

**LATISHA A. BRENGMAN, Ph.D.**  
Assistant Professor

Precambrian Geology, Geochemistry, Sedimentary Processes  
Department of Earth and Environmental Sciences  
University of Minnesota Duluth  
1114 Kirby Drive, 229 Heller Hall, Duluth, MN 55812  
email: [lbrenma@d.umn.edu](mailto:lbrenma@d.umn.edu)  
website: [www.latishabrengman.com](http://www.latishabrengman.com)  
phone: (218) 726-7586

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## EDUCATION

Ph.D. (2015), **University of Tennessee, Knoxville**; major field: Earth and Planetary Sciences; Advisor: Dr. C. M. Fedo; Dissertation: *Geochemical and isotopic characteristics of Precambrian primary and secondary chert*. Degree conferred 8 May 2015.

B.A. (2009), **Northwestern University**; major field: Geology, with honors; Advisor Dr. M. T. Hurtgen; Honors Senior Thesis: *The sulfur isotope composition of 800 Ma Neoproterozoic seawater as recorded in the Bitter Springs Formation, Australia*; Degree conferred 15 June 2009.

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## PROFESSIONAL EXPERIENCE

**Assistant Professor**, Department of Earth and Environmental Sciences, University of Minnesota Duluth, MN (2015- present).

**Research Associate**, Wisconsin Geological and Natural History Survey; Collaborator: E. Stewart; Projects: *Preliminary textural and geochemical characterization of the <1.71 Ga Freedom Formation, Baraboo, WI*; and bedrock mapping of the Baraboo quartzite, Seeley Slate, and Freedom Formation (2019 – present).

**Internship**, Exxon Mobil Research Company, Houston, TX, Non-conventional reservoir group. Collaborator, Mentor: W. Heins. Project: *Predicting the character and grain size distribution of material produced during chemical weathering of a known provenance*. (May – August 2015).

**Lecturer, Research Associate, and Teaching Assistant**, Department of Earth and Planetary Sciences, University of Tennessee, Knoxville (2010 – 2015).

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## AWARDS

- Young Teacher Award, SCSE. University of Minnesota Duluth, 2019
  - Chancellor's Citation for Extraordinary Professional Promise, University of Tennessee, 2014
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## ANALYTICAL EXPERTISE

My research focuses on understanding Precambrian depositional and post-depositional processes. Our projects aim reconstruct evolving seawater chemistry in deep time, with a focus on the nascent silica cycle. To accomplish this goal my lab group combines traditional and non-

traditional sedimentological and geochemical tools that span from the field to micron-scale sample analysis. Analytical methods include the following:

**Secondary Ion Mass Spectrometry (SIMS).** Primary measurements: silicon and oxygen isotopes. Visiting Research Associate, Department of Geosciences, Swedish Museum of Natural History, Stockholm, Sweden; Mentor/Collaborator: Dr. M. J. Whitehouse; Project: *High-resolution, in-situ silicon isotope analysis of silicified volcanic rocks and Archean banded iron formation via Secondary Isotope Mass Spectrometry (SIMS).* (2013 – present).

**Electron probe microanalysis (EPMA).** Primary measurements: mineral imaging and chemical compositions. Visiting Research Associate, Department of Geosciences, University of Wisconsin - Madison; Collaborators: Dr. J. Fournelle, Dr. A. Moy; Project: *Preliminary textural and geochemical characterization of silicate and carbonate phases the <1.71 Ga Freedom Formation, Baraboo, WI.* (2017 – present).

**Isotope ratio mass spectrometry (IRMS).** Primary measurements: dual collection of silicon and oxygen isotopes on the same sample. Visiting Research Associate, Western University, Stable Isotope Geochemistry Lab, London, Ontario; Mentor/Collaborator: Dr. N. R. Banerjee; Project: *Bulk silicon isotope analysis of silicified volcanic rocks and Archean banded iron formation via Isotope Ratio Mass Spectrometry (IRMS).* (2013 – present).

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## FIELD STUDIES

To quantify broad changes in textural and geochemical data from siliceous Precambrian sedimentary and volcano-sedimentary assemblages, our lab focuses on field work spanning a billion years from ~2.7 Ga to <1.71 Ga, and we collaborate with scientists studying modern hydrothermal systems.

**~2.7 Ga Abitibi Greenstone Belt, Canada.** (2011 – present). Collaborators: Dr. Pierre Bousquet (Ministry of Energy, Northern Development and Mines, Ontario, Canada), Dr. Philip Frählich (Lakehead University, Canada), Dr. Neil Banerjee (Western University, Canada), Dr. Martin Whitehouse (Swedish Natural History Museum, Stockholm, Sweden), Dr. Christopher Fedo (University of Tennessee), Students: Paul Bielski (Graduate student, Lakehead University, 2020), Dani Stolze (Undergraduate, UMD, 2021), Past students: Erica Cayer (Undergraduate, Western University), Lindsey Abbott (Undergraduate, Western University).

