

Mohammed S. Hashim, Ph.D.

Postdoctoral Scholar

Department of Earth Sciences

University of Southern California

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- 2017 - 2022 Ph.D. in Geochemistry
Geological & Environmental Sciences, Western Michigan University (WMU)
Dissertation: Experimental Insights into the Origin of Microcrystalline Calcites
Advisor: Dr. Stephen Kaczmarek
- 2008 - 2012 B.S. in Geology
Department of Geology, University of Baghdad, Iraq
Thesis: Characterization of the Mishrif Fm. in Northern Iraq using wireline logs

PROFESSIONAL APPOINTMENTS

- 1/2025 – present Climate and Carbon Initiative Postdoctoral Fellow, University of Southern California, California, USA
- 12/2022 – 12/2024 NSF Ocean Sciences Postdoctoral Fellow at Woods Hole Oceanographic Institution (WHOI), Massachusetts, USA
- 6/2022 – 11/2022 Postdoctoral Scholar at WHOI
- 5/2021 – 4/2022 Graduate Research Assistant (Schlanger Fellow) - WMU, Michigan, USA
- 2018 – 2021 Graduate Research Assistant - WMU, Michigan, USA
- 2017 – 2018 Graduate Teaching Assistant - WMU, Michigan, USA
- 2012 – 2015 Geologist/Geophysicist - Schlumberger Oil Services, Moscow, Russia

AWARDS AND HONORS

- 1/2025 Climate and Carbon Initiative Postdoctoral Fellowship, The Wrigley Institute for Environment & Sustainability, University of Southern California, California
- 2022 – 2023 WHOI Postdoctoral Scholarship, Massachusetts
- 2022 Dissertations Symposium for Chemical Oceanography (DISCO), Hawaii
- 2021 Schlanger Ocean Drilling Fellowship, USA Science Support Program
- 2021 All-University Graduate Research and Creative Scholar Award (Ph.D. category), WMU, Michigan
- 2021 Department-Level Graduate Research and Creative Scholar Award (Ph.D. category), WMU, Michigan
- 2021 Outstanding Student Presentation Award (OSPA) at the American Geophysical Union (AGU) Fall Meeting, San Francisco, California
- 2021 Best Student Talk Award (Ph.D. category), Midwest Geobiology Symposium, Indianapolis, Indiana

- 2021 Lloyd and Marilyn Schmaltz Professional Activities Award, Department of Geological and Environmental Sciences, WMU, Michigan
- 2012 Outstanding Student Award, College of Science, University of Baghdad, Baghdad, Iraq
- 2012 Excellence in Undergraduate Research Award, University of Baghdad, Baghdad, Iraq
- 2011 Scholarship for Undergraduate Research in Petroleum Geology, Iraq Geological Survey, Baghdad, Iraq

PUBLICATIONS

Peer-reviewed Journal Articles (published and submitted)

