

## Robert McCarley Holder

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### Education

2018 PhD, Earth Science, University of California, Santa Barbara  
2014 MS, Earth Science, University of California, Santa Barbara  
2012 BA *summa cum laude* double major, Geology and Scandinavian Studies, Gustavus Adolphus College

### Professional Positions

2020–present Assistant Professor, University of Michigan, Ann Arbor  
2018–2020 Postdoctoral Fellow, Johns Hopkins University  
2012–2018 Teaching Assistant and Graduate Student Researcher,  
University of California, Santa Barbara  
2016 Instructor of Record, University of California, Santa Barbara  
2009–2012 Teaching Assistant, Gustavus Adolphus College  
2010 ICP-MS student technician, Gustavus Adolphus College  
2009 Field Technician, Great Basin Unified Air Pollution Control District, Inyo County, CA

### Honors and Awards

2026 GeoClub Best Instructor Award, University of Michigan  
2025 Invited lead author. Treatise on Geochemistry, 3<sup>rd</sup> edition. Book chapter. Metamorphic rock record through Earth's history  
2024 Sloan Fellowship nominee, University of Michigan  
2023 Packard Fellowship nominee, University of Michigan  
2018 Most Helpful Graduate Student, University of California, Santa Barbara  
2017 Doctoral Student Travel Grant, University of California, Santa Barbara  
2017 Outstanding Student Poster, European Geophysical Union  
2017 Alumni Graduate Award in Research Excellence, University of California, Santa Barbara  
2017 Earth Science Graduate Student Opportunity Award, University of California, Santa Barbara  
2017 Earth Research Institute Summer Research Fellowship, University of California, Santa Barbara  
2016 Tanya Atwater Global Field Travel Fund, University of California, Santa Barbara  
2016 George Tunell Memorial Fellowship, University of California, Santa Barbara  
2016 Early Career Scholar Award, Microanalysis Society  
2015 United States Antarctic Service Medal  
2015 Lloyd & Mary Edwards Field Studies Fellowship, University of California, Santa Barbara  
2015 Tanya Atwater Global Field Travel Fund, University of California, Santa Barbara  
2014 PSAAPG Imperial Barrel Award Competition, University of California, Santa Barbara  
2014 Earth Science Graduate Award for Research Excellence, University of California, Santa Barbara  
2012 NAGT/USGS Summer Field Fellowship (declined)  
2012 Sigma Xi Scientific Research Society, Gustavus Adolphus College

- 2012 Undergraduate Speaker, Phi Beta Kappa Annual Meeting, Gustavus Adolphus College  
2011 Phi Beta Kappa Academic Honor Society, Gustavus Adolphus College  
2010 Chester O. Johnson Geology Scholarship, Gustavus Adolphus College

### Editorial and Professional Service

- 2017–present Manuscript reviewer for: *American Mineralogist*, *Computers and Geosciences*, *Contributions to Mineralogy and Petrology*, *Earth and Planetary Science Letters*, *Episodes*, *Geology*, *Geoscience Frontiers*, *Journal of Metamorphic Geology*, *Lithos*, *Nature Communications*, and *Precambrian Research*. 46 manuscripts since 2017
- 2020–present NSF-EAR (Tectonics, Petrology & Geochemistry, Instrumentation & Facilities) *ad hoc* proposal reviewer
- 2022–present Editorial contributor for *Geology*
- 2026 Cordilleran GSA conference session organizer, *Subduction Zones and Their Volcanic Arcs: Initiation and Evolution, Structure, Metamorphism, Magmatism*, with D Hernández-Uribe, J Wang, J Worthington, J He, and P Kapp
- 2025 GSA Penrose Conference - International Eclogites Conference session chair, *The Franciscan and HP-UHP Rocks of the Circum-Pacific Realm*, with S Baldwin
- 2024 Goldschmidt Conference chair for Theme 03: Crustal Processes and Evolution
- 2024 GSA Connects conference session chair, *State of the Art and Future Directions in Petrology and Petrochronology: A session in Honor of Chris Yakymchuk*, University of Waterloo, GSA MGPV Early Geological Career Awardee for 2024, with M Brown, J Kendrick, and D Pattison
- 2024 GSA Connects conference session chair, *Subduction Zones and their Volcanic Arcs: Initiation and Evolution, Structure, Metamorphism, Magmatism*, with P Kapp, D Hernández-Uribe, and J Wang
- 2024 Proposal reviewer for the American Philosophical Society Lewis and Clark Fund for Exploration and Field Research
- 2023 GSA Connects conference session chair, *Unravelling timescales of magmatism, metamorphism, and crustal evolution* with C Connop and M Caddick
- 2023 NC-GSA conference session chair, *Reading the Record of Tectonic Processes through Diverse Investigations of Igneous and Metamorphic Rocks*, with H Blatchford
- 2022 Goldschmidt conference session chair, *Secular evolution in magmatism, metamorphism, geochemistry, and geodynamics across the evolution of plate tectonics*, with J Garber, J Liebermann, & H Moreira
- 2019–2021 External thesis reviewer for Curtin University (1 MS student) and Adelaide University (2 PhD students)
- 2019 GSA Annual Meeting conference session chair, *Metamorphic Petrology Past, Present and Future: Preparing for the next 100 years with the Mineralogical Society of America*, with S Penniston-Dorland and M Caddick
- 2017 AGU Fall Meeting conference session chair, *Petrochronology and microstructural geochronology*, with D Moser, K Tait, and J Darling
- 2017 Book reviewer for *Reviews in Mineralogy and Petrology, Volume 83, Petrochronology: Methods and Applications*, eds. MJ Kohn, M Engi, and P Lanari. *American Mineralogist*

