Mobile: (575) 635-0430 **Sarah M. Giles** sgiles@ldeo.columbia.edu

Lamont-Doherty Earth Observatory

Seismology, Geology, and Tectonophysics Division

Office 201B, 61 Route 9W, Palisades, NY, 10964

Education

2018-Present Ph.D. Geology, **Columbia University**, Department of Earth and Environmental Sciences

Advisor: Dr. Nicholas Christie-Blick

Expected: May 2023

2014-2018 B.S. Geology, **Texas A&M University-College Station**, *Magna Cum Laude*

Relevant Experience in Geoscience

1. **Ph.D. Research, South Australia and eastern California-August 2018-Present**

* Integrated sedimentology, stratigraphy, geochemistry, and structure project incorporating field mapping, high-resolution sequence stratigraphy, petrography, and isotopic analyses to evaluate the character, source, and timing of the Neoproterozoic (1,000-541 Ma) Shuram carbon-13 isotope anomaly in the Flinders Ranges, South Australia and eastern California.
* Associated expertise: Petrographic analysis on siliciclastic/carbonate rocks, carbon and oxygen isotope analyses, Scanning Electron Microscope (SEM) applications, U-Pb geochronology on calcite and detrital zircons, K-Ar geochronology on glauconite, field geology, sequence stratigraphy, cement stratigraphy, Neoproterozoic geoscience.
* Supervising 2 undergraduate research projects integrating photogrammetric drone models, isotope geochemistry and structural restorations to determine the details of Ediacaran paleogeography

1. **Salt Tectonics and Fluid Flow Research Assistant and Collaborator, Utah**

* Formulated a collaborative research project investigating the characteristics of salt-sediment-fluid interactions at the Onion Creek salt diapir in Fisher Valley, Utah. This project will supplement the Ph.D. research of a student at the University of Texas at El Paso who is evaluating halokinetic deformation at the Onion Creek salt diapir.
* Supervised 3 undergraduate research projects investigating salt-sediment-fluid interactions through multifaceted analyses on the Onion Creek Diapir. Students received L. Austin Weeks AAPG Grants and won UTEP Student Colloquium Poster Awards.

1. **Research Assistant, Salt Sediment Interactions Research Consortium (SSIRC), University of Texas at El Paso-January 2016-July 2018**

* Conducted research evaluating the sedimentology and stratigraphy of the Patawarta supra-salt minibasin in the Flinders Ranges, South Australia.
* Utilized field mapping, carbon and oxygen isotope analyses, vein-fill fluid inclusion analysis, cathodoluminescence imaging analysis, petrographical analysis on siliciclastic/carbonate rocks. Conducted vein-fill fluid inclusion analysis and cathodoluminescence analysis to investigate the fluid flow characteristics of Patawarta diapir in the Flinders Ranges, South Australia
* Advisor: Dr. Rachelle Kernen, Dr. Katherine Giles

1. **Research Assistant, Climate-Tectonic Interactions, Texas A&M University- July 2017-May, 2018**

* Conducted a research project investigating pluton exhumation pathways in the Oregon Cascades Range. Utilized U-Pb zircon geochronology, Ar/Ar feldspar geochronology, (U-Th)/He apatite thermochronology, and HeFTy thermal-pathway modelling.
* Advisor: Dr. Nicholas Perez

1. **Intern, Texas A&M Energy Institute-June-August 2017**

* Conducted a project performing sediment core preparation, sampling, description, and interpretation. Well: Texaco #1 Navajo J, Aneth Field, Utah, USA.

1. **Research Assistant, Soil Moisture Influence on Land-Atmosphere Interactions-August 2015-May 2017**

* Evaluated land-atmosphere interactions in Oklahoma using in-situ soil measurement data and clustering statistical analysis. Utilized, ArcGIS, Matlab, and Excel.
* Advisor: Dr. Steven Quiring

1. **Intern, Environmental Protection Agency-May-August 2015**

* Worked as a geology intern in the EPA Region 6 Management of Contaminated Sites Task Force. Conducted water geochemistry analyses, filter description for air pollution monitoring, site mapping, and contributed to the EPA Region 6 environmental blog.

