

# Amy P.I. Hagen

GEOSCIENCES GRADUATE STUDENT

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## Education

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### Virginia Polytechnic Institute and State University

Blacksburg, VA

PHD IN GEOSCIENCES (IN PROGRESS), SEDIMENTARY GEOCHEMISTRY

August 2021 - Present

- **Advisor: Dr. Benjamin C. Gill**
- Research focus: Geochemical changes across past intervals of significant biotic and climatic change.
- GPA: 4.0

### Smith College

Northampton, MA

B.A. IN GEOSCIENCES WITH HIGHEST HONORS, *magna cum laude*

September 2017 - May 2021

- **Advisor: Dr. Sara B. Pruss**
- Cumulative GPA: 3.90, Major GPA: 4.0
- Thesis Title: *Evaluating redox conditions during the Cambrian SPICE Event, western Newfoundland, Canada*

## PhD Chapters

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### 1. Unusual iron cycling and clay minerals in the Cambrian Harkless Formation

Virginia Tech

WITH BEN GILL, SARA PRUSS, AND PRESCOTT VAYDA

2022-present

- I studied the paleoredox signature and mineralogy of Cambrian shales from Nevada and found complex interactions between clay minerals and iron cycling.

### 2. Facies analysis of the Cambrian SPICE event across Appalachia

Virginia Tech

WITH BEN GILL AND SARA PRUSS

2020-present

- I am analyzing the influence of sedimentological and paleoenvironmental changes on the expression of a large positive carbon isotope excursion known as the SPICE event in 3 sections from the southern Appalachians.

### 3. A long-term Cambrian-Ordovician carbon isotope record from western Maryland

Virginia Tech

WITH BEN GILL, SARA PRUSS, AND DAVID BREZINSKI

2020 - Present

- I compiled a high resolution carbon isotope record through the Cambrian to Ordovician of western Maryland (>500 samples) and am comparing its features to those of other published records.

### 4. Nitrogen Isotopes in Pleistocene Corals Project

Virginia Tech, IODP Exp. 389

WITH BEN GILL, SCOTT WANKEL, AND EXP. 389 SCIENTISTS

Spring 2024-present

- I plan to use stable nitrogen isotopes as a proxy for glacial-interglacial changes in nutrient cycling and coral health in fossil corals. This project is part of IODP Expedition 389, Hawaiian Drowned Reefs.

## Other Research

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### Iodine to calcium ratios during the Cambrian SPICE event

Virginia Tech

WITH BEN GILL, JEREMY OWENS, SETH YOUNG, AND OTHERS

2022-present

- I used the I/Ca redox proxy to investigate shallow water deoxygenation along multiple paleocontinental margins during the Cambrian SPICE event.

### Phosphorus cycling during the End-Triassic Mass Extinction

Virginia Tech

WITH BEN GILL AND OTHERS

2021-present

- I am using changes in phosphorus abundance to investigate nutrient cycling and water column redox state surrounding the end-Triassic mass extinction in shales from Alaska.

### Characteristics of middle Cambrian deep water burrows from Wexford, Ireland

University College Dublin

WITH PATRICK ORR AND BEN GILL

Spring 2020- Present

- I analyzed examples of Cambrian bioturbation in shales from southern Ireland and am collecting geochemical information to test hypotheses about early burrowing animal behavior.

## **Mercury as a proxy for redox oscillations during the Cambrian SPICE event**

Smith College

WITH SARA PRUSS

2019-2021

- I completed an honors thesis focusing on the relationship between redox changes and mercury fluctuations during the Cambrian SPICE event in limestones from western Newfoundland.

## **Analysis of free-fall penetrometer acceleration curves**

U.S. Naval Research Laboratory

WITH DR. ANDREI ABELEV

Summer 2018

- I processed and analyzed data from freefall penetrometer drops, contributing to a project studying the behavior of seafloor sediment.

## Journal Publications

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**Hagen, Amy P.I.**, Gill, Benjamin C., Vayda, Prescott J., and Pruss, Sara B., 2024. Reconstructing the redox environment of the Cambrian Harkless Formation, Nevada, USA: Navigating the effects of iron-rich clay minerals on the iron speciation redox proxy, *Chemical Geology*, <https://doi.org/10.1016/j.chemgeo.2024.122453>.