### Departmental Service

#### *Formal assignments*

- 2023–2026 Curriculum Committee  
2022–2026 Advisory Committee, Camp Davis field teaching program  
2022–2024 Smith Lecture Series coordinator (weekly department seminar)

- 2022–2023 Diversity, Equity, and Inclusion committee. Including: Field Experiences subcommittee chair (2022) and Earth & Environmental Sciences representative for Next Prof program (2022)
- 2021–2023 Advisory Committee, Electron Microbeam Analysis Laboratory
- 2020–2022 Graduate Admissions Committee

#### **Other contributions**

- 2021–present EARTH534 graduate seminar in geophysics, tectonics, and structural geology. Regular faculty participant
- 2020–present EARTH535 graduate seminar in petrology, mineralogy, and high-temperature geochemistry. Organizer and instructor of record
- 2021–2023 Unlearning Racism in the Geosciences (“URGE”) pod member
- 2021 Graduate student camping and outdoor training. Organizer and planner, in coordination with UM Adventure Leadership
- 2020 Film screening of *Picture a Scientist*. Coordinator

#### **Invited Lectures and Talks**

- 2025 Wayne State University
- 2025 Yale University
- 2023 Curtin University, Perth, Western Australia (Trip canceled)
- 2021 Queens University, Kingston, Ontario (virtual)
- 2021 International Conference on ThermoChronology
- 2021 GSA Connects Conference
- 2021 Goldschmidt Conference
- 2021 Western Washington University (virtual)
- 2020 Smithsonian Museum of Natural History (virtual)
- 2019 AGU Fall Meeting
- 2019 University of British Columbia, Vancouver
- 2019 EGU General Assembly
- 2019 University of Maryland
- 2019 Pennsylvania State University
- 2018 Goldschmidt Conference
- 2017 Goldschmidt Conference

#### **Education and Broader Impacts**

- 2026 (expected) Short course leader. Petrochronology and phase-equilibrium modeling. Reunión Anual de la Unión Geofísica Mexicana (Annual meeting of the Mexican Geophysical Union)
- 2024 Strabospot workshop for developing digital tools for modern field-geology teaching, University of Kansas
- 2022 Virtual short course leader: Phase-equilibrium modeling with Theriak-Domino for early career faculty and graduate students, with D. Hernández-Uribe
- 2020–2022 Founder and lead organizer of PetroNet, a professional network formed during the COVID-19 pandemic that aimed to foster inclusive community and collaboration among early-career academic professionals in the fields of petrology and high-temperature geochemistry
- 2019 Geology field consultant for independent film *Unconformity*, by director Jonathan DiMaio