**~2.7 Ga Vermilion District, northern Minnesota, United States** (2017 – present). Collaborators: Dr. Vicki Hansen (UMD), Dr. John Goodge (UMD), Students: Elizabeth Boor (Undergraduate, UMD, 2020), Logan Carpenter (Undergraduate, UMD, 2020), Heidi Krauss (Undergraduate, UMD, 2020), Emily Wojtowicz (Undergraduate, UMD, 2020), Dani Stolze (Undergraduate, UMD, 2021), Paul Bielski (Graduate student, Lakehead University, 2020), Past students: Mady David (undergraduate, 2019), Jackie Drazan (graduate student: 2017-2018). *Special Permit No. 201988 awarded to L. A. Brengman.*

**~1.9 Ga Animikie Basin, northern Minnesota, United States** (2016 – present). Collaborators: Dr. Elizabeth Trower (University of Colorado – Boulder), Dr. Athena Eyster (Massachusetts Institute of Technology), Dr. Jena Johnson (University of Michigan), Students: Samuel Duncanson, (Graduate student, UMD, 2018-2020), Kendall Johnson (Undergraduate, UMD,

2019), Anthony Wetzel (Undergraduate, UMD, 2018), Stephen Hanson (Undergraduate, UMD, 2017).

**<1.71 Ga Baraboo, Wisconsin, United States (2017 – present).** Collaborator: Esther Stewart (Wisconsin Geological and Natural History Survey). Students: George Segee-Wright (Undergraduate, Hamilton College), Joe Rasmussen (Undergraduate, University of Wisconsin – Madison).

**Pleistocene to present, Yellowstone National Park (2018 – present).** Collaborators: Dr. Jeff Havig (University of Minnesota – Twin Cities, Earth Science), Dr. Trinity Hamilton (University of Minnesota – Twin Cities, Biology).

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### **CURRENT SUPPORT (\$94,495)**

GRANT-IN-AID OF RESEARCH, ARTISTRY, & SCHOLARSHIP, Shared instrument category, “*Acquisition of a hand-held x-ray fluorescence instrument.*” University of Minnesota, Office of the Vice President for Research. Awarded, November 2019. \$35,496. Brengman, L. A. (PI), Swenson, J., (Co-I). Matching funds (50%) were secured separately through a Collegiate Fee proposal.

COLLEGIATE FEE PROPOSAL, “*Acquisition of a hand-held x-ray fluorescence instrument for integrated teaching and research in the Earth and Environmental Sciences at UMD.*” University of Minnesota Duluth. Awarded, July 2019 – June 2020. \$29,042. Brengman, L. A. (PI).

GRANT-IN-AID OF RESEARCH, ARTISTRY, AND SCHOLARSHIP, “*Application of a newly developed silicon isotope proxy to sulfide mineral deposit exploration.*” University of Minnesota, Office of the Vice President for Research. Awarded, July 2018 – October, 2020. \$27,107. Brengman, L. A. (PI).

CHANCELLOR’S SMALL GRANT, “*Involving UMD students from across campus to update the museum-quality display cases in Heller Hall and connect to a modern audience.*” Awarded, May 8, 2019. \$2,999.40. Brengman, L. A. (PI).

### **PENDING SUPPORT**

NASA EXOBIولوجY, “*Tracking conditions of silica precipitation in terrestrial hot springs as a window into Precambrian silicification and silica deposition.*” PI: Latisha Brengman (University of Minnesota Duluth, Co-I: Jeff Havig (University of Minnesota Twin Cities), Collaborators Trinity Hamilton (University of Minnesota Twin Cities), Neil Banerjee (Western University, Ontario). Submitted May 22, 2020. Requested: \$438,923 to UMD.

NASA EXOBIولوجY, “*Revisiting sedimentary manganese enrichment pathways with a redox proxy toolkit.*” PI: Elizabeth Swanner (Iowa State University), Co-PI: Chad Wittkop (Minnesota State University), Co-I’s: Latisha Brengman (University of Minnesota Duluth), Jeremy Owens (Florida State University), Ioan Lascu (Smithsonian Institution), and Ann Bauer (University of Wisconsin Madison). Submitted May 22, 2020. Requested: \$56,324 to University of Minnesota Duluth (\$1,020,605 total)

**PREVIOUS SUPPORT** as Co-I, Collaborator, and/or instrument user

RESEARCH INFRASTRUCTURE INVESTMENT PROGRAM, “*Reinvestment and Upgrade of the UM Duluth Stable Isotope Analytical Facility*”. University of Minnesota, Office of the Vice President for Research. Schreiner, K., (Principal Investigator), Brengman, L.A. (Co-Investigator), Steinman, B.A. (Co-Investigator), Dymond, S.F. (Co-Investigator). Funded: July 1, 2018 – June 30, 2019. \$184,788.

WISCONSIN DNR, JOINT SOLICITATION FOR GROUNDWATER RESEARCH AND MONITORING PROPOSALS, “*Defining the base of the Cambrian aquifer through geophysical modeling of Precambrian topography, Columbia, County, WI*”. Stewart, E. (Principal Investigator), Brengman, L.A. (Collaborator, Professional Consultant). Funded: July 1, 2017 to June 30, 2018. \$30,747.

GRANT-IN-AID OF RESEARCH, ARTISTRY, & SCHOLARSHIP, Shared instrument category, “*Acquisition of a new EDXRF system*”. University of Minnesota, Office of the Vice President for Research. Fortini, O. (Principal Investigator) ..., Brengman, L.A. (Primary instrument user). Funded: January 1, 2017 – June 30, 2018. \$87,761.40.

