, 17 November 2021
- \*Bearden, A.T., **Brueseke, M.**, Benowitz, J., Miggins, D.P., & Mann, M.E. (2022). New Insights on the Yakutat slab tear, south central Alaska (USA): Sr-Nd-Pb isotope constraints on the Pleistocene Maclaren River Volcanic Field: *American Geophysical Union Fall Meeting*.
- \*Bearden, A.T., **Brueseke, M.**, Benowitz, J., Miggins, D.P., & Mann, M.E. (2022). Evidence for a post 1 Ma Yakutat slab tear: geological, geochronological, and geochemical constraints on the Maclaren river volcanic field, south-central Alaska (USA): *Geological Society of America Abstracts with Programs*, v. 55.
- \*Brooks, C., **Kempton, P.D.**, & \*Rader, M. (2021) Melt inclusions in granulite xenoliths from the Geronimo Volcanic Field: evidence for the nature of crustal melting processes. *Geological Society of America Abstracts with Programs*, v. 53, Portland, OR
- Brigham, K.B., **Brueseke, M.E.**, & Turner, S. (2022). Geochemistry of Wrangell Arc Lavas Indicate a Mantle Origin for Voluminous High-Mg# Andesites, With Implications for the Growth of Continental Crust: *American Geophysical Union Fall Meeting*.
- Brueseke, M.E.**, \*Karrasch, A., \*Endrich, A., Adams, D.C., Miggins, D.P., & Benowitz, J. (2022). Investigating <10 Ma off-axis magmatism in the Centennial Valley, Montana and Upper Wind River basin-Jackson Hole, Wyoming: Yellowstone hotspot-lithosphere interactions at the leading edge of the Snake River plain (U.S.A.): *Geological Society of America Abstracts with Programs*, v. 55.
- Coggon, R., Teagle, D. and Expeditions 390 / 393 shipboard party (including **Kempton, P.D.**) (2022) The South Atlantic Transect: Multidisciplinary Experiments from Ridge Crest to Margin Drilled by Joint IODP Expeditions 390/393. *American Geophysical Union, Fall Meeting*, Chicago, IL. doi: 10.1130/abs/2022AM-377646

- \*Eme, C., & **Ghanbarian, B.** (2022). Rock typing of Mesaverde tight gas sandstones from western US basins. *American Geophysical Union Fall Meeting*, Chicago IL, Dec. 12-16.
- \*Eme, C.E. & **Goldberg, K.** (2022). Fort Riley geology trail: an outreach program to bring awareness of geosciences to military families. *Geological Society of America Abstracts with Programs* 54(5), <https://doi.org/10.1130/abs/2022AM-379984>
- \*Endrich, A., **Brueseke, M.**, \*Karrasch, A., Haley, J.C., & Miggins, D.P. (2022). Cenozoic basaltic volcanism in the Centennial Valley and vicinity: implications for the areal extent of Snake River olivine tholeiites associated with the Yellowstone hotspot: *Geological Society of America Abstracts with Programs*, v. 54.
- Goldberg, K.** & Da Rosa, L.G. (2022). Applying statistical analysis and economics models to unscramble the depositional signals from chemical proxies in black shales. *Geological Society of America Abstracts with Programs* 54(5), <https://doi.org/10.1130/abs/2022AM-378672>
- Goldberg, K., Kempton, P.**, Allen, D. & Spears, J. (2022). GEOCAT Workshop: Geoscience Careers Ambassador Training Workshop. *Geological Society of America Abstracts with Programs* 54(5), <https://doi.org/10.1130/abs/2022AM-377934>
- Guthrie, A., Sullivan, P., Unruh, M., **Kirk, M.**, Loecke, T., & Billings, S. (2022). Deep in the subsurface, land use decisions and climate drive soil carbon solubility potential. SACNAS
- \*Hatley, C, \*Armijo, B, \*Andrews, K, \*Anhold, C, Nippert, JB, & **Kirk, M.F.** (2022). Intermittent streamflow generation in a merokarst headwater catchment. *American Geophysical Union fall meeting*. Dec 2022.
- Hauteville, A., **Lacroix, B.**, Eglinger, A., Gourcerol, B., André-Mayer, A.S., & Lahondes, D. (2022). Boron isotopes as a tracer of fluid source and progressive deformation at the Boulanger orogenic gold district.
- \*Heydari, M., Liang, F., Liu, H.-H., & **Ghanbarian, B.** (2022). Scale dependence of permeability and electrical resistivity in rough-surfaced microfractures. *American Geophysical Union Fall Meeting*, Chicago IL, Dec. 12-16.
- \*Heydari, M., Liang, F., Liu, H.-H., & **Ghanbarian, B.** (2022). Simulation of fluid flow through rough surfaced microfractures. *American Geophysical Union Fall Meeting*, Chicago IL, Dec. 12-16.
- Hunt, A. G., Faybishenko, B., & **Ghanbarian, B.** (2022). On the effect of coupled ecosystems and coupled fluxes on Earth's climate system. CouFract. Berkeley CA, Nov. 14-16.
- \*Jamali, T., & **Ghanbarian, B.** (2022). Complex network analysis of precipitation events in California. *American Geophysical Union Frontiers in Hydrology*, San Juan, Puerto Rico, Jun. 19-24.
- Kempton, P.D.**, Mathur, R., **Brueseke, M. E.** (2022). Metasomatized lithospheric mantle an unlikely source for porphyry Cu deposits in the southern Basin and Range. *Geological Society of America Abstracts with Programs*, Vol 54, No. 5,