- 14. Hashim, M.**, Conte, M., Salter, M., A., Pedrosa-Pamies, R. Weber, J. C., Hayden M., Wilson R., Perry, C., Crowley, S.F., Dennis, P.F., Bish, D., and Subhas, A.V. **2025**. Fish Carbonates in the Open Ocean and Their Role in the Carbon Cycle. *In revision at Global Biogeochemical Cycles*.
- 13.** Tominaga, M., Konrad, K., Reilly, B., Schrenk, M., Walczak, M., **Hashim, M.**, et al. The FUTURE of the US marine seafloor & subseafloor sampling capabilities **2025**. *In revision at AGU Advances*
- 12.** Hupp, B., **Hashim, M.**, Yobo, L., N., Ajayi, J., Bryant, R., Chin, S., and Kinsley, C., Villa, A., Nana Yobo, L., Ajayi, J. O., and the Participants of the Establishing Early-Career Scientific Ocean Drilling Learning Communities Workshop. **2025**. Perspectives on Developing a Diverse, Knowledgeable, and Inclusive Scientific Community in the Shifting Landscape of U.S. Scientific Ocean Drilling. *In revision at Earth Science, Systems and Society*.
- 11.** Subhas, A.V. **Hashim, H.** Long, M.L. McCorkle, D.C. Liu, X., Gray, W.R., Berelson, W.M., and Adkins, J.F. Enhanced solubility of planktonic foraminiferal calcite in seawater. *In revision at Science Advances*.
- 10. Hashim, M.**, Marx, L., Dean, C., Burdige, E., Hayden, M., Klein, F., Van Mooy, B., McCorkle, D., and Subhas, A. V. **2025**. Mineral Formation during Shipboard Ocean Alkalinity Enhancement Experiments in the North Atlantic. EGU sphere [preprint], <https://doi.org/10.5194/egusphere-2025-988>.
- 9.** Yaqoob M., Ishaq, M., Ansari, M., Sujay Anand John Jayachandran, I., **Hashim, M.**, Seers, T. **2025**. MicroCrystalNet: An Efficient Convolutional Neural Network for Microcrystal Classification using Scanning Electron Microscope Petrography. *IEEE Access*. <https://ieeexplore.ieee.org/document/10930763>
- 8. Hashim, M.**, Subhas, A., Kaczmarek, S., Gemakrisindo Wolfram Naa, and Bish, D. **2024**. A Process-based Geochemical Framework for Carbonate Sediments During Marine Diagenesis. *Geochimica et Cosmochimica Acta*. <https://doi.org/10.1016/j.gca.2024.05.023>
- 7. Hashim, M.**, Rose, K., Cohen, H., and Kaczmarek, S. **2023**. Effects of Sodium and Potassium on Dolomite formation rate, Stoichiometry, Crystallographic Characteristics. *Sedimentology*. <https://doi.org/10.1111/sed.13124>
- 6. Hashim, M.**, Burke, J., Hardisty, D., and Kaczmarek, S.E. **2022**. Iodine Incorporation into Dolomite: Experimental Constraints and Implications for the Iodine Redox Proxy and Proterozoic Ocean. *Geochimica et Cosmochimica Acta*. <https://doi.org/10.1016/j.gca.2022.10.027>
- 5. Hashim, M.** and Kaczmarek, S.E. **2022**. Rhombic Calcite Microcrystals as a Textural Proxy for Meteoric Diagenesis. *Scientific Reports*. <https://doi.org/10.1038/s41598-021-04219-2>
- 4. Hashim, M.** and Kaczmarek, S.E. **2021**. The Transformation of Aragonite to Calcite in the Presence of Magnesium: Implications for Marine Diagenesis. *Earth and Planetary Science Letters*, v. 574., no.

117166. Doi: <https://doi.org/10.1016/j.epsl.2021.117166>

3. Hashim, M. and Kaczmarek, S.E, **2021**. Evolution of Calcite Microcrystal Morphology during Experimental Dissolution. *Journal of Sedimentary Research*, v. 91 (3), p. 229–242.

<https://doi.org/10.2110/jsr.2020.154>

2. Hashim, M. and Kaczmarek, S.E, **2020**. Experimental Stabilization of Carbonate Sediments to Calcite: Insights into the Depositional and Diagenetic Controls on Calcite Microcrystal Texture. *Earth and Planetary Science Letters*. vol. 538, no. 116235. <https://doi.org/10.1016/j.epsl.2020.116235>

1. Hashim, M. and Kaczmarek, S.E., **2019**. A Review of the Nature and Origin of Limestone Microporosity. *Marine and Petroleum Geology*, 107, p. 527–554.

<https://doi.org/10.1016/j.marpetgeo.2019.03.037>

Manuscripts in Preparation

Cook, L., K., Hashim, M., Schwarz, M., Urick, S., Subhas, A. V., and Saba, G, K. A novel laboratory-quantified carbon production suite for an abundant, temperate marine forage fish. In preparation for *Limnology & Oceanography*.

Marx, L., **Hashim, M.**, McCorkle, D.C., Subhas, A.S. Guidelines for Carbonate Chemistry Measurements during Ocean Alkalinity Enhancement Experiments in the Field. In preparation for *Marine Chemistry*.