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**PUBLICATIONS** \*student authors

***Published***

**Brengman, L.A.**, Fedo, C. M., Whitehouse, M. J., Banerjee, N. R., & Jabeen, I. (2020). Constraining mechanisms of quartz precipitation during silicification and chemical sedimentation in the in the ~2.7 Ga Abitibi Greenstone Belt, Canada. *Precambrian Research*, accepted manuscript, in revision.

A pre-print version of the manuscript can be downloaded here:  
<https://doi.org/10.31223/osf.io/xk4av>.

**Brengman, L. A.**, & Fedo, C. M. (2018). Development of a mixed seawater-hydrothermal fluid geochemical signature during alteration of volcanic rocks in the Archean (~2.7 Ga) Abitibi Greenstone Belt, Canada. *Geochimica et Cosmochimica Acta*, 227, 227-245. doi: [10.1016/j.gca.2018.02.019](https://doi.org/10.1016/j.gca.2018.02.019)

Stewart, E. K., \*Rasmussen, J., Skalbeck, J., **Brengman, L. A.**, & Gotkowitz, M. (2018). *Mapping the base of the Cambrian aquifer through geophysical modeling of Precambrian topography, southern Wisconsin*. Wisconsin Geological and Natural History Survey Project Completion Report, 15 p.

**Brengman L. A.**, Heins W.A., & Matthews J.A. (2016). Dissolution and Transformation of Provenance Lithotypes during Initial Sediment Generation with Application to Play-Element Prediction. ExxonMobil Upstream Research Company Research Application Report URC.2016.046, 136 p.

**Brengman, L.A.**, Fedo, C. M., & Whitehouse, M. J. (2016). Micro-scale silicon isotope heterogeneity observed in hydrothermal quartz precipitates from the >3.7 Ga Isua Greenstone Belt, SW Greenland. *Terra Nova*, 28.1, 70-75. doi: <https://doi.org/10.1111/ter.12192>

## *In review*

Eyster, A., **Brengman, L.A.**, Nichols, C., Levitt, Z., & Bergmann, K. (in review). A new depositional framework for massive iron formations after the Great Oxidation Event. Manuscript in review in *Geochemistry, Geophysics, and Geosystems (G<sup>3</sup>)*.

Stewart, E., & **Brengman, L.A.** (in review). Sedimentology, stratigraphy, and provenance of the Baraboo quartzite. Manuscript in review in the *Journal of Geology*.

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## ABSTRACTS \*graduate student authors, \*\*undergraduate student authors

\*Duncanson, S.D., **Brengman, L.A.**, Fournelle, J., Moy, A. (2020). *Reconstructing Fe-silicate paragenesis using paired textural and compositional data in the ~1.9 Ga Biwabik Iron Formation, MN*. North-Central Geological Society of America, May 18-19, 2020 (virtual presentation, COVID-19).

Eyster, A., **Brengman, L.A.**, Nichols, C., \*\*Levitt, Z., Bergmann, K.D. (2020), *The tectonic context for the Gogebic Range iron formations*. North-Central Geological Society of America, May 18-19, 2020 (virtual presentation, COVID-19).

\*\*Boor, E., \*\*Carpenter, L., \*\*Krauss, H., \*\*Wojtowicz, E., **Brengman, L.A.**, Goodge, J.W., Hansen, V.L. (2020), *Origin of Neoproterozoic metasedimentary rocks near Pike Lake, Vermilion District, Northeast, Minnesota*. North-Central Geological Society of America (presentation cancelled, COVID-19).

**Brengman, L.A.**, Stewart, E.K., \*\*Stolze, D., \*\*Faust, E., Wittkop, C. (2020), *The role of silica in iron formations: textural, mineralogical, and geochemical comparisons from low metamorphic grade Neoproterozoic and Paleoproterozoic examples*. North-Central Geological Society of America (presentation cancelled, COVID-19).

**Brengman, L.A.**, Stewart, E. (2019), *Textural and mineralogical characteristics of the <1710 Ma Freedom Formation compared to well-characterized, low-metamorphic grade Archean and Paleoproterozoic iron formations*. PP51E-1406, American Geophysical Union.

**Brengman, L.A.**, \*Duncanson S.P., \*\*Hanson, S., \*\*Wetzel, A (2019). *Crossing the redoxcline: an investigation into geochemical changes that directly link to textural transitions in the ~1.9 Ga Biwabik Iron Formation, MN*. Geological Society of America *Abstracts with Programs*. Vol. 51, No. 5. doi: 10.1130/abs/2019AM-339533.  
<https://gsa.confex.com/gsa/2019AM/webprogram/Paper339533.html>

\*Duncanson, S.P., **Brengman, L.A.**, Fournelle, J.H., Moy, A (2019). *Deciphering primary and diagenetic controls on mineralogy in the ~1.9 Ga Biwabik Iron Formation, MN using paired textural and geochemical analyses*. Geological Society of America *Abstracts with Programs*. Vol. 51, No. 5. doi: 10.1130/abs/2019AM-339482.  
<https://gsa.confex.com/gsa/2019AM/webprogram/Paper339482.html>