- Kempton, P.D.**, Spence, A., Downes, H., Blichert-Toft, J., Bryce, J.G., Hegner, E., and Vroon, P.Z. (2021) Geochemistry and geodynamics of the prehistoric mantle source beneath Mt. Etna, Sicily: evidence from the Valle del Bove. *Geological Society of America Abstracts with Programs*, v. 53, Portland, OR
- Kirk, M.F.**, Hansen, J., Nave, B., Hackley, K.C., Zeglin, L., Paper, J.M., Vinson, D.S., & Jin, Q. (2022). Direct interspecies electron transfer may complicate use of stable isotopes to trace the pathway of methanogenesis. *American Geophysical Union fall meeting*. December 2022
- Koorapati, R. K, Lam, A.R., Guerin, G., Yeon, J., Teagle, D., Reece, J., Coggon, R.M., Sylvan, J., Williams, T., Estes, E.R., and Expeditions 390 / 393 shipboard party (including **Kempton, P.D.**) (2023) Middle Miocene qualitative reconstruction of the oligotrophic South Atlantic gyre, IODP Expeditions 390/393. *Joint Northeast/Southeast Geological Society of America Meeting*, March 2023, Reston, Virginia
- Lacroix, B.**, Bruce, H., Akers, M., Payne, J., & Möller, A. (2022). Refining syn-tectonic disagenetic and structural history of the Arbuckle Mountains. *Geological Society of America Abstracts with Programs*, Vol 54, No. 5
- Lacroix, B.**, Hainque, P.J., Hauteville, A., Lahondes, D., Le Goff, E., Fournier, D., Bertoni, C., Tarravella, S., Robo, K., & de Witasse, M. (2022). The Role of Polyphase Folding in the Distribution of Gold: Insights from the Guiana Shield. 12th IGGC – Georgetown (Guyana)
- Lacroix, B.**, \*Ward, C., Chapman, A., Niemi, N., **Kempton, P.D.**, \*Jarvis, W. (2022). Raman thermometry and (U-Th)/He thermochronometry reveal Neogene transpressional Exhumation in the Nacimiento block of central California. *Geological Society of America Abstracts with Programs*, Vol 54, No. 5, doi: 10.1130/abs/2022AM-383850
- Lamm, S., Bosch, J.S., **Kempton, P.D.**, Marshall, C., & Schwartz, J. (2022). When Sci Comm becomes personal: ‘Rocks & Rockets’ outreach event in my rural hometown, *Geological Society of America Abstracts with Programs*, Vol 54, No. 5, doi: 10.1130/abs/2022AM-378158
- \*Lee, E.R., Adam, C., **Kempton, P.D.** (2022). New constraints on North American kimberlite emplacement from kinematic and geophysical models, *Geological Society of America Abstracts with Programs*, Vol 54, No. 5, doi: 10.1130/abs/2022AM-381024
- \*Lupini, I., **Kempton, P.D.**, Möller, A., **Adam, C.** (2022). Determining the U-Pb emplacement age of lamproites in southeastern Kansas. *Geological Society of America Abstracts with Programs*, Vol 54, No. 5, doi: 10.1130/abs/2022AM-380008
- Öncü, U., Sözbilir, H., Özkaymak, C., Sümer, O., Softa, M., Eski, S., Şahiner., E., Yüksel, M., Meric, N., Topaksu, M., **Spencer, J.Q.G.** (2022). Long-term slip rate and paleoseismology of the Tuzla Fault, İzmir, Western Anatolia, *74th Geological Congress of Turkey with international participation*, Ankara, Turkey, April 11-15, 2022.
- \*Owusu, P.A. & **Raef, A.** (2022). August. Machine learning in reservoir characterization: Coupling data resolution-enhancement with hierarchical analysis of 3D seismic