Crockford, P., **Hashim, M.**, et al., The effect of seafloor processes on barium concentration and isotopes on the slope of the Great Bahama Bank. In preparation for *Earth and Planetary Science Letters*

McCormick C., Hardisty, D., **Hashim, M.**, Lau, K. Experimental constraints on the partitioning of uranium in dolomite. In preparation for *Geochimica et Cosmochimica Acta*.

Akam, S.A., Hardisty, D., Feng, D. Wang, X., **Hashim, M.**, Burke, J. Swanner, E., Cr  mi  re, A., Peckmann, J. Incorporation of iodine in methane-derived authigenic carbonates: Implications for methane flux dynamics. In preparation for *Geochimica et Cosmochimica Acta*

FUNDING & GRANTS

2023	<i>Project:</i> A novel microfluidic “lab-on-a-chip” approach to assess and optimize the efficacy of ocean alkalinity enhancement. <i>Funding agency:</i> Woods Hole Oceanographic Institution Innovative Technology Award. <i>Role:</i> Co-I. <i>Amount:</i> \$99,648 . <i>Status:</i> <u>funded</u>
2023	<i>Project:</i> Elevator pitches for labs: Building hands-on tools to communicate lab-based research. <i>Funding agency:</i> WHOI Sea Grant, Program Development Funding. <i>Role:</i> PI. <i>Amount:</i> \$3,358 . <i>Status:</i> <u>funded</u>
2023	<i>Project:</i> Establishing early-career scientific ocean drilling learning communities. <i>Funding agency:</i> United States Science Support Program (USSSP). <i>Role:</i> Co-I. <i>Amount:</i> \$50,000 . <i>Status:</i> <u>funded</u>
2022 - 2025	<i>Project:</i> Experimental constraints on dolomite geochemistry as an archive of seawater redox evolution. <i>Funding agency:</i> NASA Exobiology Program. <i>Role:</i> Student co-author, not PI eligible; PI: Dr. Kimberly Lau, Co-I Dr. Dalton Hardisty. I developed proposal ideas along with PIs, provided preliminary data for the proposal, and contributed to proposal writing. <i>Hosting institutes:</i> Penn State University & Michigan State University. <i>Amount:</i> \$855,289 . <i>Status:</i> <u>funded</u>
2022 – 2024	<i>Project:</i> Towards quantifying calcium carbonate sediment dissolution during marine diagenesis. <i>Funding agency:</i> National Science Foundation Ocean

	Sciences Postdoctoral Fellowship. <i>Role:</i> PI. <i>Hosting institute:</i> Woods Hole Oceanographic Institution. <i>Amount:</i> \$376,504 . <i>Status:</i> <u>funded</u>
2022 - 2024	<i>Project:</i> Constraints from laboratory and natural experiments on dolomite as an archive of seawater redox evolution. <i>Funding agency:</i> National Science Foundation Earth Sciences Postdoctoral Fellowship. <i>Role:</i> PI. <i>Hosting institutes:</i> Penn State University & Michigan State University. <i>Amount:</i> \$180,000 . <i>Status:</i> <u>funded (Award declined by me due to the acceptance of another award)</u>
2021 - 2022	<i>Project:</i> Parsing the diagenetic pathways of carbonate metastable sediments on the slope of the great Bahama bank. <i>Funding Agency:</i> U.S. Science Support Program (NSF) through Schlanger Ocean Drilling Fellowship. <i>Role:</i> PI. <i>Hosting institute:</i> Western Michigan University. <i>Amount:</i> \$30,000 . <i>Status:</i> <u>funded</u>
2017 - 2022	Student research grants (\$3,750)
2017 - 2022	Student travel grants (\$2200)

ACADEMIC SERVICES, OUTREACH, AND SCIENCE COMMUNICATION

Academic service

September 2024	Panelist for the “Academic Jobs Workshop” at WHOI; a workshop for students and postdoctoral researchers focusing on application materials, negotiations, building a lab, and transitioning to a faculty position.
October 2023 12, 19, and 26.	Co-organizer and moderator of the Academic Jobs workshop, WHOI, October 5, 12, 19, and 26. Four sessions focusing on various aspects on academic jobs.
July 2024	Panelist for the Woods Hole Partnership Educational Program (PEP) on mental health. PEP is a 10-week program designed primarily for college juniors and seniors from underrepresented groups in marine and ocean sciences.
2023 – 2024	Vice President of the Postdoctoral Association at WHOI. The Postdoctoral Association is an organization that formally represent the WHOI postdoc community and to assist postdocs with issues concerning work and life around Woods Hole.