**Brengman, L. A.**, & Fedo, C (2018). *Replacement minerals formed during alteration of volcanic rocks in the ~2.7 Ga Abitibi Greenstone Belt carry rare-earth element attributes of mixed hydrothermal fluids and seawater*. American Geophysical Union Abstracts.  
<https://agu.confex.com/agu/fm18/meetingapp.cgi/Paper/446424>

- Brengman, L.A.**, Stewart, E., Stewart, E., Moy, A., Fournelle, J., & \*\*Segee-Wright, G. (2018) *Reviving historical data >100 years later: a fresh look at the depositional setting and petrogenesis of the <1.71 ga freedom formation, Baraboo, Wi.* Geological Society of America Abstracts. <https://gsa.confex.com/gsa/2018AM/meetingapp.cgi/Paper/321325>
- Brengman, L.A.**, \*\*Johnson, K., & Trower, L (2018). *Grain size distributions and mineralogy of coated grains, detrital sand and silt within the ~1.9 ga mesabi iron range, minnesota.* Geological Society of America Abstracts. <https://gsa.confex.com/gsa/2018AM/webprogram/Paper321622.html>
- Fedo, C., & **Brengman, L.A.** (2018) *Geochemistry of multiple carbonate units from the ~3.7 ga isua greenstone belt, sw greenland.* Geological Society of America Abstracts. <https://gsa.confex.com/gsa/2018AM/meetingapp.cgi/Paper/321151>
- \*Drazan, J., **Brengman, L.A.**, & Fedo, C (2018). *Preliminary petrographic and geochemical investigation of silicified volcanic rocks and silica-rich exhalative rocks from the ~2.7 Ga Abitibi Greenstone Belt, Canada.* Institute of Lake Superior Geology (ILSG) Program and Abstracts. <http://flash.lakeheadu.ca/~pnhollin/ILSGVolumes/2018%20ILSG%20Program%20and%20Abstracts.pdf>
- Stewart, E., Skalbeck, J., \*\*Rasmussen, J., Gotkowitz, M., **Brengman, L.A.**, \*\*Segee-Wright, (2017) *G. Developing a geologic framework for aquifer geometry through modeling of gravity and aeromagnetic data.* (American Water Resources Association, Wisconsin Section Annual Meeting, Appleton, WI)
- Brengman, L. A.** (Author & Presenter), Fedo, C.M., Whitehouse, M.J. (2016), American Geophysical Union, "Textural and isotopic evidence for silica cementation in ~1.88 Ga Granular Iron Formation," San Francisco, California, United States. (December 12, 2016).
- Brengman, L. A.** (Author & Presenter), Larson, P., \*\*Hanson, S. (2016), Geological Society of America, "A textural and mineralogical investigation of early diagenetic reactions in the ~1.88 Ga Biwabik iron formation, MN," Denver, Colorado, United States. Geological Society of America, Abstracts with Programs. v. 48, n. 7. (September 25, 2016).
- Brengman, L.A.**, Fedo, C. M., Whitehouse, M. J. (2015) Micro-scale silicon isotope heterogeneity observed in hydrothermal quartz precipitates from the >3.7 Ga Isua Greenstone Belt, SW Greenland. Geological Society of America, Abstracts with Programs, Annual Meeting, Baltimore, MD, v. 47, n. 7, p.786.
- Brengman, L. A.**, Fedo, C. M., Whitehouse, M. J. (2014) From source to sink: silicon isotope composition of bedrock, detrital quartz arenites, and siliceous precipitates from the ~3 Ga Buhwa Greenstone Belt, Zimbabwe. Geological Society of America, Abstracts with Programs, Annual Meeting, Vancouver, BC, v. 46, n. 6, p. 221.
- Fedo, C. M., **Brengman, L. A.**, (2014) Revisiting the stratigraphic setting of the ~3 Ga Buhwa Greenstone Belt, Zimbabwe. Geological Society of America, Abstracts with Programs, Annual Meeting, Vancouver, BC, v. 46, n. 6, p. 221.
- Prentice, A., Jabeen, I, Webb, E., Banerjee, N., Ali, A., **Brengman, L.A.**, Fedo, C. (2014). Dual Si and O Measurements Using IRMS-BrF<sub>5</sub> Fluorination. Goldschmidt Conference, Sacramento, C.A., p. 1988.

**Brengman, L. A.**, Fedo, C. M., Whitehouse, M. J. (2013). Silicon isotope composition of Archean cherts from >3.7 Ga to 2.7 Ga determined by Secondary Ion Mass Spectrometry (SIMS). Geological Society of America, Abstracts with Programs, Annual Meeting, Charlotte, N.C., v. 44, n. 7, p. 36.

**Brengman, L. A.**, Fedo, C.M. (2012). Origin of BIF-like jaspilite in the 2.72 Ga Hunter Mine Group, Abitibi Greenstone Belt, Quebec by metasomatic replacement of felsic volcanic rocks. Geological Society of America, Abstracts with Programs, Annual Meeting, Charlotte, N.C., v. 45, n. 7, p. 627.

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## INVITED TALKS

**Brengman, L. A.**, “*Evaluating textural and geochemical evidence in Precambrian sedimentary rocks: implications for preservation potential and depositional setting*,” Soft Rock seminar, University of Minnesota, Minneapolis, Minnesota (October 28, 2019).

