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Research Interests and Areas of Expertise

Research Interests: The development Earth systems thinking in undergraduate courses; Conceptions of biogeochemical processes and cycles; Conceptions of the Earth system and human-environment interactions; Systems thinking and global change; Biogeoscience education; Student engagement in geoscience classes; Field experiences in the geosciences; Coupling of systems and temporal thinking skills in historical and environmental geology, K-12 Teacher preparation in geosciences, Medical geology and geohealth

Expertise: Geoscience education, biogeoscience, environmental geology, oceanography, paleobiology, geomorphology, Earth system science, sedimentary geology, medical geology, environmental geoscience, planetary geology, Field-based education, K-12 Earth science education

Education

2017 – 2020

Auburn University, Auburn, AL
Doctor of Philosophy in Earth System Science
Exploring and Measuring the Teaching and Development of Earth Systems Thinking Skills in Undergraduate Geoscience Courses
Advisor: Karen McNeal **Committee:** Christine Schnittka, Stephanie Shepherd, & Joni Lakin
GPA: 4.0

2013 – 2015

Mississippi State University, Starkville, MS
Master of Science in Geosciences
Advisors: Renee Clary & John Rogers
GPA: 4.0

2010 – 2013

Muskingum University, New Concord, OH
Master of Arts in Education in Science Education and Talented and Gifted Education
Advisor: Linda Rogness
GPA: 3.98

2006 – 2010

Muskingum University, New Concord, OH
Bachelor of Arts Suma Cum Laude in Middle Childhood Education (Science and Language Arts), minors in French and English
GPA: 3.99

Additional Coursework **North Carolina State University:** Biological Oceanography (2016)
GPA: 4.0

Professional Experience

2020 to present

Assistant Professor, University of Indianapolis Department of Earth-Space Science. Indianapolis, IN

2020 to present

Faculty Fellow, University of Indianapolis Strain Honors College. Indianapolis, IN

2020

Instructor, Auburn University Department of Geoscience. Auburn, AL

2019

Educational Coach, University of Texas, Austin. GeoFORCE

2018

Consultant, W. W. Norton & Company, Inc. New York, NY

Wrote and curated the instructor guide for the textbook *Earth: Portrait of a Planet*, Geo6 ed.

2010-2015 **Teacher**, Garaway Local Schools, Sugarcreek, OH

Research Experience

2017 – 2020 **Research Assistant**, Department of Geoscience, Auburn University, Auburn, AL
Geoscience Education and Geocognition Lab

2016 **Research Assistant**, Department of Marine, Earth, and Atmospheric Sciences, North Carolina State University, Raleigh, NC
Geoscience Education and Geocognition Lab

Undergraduate Teaching Experience

2020-Present **University of Indianapolis**
ESCI 100 Elements of Earth-Space Science, Fall 2020- Present

ESCI 202 Physical Geography, Fall 2020- Present

ESCI 206 Time, Trilobites, and T-Rex, Fall 2020- Present

2017-2020 **Auburn University**
GEOL 1103 Dynamic Earth, Spring- Summer 2020, online course

GEOL 1111 Earth and Life through Time Lab, Fall 2019-Spring2020, introductory undergraduate lab as head teaching assistant

GEOL 4010 Sedimentary Petrology, Fall 2019, upper-level undergraduate combined lecture and lab as teaching assistant

GEOL 3200 Introduction to Paleobiology, Fall 2019, upper-level undergraduate combined lecture and lab as teaching assistant

GEOL 3650 Field Camp, Summer 2019, upper-level undergraduate field course as teaching assistant

GEOL 1110/1117 Earth and Life through Time/ Honors, Fall 2017, Spring 2019, Fall 2018, introductory undergraduate lecture as instructor of record

CTSE 5100/6100 Curriculum and Teaching II: Science, Fall 2017, undergraduate lecture and field placement as teaching assistant and field supervisor

2016 **North Carolina State University**
MEAS 100 Earth System Science Lab, Fall 2016, undergraduate lab, as teaching assistant

Field Experiences/ Field Courses

Summer 2019 GeoForce Junior Academy, Pacific Northwest, Education Coach (Administered by University of Texas Austin)

Summer 2019 Field Camp, Colorado, Utah, New Mexico, Teaching Assistant (Administered by Auburn University)

Summer 2019 Volcanic Systems, Iceland, Student (Administered by Auburn University)

Spring 2019 Carbonate Depositional Systems, San Salvador Island, Bahamas, Student (Administered by Auburn University)

Summer 2018 GeoForce Senior Academy, Texas, Research Team Member (Administered by University of Texas Austin)

Summer 2017 GeoForce Junior Academy, Pacific Northwest, Research Team Member (Administered by University of Texas Austin)

Summer 2015 Field Methods, Washington, USA, Student (Administered by Mississippi State University)