Outreach, science communication, and advocacy

January 2023 & 2024	Organizer of the Blue Economy Short Course at WHOI. This program consists of a short course on “Blue Economy” topics and an internship placement in a WHOI lab.
April 2024	Organizer of science communication sessions to discuss marine carbon dioxide removal techniques for middle school students visiting WHOI.
September 2023	Co-writing an open letter to the National Academy of Sciences Decadal Survey of Ocean Sciences for the National Science Foundation committee to advocate for a more equitable and inclusive scientific ocean drilling program. Click here to read the letter
August 2023	Steering committee member and presenter at an educational workshop (“Establishing Early-Career Scientific Ocean Drilling Learning Communities”) in College Station, TX, August 8-10.

- July 2023 Co-founded and co-organizer of Elevator Pitch for Labs Initiative at WHOI. The mission of this initiative is to equip WHOI researchers with the knowledge and tools to effectively communicate their lab-based science to non-specialist audiences.
- July 2022 Led 207 early-career scientists in writing a letter to ask the NSF to keep the JOIDES Resolution operating until 2028. Click [here](#) to read the letter.
- February 2019 Organizer and Instructor at the Science Olympiad Tournament, Michigan, USA. A premier competition-based activity that immerses students in the whatever areas of Science, Technology, Engineering, and Math that excites them.
- 2017 - 2019 Instructor at WMU CoreKids K-12 Outreach Program, Michigan, USA. This is an educational program that introduces elementary school students, many of whom from marginalized groups, to geology and raises awareness of the important roles it plays in society.

Peer reviewing service and science organization

- 2024 – present Reviewer for funding agencies: USA National Science Foundation; American Chemical Society; Czech Science Foundation
- 2020 - present Reviewer for scientific journals: Earth and Planetary Science Letters; Scientific Reports; Geochimica et Cosmochimica Acta; Geochemical Perspectives Letters; Marine and Petroleum Geology; Communications Earth & Environment; Journal of Geophysical Research – Biogeosciences; Sedimentology
- June 2023 Co-convener at the 36th International Association of Sedimentologists (IAS), 12-16 June 2023, Dubrovnik, Croatia. Session title: Early diagenesis in carbonate sediments
- 2022 – 2024 Organizer of the seminar series of the department of Marine Chemistry and Geochemistry at WHOI
- 2022 - 2024 Session chair and primary convener at American Geophysical Union. Session title: Carbonate Sediments Through Time: Proxies for Process and Planets.

Hiring committees

- 2022 - 2023 Member of a Search Committee for the Vice President for Academic Programs & Dean at WHOI
- 2021 Student member of a faculty hiring committee, Department of Geological and Environmental Sciences, WMU

MOST IMPORTANT *INVITED* TALKS & SEMINARS (All these talks were invited; a complete list of all talks is available upon request)

- November 2024 On the reliability and fragility of the carbonate paleoclimate archive: the iodine redox proxy in dolomite. **Brown University**, Rhode Island, USA
- November 2024 Fish carbonates in the open ocean and their roles in the carbon cycle. Geotopic seminars, **University of Miami**, Florida, USA
- April 2024 Marine calcium carbonate: A dynamic component of the carbon cycle and an extensive archive of Earth's environmental evolution. **Woods Hole Oceanographic Institution**, Massachusetts, USA
- March 2024 Marine calcium carbonate: A dynamic component of the carbon cycle and an