Stewart, E., **Brengman, L.A.** (Co-authors & Co-presenters), “*Reading the deep time sedimentary record - Using historic mine records and outcrop to understand the history of ancient rivers, oceans, and faulting in Wisconsin*,” Department Seminar, University of Minnesota Duluth, Duluth, Minnesota (February 7, 2019).

**Brengman, L. A.**, Sedimentary geology, hydrogeology, and geomorphology seminar, University of Minnesota Duluth, Duluth, Minnesota (December 5, 2017).

**Brengman, L. A.**, “*How can iron formations inform us about the ancient ocean*,” SCSE Faculty Colloquium, University of Minnesota Duluth, Duluth, Minnesota (November 27, 2017).

**Brengman, L. A.**, “*Decoding the Precambrian silica cycle using silicon isotopes of quartz in chert and iron formation*,” Department Seminar, University of Iowa, Iowa City, Iowa (February 24, 2017).

**Brengman, L.A.**, “*Textural and isotopic evidence for early silica cementation in ~1.9 Ga Granular Iron Formation*” Seminar, Mesabi Range Geological Society, Duluth, Minnesota (January 18, 2017).

**Brengman, L. A.**, “*Seafloor silicification as a genetic mechanism for some iron formation influenced by hydrothermal fluids*,” Soft Rock seminar, University of Minnesota, Minneapolis, Minnesota (October 21, 2016).

**Brengman, L. A.**, “*Decoding the Precambrian silica cycle using silicon isotopes of quartz from chert and iron formation*,” Department Seminar, University of Minnesota, Minneapolis, Minnesota (October 20, 2016).

Brengman, L.A., “*The growth of continents, the rise of oxygen, and the birth of the biosphere – what one extinct rock can tell us about early Earth*.” Seminar, Gustavus Adolphus College, St. Peter, Minnesota (December 3, 2015).

**Brengman, L.A.**, “*Do silicon isotopes of quartz in chert and iron formation reveal information about critical events in early Earth history?*” Large Lakes Observatory seminar, University of Minnesota Duluth, Duluth, Minnesota (October 2, 2015).

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## MEDIA APPEARANCES

University of Minnesota Duluth, Swenson College of Science and Engineering, *Resolving the rock paradox* (online news article), April 11, 2018.

Myself and with two undergraduate researchers (A. Wetzel and K. Johnson) were interviewed for our work on chemical sedimentary rocks from the Iron Range, which seeks to answer longstanding questions about the temperature and elemental compositions of earth's early oceans.

Link: <https://scse.d.umn.edu/earth-environmental-sciences-department/news/rock-paradox>

*Earth Magazine*, American Geosciences Institute (AGI), “Going subterranean: repurposed mines become innovative labs”, February 2018.

For our Geobiology class, GEOL 5095 (Spring 2018), J. Knackert (journalist and science communicator) and K. Cantner (AGI science illustrator) came with our class to the Soudan Underground mine. While there, we collected samples from the unique pools and rocks associated with lower mine levels for microbiological and geochemical characterization by the undergraduate / graduate students in the Geobiology course. That trip forms a large part of the cover article for the November 2018 *Earth Magazine* issue "Old Mines, New Labs".

Link: <https://www.earthmagazine.org/article/going-subterranean-repurposed-mines-become-innovative-labs>

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## SCIENTIFIC SESSIONS ORGANIZED

Geological Society of America Annual Meeting, 2019, Phoenix, Arizona. Session organizer and chair with Dr. Athena Eyster (MIT) and Dr. Geoff Gilleaudeau (George Mason University). *Iron Formations, Ferruginous Sediments, and Redox through Time and Space*. Geological Society of America *Abstracts with Programs*. Vol. 51, No. 5

Talks: <https://gsa.confex.com/gsa/2019AM/webprogram/Session47906.html>

Geological Society of America Annual Meeting, 2018, Indianapolis, Indiana. Session organizer and chair with Dr. Geoff Gilleaudeau (George Mason University). *Evolving perspectives of the Precambrian world: using combined theoretical and applied approaches to tackle problems at the intersection of geology, geobiology, and geochemistry*.

Poster presentations: <https://gsa.confex.com/gsa/2018AM/webprogram/Session46475.html>

Talks: <https://gsa.confex.com/gsa/2018AM/meetingapp.cgi/Session/45551>

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## CONTRIBUTIONS TO PROFESSIONAL ORGANIZATIONS

*Proposal Reviewer (2016 – present)*



- Society for Advancing Chicanos/Hispanics & Native Americans in Science (SACNAS), Reviewed proposals for travel grants
- Society for Advancing Chicanos/Hispanics & Native Americans in Science (SACNAS), Reviewed proposals for Research Presentations
- Mathematics of Information Technology and Complex Systems (MITACS), national, not-for-profit organization that has designed and delivered research and training programs in Canada, Reviewed research and project proposals
- American Chemical Society, Petroleum Research Fund, Reviewed research proposals