- attributes for seismic facies classification. In Second International Meeting for Applied Geoscience & Energy (pp. 1344-1348). *Society of Exploration Geophysicists and American Association of Petroleum Geologists*. Expanded abstract <https://doi.org/10.1190/image2022-3750724.1>
- \*Rader, M., **Kempton, P.D.**, Möller, A. (2021). In situ U-Pb zircon geochronology and Hf isotope analysis of xenoliths from the Geronimo Volcanic Field, SE Arizona; implications for lower crustal evolution since 2.4 Ga. *Geological Society of America Abstracts with Programs*, v. 53, Portland, OR
- Sansing, A., Godet, A., Sharpe, J., **Lacroix, B.**, (2022). The resilience of a northern Tethyan carbonate platform during the OAE1A: Geochemical insights from the Corbières region of France. *Geological Society of America Abstracts with Programs*, Vol 54, No. 5
- \*Shukla, V., & **Spencer, J.Q.G.** (2022). Extent and glacial history of the Cordilleran Ice Sheet in NW Montana: using OSL to date glacial sediments from the southeastern Flathead Lobe. *14<sup>th</sup> New World Luminescence Dating Workshop*, Palisade, Colorado, October 13-15, 2022.
- Softa, M., Sözbilir, H., & **Spencer, J.Q.G.** (2022). An approach to hydrocarbon exploration strategy in the eastern Black Sea Basin in terms of Quaternary geology and neotectonics, *Sedimentology Working Group Workshop*, Trabzon, Turkey, September 1-4, 2022.
- Sözbilir, H., Özkaymak, C., Tatar, O., Softa, M., Sümer, O., Tepe, C., Eski, S., Öncü, U., Şengöçmen Geçkin, B., Koçbulut, F., Şahiner., E., Yüksel, M., Topaksu, M., **Spencer, J.Q.G.**, & Deliormanlı, A.H. (2022). Seismic hazard sources of İzmir city and their earthquake potentials. *İzmir Earthquake Workshop*, İzmir, Turkey, October 31, 2022.
- Spencer, J.**, Atae, N., **Lacroix, B.**, Owen, L. (2022). Development of luminescences dating methods in tectonically active and arid regions: dating fanglomerates from alluvial fans, Coachella Valley, Southern California. *Geological Society of America Abstracts with Programs*, Vol 54, No. 5
- Spencer, J.Q.G.** (2022). Bio–Luminescence? Steps towards a phytolith luminescence chronometer. *14<sup>th</sup> New World Luminescence Dating Workshop*, Palisade, Colorado, October 13-15, 2022.
- Spencer, J.Q.G.** (2022). Chair of workshop on gamma spectrometry techniques. *14<sup>th</sup> New World Luminescence Dating Workshop*, Palisade, Colorado, October 13, 2022.
- Spencer, J.Q.G.**, Atae, N., Lacroix, B.J., Owen, L.A. (2022). Development of luminescence dating methods in tectonically active and arid regions: dating fanglomerates from alluvial fans, Coachella Valley, southern California. *Geological Society of America Abstracts with Programs* Vol 54, No. 5, 2022 doi: 10.1130/abs/2022AM-383890.
- Swenson, L.J., Zipper, S.C., Burgin, A.J., \*Hatley, C., Jones, N., **Kirk, M.F.**, Peterson, D., Seybold, E.C. (Nov 2022) Changes in baseflow sources during the dry-down of a non-perennial headwater stream. *Kansas Governor's Water Conference*, Manhattan, KS