Fellowships

2019-Present **NSF Graduate Student Research Fellowship**

2021-2022 **Lead Teaching Fellow – Columbia University Center for Teaching and Learning**

2018-2019 **Dean’s Fellowship, Columbia University**

Grants and Awards

2021 **AAPG** Gordon I. Atwater Memorial Grant

2020 **AGeS2** Geochronology Grant

2020 **GSA** Graduate Student Research Grant

2020 **AAPG** General Fund Graduate Research Grant

2020 **SEPM-NSF** Travel Grant

2020 **ISGC** Travel Grant

2020 **Chevron** Student Initiative Fund Grant

2019 **Explorer’s Club** Mamont Research Grant

2019 GSA Graduate Student Research Grant

2018 Chevron Student Initiative Fund Grant

2018 College of Geosciences Outstanding Senior Award, Texas A&M University

2018 Geoscience Silver Medallion Scholar Award

2017 George Bush Presidential Library Research Travel Grant

2017 TAMU Geology & Geophysics Research Travel Grant

2017 AIPG-TX Foss Scholarship

2017 **ConocoPhillips** Field Camp Scholarship

2017 Chevron Field Camp Scholarship

2017 Distinguished Student in Geosciences Award, Texas A&M College of Geosciences

2017 GSA South-Central Conference Best Poster Presentation-Honorable Mention

2017 TAMU Geology & Geophysics Research Symposium 2nd Place Poster Presentation

2017 Student Ambassador Nomination for Texas A&M Institute of Advanced Research Study

Selected Presentations and Publications

**2021-2018**

* **Giles, S.M.,** Giles, K.A., Rowan, M.G., Christie-Blick, N., Lankford-Bravo, D.F.,Did Neoproterozoic (Ediacaran) regional sea-level drawdown trigger extensive allochthonous salt breakout and incision of the Wonoka paleocanyons, Flinders Ranges, South Australia? 2021 Australian Earth Sciences Convention, *Poster presentation*.
* **Giles, S.,** Christie-Blick, N., Lankford-Bravo, D.F., and Ramirez, M., 2020, Potential Gaskiers connection for two mid-Ediacaran paleocanyons: Evidence from the Wonoka canyons, South Australia and the Johnnie incisions, eastern California: Geological Society of America, Abstracts with Programs, v. 52, No. 6, doi: 10.1130/abs/2020AM-354131.
* Christie-Blick, N., Geyer, W.R., and **Giles, S.,** 2020, Coriolis deflection of hyperpycnal flow in delta front sediments in the mid-Ediacaran (~580 Ma) Wonoka canyon at Umberatana syncline, South Australia: Geological Society of America, Abstracts with Programs, v. 52, No. 6, doi: 10.1130/abs/2020AM-354107
* Lankford-Bravo, D.F., **Giles, S.M.,** Supplementing the field experience in geoscience education and research: A module-based teaching approach using interactive 3D outcrop models: Geological Society of America, Abstracts with Programs, v. 52, No. 6, doi: 10.1130/abs/2020AM-360030
* Lankford-Bravo, D.F., Giles, K.A., Langford, R., **Giles, S.M.,** 2020, Comparing heterogeneities in syn-depositional styles of deformation within the Cutler Group, Onion Creek Salt Diapir, Utah. Geological Society of America, Abstracts with Programs.
* **Giles, S.M.,** Christie-Blick, N., Lankford-Bravo, D., Discerning the submarine from the subaerial: New insights from the mid-Ediacaran Wonoka canyons, South Australia, SEPM IGC 2019 and 2020, Abstract, *Accepted.*
* Pesek, M. E., Perez, N. D., Meigs, A., Rowden, C., **Giles, S. M.,** Exhumation timing the Oregon Cascade Range decoupled from deformation, magmatic, and climate patterns. *Published in 2020 Tectonics v. 30, i. 9*
* Christie-Blick, N., **Giles, S.M.,** Lankford-Bravo, D., New insights on the origin of the Wonoka canyons (mid-Ediacaran), South Australia. 2019 36th International Geological Congress, Delhi, India, Oral presentation, *Accepted.*
* **Giles, S.M.,** Christie-Blick, N., Character, Timing, and Significance of the Shuram-Wonoka Carbon-13 Isotope Anomaly, Flinders Ranges, South Australia, 2019 Columbia First-Year Colloquium, Oral Presentation

