Curriculum Vitae: Brandon M. Spencer

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CURRENT APPOINTMENT

Teaching Assistant Professor of Geology, Boone Pickens School of Geology
Associate Director of Les Huston Geology Field Camp, Penrose, CO
Oklahoma State University
Stillwater, OK 74078
Contact: 302 Noble Research Center; Telephone: 405.744.5315 (O)

CURRENT TEACHING AND RESEARCH INTERESTS

My current teaching duties are focused on undergraduate instruction, specifically in introductory courses (physical geology) and undergraduate core curriculum courses (Mineralogy/Petrology), including serving as the associate director of the Les Huston Geology Field Camp near Cañon City, CO. Additional interests include integrating technology in geological education, specifically in the instruction of field methods; methods of interest include, but are not limited to, digital mapping software and GIS application of field data. I believe in a holistic approach to geologic education, and teach my courses with particular emphasis on developing transferrable skills and an understanding of the material's role in our science as a whole. I am also currently revamping our department's field-based instruction core—we are developing field-based physical geology for majors, to avoid dilution amongst non-majors in service-level courses, digital field methods, and geochronology courses to further prepare our students for their careers in a modern world.

My research currently focuses on the collapse and decay of collisional orogens, primarily utilizing geo- and thermochronology, finite element modeling, metamorphic petrography and petrology, quartz deformation thermometry/paleopiezometry, and field structural relationships. Modeling efforts employ both surface process and geodynamic models to investigate the links between tectonics, crustal thermal evolution, and surface topographic expression. I also employ paleomagnetic and petrographic techniques to investigate how post-orogenic surfaces may record timing of subaerial exposure in magnetic minerals. Past and current field areas include southern Nevada, southeastern Missouri, the southern Appalachians of North Carolina, South Carolina, and Georgia, northwestern Wyoming, Utah, and northern Scotland.

PROFESSIONAL PREPARATION

Ph.D. Geological Sciences, *with* **Graduate Certificate in College Teaching and Learning (May 2022)**
The University of Kentucky, Lexington, KY
Dissertation Research: Documenting the rates and mechanisms of orogenic collapse.
Dissertation Committee: Kip Hodges, David Moecher, Michael McGlue, Alice Turkington, J. Ryan Thigpen (chair)

M.S., Geology (August 2017)
The University of Oklahoma, Norman, OK
Thesis: A paleomagnetic and petrographic analysis of unconformity surfaces in Nevada and Missouri: possible implications for paleoweathering processes.
Thesis Committee: Lynn Soreghan, Richard Elmore (co-chair), Shannon Dulin (chair)

B.S., Geology, Emphasis in Petroleum Geology (August 2015)
The University of Oklahoma, Norman, OK

TEACHING AND MENTORING EXPERIENCE

Teaching Assistant Professor of Geology, Oklahoma State University
Boone Pickens School of Geology, Stillwater, OK; July 2021-present

Courses taught include:
- GEOL 1014, Geology and Human Affairs
- GEOL 1114, Physical Geology
- GEOL 2464, Rocks and Minerals
- GEOL 3546, Field Camp
- GEOL 3546, Field Camp ONLINE
- GEOL 4613, Magmatism and Metamorphism
- GEOL 4753, Volcanology

Courses in development include:
- GEOL 5001, Field Geology of Oklahoma for Petroleum Geoscientists (PSM program)
- GEOL 2030/1222, Field-Based Physical Geology for Majors and New Geoscientists
- GEOL 3222, Introductory Field Methods
- GEOL 4623/5623, Radioisotope Geochronology

Part-Time Faculty, Northern Kentucky University
Department of Physics, Geology, and Engineering Technology, Highland Heights, KY; Jan. 2020-August 2020

Courses taught include:
- GLY 110, The Face of the Earth (Online: Physical Geology with Lab)
- GLY 120, This Dangerous Earth (Online: Geological and Natural Hazards)

Head Teaching Assistant, University of Kentucky
Department of Earth and Environmental Sciences, Lexington, KY; Aug. 2020-present

In cooperation with Director of Graduate Studies and all faculty, I coordinated TA efforts across the department, placing emphasis on serving as a liaison between the TAs and faculty/administration. I worked with the department manager and academic coordinator to update and improve TA and course information on the department website. Additionally, I planned and hosted/facilitated two workshops per semester for all department graduate students with topics ranging from TA responsibilities to inclusion and diversity in the classroom and, more broadly, in the geosciences.