**Hagen, Amy P.I.**, Jones, David S., Fike, David A., Tosca, Nicholas J., and Pruss, Sara B., 2022. Sedimentary mercury as a proxy for redox oscillations during the Cambrian SPICE event in western Newfoundland, *Canadian Journal of Earth Sciences*, 59(8), pp. 504-520, <https://doi.org/10.1139/cjes-2021-0108>. **\*\*Awarded CJES Best Paper of 2022\*\***

## In Prep

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**Hagen, Amy P.I.**, DeNunzio, Maria, Kroehler, Carolyn J., Chen, Susan, Goh, Ying-Xian, Burke, K.L., Oyedele, Esther, Hockman, Cassandra, Vayda, Prescott J., Bracci, Nicole, Pagani, Mika, Good, Deborah, Pfeiffer, Doug, Allen, Elizabeth, and Raun, Patricia (*in prep*). Tapping into the success of Science on Tap New River Valley: Lessons learned from seven years of a community-centered science outreach program.

## Other Published Work

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**Hagen, Amy**; Gill, Benjamin; Pruss, Sara; Vayda, Prescott (2024), "Geochemical and mineralogical data from the Cambrian Harkless Formation", Mendeley Data, V1, doi: 10.17632/zdmcbxp24.1

Webster, J.M., Ravelo, A.C., Grant, H.L.J., and the **Expedition 389 Scientists**, 2024. Expedition 389 Preliminary Report: Hawaiian Drowned Reefs. International Ocean Discovery Program. <https://doi.org/10.14379/iodp.pr.389.2024>

**Hagen, Amy**, 2021. Evaluating redox conditions during the Cambrian SPICE event, western Newfoundland, Canada. Honors Project, Smith College, Northampton, MA. <https://scholarworks.smith.edu/theses/2338>

## Workshops

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### **ANZIC Marine Geoscience Masterclass**

January 15-25, 2024

- I attended a short course in Queensland, Australia focused on future ocean drilling and subtropical shallow marine environments. We completed laboratory and field exercises at the Uni. of Queensland, Queensland Uni. of Tech., and Moreton Bay Research Station.

### **IODP Establishing Early-Career Scientific Ocean Drilling Learning Communities**

August 8-10, 2023

- At this workshop at the IODP Gulf Coast Core Repository in Texas, I learned of various resources available to early-career researchers and fostered scientific collaborations with colleagues.

### **Urbino Summer School in Paleoclimatology**

July 6-22, 2023

- I traveled to Urbino, Italy to attend an intensive course on Earth's climate history. We focused on tools to study past climates, Cenozoic climate, and statistical/modeling techniques.

## Creating LGBTQ-communities in Paleoscience

April 14-16, 2023

• During this workshop at the Ohio State University, I attended several professional development sessions while building relationships with other early-career LGBTQ+ Earth scientists.

## Certificates

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### Future Professoriate Certificate

*in progress*

• To achieve this certificate from the Graduate School at Virginia Tech, I complete coursework focused on leadership and pedagogy.

### GTA Teaching Certificate

2022

• I received this certificate from the VT Center for Excellence in Teaching and Learning for completing online modules and attending in-person events focused on teaching.

## Teaching Experience

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### GRADUATE

#### Evolution of the Earth Life System Teaching Assistant

*Virginia Tech  
Spring 2023*

• I managed administrative duties for the course, including creating weekly quizzes and grading exams.

#### Elements of Geology Teaching Assistant

*Virginia Tech  
Fall 2021*

• I taught two lab sections, during which I gave short lectures and then helped students complete an assignment.  
• In collaboration with other TAs, I designed lab assignments and assessments.

### UNDERGRADUATE

#### Mineralogy Teaching Assistant

*Smith College  
Fall 2020*

• I attended virtual lectures and labs to help with technology and answering student questions.

#### Invertebrate Paleontology Teaching Assistant

*Smith College  
Fall 2019*

• I helped answer questions during a lab section and graded lab assignments.

#### Oceanography Teaching Assistant

*Smith College  
Spring 2019*

• I helped students with assignments during two lab sections and assisted with grading.

## Conference Presentations

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**Hagen, Amy P.I.**, Gill, Benjamin C., and Pruss, Sara B., Why the long facies? Factors controlling the expression of the SPICE event in the southern Appalachians, oral presentation, GSA Annual Meeting, Anaheim, CA, September 2024.

**Hagen, Amy P.I.**, Gill, Benjamin C., Vayda, Prescott J., and Pruss, Sara B., The impact of unusual mineralogy on the iron speciation redox proxy: A case study from the Cambrian Harkless Formation, oral presentation, Goldschmidt Conference, Chicago, IL, August 2024.

**Hagen, Amy P.I.**, Pruss, Sara B., and Gill, Benjamin C., Trouble on a 500-million-year-old beach: A detailed record of the SPICE event at C & O Canal National Park, oral presentation, Spotlight on National Park Resources in the National Capitol Region, Shepherdstown, WV, April 2024.