**2017-2016**

* Kernen, R.A., Giles, K.A., Fischer, M.P., **Giles, S.M.,** Lehrmann, A., Rowan, M.G., Evaluating Exploration Potential of Suture Zones or Encased Minibasins Using an Outcrop Example from the Neoproterozoic Patawarta Salt Canopy, Central Flinders Ranges, South Australia. AAPG 2017 Conference Paper
* **Giles, S.M.,** Kernen, R.A., Lehrmann, A., Giles, K.A., Evolution of a suprasalt minibasin: Neoproterozoic (Ediacaran) Patawarta salt sheet, Flinders Ranges, South Australia. South-Central GSA 2016 Conference Paper, Best Poster Presentation Honorable Mention
* **Giles, S.M.,** Pesek, M.E., Perez, N.D., Analysis of the Exhumation Pathways Experienced in the Cascades Range. American Geophysical Union Conference 2017 Poster Presentation
* **Giles, S.M.,** Pesek, M.E., Perez, N.D., Analysis of the Exhumation Pathways Experienced in the Cascades Range. 2017 TAMU Geology & Geophysics Symposium, Poster Presentation
* **Giles, S.M.,** Kernen, R.A., Lehrmann, A., Giles, K.A., Evolution of a suprasalt minibasin: Neoproterozoic (Ediacaran) Patawarta salt sheet, Flinders Ranges, South Australia. *2016 TAMU Geology & Geophysics Research Symposium, 2nd Best Poster Presentation Award*
* Lehrmann, A., Kernen, K.A., **Giles, S.M.,** Giles, K.A., Timing of allochthonous salt emplacement of the Neoproterozoic (Ediacaran) Patawarta salt sheet, Flinders Ranges, South Australia: Evidence from the subsalt minibasin. South-Central GSA 2016 Conference Paper
* **Giles, S.M.,** McRoberts, B., Quiring, S., Investigating the Local Forcing Effect of Soil Moisture on Temperature and Precipitation in Oklahoma. 2016 TAMU GIS Day, Poster Presentation
* **Giles, S.M.,** McRoberts, B., Quiring, S., Investigating the Local Forcing Effect of Soil Moisture on Temperature and Precipitation in Oklahoma. American Geophysical Union Conference 2015 & 2016 Poster Presentation

Certifications and Short Courses

2020-2021 **Teaching Development Program Certification (Foundational Track) –** Columbia Center for Teaching and Learning

Summer 2020 **Foundations for Research Computing Bootcamp (Python, UNIX Shell, Git)-** Columbia University

Summer 2020 **Practical Salt Tectonics Short Course-** Mark Rowan Consulting Inc.

Teaching Experience

Fall 2021- 2022 **Lead Teaching Fellow – Columbia University**

* Department of Earth and Environmental Sciences teaching aid and liaison for graduate students
* Will lead a workshop on 3D visualization and applications to undergraduate courses

Spring 2021

& Fall 2020 **Sedimentary Geology- Teaching Assistant at Columbia University**

* Primary lab instructor

Spring 2020 **Climate Science Class Instructor- High-school Science Honors Program hosted by Columbia University**

* Certified course taught by 3 Ph.D. students.
* Prepared a 45-min lecture on sequence-stratigraphy using sediment cores. Prepared 75-min in-class activity involving group competition.