- Swenson, L.J., Zipper, S.C., Burgin, A.J., Jones, N., **Kirk, M.F.**, Peterson, D., & Seybold, E.C. (2022) Changes in baseflow sources during the dry-down of a non-perennial headwater stream. *Frontiers in Hydrology Meeting* (June 2022), San Juan, Puerto Rico.
- Vogt, B.M., Dimapilis, J.R., Dodds, W.K., **Kirk, M.F.**, Diaz, D., & Zeglin, L.H. (2022) Evaluating the impact of land use on the biogeochemistry of streams and their microbial inhabitants. *Joint Aquatic Sciences Meeting*, Grand Rapids, MI
- Zeglin, L.H., Brisendine, J., Freeman, K., Wohler, A., Burgin, A., Dodds, W., Forester, M., Hansen, P., **Kirk, M.**, Lee, S., Semenova-Nelsen, T., Sikes, B.A., Thomas, S., Tobler, C., VanderPutten, M. (May 2022) Assessing terrestrial-aquatic microbiome connectivity across a regional precipitation gradient. *Joint Aquatic Sciences Meeting*, Grand Rapids, MI
- Zhang, T., Hu, Q., & **Ghanbarian, B.** (2022). A pulse-decay method for low permeability analyses of granular porous media: Mathematical solutions and experimental methodologies. *American Geophysical Union Fall Meeting*, Chicago IL, Dec. 12-16.
- Zhang, T., Hu, Q., & **Ghanbarian, B.** (2022). A pulse-decay method for low permeability analyses of granular porous media: Mathematical solutions and experimental methodologies. *CouFract* (3<sup>rd</sup> International Conference on Coupled Processes in Fractured Geological Media) Berkeley CA, Nov. 14-16.

### **Conferences Session Conveners**

- Adam, C.A., Kempton, P.D., Brueseke, M.E.** (2023). Session Co-Conveners, Drivers of Continental Magmatism (2023) Geological Society of America, Rocky Mountain Section meeting, Fort Collins, CO).
- Brueseke, M.E.** (2022). Session Co-Convener, T33A The Alaskan and Northern Canadian Cordillera: Geology, Geochemistry, Geophysics, Petrology, and Tectonics (2022) American Geophysical Union, Fall meeting, Chicago, IL)
- Ghanbarian, B.** (2022). Session Chair, “Physics of Fluids in Unconventional Reservoir Rocks”, American Geophysical Union (AGU), Chicago IL.

### **Non-peer reviewed databases and conference proceedings**

- Brueseke, M.E.** (2022). The leading edge of the Snake River Plain – Yellowstone volcanic province: <5 million-year-old volcanism around Dubois, Wyoming, 10/24/2022, U.S.G.S. Yellowstone Volcano Observatory Caldera Chronicles. <https://www.usgs.gov/observatories/yvo/news/leading-edge-snake-river-plain-yellowstone-volcanic-province>

## **Grants and Contracts**

### ***New***

**Adam, C.A.** (PI) & Vidal, V. (co-PI) Invited researcher at ENS Lyon, France, working on the project “Investigating the relationship between the subduction zone curvature and the volume of arc volcanoes”, 2022, **\$4,000**

**Brueseke, M.** (PI). Travel support to the International Association of Volcanology and Chemistry of Earth's Interior (IAVCEI) 2023 Scientific Assembly “Yellowstone hotspot-lithosphere interactions (U.S.A.): <10 Ma off-axis magmatism in northwest Wyoming distinct from the Yellowstone hotspot track January 30-February 3, 2023; Rotorua, New Zealand.” K-State FDA proposal, 2023, **\$2,675**.

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

**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 PI salary for three months and assorted travel expenses, 2022-2023, \$68,500 + \$2,500 for post-cruise travel. Total funding **\$71,000**

**Kirk, M.** (PI), Helene Avocat (Co-PI), Monica Cook (Co-PI), Amanda Alliband (Co-PI), Rick Sloan (Co-PI). Title: NSF GP-IN: Introducing Community College and Pre-College Students to Geoscience through Groundwater Quality Monitoring. Jan. 1 2023 – Dec. 31, 2025. Total funding **\$363,254**.

Lamm, S. (PI) & **Kempton, P.D.** (co-PI), Bosch, J.S. (co-PI) *Rocks and Rockets II*, outreach activity aimed at residents in NW Kansas, Kansas Geological Foundation, 2023, \$1,500.