Graduate Teaching Assistant, University of Kentucky and University of Oklahoma
Department of Earth and Environmental Sciences, Lexington, KY; 2018-present
School of Geology and Geophysics, Norman, OK; 2015-2017

Courses taught include:

Environmental Geology (Online: 2020)	Digital Geologic Methods (2021, 2018)
Structural Geology (2015-2016, 2019)	Field Methods (2016-2019)
Geologic Mapping (2016-2017)	Field Camp (2017)
Physical Geology (2017, 2019)	Mineralogy/Petrology (2016)

CURRENT PUBLICATIONS AND OTHER WORKS

Spencer, B. M. (2022). Post-orogenic evolution of collisional mountain systems: investigating the potential for crustal flow using thermochronology and numerical models. Compiled publications for unpublished PhD dissertation, The University of Kentucky, Lexington, Kentucky.

Spencer, B. M., Thigpen, J. R., Gallen, S. F., Dortch, J. M., Hodges, K. V., Law, R. D., & Mako, C. A. (2021). An evaluation of erosional-geodynamic thresholds for rapid orogenic denudation. *Journal of Geophysical Research: Solid Earth*, 126, e2021JB022353. DOI: https://doi.org/10.1029/2021JB022353.

Thigpen, J. R., Ashley, K. T., Mako, C., Law, R. D., & **Spencer, B.M.** (2021). Interplay between crustal-scale thrusting, high metamorphic heating rates, and the development of inverted thermal-metamorphic gradients: Numerical models and examples from the Caledonides of northern Scotland. *Tectonics*, 40, e2021TC006716. DOI: https://doi.org/10.1029/2021TC006716.

Law, R.D., Thigpen, J.R., Mazza, S.E., Mako, C.A., Krabbendam, M., **Spencer, B.M.,** Ashley, K.T., Strachan, R.A., Davis, E.F. (2021). Tectonic transport directions, shear senses, and deformation temperatures indicated by quartz c-axis fabrics and microstructures in a NW-SE transect across the Moine and Sgurr Beag thrust sheets, Caledonian orogen of northern Scotland. *Geosciences*, 11, p. 411. DOI: https://doi.org/10.3390/geosciences11100411.

Spencer, B.M., Thigpen, J.R., Law, R.D., Mako, C.A., McDonald, C.S., Hodges, K.V., Ashley, K.T. (2020). Rapid cooling during late stage orogenesis and implications for collapse of the Scandian retrowedge, northern Scotland. *Journal of the Geological Society*, 178, jgs2020-022. DOI: https://doi.org/10.1144/jgs2020-022.

Spencer, B.M., Dulin, S., Elmore, R.D., & Soreghan, G. (2017). A paleomagnetic and petrographic analysis of unconformity surfaces in Nevada and Missouri: possible implications for paleoweathering processes. Unpublished master's thesis, The University of Oklahoma, Norman, Oklahoma. https://shareok.org/handle/11244/51840

MANUSCRIPTS IN REVIEW OR IN PREPARATION

Swanger, W.R., Thigpen, J.R., Goldsby, R.C., Preece, M.B., Powell, N.E., **Spencer, B.M.**, Helfrich, A.L. Understanding near-salt deformation band gradients in the Paradox Basin,

Utah: Implications for understanding seismically unresolvable deformation adjacent to salt structures. *In Review, Journal of Structural Geology (SG-D-22-00042).*

Spencer, B.M., Thigpen, J.R., Merschat, A.J., Powell, N.E. Metamorphic and thermal evolution of the Southern Appalachians I: insights and tectonic implications from amphibole $^{40}Ar/^{39}Ar$ thermochronology. *In preparation for submission to GSA Bulletin.*

Powell, N.E., **Spencer, B.M**., Thigpen, J.R., Merschat, A.J., et al. Metamorphic and thermal evolution of the Southern Appalachians II: insights and tectonic implications from monazite geochemistry and geochronology. *In preparation.*