Spring 2020 **Kindergarten Earth Science Tutor, Columbia Volunteer Tutor Program**

* Designed and led virtual (Zoom) mini-lessons and interactive demonstrations for kindergarten level children of Columbia University Medical Staff workers. Topics focused on a wide range of Earth Science subjects, including lessons on storms, climate, weather, and fossils.
* This tutoring group was formed in response to the 2020 COVID-19 pandemic, and was created to support essential staff workers who could not be present at home to aid in their children’s learning.

Spring 2020 **Solid Earth Systems- Teaching Assistant at Columbia University**

* Designed lab assignments/exams and taught the lab section
* Contributed to field-trip outline and assignments

Spring 2019 **Field Geology in Death Valley- Teaching Assistant at Columbia University**

* Instructed students on field mapping and techniques while in the field
* Helped organize and design schedule of geoscience activities before the course occurred
* Undergraduate course, Columbia University

Spring 2019 **High-school Earth Science Instructor-Volunteer at Manhattan International High School**

* Prepared class assignments, handouts, and projects for 9th graders taking an introductory Earth science course
* Students primarily spoke English as their second language, so material needed to be clearly and effectively communicated for a diverse classroom of students

Science Communication and Outreach

2021 **Chair of Graduate Research Symposium – Women in Science at Columbia**

* Coordinated and designed virtual research symposium to promote women in STEM and effective scientific communication
* Moderated a panel on how to how to bridge career divides and self advocacy
* Facilitated abstract submission and review by Columbia faculty
* Identified and contacted sponsors to raise a total of $5,000 for the symposium
* Developed judging guidelines for presentations for Columbia faculty judges

2020 **GSA Annual Meeting Session Co-chair**

* Session title: “Interactions between Life, Tectonics, Climate, and Sedimentary Systems at the Neoproterozoic-Early Cambrian Transition”
* Created session topic and a special invited speaker panel component

2020 **Energy Solutions Mentee Program, World Petroleum Council**

* Participated as a group mentee in global energy discussions.
* Facilitated group discussion with energy professionals about energy education for K-12 students.

2020 **Co-organized the Undergraduate Earth Science Mentee Program**

* Helped create a matching program to pair undergraduate Earth science students at Columbia University with an Earth science graduate student and facilitate mentoring on topics such as how to get into graduate school, job searching, and class guidance.
* Co-organized semesterly “How to get involved in undergraduate research” panels that discussed how to arrange undergraduate research opportunities, with panels of graduate students and professors discussing their own experiences and opportunities. This panel was advertised to all Earth science undergraduates.

2019-Present **Geology Chair on Colloquium Committee, Lamont-Doherty Earth Observatory**

* Served as the geology representative on the search committee for engaging scientific speakers that can lecture on multidisciplinary geoscience subjects.
* Host a round table discussion with the speaker where Columbia graduate students can ask the speaker questions related to science, career, and work-life balance.

2018-2020 **Experiment Instructor-Volunteer, Girl’s Science Day Event, Women in Science at Columbia**

2018 & 2019 **Instructor,** **Lamont-Doherty Earth Observatory Open House**

* Hosted a booth with rock specimens and diagrams discussing how we use sedimentology and stratigraphy to evaluate depositional environments
* This was an event open to the public to come participate in scientific lectures and experiments

2018-2019 **Mentor, National Academy of Sciences 1000 Girls 1000 Futures Program**

* Mentored a female 10th grade student from Egypt on STEM modules and college preparation

Diversity, Equity, and Inclusion Training and Outreach

2020-Present  **Co-developed and led a DEI course at Columbia University**

* Course was designed as a seminar series/discussion group: “A Seminar on Race, Climate Change, and Environmental Justice.”
* This series focuses on how climate, poverty, and racial injustice are linked, and how to act on those issues while promoting equity and inclusion
* This series can be taken for credit at Columbia University, and is co-led by Columbia faculty and graduate students. This will remain an on-going course after I graduate.