**Courses Taught*****University of Michigan (73 credits taught)***

Year	Term	Course	Format	Title	Credit	Enrolled	Eval1 <sup>§</sup>	Eval2 <sup>§</sup>
2026	Su	EARTH440	Field	Field Geology	6	TBD	TBD	TBD
2026	W	EARTH352	Lecture, Lab	Magma & Metamorphism	4	16	4.9	4.9
2026	W	EARTH535	Seminar	Grad. Seminar, Petrology	1	5 <sup>†</sup>	—	—
2025	Su	EARTH440	Field	Field Geology	6	12	4.8	5.0
2025	W	EARTH485	Lecture, Lab	Geochronology (ULWR)	4	13*	4.9	5.0
2025	W	EARTH535	Seminar	Grad. Seminar, Petrology	1	5 <sup>†</sup>	—	—
2024	Su	EARTH440	Field	Field Geology	6	12	5.0	5.0
2024	W	EARTH596	Seminar	Evolution of PreC. Earth	1	6	5.0	5.0
2023	F	EARTH351	Lecture, Lab	Earth Structure	4	19	4.8	4.8
2023	F	EARTH535	Seminar	Grad. Seminar, Petrology	1	4 <sup>†</sup>	—	—
2023	Su	EARTH440	Field	Field Geology	6	23	4.9	5.0
2023	W	EARTH535	Seminar	Grad. Seminar, Petrology	1	8 <sup>†</sup>	—	—
2023	W	EARTH485	Lecture, Lab	Geochronology (ULWR)	4	10*	5.0	5.0
2022	Su	EARTH440	Field	Field Geology	6	18	4.8	4.9
2022	W	EARTH535	Seminar	Grad. Seminar, Petrology	1	5 <sup>†</sup>	—	—
2022	W	EARTH352	Lecture, Lab	Magma & Metamorphism	4	15	5.0	5.0
2021	F	EARTH535	Seminar	Grad. Seminar, Petrology	1	5 <sup>†</sup>	—	—
2021	F	EARTH485	Lecture, Lab	Geochronology	4	11*	5.0	5.0
2021	Su	EARTH440	Field	Field Geology	6	19	4.3	5.0
2021	W	EARTH412	Lecture, Lab	Geochem. of Solid Earth	4	8	5.0	5.0
2021	W	EARTH535	Seminar	Grad. Seminar, Petrology	1	4 <sup>†</sup>	—	—
2020	F	EARTH535	Seminar	Grad. Seminar, Petrology	1	2 <sup>†</sup>	—	—

<sup>§</sup> 'Eval1' refers to the median score of student course evaluation question Q1631, "This course advanced my understanding of the subject matter." 'Eval2' refers to the median score of student course evaluation question Q207, "Robert Holder appeared to have a thorough knowledge of the subject." Response rates varied.

<sup>†</sup> Formal enrollment only (MS students, pre-candidacy PhD students, and occasionally undergraduate students involved in department research). Total participation averaged 10–15 students per term, including post-candidacy PhD students as well as MS students and pre-candidacy PhD students who had already met the credit requirements for their degrees. Students do not generally complete course evaluations for this seminar.

\* Approximately half of students who enroll in EARTH485 are graduate and half are undergraduate students.

***University of California, Santa Barbara******Instructor of Record***

2016 Antarctica (EARTH10; themed introductory Earth science)

***Teaching Assistant***

2013–2017 Field Methods (EARTH104b; "Spring Break Field Camp")

2013, '15, '17 Mountains, Boots, and Backpacks (EARTH6; field geology for incoming freshmen)

2012, '14, '16 Metamorphic Petrology (EARTH102c)

2013 Geomaterials (114; mineralogy)

2014 Analytical Methods (EARTH115; optical mineralogy, XRD, SEM, EPMA)

2014 Summer Field Geology (EARTH118; "Field Camp")

## Research Grants

### *Active grants and pending proposals*

In-progress	PI — NSF-MRI Track 2 Acquisition of a multi-collector inductively coupled plasma mass spectrometer for petrochronology and isotope geochemistry. Estimated \$1.5M.
Pending	PI — NSF-EAR CESEV. Collaborative Research: Does partial melting of metasedimentary rocks lead to net differentiation of heat-producing elements in continental crust? \$431,108.
Pending	Named Collaborator — NSF-DEB Systematics & Biodiversity Science. Collaborative Research: Origin of the marsupial-placental dichotomy: did reproductive innovations steer early mammalian evolution? (PI: LN Weaver)
2025–	PI — UM Center for Habitable Planetary Systems. Secular change in redox-sensitive ore deposits as a record of global biogeochemical evolution. \$15,000.
2023–	Named collaborator — NSF-EAR Petrology & Geochemistry 2233425. Collaborative Research: Testing endmember hypotheses for the source of mineralizing fluid(s) in iron oxide - copper - gold (IOCG) deposits. \$444,296 (PI: AC Simon)
2022–	PI — NSF-EAR Tectonics 2127195. Collaborative Research: Do subduction zone metamorphic rocks record evolving subduction-zone thermal structure or anomalous tectonic activity? Baja California. \$340,466