**Spencer, J.Q.G.**, Pullen, A., Kroeger, E. OSL dating of aeolian loess deposits in the wind deflated areas of La Pampa, Argentina. Clemson University, 2022-2023, **\$4,050**.

**Spencer, J.Q.G.**, 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, 2022-2023, **\$2250**.

**Spencer, J.Q.G.**, 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, 2022-2023, **\$900**.

Thompson, S. (PI), **Goldberg, K.** (co-PI), Genevieve Baudoin (Co-PI) NSF FMSG: Eco: Off-Grid Construction via Sustainable Compression Curing of Vegetable Oil-Impregnated Sediments. 2022-2024, **\$494,685**.

### ***Active***

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

Andrews, G. (PI; West Virginia U.), **Brueseke, M.E.** (Co-PI). *RAPID: Collaborative Proposal: Development of Digital Models of Minerals and Rocks for Online Geoscience Classes.* 8/1/2020-2022, **\$16,864.**

**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 – 8/31/2023, **\$240,385**

**Kirk, M.** (funded personnel) NSF LTER: Manipulating drivers to assess grassland resilience. M. Kirk leads the long-term groundwater monitoring effort. Oct. 1 2020 – Sept. 30, 2026, Total funding: **\$7,122,000.**

**Kirk, M.** (funded personnel) NSF RII Track-1NSF EPSCoR: Microbiomes of Aquatic, Plant and Soil Systems (MAPS) Mediating Sustainability: An Observational and Experimental Network across Kansas. M. Kirk is one of the group leaders in the project team. Sept. 1, 2017 – Aug. 31, 2023, Total funding \$20 million, **\$2.65 million to KSU,**

**Lacroix, B.** (PI), **Brueseke, M.E.** and **Kempton, P.D.** (Co-PIs). *RAPID: PetCAT-Scan: A high definition scanning tool for geoscientists in the COVID-19 pandemic and beyond.* NSF-I/F, 7/15/2020-2022, **\$169,220.**

**Lacroix, B.** (PI). American Chemical Society – Petroleum Research Fund. Refining Syn-Tectonic Diagenetic History of Carbonates from the Arbuckle Mountains using  $\delta^{47}(\text{U-Pb})$  Thermochronometry, a new and Emerging Geochemical Technique, 2020-2023, **\$70,000.**

Lamm, S. (PI), **Kempton, P.D.** (faculty supervisor and Co-PI), Bosch, J.S. (co-PI) *Rocks and Rockets,* outreach activity aimed at residents in NW Kansas, GSA E-An Zen grant, 2022, \$1,500.

**Goldberg, K.** (PI), **Kempton, P.D.** (Co-PI), Spears, J. (Co-PI), Allen, D. (Co-PI). *GP-IMPACT: GeoCAT Workshop: Geoscience Careers Ambassador Training Workshop,* NSF- IUSE-Geopaths, 2020-2023, **\$154,217.**

**Goldberg, K.** (PI). High-Resolution Sequence Stratigraphy in Mudrock-Dominated Successions: The Chattanooga/Woodford Shale (Late Devonian, Midcontinent Basin), American Chemical Society (ACS), The Petroleum Research Fund (PRF), 2019-2022, **\$70,000.**

**Ghanbarian, B.** (PI). Reactive transport simulations in rough-walled fractures, Saudi Aramco, 2021-2022, **\$90,000.**

**Spencer, J.Q.G.,** Layzell, T., and others, Luminescence dating for geologic mapping in Kansas project. USGS-STATEMAP/KGS, 2018-2022, **\$21,600.**

**Spencer, J.Q.G.,** Luminescence dating of Bronze Age terraces, Sardis, Turkey. UWM/Harvard, 2019-2022, **\$9,900.**

**Spencer, J.Q.G.,** Davies, C., Luminescence dating of loess samples from Kansas. UMKC, 2018-2022, UMKC, **\$1,648.**

**Spencer, J.Q.G.,** Davies, C., Luminescence dating of dune samples from Jordan. UMKC, 2018-2022, **\$2,884.**

## **Faculty Awards and Recognition**

**Brueseke, M.**, Review Editor, *Frontiers in Earth Science – Petrology*

**Ghanbarian, B.** Top 2% Scientists in the world (single year category), Stanford University, DOI: 10.17632/btchxktzyw.4

**Goldberg, K.** Honorary faculty member of the Tri-Alpha Honorary Society, a group that recognizes first-generation student academic excellence

**Raef, A.** Invitation to join the editorial board of Modern Subsea Engineering and Technology

**Raef, A.**, Invitation to join the editorial board team of Alexandria Journal of Science and Technology (AJST)

**Spencer, J.Q.G.** Judge in student prize competition for best poster presentation. *14<sup>th</sup> New World Luminescence Dating Workshop*, Palisade, Colorado, October 13-15, 2022.