Fellowships, Honors & Awards

- 2020 Outstanding GTA Award, Auburn University College of Science and Mathematics
- 2020 Geoscience Advisory Board Outstanding Earth System Science Graduate Student, Auburn University Department of Geosciences
- 2019 Geoscience Advisory Board Research Grant, Auburn University Department of Geosciences, \$500
- 2019 Geoscience Advisory Board Travel Grant, Auburn University Department of Geosciences
- 2019 Charles E. Savrda Outstanding Graduate Student Award, Auburn University Department of Geosciences
- 2018 Outstanding TA Award, National Association of Geoscience Teachers
- 2018 Geoscience Advisory Board Travel Grant, Auburn University Department of Geosciences
- 2017 Geoscience Advisory Board Travel Grant, Auburn University Department of Geosciences
- 2016 North Carolina State University Graduate Fellowship
- 2010 Bill and Ruth McCauley Scholarship in Education, Muskingum University

Publications

Published

- Soltis, N. A.**, McNeal, K. S., Atkins, R. M., & Maudlin, L. C. (2020). A novel approach to measuring student engagement while using an augmented reality sandbox. *Journal of Geography in Higher Education*, 1-20.
- McNeal, K.S., Zhong, M., **Soltis, N.**, Doukopoulos, L., Johnson, E., Courtney, C., Alwan, A., Porch, M. (2020). Measuring student engagement in traditional and active learning biology classrooms using skin biosensors. *CBE Life Sciences Education*, 19(4)
- Soltis, N.**, McNeal, K., Forbes, C., & Lally, D. (2019). The relationship between active learning, course innovation and teaching Earth system thinking: A structural equation modeling approach. *Geosphere* 15(5), 1703-1721.
- McNeal, K.S., Ryker, K., Atkins, R., Whitemeyer, S., Giorgis, S., Clark, C., **Soltis, N.**, & Pingle, T. (2019). The Effect of the Augmented Reality Sandbox on Student Learning in Introductory Undergraduate Geology Courses during Structured, Semi-Structured, and Unstructured Activities. *Journal of Geography in Higher Education*, 1-23.
- Lally, D., Forbes C.T., McNeal, K., & **Soltis, N.** (2019). National Geoscience Faculty Survey 2016: Prevalence of systems thinking and scientific modeling learning opportunities. *Journal of Geoscience Education*, 67(2), 174-191.
- Soltis, N.**, Helf, J., & Schnittka, C. (2018). A review of classic works in sustainability education. *Green Schools Catalyst Quarterly*, 5(2), 98-99.

Accepted

- Soltis, N.**, McNeal, K., & Schnittka C. Undergraduate student conceptions of the Earth system and biogeochemical cycling. *Journal of Geoscience Education*

In Preparation

- Soltis, N.**, Rogers, S., Johnson, E., & Ojeda, A. (In preparation). Evaluating Dissolved Organic Carbon Concentrations Related to Lignite Deposits in the US Gulf Coast. *Environmental Geochemistry and Health*
- Soltis, N.**, McNeal, K., & Lakin, J. (In preparation). A new valid instrument for the measurement of Earth systems thinking skills in the context of the Earth sciences. *The Journal of Environment Education Research*.
- Soltis, N.** & McNeal, K. (In preparation). A new valid instrument for the measurement of biogeochemical content knowledge. *Biogeosciences*.

Conference Presentations

- Soltis, N.**, Johnson, E., Rogers, S., Ojeda, A. (2020). Exploring spatial relationships between lignite- bearing aquifers, total organic carbon, and end-stage renal disease in the US gulf coast. In Geological Society of America Annual Meeting, virtual, October 26-30.
- Maudlin, L.C., McNeal, K.S, **Soltis, N.**, Hassol, K.J. (2020). Narrated animations and still frame figures: A comparative study. In Geological Society of America Annual Meeting, virtual, October 26-30.
- Kotowski, A., Wright, V., **Soltis, N.**, Ramos, E., Thomas, D. (2019). Assessing the impact of a challenge-based, collectivist approach to learning on minority student engagement in the geosciences. In American Geophysical Union Annual Meeting, San Francisco, CA, December 10-14.
- Soltis, N.**, McNeal, K. (2019). The underpinnings of developing an instrument to measure systems thinking abilities in the context of Earth system science. In Geological Society of America Annual Meeting, Phoenix, AZ, September 22-25.
- Soltis, N.**, McNeal, K., Swain, Q., (2019). Using student drawings of biogeochemical cycles to explore systems thinking abilities. In Earth Educators Rendezvous, Nashville, TN, July 15-19.