- Hagen, Amy P.I.**, Gill, Benjamin C., Pruss, Sara B., and Vayda, Prescott J., Unusual iron cycling and redox conditions in the lower Cambrian Harkless Formation, oral presentation, GSA Annual Meeting, Pittsburgh, PA, October 2023.
- Vayda, Prescott; Xiao, Shuhai; Keller, Noah; Strauss, Justin; Lonsdale, Mary; and **Hagen, Amy**; Was Earth's oldest mineral collector a cnidarian? Morphological, mineralogical, and microstructural analysis of *Salterella*, oral presentation, GSA Annual Meeting, Pittsburgh, PA, October 2023.
- Goodin, John; Them II, Theodore; Newby, Sean; Caruthers, Andrew; **Hagen, Amy**; Marroquin, Selva; McCabe, Kayla; Tra- bucho Alexandre, Joao; Gill, Benjamin; and Owens, Jeremy; Expansions of oceanic anoxia following the end-Triassic mass extinction revealed by Tl isotopes, oral presentation, GSA Annual Meeting, Pittsburgh, PA, October 2023.
- Gill, Benjamin; Marroquin, Selva; Caruthers, Andrew; Goodin, John; Grocke, Darren; **Hagen, Amy**; McCabe, Kayla; Owens, Jeremy; Them II, Theodore; and Tra- bucho Alexandre, Joao; A long-term record of the late Triassic through early Jurassic carbon cycle, oral presentation, GSA Annual Meeting, Pittsburgh, PA, October 2023.
- Hagen, Amy P.I.** and Gill, Benjamin C., Iodine to calcium ratios (I/Ca) reveal water column oxygen trends and delineate a minimum atmospheric oxygen concentration during the Cambrian SPICE event, Virginia Tech Geosciences Student Research Symposium, Blacksburg, VA, February 2023.
- Hagen, Amy P.I.**, Gill, Benjamin C., Pruss, Sara B., Kozik, Nevin K., McGuire, Teagan E., Olsen, Amelia E., and Young, Seth A., Iodine to calcium ratios (I/Ca) suggest increased shallow water deoxygenation during the later Cambrian SPICE event, oral presentation, GSA Annual Meeting, Denver, CO, October 2022.
- Hagen, Amy P.I.**, Gill, Benjamin C., and Pruss, Sara B., Finding a geological needle in a haystack: the SPICE event at C and O Canal National Park, Spotlight on National Park Resources in the National Capitol Region, Online, April 2022.
- Hagen, Amy P.I.**, Gill, Benjamin C., and Pruss, Sara B., SPICEy results from western Maryland: Implications for tracking Cambrian-Ordovician redox and biodiversity trends, Virginia Tech Geosciences Student Research Symposium, Blacks- burg, VA, March 2022.
- Hagen, Amy P.I.**, Jones, David S., Fike, David A., Tosca, Nicholas J., and Pruss, Sara B., Sedimentary mercury as a proxy for redox oscillations during the Cambrian SPICE event in western Newfoundland; oral presentation, GSA Annual Meeting, Portland, OR, October 2021.
- Hagen, Amy P.I.**, Jones, David S., Fike, David A., Tosca, Nicholas J., and Pruss, Sara B., New insights on redox conditions during the Cambrian SPICE Event, western Newfoundland, Canada; poster, Northeast Geobiology Symposium, Online, April 2021.
- Hagen, Amy P.I.**, Jones, David S., Fike, David A., Tosca, Nicholas J., and Pruss, Sara B., Evaluating redox conditions during the Cambrian SPICE Event, western Newfoundland, Canada; poster, GSA Annual Meeting, Online, October 2020.

## Invited Talks

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- Science on Tap New River Valley:** Reading the Rocks: What rocks tell us about the history of the Earth, in the NRV and beyond! June 27, 2024.
- Roanoke Valley Mineral and Gem Society:** Trouble on a 500-million-year-old beach: My geochemistry PhD work in Virginia and Maryland. June 13, 2024.

## Awards, Fellowships, & Grants

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| 2024 | <b>Student Talk Award</b> , GSA Geobiology & Geomicrobiology Division<br><b>Post Expedition Activity Award</b> , U.S. Science Support Program (\$20,000)<br><b>Research Award</b> , Virginia Tech Department of Geosciences (\$1000)<br><b>IODP Expedition 389 support</b> , US Science Support Program (\$5000) |
| 2023 | <b>Scholarship to attend ANZIC Geoscience Masterclass</b> , US Science Support Program (\$4000)<br><b>Best Paper of 2022 Award</b> , Canadian Journal of Earth Sciences (\$1000 CAD)<br><b>Scholarship to attend USSP 2023</b> , National Science Foundation (\$2000)  |
| 2022 | <b>GSA Graduate Student Research Grant</b> , Geological Society of America (\$2266)<br><b>Cooper Memorial Geology Scholarship</b> , Virginia Tech Department of Geosciences (\$1000)   |
| 2021 | <b>Conference Participation Grant to Support Inclusion</b> , The Paleontological Society (\$1000)<br><b>Dean's List</b> , Smith College  |