### *Past Grants*

2022–2025	Named collaborator — NSF-EAR Petrology & Geochemistry 2214119. Reconstructing the magmatic and hydrothermal evolution of the Au-rich, Cu-poor Dorado porphyry deposit, Chile: Implications for Cu/Au ratios in porphyry deposits worldwide. \$357,603 (PI: AC Simon)
2023–2024	Named collaborator — M-LEEA (Michigan Center on Lifestage Environmental Exposures and Disease) pilot project: Integrated Spatial Metals and Transcriptomics Analysis to Understand Triple Negative Breast Cancer Disparities. \$29,937 (PI: J. Colacino; UM School of Public Health)
2020–2024	PI — NSF-EAR Tectonics 2022746. Collaborative Research: Did Mantle Magma Cause Ultrahigh-Temperature Metamorphism (UHTM) in Southern Madagascar? \$259,405
2023	PI — UM Provost Early Tenure Track Faculty Research Support Initiative. \$3000

## Graduate Students Advised

### *Primary Advisor*

Samuel Neumann 2026–present	PhD: The distribution of radioactive, heat-producing elements in continental crust
Hannah Schroeder 2022–present	PhD: Archean metamorphism and tectonics in the English River Subprovince, Ontario, Canada
Samuel Neumann 2024–2026	MS: Intrinsic Challenges in the Interpretation of Zirconium-in-Titanite Thermometry and Quartz-in-Garnet Barometry of an Ancient Subduction Zone; Cedros Island, Baja California, Mexico
Yiruo Xu 2021–2026	PhD: The Temporal Footprint of Tectonics: Deciphering Metamorphic Timescales via Diffusion Chronometry
Julisan Street 2021–2024	MS: Low-pressure granulite metamorphism in the Ivanpah and Southern McCullough Mountains: A case study on partial melting drivers

### *Academic Mentor*

Amanda Holmes	MS, advisor AC Simon, 2025–
Annie Lammes	MS, advisor AC Simon, 2025–
Anaé Lamaire	PhD, advisor MK Clark, 2024–

Madison Huising	MS, advisor NA Niemi, 2024–
Chloe Marks	PhD, advisor NA Niemi, 2023–

**Committee Member (PhD) or Reader (MS)**

*Active*

Rory Sweedler	PhD, advisor LN Weaver, 2026–
Amanda Florea	PhD, advisor RA Lange, 2025–
Ziqi Yang	PhD, advisor Y. Zhang, 2025–
David Aguilar	PhD, advisor J. Colacino (School of Public Health), 2024–
Jiaqi Li	PhD, advisor J. Li, 2024–
Bobo Bai	PhD, advisor Y. Zhang, 2023–
Mackenzie Taylor	PhD, advisor RA Lange, 2022–
Bryanne Gordon	PhD, advisor RA Lange, 2022–

*Past*

Benjamin Colding	MS, advisor RA Lange, 2024–2026
Lucas Gomes	PhD, advisor SV Petersen, 2022–2026
Andrés González Duran	PhD, advisor AC Simon, 2022–2026
Anisha Ghosh	MS, advisor JE Johson, 2024–2025
Evan Hirsh	MS, advisor AC Simon, 2024–2025
Allyson Murray	PhD, advisor AC Simon, 2023–2025
Daniel Blakemore	PhD, advisor AC Simon, 2020–2024
Justin Casaus	PhD, advisor AC Simon, 2021–2023
María Rodríguez Mustafa	PhD, advisor AC Simon, 2021–2022

**Postdoctoral Researchers Advised**

Charlotte Connop 2024–2025	Petrochronology of a Mesozoic subduction complex, Baja California, Mexico — Assistant Professor, Bates College
David Hernández Uribe 2020–2022	Theoretical modeling of subduction metamorphism, intermediate-depth earthquakes, and slab melting — Assistant Professor, University of Illinois, Chicago

**Undergraduate Students Supervised**

*Active*

Benjamin Woodmansee	2026– Honors Thesis. U–Pb dating of the Middle Jurassic Sundance Seaway, Wyoming
Kendal Boyce	2026–
Tess Gillum	2026–