**Spencer, J.Q.G.** Judge in student prize competition for best oral presentation. *14<sup>th</sup> New World Luminescence Dating Workshop*, Palisade, Colorado, October 13-15, 2022.

**Spencer, J.Q.G.** Member of international working group to establish an academic association for luminescence and ESR dating

## **Student Grants, Awards and Recognition**

**Alex Bearden** (MSc; M. Brueseke, advisor), NSF/GSA student research grant, **\$2500**

**Alex Bearden** (MSc; M. Brueseke, advisor), Alaska Geological Society – Don Richter Memorial Scholarship, **\$2000**

**Alex Bearden** (MSc; M. Brueseke, advisor), KSU Graduate student council travel award, **\$400**

**Alex Bearden** (MSc; M. Brueseke, advisor), KSU College of Arts and Sciences Research Travel award, **\$400**

**Alex Bearden** (MSc; M. Brueseke, advisor), KSU Graduate student council travel award, **\$400**

**Alex Bearden** (MSc; M. Brueseke, advisor), NSF/GSA Travel Grant, **\$500**

**Alex Bearden** (MSc; M. Brueseke, advisor), Association of Earth Science Clubs of Greater KC Grant, **\$500**

**Chinyere Eunice Eme** (MSc; K. Goldberg, advisor), KSU Graduate student council travel award, **\$800**

**Chinyere Eunice Eme** (MSc; K. Goldberg, advisor), College of Arts and Sciences scholarship, **\$300**

**Chinyere Eunice Eme** (MSc; K. Goldberg, advisor), National Association of Black Geoscientists scholarship, **\$400**

**Eresay Alcantar-Velasquez** (BSc) inducted into McNair Scholars Program, which helps prepare talented undergraduates for graduate study.

**Fidelis Onwuagba** (MSc; K. Goldberg, advisor) SEG Foundation/Chevron Scholarship, **\$5,000**

**Isabella Lupini** (MSc; P. Kempton, advisor) KSU College of Arts and Sciences Research Travel Award, **\$400**

**Isabella Lupini** (MSc; P. Kempton, advisor) Society of Independent Professional Earth Scientists award for outstanding earth science and engineering students, \$3,000

**Isabella Lupini** (MSc; P. Kempton, advisor) Timothy R. Donoghue Scholarship, \$3,000

**Jace Kaminski** (MSc; B. Ghanbarian, advisor) Geology Department Student Travel Award, **\$400**

**Jace Kaminski** (MSc; B. Ghanbarian, advisor) KSU College of Arts and Sciences Research Travel Award, **\$230**

**Jace Kaminski** (MSc; B. Ghanbarian, advisor) US Government Federal Aid, **\$1000**

**Jade Mountain** (BSc) inducted into Phi Beta Kappa honor society

**Jade Mountain** (BSc) KSU Arts and Sciences undergraduate research opportunities travel grant, **\$400**

**Joseph Akomolafe** (MSc; B. Ghanbarian, advisor) Kansas Geological Foundation (KGF) scholarship, **\$500**

**Joseph Akomolafe** (MSc; B. Ghanbarian, advisor) KSU College of Arts and Sciences Research Travel Award, **\$400**

**Joseph Akomolafe** (MSc; B. Ghanbarian, advisor) National Association of Black Geoscientists (NABG) scholarship, **\$400**

**Joseph Akomolafe** (MSc; B. Ghanbarian, advisor) Graduate Student Council Travel Award, **\$400**

**Lauren Cannon** (BSc) GSA J. David Lowell Field Camp Scholarship, **\$2,000**

**Papa Owusu** (MSc; A. Raef, advisor) KSU College of Arts and Sciences Research Travel Award, **\$400.**

**Quinton Mindrup** (BSc; P. Kempton & M. Bruseke faculty mentors) K-State nominee for national Barry Goldwater scholarship