- Marshall Schalk Prize for Achievements in Geological Research**, Smith College Department of Geosciences (\$1000)
- Elected Phi Beta Kappa**, Smith College
- Elected Sigma Xi**, Smith College
- Summer Undergraduate Research Fellowship**, Smith College (\$6000)
- Academic All-Conference, Crew**, New England Women's and Men's Athletic Conference (NEWMAC)
- Marly Pineda Team, Volleyball**, Smith College Athletic Department
- 2020 **GSA Student Poster Competition Undergrad. Awardee**, The Paleontological Society (\$100)
- Academic All-Conference, Volleyball**, NEWMAC
- 2019 **Dean's List**, Smith College
- Summer Undergraduate Research Fellowship**, Smith College (\$6000)
- Academic All-Conference, Volleyball**, NEWMAC
- Academic All-Conference, Crew**, NEWMAC
- 2018 **Academic All-Conference, Volleyball**, NEWMAC
- 2017 **Student Research in Departments (STRIDE) Scholarship**, Smith College (\$84,800)

## Professional Memberships

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- 2020-2024 **The Geological Society of America**,
- 2021-2022 **Association of Women Geoscientists**,
- The Paleontological Society**,

## Field Experience

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- **Western Newfoundland, Canada**, 2024, 2019
- **C & O Canal National Park, Maryland**, 2024, 2023, 2022, 2021, 2020
- **Southwest Virginia**, 2024
- **Utah and Nevada**, 2023, 2021
- **Wrangell Mountains, Alaska**, 2022
- **Death Valley area**, 2022, 2019, 2018
- **County Wexford, Ireland**, 2020
- **Isle of Skye, Scotland**, 2018

## Service

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- **Associate Editor**, *Journal of Emerging Investigators*, 2024-present
- **Organizer**, *Virginia Tech Graduate Labor Union*, 2023-present
- **Session chair**, *Dynamic Environments Across the Ediacaran-Cambrian Boundary and the Rise of Early Animals*, GSA Annual Meeting 2024
- **Conference chair**, *Geosciences Student Research Symposium*, 2023-2024
- **Graduate representative**, *Inclusion, Diversity, Equity, and Accessibility committee*, VT Dept. of Geosciences, 2023-2024
- **Reviewer** for the Graduate Research Development Program, *Virginia Tech*, 2022-2023
- **Art committee chair**, *Geosciences Student Research Symposium*, 2022-2023
- **Fundraising committee**, *Geosciences Student Research Symposium*, 2022-2023
- **Undergraduate poster committee**, *Geosciences Student Research Symposium*, 2021-2022
- **Reviewer** for the following journals: *Nature Geoscience*, *Global and Planetary Change*
- **Student Athlete Advisory Committee**, *Smith College Athletic Department*, 2017-2021
- **Geology Club President**, *Smith College*, 2019

## Extracurricular Activities

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- 2024 **Violin**, Virginia Tech Dept. of Music
- 2017-2021 **Varsity Volleyball**, Smith College
- 2019-2021 **Varsity Rowing**, Smith College
- Featured in the Smithsonian National Museum of Natural History exhibit *Deep Time* as part of the Pruss lab**, Smith College

## Outreach Activities

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### **Science on Tap New River Valley**

*June 2022- present*

- I work in a team to organize monthly events where scientists share knowledge with the local community in a fun, accessible talk format.

### **Letters to a Pre-scientist Program**

*August 2022- present*

- I correspond with a K-12 student pen pal about STEM careers, higher education, and overcoming obstacles.

### **Virginia Tech Hokie BugFest**

*2023, 2024*

- I helped run the VT Museum of Geosciences booth at Hokie BugFest, where I showed visitors fossil insects and arthropods.

### **Local Middle School Outreach Talks**

*Spring 2023*

- I visited two local middle schools to speak about deep time and Earth history. I prepared a presentation and led a timeline activity.

### **Virginia Tech Explore Science Camp**

*2022, 2024*

- I designed and implemented an activity on geologic time for 7th-10th graders.

### **Montgomery County Public Schools Stormwater Days**

*April 2022*

- I used an augmented reality sandbox to explain topography and flood hazards to local middle school students.

### **Hokie for a Day**

*March 2022*

- Myself and two classmates introduced fifth graders to topics in geology. I focused on common minerals and their uses.

### **Center for Communicating Science Nutshell Games**

*March 2022*

- I participated in a graduate student competition to present my research to a public audience in only 90 seconds.