- Reyes, E., Ellins, K., Campos, D., McNeal, K., **Soltis, N.**, Stocks, E., Thomas, D. (2019). Implementing the STAR legacy cycle to promote student-centered field learning in the GeoFORCE/STEMFORCE 12th grade academy. In Earth Educators' Rendezvous, Nashville, TN, July 15-19.
- Kotowski, A., Wright, V., **Soltis, N.**, Ellins, K. (2018). Engaging high school students from underrepresented minorities in the geoscience through graduate-student led, challenge-based learning. In American Geophysical Union Annual Meeting, Washington D.C. December 10-14.
- Soltis, N.**, McNeal, K., Forbes, C., & Lally, D.. (2018). The relationship between active learning, course innovation and teaching Earth system thinking: A structural equation modeling approach. In Geological Society of America Annual Meeting, Indianapolis, IN, November 4-8.
- McNeal, K.S., **Soltis, N.**, Zhong, M., Doukopoulos, L., Perch, M., Alwan, A., Johnson, E. T., Courtney, S. L. (2018). Using skin sensors to measure student engagement in traditional and active learning classrooms. In Geological Society of America Annual Meeting, Indianapolis, IN, November 4-8.
- Lally, D., Forbes C.T., McNeal, K., & **Soltis, N** (2018). National survey of geoscience teaching practices 2016: Current trends in geoscience instruction of scientific modeling and systems thinking. In Geological Society of America Annual Meeting, Indianapolis, IN, November 4-8.
- Ellins, K.K., Thomas, D.L., Campos, D., George, S.W.M, Goldfarb, E., Kotowski, A., McCall, L., **Soltis, N.**, Stocks, E., & Wright V (2018). Using the star legacy cycle to promote student-centered field learning in geoFORCE and STEMForce 12th grade summer academies. In Geological Society of America Annual Meeting, Indianapolis, IN, November 4-8.
- Soltis N.**, McNeal, K.S., (2018). Understanding undergraduate student conceptions about biogeochemical cycles and the Earth System. In Earth Educators' Rendezvous, Lawrence, KS, July 16-20
- Soltis, N.**, McNeal, K.S., Atkins, R., Maudlin, L., Schnittka, C. (2018). Understanding Student Engagement while Using an Augmented Reality Sandbox in National Association for Research on Science Teaching, Atlanta, GA, March 10-13.
- Soltis, N.**, McNeal, K.S., Atkins, R., Maudlin, L. (2017). Understanding Student Engagement while Using an Augmented Reality Sandbox in 2017 Geological Society of America Annual Meeting, Seattle WA, October 22-26 .
- Gold, A.U, Morrison, A., **Soltis, N.**, McNeal, K., Kay, J. (2017). Measuring engagement and learning outcomes during a teacher professional development workshop about creative climate communication. in 2017 Geological Society of America Annual Meeting, Seattle WA, October 22-26 .
- Soltis, N.**, McNeal, K.S., Atkins, R., Maudlin, L. (2017). Understanding Student Engagement while Using an Augmented Reality Sandbox in 2017 Earth Educators' Rendezvous, Albuquerque, NM, July 17-21.
- McNeal, K.S., Luginbuhl, S., Ngo, A., **Soltis, N.** (2016). Capturing Tweets on Climate Change: What is the Role of Twitter in Climate Change Communication? In Geological Society of America Annual Meeting, Denver, CO, September 25-28.

Professional Affiliations

National Science Teachers Association, Geological Society of America (Geoscience Education Division, Geobiology and Geomicrobiology Division, Geology and Health Division), Paleontological Society, Society for Sedimentary Geology, National Association of Geoscience Teachers, National Association for Research on Science Teaching, Kappa Delta Pi, Phi Kappa Phi

Service

- 2021-Present Associate Editor, *Journal of Geoscience Education*
- 2019-Present Reviewer, *Journal of Geoscience Education*, *Journal of Research in Science Teaching*
- 2019 Homeschool Outreach Day, Auburn University Department of Geosciences
- 2018 Greater East Alabama Regional Science and Engineering Fair: Head Judge Social and Behavioral Sciences, Junior Division
- 2017 AU Access/Destination STEM Outreach: Volunteer
- 2017 Greater East Alabama Regional Science and Engineering Fair: Judge Social and Behavioral Sciences, Junior Division

Professional Development and Short Courses

- Marine Geology Using GEODE Workshop, Earth Educators' Rendezvous, 2019
- Using Conceptual Frameworks of Earth Systems to Frame Future Directions in Systems Thinking Research, Earth Educators' Rendezvous, 2018
- Advancing Transdisciplinary Dialogue in Geoscience Education Research, Earth Educators' Rendezvous, 2018
- Paleobiology Database Educational Resources, Earth Educators' Rendezvous, 2017
- Preparing for an Academic Career Workshop, Earth Educators' Rendezvous, 2017

Place, Cultural Context, and Geoscience Teaching, Earth Educators' Rendezvous, 2017
COPUS Training, Auburn University, 2017
Teaching Assistant and Active Learning Training, North Carolina State University, 2016

Other Related Skills

Microsoft Office
SPSS and AMOS
Proficient in written and spoken French
Literate in Portuguese
Qualitative and Quantitative Research Methods
Structural Equation Modeling
Environmental Education
Curriculum Development (K-16)
Psychomotor tools (eye-tracking, wrist biosensors)
Geochemist's Workbench
COPUS Observation Protocol and Reformed Teaching Observation Protocol
Undergraduate Course Development
Geologic Field Methods and Mapping
Geographic Information Systems (ArcGIS)
R Studio