**Tolulope Agbaje** (MSc; B. Ghanbarian, advisor) Kansas Geological Foundation (KGF) scholarship, **\$500**

**Tolulope Agbaje** (MSc; B. Ghanbarian, advisor) American Association of Petroleum Geologist (AAPG), Barrett Family scholarship, **\$1500**

**Tolulope Agbaje** (MSc; B. Ghanbarian, advisor) National Association of Black Geoscientists (NABG) scholarship, **\$400**

**Tolulope Agbaje** (MSc; B. Ghanbarian, advisor) KSU College of Arts and Sciences Research Travel Award, **\$400**

**Vidhesh Shukla** (MSc; J. Spencer, advisor) Geological Society of America Graduate Student Research Grant, **\$2,300**

**Vidhesh Shukla** (MSc; J. Spencer, advisor) KSU Graduate Student Council Travel Grant, **\$250**

**Vidhesh Shukla** (MSc; J. Spencer, advisor) Geological Society of America Connects 2022 student volunteer – registration waived, **\$100**

## **Public Outreach**

- Brueseke, M.E.**, 2022, The story in the rocks: differences between the volcanic activity that formed the Absaroka range vs. volcanism associated with the Yellowstone hotspot. The Dubois Museum (Fremont County, WY Museums), 8/11/2022. This public talk was also the basis for a local newspaper article: Story in the Rocks. 2022, Shawn O’Brate, The Ranger (Fremont County, WY newspaper), <https://rivertonranger.com/2022/08/13/08-13-2022-2/>
- Brueseke, M.E.**, 2022, Tuttle Creek spillway geology field trip - for Hiawatha Middle School (KS) students, May, 2022.
- Brueseke, M.E.**, 2022, Critical Minerals and Society - for Eisenhower Middle School (MHK) Science Olympiad class, November, 2022.
- Brueseke, M.E.**, Mineral and rock identification for the general public
- Brueseke, M.E. and Ghanbarian, B.** Geoscience Academy Advisory Board Meeting, Olathe North High School, Oct. 2022
- Ghanbarian, B.** Geology booth representative at the KSU Future Educators Visit Day, Nov. 2022
- Ghanbarian, B.** Geology representative, DOE Summer Internship Fair (Virtual), Oct. 2022
- Ghanbarian, B.** Geology booth representative at the 2022 Kansas Independent Oil & Gas Association, Wichita KS, Aug. 2022
- Goldberg, K.** Educational video entitled “Geonugget #3 Oil rig” on YouTube (<https://www.youtube.com/watch?v=ReRbxd1Fsbl&t=3s>), Feb. 2022
- Goldberg, K.** Field trip with 4H Group “Bonfire” in Manhattan, Apr. 2022
- Goldberg, K.** Field trip with Hiawatha Middle School in Manhattan, May 2022
- Goldberg, K.** Field trip with the Flint Hills Discovery Center, Canyon Trail, Tuttle Creek State Park, Oct. 2022
- Goldberg, K.** Session on “Petroleum” at Barton Community College STEM Day, for high school students, Nov. 2022
- Kirk, M. and Goldberg, K.** led geoscience activities for high school students at the Jack Kilby STEM day at Barton Community College (Nov. 21, 2022). Students were introduced to groundwater and petroleum geoscience and participated in activities that taught them about density and water quality measurements.
- Kirk, M.** mentored a student in the Kansas Louis Stokes Alliance for Minority Participation (KS-LSAMP) summer research program during June and July 2022. The student, Eresay Alcantar-Velasquez, is a recent transfer to K-State from Garden City Community College. During the summer she contributed to our Konza research by examining stream CO2 emissions. Eresay has continued her efforts in the Kirk lab this fall and through next year as a participant in the K-State Developing Scholars Program.



Lamm, S. and **Kempton, P.** led public outreach event in Colby, KS, called *Rocks and Rockets*, aimed at residents in NW Kansas. Several graduate students—Eunice Eme, Papa Owusu—also participated. June 2022

**Raef, A.; Lacroix, B.; Keast, R.**, Earthquakes and Assessing Fault Reactivation Potential, South Central Kansas. Salina League of Women Voters