***Proposal Review Panelist (2016 – present)***

- NASA

***Journal Manuscript Reviewer (2015 – present)***

- *Precambrian Research*
- *Sedimentology*
- *Terra Nova*
- *Minerals*

***Professional Affiliations (2011 – present)***

- American Geophysical Union, Member, 2016 – present
- SEPM, Society for Sedimentary Geology, Member, 2014 – present
- Mineralogical Society of America, Member, 2012 – present
- Geological Society of America, Member, 2011 – present

**STUDENT ADVISEES**

***Graduate students supervised***

- Ann Marie Prue, M.S. student 2020 – present (primary advisor). In progress.
- Sam Duncanson, M.S. student 2018 – present (primary advisor). In progress. Current thesis title: “*Inferring primary seawater chemistry from sub-micron scale mineral mapping in silica-cemented horizons of the ~1900 Ma Biwabik Iron Formation.*”
- Jackie Drazan, M.S. student 2017 – 2018 (primary advisor). Thesis proposal title: “*Determining chert petrogenesis in VMS-hosting systems using silicon isotopes of quartz: a case study from the ~2.7 Ga Abitibi Greenstone Belt.*”

***Undergraduate students supervised (research projects and UROPs)***

- Elizabeth Boor, Geological Sciences, B.S., (2019 – present).
- Heidi Krauss, Geological Sciences, B.S., (2019 – present).
- Emily Wojtowicz, Geological Sciences, B.S., (2019 – present).
- Logan Carpenter, Geological Sciences, B.S., (2019 – present).
- Danielle Stolze, Geological Sciences, B.S. (2019 – present). Project: “*Comparative mineralogy of the ~2.7 Ga Soudan Iron Formation, Minnesota and the Deloro Iron Formation, Timmins, ON, and the Temagami Iron Formation, Temagami, ON.*”

<https://conservancy.umn.edu/handle/11299/213805>

- Kendall Johnson, Geological Sciences B.S. (2017 – 2018). Project: “*Grain size distributions and mineralogy of coated grains, detrital sand and silt within the ~1.9 Ga Mesabi Iron Range, Minnesota*”
- Anthony Wetzel, Geological Sciences B.S. (2017 – 2018). Project: “*Broadly constraining Proterozoic ocean pH by determining primary and secondary carbonate mineral reactions in iron formation from the ~1.9 Ga Mesabi Iron Range, MN*”
- Stephen Hanson, Geological Sciences, B.S. (2016 – 2017). Project: “*A textural and mineralogical investigation of early diagenetic reactions in the ~1.9 Ga Biwabik iron formation, MN*”

#### ***Undergraduate summer Research Assistants***

- Logan Carpenter, Geological Sciences, B.S., (2019 – present).
- Danielle Stolze, Geological Sciences, B.S. (2019 – present).
- Mady David, Geological Sciences B.S. (2018 – 2019).
- Kendall Johnson, Geological Sciences B.S. (2017 – 2018).
- Anthony Wetzel, Geological Sciences B.S. (2017 – 2018).
- Stephen Hanson, Geological Sciences, B.S. (2016 – 2017).

#### ***Research employees***

- George Segee-Wright, Hamilton College, Summer/Fall 2017.
- Kendall Johnson, Spring 2020.

#### ***Graduate student committees***

- Kristi Kotrapu, Geological Sciences, M.S., 2017 – 2018.
- Amber Roberts, Geological Sciences, M.S., 2016 – 2018.
- Matthew Matko, Geological Sciences. M.S., 2017 – 2018.
- Margaret Upton, Geological Sciences, M.S., 2017 – 2018.

***Undergraduate academic advisees*** (9 Geological Sciences and Environmental Sciences).

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## **ACTIVE COLLABORATORS**

- Esther Stewart, Wisconsin Geological and Natural History Museum
- Dr. Athena Eyster, Massachusetts Institute of Technology
- Dr. Elizabeth Trower, University of Colorado – Boulder
- Dr. Jeff Havig, University of Minnesota – Twin Cities
- Dr. Trinity Hamilton, University of Minnesota – Twin Cities
- Dr. John Fournelle, University of Wisconsin – Madison
- Dr. Aurelian Moy, University of Wisconsin – Madison
- Dr. Jena Johnson, University of Michigan
- Dr. Phil Frahlick, Lakehead University
- Dr. Martin Whitehouse, Swedish Museum of Natural History
- Dr. Neil Banerjee, Western University (Ontario)
- Dr. Iffat Jabeen, Western University (Ontario)
- Dr. Christopher Fedo, University of Tennessee

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## TEACHING EXPERIENCE

University of Minnesota Duluth, Duluth, Minnesota (August 2015 – present)