*Past*

Benjamin Woodmansee	2024–2026
Astrid Olsson	2024–2025
Hannah Barlett	2023–2024
Tyler Bush	2023–2024
Anna Scheck	2024
Benjamin Bos	2024

**Publications**      H-index = 17    i10-index = 24    citations = 1302    (Google Scholar, 15 May 2026)

†Graduate student lead author    ‡Postdoctoral researcher lead author    \*I am corresponding author (not first listed)

- †44. Xu Y, **Holder RM**, Connop C, Neumann SM, Hernández-Uribe D, Worthington J, Wang JW, He JY, Kapp P (in review) Rapid Cycling and Exhumation of Metamorphic Rocks in the Subduction Channel: Evidence from Diffusion Modeling on the Subduction Mélange of Cedros Island, Mexico. *Earth and Planetary Science Letters*
- †43. Neumann SM, **Holder RM**, Connop C, Xu Y, Hernández-Uribe D, Worthington J, Wang JW, He JY, Kapp P (in review) Thermodynamic and kinetic controls on the incorporation of Zr in titanite; Examples from the Cedros Island subduction complex, Baja California, Mexico. *Journal of Metamorphic Geology*
42. Gonzalez-Duran AF, Simon AC, **Holder RM**, Palma G, Mathur R (in review) Constraining the origin and timing of mineralization in the Llahuín Cu-Mo-Au porphyry deposit, Chile, using titanite petrochronology and magnetite chemistry. *Economic Geology*
41. Pramanik S, Hernández-Uribe D, **Holder RM**, Kapp P (in review) Early Cretaceous eclogites from the Puerto Nuevo mélange (Baja California Sur, Mexico): the youngest eclogite-facies record in the North American Cordillera. *Geology*
- †40. Xu Y, **Holder RM**, Hames W (in review) Rapid metamorphic cooling of the Quetico Subprovince challenges the paradigm of long-lived slow-cooling Archean metamorphism. *Precambrian Research*
39. González-Durán AF, Simon AC, **Holder RM**, García-Toloza J (in review) Multi-stage emerald formation in the Eastern Cordillera of Colombia revealed by monazite and xenotime petrochronology. *Mineralium Deposita*
- ‡38. Hernández-Uribe D, Epstein GS, **Holder RM**, Holt AF, Condit CB, Guevara VE (in review) The feasibility of slab melting: implications for arc magmatism and geochemical cycling in subduction zones. *Earth and Planetary Science Letters*
37. González-Durán AF, Simon AC, **Holder RM**, Thompson JFH, Wade D, Ryan C, Mathur R (2026) Tracing the Origin and Hydrothermal Overprint of Magnetite-Apatite Mineralization in the New Afton Cu-Au ± PGE Alkalic Porphyry Deposit: Insights from Magnetite Textures and Chemistry. *Economic Geology*. doi: *pending*
36. Wang JW, Kapp P, **Holder RM**, He JY, Hernández-Uribe D, Worthington J (2026) Polycyclic metamorphism and exhumation of subduction complex rocks, Cedros Island, Baja California. *GSA Bulletin*. doi:10.1029/2025TC009340
35. Roy S, **Holder RM**, Ramezani J, Brenner DC, Nelson LL, Viete DR (2025) Mantle heating drove short-duration Barrovian-type regional metamorphism during the Paleoproterozoic Penokean Orogeny, Michigan (USA). *GSA Bulletin*. doi:10.1130/B38653.1
34. Su X, Zhang Y, Liu Y, **Holder RM** (2025) Cooling History and Evolution Dynamics of Green Glass Beads During Lunar Fire-Fountain Eruptions: Insights from Na, K, and Cu Distributions. *JGR Planets*. doi:10.1029/2025JE009027
- †33. Xu Y, **Holder RM**, Viete DR (2025) Contrasting cooling histories within the Archean Minnesota River Valley Subprovince and re-examination of secular change of metamorphic timescales. *GSA Bulletin*. doi:10.1130/B37639.1
32. Hammerli J, Kemp AIS, Bouvier A-S, Rudnick R, Boivin P, **Holder RM**, Chacko T, Blake K (2025) The role of scapolite-bearing granulites in sequestering and releasing sulfur: Implications for S isotope signatures of crustal fluids during the exhumation of the lower crust. *Geochimica et Cosmochimica Acta*. doi:10.1016/j.gca.2025.01.010
31. **Holder RM**, Viete DR (2025) The metamorphic rock record through Earth's history. In: Weis D and Anbar A (eds) *Treatise on Geochemistry 3e*, Vol 2, pp 621-645, Elsevier. doi:10.1016/B978-0-323-99762-1.00002-4
30. **Holder RM**, Horton F, Swindle C, Rakotondrazafy AFM (2025) The monazite record of (ultra)high-temperature metamorphism in southern Madagascar: Gondwana terrane correlations and structural trapping of hot middle crust. *Journal of the Geological Society*. doi:10.1144/jgs2024-065