PRESENTATIONS AND WORKSHOPS

PRESENTATIONS

Spencer, B.M., Powell, N.E., Thigpen, J.R., Moecher, D.P., Stowell, H.H., Merschat, A.J. (2021). Defining metamorphic timing, extent, and conditions in the southern Appalachian Blue Ridge and Inner Piedmont—insights from monazite-xenotime geochemistry and geochronology. Presented at GSA Annual Meeting, 10-13 October. (oral). Geological Society of America *Abstracts with Programs 53*(6). DOI: 10.1130/abs/2021AM-370757

Clark, G., **Spencer, B.M.**, Thigpen, J.R., Merschat, A.J., Casale, G., Levine, J. (2021). Understanding gradients in the differential stress driving flow: implications for the crustal escape flow model in the southern Appalachian Inner Piedmont. Presented at GSA Annual Meeting, 10-13 October (poster). Geological Society of America Abstracts with Programs *53*(6). DOI: 10.1130/abs/2021AM-371086

Spencer, B.M., Thigpen, J.R., Merschat, A.J., Powell, N.E., McDonald, C.S. (2021) Deciphering the "footprint" of the Neoacadian metamorphic event in the southern Appalachians: insights from $^{40}Ar/^{39}Ar$ geochronology in the eastern Blue Ridge and Inner Piedmont of North Carolina. Presented at SE GSA Annual Meeting, 1-2 April. (oral). Geological Society of America *Abstracts with Programs 53*(2). DOI: 10.1130/abs/2021SE-362173

Spencer, B.M., Thigpen, J.R., Gallen, S.F., Dortch, J.M., Law, R.D. (2020) Rapid orogenic collapse—efficient erosion, or something more? T051-02 (poster), presented at 2020 Fall Meeting, AGU, 1-17 Dec.

Spencer, B.M., Thigpen, J.R., Law, R.D., Hodges, K.V., Gallen, S.F., Dortch, J.M., Mako, C.A. (2020) Thermal evolution of the Scandian orogenic retrowedge, northern Scotland: tectonic implications of rapid collapse. Presented at GSA Annual Meeting, 25-28 Oct. (oral). Geological Society of America *Abstracts with Programs 51*(6). DOI: 10.1130/abs/2020AM-356750

Thigpen, J.R., Ashley, K.T., Mako, C.A., Law, R.D., **Spencer, B.M.** (2020). Numerical investigations of rapid heating in thrust belts and implications for metamorphism in the Scandian orogenic wedge, NW Scotland. Presented at GSA Annual Meeting, 25-28 Oct. (oral). Geological Society of America *Abstracts with Programs 51*(6). DOI: 10.1130/abs/2020AM-359871

Swanger, W., Thigpen, J.R., Helfrich, A.L., **Spencer, B.M.** Quantifying strain accommodation and deformation of wall rocks and overburden sequences proximal to salt diapirs in Salt

Valley, Utah. Presented at GSA Annual Meeting, 25-28 Oct. (oral). Geological Society of America *Abstracts with Programs 51*(6). DOI: 10.1130/abs/2020AM-356367

Spencer, B.M., Thigpen, J.R., McDonald, C.S., Hodges, K.V., Mako, C.A., Law, R.D., and Ashley, K.T. (2019). Rapid rates of orogenic collapse in the Scottish Caledonides. Presented at GSA Annual Meeting, 22-25 Sept. (oral). Geological Society of America *Abstracts with Programs 51*(5). DOI: 10.1130/abs/2019AM-337882

Streib, L., **Spencer, B.M.**, Swallom, M., Lo, E., McGlue, M.M., Thigpen, J.R., Woolery, E., and Brown, S.J. (2019). Understanding sediment accumulation and distribution in Jackson Lake, Wyoming using CHIRP seismic surveying. Presented at SE GSA Annual Meeting, 28-29 Mar. (poster). Geological Society of America *Abstracts with Programs 51*(3). DOI: 10.1130/abs/2019SE-327729