- **Earth History GEOL 2110** (Instructor) Undergraduate level; I teach all lectures and all laboratories (1 lecture section (3, 50-minute meetings per week), 4 lab sections (4, 2 hour lab sessions per week); 172 students taught in: 2019, 2018, 2017, 2016; selected student evaluation responses as follows:
  - (2017) 5.9/6.0, (2018) 5.7/6.0, (2019) 5.67/6.0, The instructor created an open, respectful environmental that supported my learning
  - (2017) 5.8/6.0, (2018) 5.56/6.0, (2019) 5.55/6.0, I felt comfortable asking questions in class and/or for help outside of class
  - (2017) 5.8/6.0, (2018) 5.61/6.0, (2019) 5.4/6.0, The instructor was organized
  - Spring 2020, University of Minnesota Center for Educational Innovation “Thank a Teacher” certificate awardee.
- **Geochemistry GEOL 4710/5711** (Instructor) Upper division undergraduate/graduate level, with combined lecture and lab (4 hours per week); 41 students taught in: 2020, 2019, 2017, 2016 (in 2016 and 2017 the course was taught as “*Introduction to Geochemical Concepts*” GEOL 4095/5095); selected student evaluation responses as follows:
  - (4710) 5.85/6.0, (5711) 5.86/6.0 The instructor created an open, respectful environmental that supported my learning
  - (4710) 5.92/6.0, (5711) 6.0/6.0, I felt comfortable asking questions in class and/or for help outside of class
  - (4710) 5.85/6.0, (5711) 5.86/6.0, The instructor was organized
- **Geobiology GEOL 5091/4091** (Instructor, co-taught with Dr. Cody Sheik) Upper division undergraduate/graduate level; 14 students taught in: 2018
  - Overall course teaching evaluation average 5.9/6.0
- GEOL 4091/5091 *Geologic Problems: Interpreting Precambrian Depositional systems* (Instructor), Years taught, 2020
- GEOL 5091 *Geologic Problems: Chemical sedimentation in the Precambrian* (Instructor), Years taught: 2018, 2020
- GEOL 5091 *Geologic Problems: Silicification of Archean volcano-sedimentary assemblages* (Instructor), Years taught: 2017
- **Sedimentology and Stratigraphy GEOL 320** (Instructor, co-taught with Dr. John Swenson) Upper division core course, Fall 2020

University of Tennessee, Knoxville, Tennessee (August 2010 – 2015)

- Graduate Teaching Assistant (Laboratory Instructor): Introduction to Physical Geology (101 – undergraduate); Sedimentology and Stratigraphy (340 – undergraduate); Siliciclastic Petrogenesis (545 – graduate).
- Lecturer (instructor of record): Introduction to Environmental Geology (GEOL 103), Summer Semester 2014
- Guest Lecturer: Introduction to Environmental Geology (103, for Professor Bill Deane), Sedimentology and Stratigraphy (340, for Professor Christopher Fedo)

## OUTREACH & SERVICE

- Chancellor’s small grant, “Involving UMD students from across campus to update the museum-quality display cases in Heller Hall and connect to a modern audience.” Awarded, May 8, 2019. \$2,999.40. Brengman, L. A. (PI).

***Project Goal:** The goal of this project is to involve UMD students from Earth and Environmental Science, Art and Design, and Museum Studies in the re-design and renovation of the outdated museum-quality display cases on the first floor of Heller Hall. **Purpose:** By updating the Heller Hall museum cases, we propose to bring the displays into the digital age and increase accessibility of the information for diverse audiences within our community. The students will directly improve their science communication skills in addition to increased exposure to connecting art, design, and science. **Community Impact:** With the renovation of the museum-quality display cases on the first floor of Heller Hall, we have the unique opportunity to increase public engagement with UMD by providing a free, accessible educational resource for classes, students, and the public.*

- Participant, Letters to a Pre-Scientist, Science Communication and Representation (<https://www.prescientist.org/>). (September 2019 – present).
- Community Ambassador for EarthArXiv (<https://eartharxiv.org/>). (2017 – present).
- Women in Geology Career Pathways Program Mentor, Geological Society of America (GSA). (September 21 - 25, 2019).
- Resume Mentor, Geological Society of America (GSA). (September 21- 25, 2019).
- Faculty Advisor, Earth Science Club. (August 2019 – present).
- Member, Search committee for new Staff hire in Earth & Environmental Sciences. (August 2019 – December 2019).
- Women in Geology Career Pathways Program Mentor, Geological Society of America (GSA). (November 4 - 6, 2018).
- Resume Mentor, Geological Society of America (GSA). (Nov.4 - 6, 2018).
- Outstanding Student Presentation Award (OSPA) Poster Judge, American Geophysical Union. (December 10, 2018 - December 14, 2018).
- Member, Lakehead University International opportunity exploration committee. (November 15, 2018 - November 16, 2018). *I was a part of a 2-day international envoy to Lakehead University in Thunder Bay, Ontario. The goal was to explore institutional collaborative potential between UMD and Lakehead.*
- Member, Science and Engineering Day Committee, Swenson College of Science & Engineering (May 26, 2016 - 2018).