	extensive archive of Earth's environmental evolution. <i>Michigan State University</i> , Michigan, USA
March 2024	Marine calcium carbonate: A dynamic component of the carbon cycle and an extensive archive of Earth's environmental evolution. <i>Texas A&M University</i> , Texas, USA
March 2024	Marine calcium carbonate: A dynamic component of the carbon cycle and an extensive archive of Earth's environmental evolution. <i>University of Southern Mississippi</i> , Mississippi, USA
July 2023	Micro-scale Observations and Global Trends in Carbonate Diagenesis at the Great Bahama Bank. Goldschmidt Conference, Lyon, France, 9-14 July 2023, <i>Goldschmidt Conference (invited)</i> , Lyon, France
February 2023	On the Reliability and Fragility of the Carbonate Paleoclimate Archive, Geochemistry Forum, <i>Penn State University</i> , Pennsylvania, USA
December 2022	On the Reliability and Fragility of the Carbonate Paleoclimate Archive, CoG3 seminar, <i>Massachusetts Institute of Technology</i> , Massachusetts, USA
November 2022	Carbonate Diagenesis and its Implications for Paleoclimate Reconstructions & Ocean Chemistry, Marine and Coastal Sciences Seminar, <i>Rutgers University</i> , New Jersey, USA

TEACHING EXPERIENCE

Fall 2023	Guest lecturer at WHOI for the graduate-level Marine Chemistry class (part of the MIT-WHOI Joint Program) (1 lecture, 8 graduate students)
Spring 2023	Guest lecturer at WHOI for the graduate-level Marine Sediments class (part of the MIT-WHOI Joint Program) (4 lectures, 6 graduate students)
Summer 2021	Teaching assistant at WMU for the Hydrology Field Course, (25 students)
2020 - 2021	Teaching assistant at WMU for Dynamic Earth (GEOS 1000), two labs (18 students each)
2017 - 2018	Teaching assistant at WMU for Dynamic Earth (GEOS 1000), two labs (20 students each)
2013 - 2015	Instructor at Schlumberger for Training Courses teaching professionals from oil companies (10 - 30 employees in each course)

MENTORING EXPERIENCE

2025	<i>Name: Mengshi Liu</i> <i>Position:</i> undergraduate student at the University of Southern California <i>Project:</i> Characterization of ion exchange resins
2024	<i>Name: Hope Cobbs</i> <i>Position:</i> undergraduate student at University of Georgia and a participant in the Bridge2PhD program at WHOI <i>Project:</i> Shipboard incubation of planktic foraminifera in oxygen minimum zones off California
2023	<i>Name: Yasmin Hamilton</i>

- Position:* undergraduate student at Amherst College and 2023 summer student fellow at WHOI
Project: Testing the Impact of Mg/Ca and $[\text{SO}_4^{2-}]$ on the Growth and Calcification of *E. huxleyi* Coccolithophore
- 2023 *Name:* **Esmeralda Garcia**
Position: undergraduate student at College of the Holy Cross and a summer intern at the Woods Hole Partnership Education Program (PEP)
Project: Effect of Ocean Alkalinity Enhancement on the Growth and Calcification of *G. Oceanica* Coccolithophore
- 2022 *Name:* **Maiya Rizzo**
Position: WMU recent graduate
Project: Acquiring temperature data from geothermal gradients for Scientific Ocean Drilling sites
- 2022 *Name:* **Gemakrisindo Wolfram Naa**
Position: WMU Master's student
Project: Insights from x-ray diffraction data into the diagenesis of carbonate sediments from the slope of the Great Bahama Bank (Ocean Discovery Program site 1003)
- 2022 *Name:* **Marwan Al Hinaai**
Position: WMU undergraduate student
Project: Insights into the global carbon cycle using stable carbon isotopes in marine sediments. (The project was selected for ORI Undergraduate Award for Research and Creative Scholarship Excellence Award)
- 2022 *Name:* **Donovon Vitale**
Position: WMU undergraduate student
Project: Tabulation and processing of data from International Ocean Discovery Program expeditions to calculate the pore fluid saturation state with respect to carbonate minerals
- 2019 - 2020 *Name:* **Zander Sorenson**
Position: WMU undergraduate student
Project: XRD and SEM trainings, and sample preparation for laboratory experiments
- 2013 - 2015 Mentor for several Schlumberger interns. Software training, seismic data interpretation, well logging, and 3D modeling