2021  **Unlearning Racism in Geoscience (URGE) Pod Member – Lamont-Doherty Earth Observatory**

* I completed the training program composed of eight two-week sessions aimed at addressing racism in geoscience and designing inclusive pedagogy

Supervised Undergraduate Research Projects

2020-Present  **Juliet Tochterman, Columbia Undergraduate (’22)**

* I created the research project idea and methodology. I supervised all lab work for the student project and developed teaching materials to communicate research concepts that the student was struggling with.

2019-2020 **Mia Ramirez, UTEP Undergraduate (’20)**

* I created the research project idea and methodology, helped student write research grants to support travel and laboratory analyses.
* **Student presented a poster at the 2020 GSA Connects Online Meeting:**

Ramirez, M.R., Giles, S.M., Lankford-Bravo, D.F., 2020, Evaluation of the syndepositional tectonism hypothesis for the formation of the Ediacaran Johnnie incisions in eastern California using structural restoration analyses: Geological Society of America, Abstracts with Programs, v. 52, No. 6, doi:10.1130/abs/2020AM-357007.

* **2020 L. Austin Weeks Undergraduate Grant Recipient**

2019-2020 **Rachael Hill, UTEP Undergraduate (’20)**

* Co-created project idea, methodology, and helped student write research grants to support field work travel and laboratory expenses.
* Project title: “Interactions between deformation and fluid alteration at the salt-sediment interface: Insights from the Onion Creek Diapir, Utah”
* **Presented as a student poster at the 2020 UTEP Colloquium**

2019-2020 **Hao Pham, UTEP Undergraduate (’20)**

* Co-created project idea and methodology, helped student write research grants to support field research travel.
* Project title: “Integration of 3D drone modeling and cement stratigraphy on the Permian Cutler Formation, Utah”
* **Presented as a student poster at the 2020 UTEP Colloquium**
* **2020 L. Austin Weeks Undergraduate Grant Recipient**

Research Collaborations

2020-Present **Timing of Allochthonous Salt Breakout in the Flinders Ranges, South Australia**

* Collaborators: Dr. Mark Rowan (Rowan Consulting Inc.), Dr. Katherine Giles (UTEP), David Lankford-Bravo (UTEP), Dr. Nick Christie-Blick (Columbia)
* Purpose: Using isotope chemostratigraphy, geologic mapping, and physical stratigraphic analysis we will test the hypothesis that a large sea level drawdown related to the Gaskiers Glaciation initiated sufficient erosion and non-deposition to cause the incision of the Wonoka canyons and allochthonous salt outbreak.

2020-Present **Detrital Zircon Provenance of Ediacaran Sediments, South Australia: Implications for the**

**Emergence of the Ediacaran Biota**

* Collaborators: As part of the AGeS2 grant - Dr. Kip Hodges (ASU), Dr. Nicholas Christie-Blick (Columbia)
* Purpose: To reconstruct the Ediacaran paleogeography of the southern and northern Flinders Ranges to determine if the depositional age of the Wonoka Fm., as well as how the Petermann and Ross orogenies were distributing sediment to regional basins. Geologic mapping, sedimentological analysis, and U-Pb detrital zircon geochronology will be utilized to constrain drainage sources and transport pathways.

2019-Present **Fluid Interactions at the Salt-Sediment Interface, Onion Creek Diapir, Utah**

* Collaborator: David Lankford-Bravo, UTEP Ph.D. Student
* Purpose: To identify is fluid alteration occurred at the salt-sediment interface, causing the Permian Cutler Fm. to appear locally altered. Petrographical, geochemical, sedimentological, and structural tests will be performed to constrain potential sources of the lithologic variances.