- Member, Search committee for new Faculty hire in Chemical Engineering. (Jan. 2018 - May 2018).
- Member, SciArt Committee in Earth & Environmental Sciences. (August 2018 - Present). *The SciArt (Science and Art) Committee is tasked with renovating the display cases, installing geologic, educational floor maps, and updating outward facing educational content displayed within Heller Hall.*
- Member, Curriculum Committee for Department of Earth and Environmental Sciences. (September 2016 - Present). *The Curriculum Committee completely revised both majors and minors in the department (1: Geology, 2: Environmental Sciences) to allow all students in the program to begin a core sequence together to facilitate interdisciplinary action and foster community within the program.*
- Volunteer, Math Prep for STEM Careers summer course field trip outreach events. (2018, 2019). *I participated in and formulated activities for the STEM incoming freshman camp.*
- Coordinator, Middle school class visit and field trips. (2018, 2019). *I helped facilitate, organize, and coordinate group field trips from led by graduate students.*
- Member, Lake Superior Youth Symposium planning committee. (June 2018 - October 2018).
- Volunteer at STARBASE, Hermantown, MN. (October 5, 2018). *“STARBASE is a non-profit ... educational program that provides free, hands-on, immersive curriculum in STEM (Science, Technology, Engineering, and Math) to local 5<sup>th</sup> graders.”* Link to STARBASE website: <http://www.starbasemn.org/starbase-duluth/>
- Institute of Lake Superior Geology (ILSG) student poster judge. (May, 2018).
- Coordinator, organizer, member, and facilitator, Community Outreach for Department of Earth and Environmental Sciences (November 2016 - 2018). *I helped to develop outreach kits and activities for the UMD K-12 local outreach program to five Duluth area schools. The program initiated by Charity Rupp reached >500 students for 26 days out of the year (2-3 times a day, for a total of 156 student/faculty volunteer slots for 52-78 events). With the help of the outreach office and graduate student Maggie Upton, we created 3 deployable outreach kits for 4<sup>th</sup> and 5<sup>th</sup> grade students. Each kit contains: (1) a formal lesson plan, complete with instructions and worksheets for both students and student volunteers / primary instructors, and (2) all materials necessary for the 45-minute, or 90-minute activities. At present, all activities align with Minnesota State Standards for “Rocks and Minerals I and II”, and “Landforms”, and we have built in the possibility for yearly extension or expansion packs to highlight novel regional and global research from our department.*
- Department tour guide for Donors (periodic since 2015).
- Presenter, Graduate student breakfast “speed research” talk (October 21, 2015). *“The growth of the continents, the rise of oxygen, and the birth of the biosphere - what one extinct rock can tell us about early Earth.”*
- Reviewer, Undergraduate Research Opportunities Program (UROP) at UMD (2015, 2017).
- Science Day coordinator, University of Minnesota Duluth, MN; *Helped to organize Science and Engineering Day activities for local K-12 students. (2015 – 2017).*
- Darwin Day volunteer, University of Tennessee, Knoxville, TN; *Helped to organize Darwin Day events including workshops and seminars for middle and high school teachers focused on teaching evolution. (2014 – 2015).*
- McClung Museum volunteer, University of Tennessee, Knoxville, TN; *Led youth (K-8) tours through the campus museum geology exhibit. (2010 – 2015).*

- Sedimentology “Soft Rock” Brown Bag coordinator, University of Tennessee, Knoxville, TN; *Initiated and organized an informal, weekly, lunch-time speaker series promoting research discussion between professors, graduate students, and upper level undergraduates.* (2011 – 2013).

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## PROFESSIONAL DEVELOPMENT

- AGU Workshop, “Fostering Diverse Inclusive and Equitable Communities in Geoscience Field Experiences” (December 10, 2019, ½ day)
- AGU Workshop, “Establishing and Sustaining an Undergraduate Research Program” (December 9, 2019, ½ day)
- SERC workshop, “Inclusive and Effective College Science Classrooms: Engaging Students, Designing Lessons, and Integrating Diversity into Curriculum” (December 8, 2019, full day)
- SCSE Teaching and reading cohort (weekly meetings, Spring 2019)
- Union of Concerned Scientists Webinar: Beyond the trend of Decolonizing Science (April 15, 2019)
- Yearly SCSE Faculty Mentoring Program workshops and Mentor/Mentee trainings
- UMD SCSE Getting External Grants: A workshop for early career faculty researchers (1 day, October 2018)
- Arizona State University, Secondary Ion Mass Spectrometry Workshop (Jan 4-6, 2017)
- Early Career Workshop, SERC, College Park, Maryland (July 24-29, 2016)
- SCSE UMD Teaching workshop, with a focus on Active learning (January 6-8, 2016, 3 full days)
- UMD Active Learning Workshop (2 days, October 2015)

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## GRADUATE STUDENT HONORS & AWARDS

- 2014, Graduate Student Association Travel Grant, University of Tennessee
- 2014, Summer Graduate Research Assistantship, University of Tennessee
- 2014, Interdisciplinary Research Award, University of Tennessee, Earth and Planetary Sciences.
- 2014, Gordon Award for Professional Promise, University of Tennessee, Geology Club.
- 2013, Sedimentary Geology Division of GSA, Student Research Award
- 2013, Geological Society of America Student Grant
- 2013, Graduate Student Association Travel Grant, University of Tennessee
- 2013, ExxonMobil Science Grant
- 2012, Soft Rock Research award, University of Tennessee, Earth and Planetary Sciences.
- 2012, Coffee Cup Award, highest graduate student GPA, University of Tennessee, Earth and Planetary Sciences.
- 2011, Excellence in Teaching Award, University of Tennessee, Earth and Planetary Sciences.
- 2011, Gene Tipton Graduate Student Award from the Knoxville Gem and Mineral Society.
- 2011, 2012, 2014, 2015, Frank H. McClung Museum, Certificate of Appreciation in acknowledgement of volunteer service to the Museum, University of Tennessee