Spencer, B.M., & Dulin, S. (2018). A paleomagnetic and petrographic analysis of unconformity surfaces in Nevada and Missouri: possible implications for paleoweathering processes. Presented at GSA Annual Meeting, 4-7 Nov. (poster). Geological Society of America *Abstracts with Programs, 50*(6). DOI: 10.1130/abs/2018AM-324446

Adams, G., Dulin, S., Elmore, R.D., Evans, S., **Spencer, B.M.**, and Schwing, J. (2017). Timing of dolomitizing fluids in zebra dolomite bodies of Nevada's Basin and Range province. Geological Society of America *Abstracts with Programs*, *49*(6). DOI: 10.1130/abs/2017AM-306056

WORKSHOPS

2020: GSA Annual Meeting Short Course: Exploring Surface Processes using Community Surface Dynamics Modeling System Modeling Tools: How to Build Coupled Models (participant)
2020: UK EES Graduate Student Diversity and Inclusion Workshop (organizer)
2020: UK EES Graduate Student Teaching Workshop (organizer)
2018: ExxonMobil Reservoir Characterization Short Course, University of Georgia (participant)

DEPARTMENTAL TALKS

UK EES ReSEES Symposium, 2020. Rapid Cooling and Post-Orogenic Collapse Scenarios of the Caledonides of Northwest Scotland.

Rast-Holbrook Seminar Series, UK EES. 2019. Rapid Orogenic Collapse in the Scottish Caledonides; Crustal Flow in a Small, Cold Orogen?

GRANTS, FELLOWSHIPS, AND AWARDS

AWARDS AND SUCCESSFUL FUNDING

Society for Sedimentary Geology (SEPM) Foundation Student Research Grant; 2019
Geological Society of America Graduate Student Research Grants; 2018, 2019
UK EES Research Symposium Most Outstanding Presentation Award; 2020
UK Department of Earth and Environmental Sciences Outstanding TA Award; 2019, 2020
UK Department of Earth and Environmental Sciences Pirtle Fellowship; 2018-2020
University of Oklahoma Provost's Certificate of Distinction in Teaching (3x); 2015-2017

SUBMITTED, BUT NOT FUNDED, RESEARCH PROPOSALS

Collaborative Research: Orogenic collapse: Developing insight through studies of the Scandian orogenic wedge, NW Scotland (PI: Thigpen, J.R., submitted to NSF Tectonics in Dec. 2020). *Ranked competitive, but declined funding.*

PROFESSIONAL ASSOCIATIONS AND SERVICE

SC GSA Field Trip Chair, 2023 (upcoming)
BPSoG Undergraduate Committee, 2021-present
BPSoG Safety Committee, 2021-present
BPSoG Outreach Committee, 2021-present
UK EES Head TA, 2020-2021
UK EES Graduate Student Faculty Representative, 2019-2020
Geological Society of America
American Geophysical Union
American Association of Petroleum Geologists
Graduate Geoscience Group, UK EES (Founding Treasurer)
Society for Sedimentary Geology (SEPM)
Sigma Gamma Epsilon
Mineralogical Society of America
American Institute of Professional Geologists
Edinburgh (Scotland) Geological Society

INDUSTRY EXPERIENCE

2019 - Geoscience Intern- Pioneer Natural Resources, Las Colinas, TX
Facies and petrophysical mapping of the lower San Andres formation, Midland Basin, TX. Investigated potential wastewater injection zones and effects of prior/current wastewater injection on drilling practices. Recommended changes to drilling protocols based on facies distribution, which improved borehole stability and pressure models.

2016 - Geoscience Intern- Anadarko Petroleum Corporation, The Woodlands, TX
Deepwater GoM development team, Green Canyon. Mapped Middle Miocene sand packages for future development. Analyzed deformation band distribution and effects on reservoir EUR; recommended changes to well steering/deviation plans and perforating intervals to avoid deformation bands.

2014 - CO_2-EOR Geology Intern- Chaparral Energy, LLC, Oklahoma City, OK
Development geological mapping for infill drilling of South Burbank and Burbank fields, NE Oklahoma. Mapped distribution and properties of Red Fork and Bartlesville sandstones for potential enhanced recovery operations.