29. Kaare-Rasmussen J, Horton F, **Holder RM**, Kylander-Clark A, Bouvier A-S, Müntener O, Rakotondrazafy AFM (2024) Protracted mantle heat conduction after lithospheric foundering beneath the Malagasy Orogen. *Geology*. doi:10.1130/G52316.1
28. Ben-Israel M, **Holder RM**, Nelson L, Smith E, Kylander-Clark ARC, Ryb U (2024) Late Paleozoic Oxygenation of Marine Environments Supported by Dolomite U-Pb Dating. *Nature Communications*. doi:10.1038/s41467-024-46660-7
27. **Holder RM**, Viete DR (2024) A compilation of metamorphic isograd sequences and their ages, Version 1.0. Interdisciplinary Earth Data Alliance (IEDA). doi:10.26022/IEDA/112748
26. Weaver LN, Kelson JR, **Holder RM**, Niemi NA, Badgley C (2024) On the role of tectonics in stimulating the Cretaceous diversification of mammals. *Earth Science Reviews*. doi:10.1016/j.earscirev.2023.104630
25. Guice GL, Viete DR, **Holder RM**, Roy S (2023) c. 1900 Ma Tethyan-type ophiolite in the Paleoproterozoic Penokean Orogen, Pembine, Wisconsin (USA): Insights from the volcanic stratigraphy. *Precambrian Research*. doi:10.1016/j.precamres.2023.107223
24. Yakymchuk Y, **Holder RM**, Kendrick J, Moyon J-F (2023) Europium anomalies in zircon: a false signal of crustal depth? *Earth & Planetary Science Letters*. doi:10.1016/j.epsl.2023.118405
23. Rodriguez-Mustafa MA, Simon AC, **Holder RM**, Stein H, Kylander-Clark ARC, Jicha BR, Blakemore D, Machado ELB (2023) Integrated Re–Os, Ar/Ar, and U–Pb geochronology directly dates the timing of mineralization at the Mina Justa and Marcona Deposits, Peru. *GSA Bulletin*. doi:10.1130/B36904.1
- ‡22. Hernández-Uribe D, **Holder RM**, Hernández-Montenegro JD (2023) Eclogite thermobarometry: the consistency between conventional thermobarometry and phase-equilibrium modeling. *Journal of Metamorphic Geology*. doi:10.1111/jmg.12747
21. Su X, Zhang Y, Liu Y, **Holder RM** (2022) Outgassing and in-gassing of Na and Cu in Lunar 74220 Orange Glass Beads. *Earth and Planetary Science Letters*. doi:10.1016/j.epsl.2022.117924
- ‡20. Gutiérrez-Aguilar F, Hernández-Uribe D [*postdoctoral researcher, corresponding author*], **Holder RM**, Condit CB (2022) Fluid-induced fault reactivation due to brucite + antigorite dehydration triggered the M<sub>w</sub>7.1 September 19<sup>th</sup> Puebla-Morelos (Mexico) intermediate-depth earthquake. *Geophysical Research Letters*. doi:10.1029/2022GL100814
- \*19. Horton F, **Holder RM** [*corresponding author*], Swindle C (2022) An extensive record of orogenesis recorded in a Madagascar granulite. *Journal of Metamorphic Geology*. doi:10.1111/jmg.12628
18. Brenner DC, Passey BH, **Holder RM**, Viete DR (2021) Clumped-isotope geothermometry and carbonate U-Pb geochronology of the Alta stock metamorphic aureole, Utah, USA: Insights on the kinetics of metamorphism in carbonates. *Geochemistry, Geophysics, Geosystems*. doi:10.1029/2020GC009238
17. Guice GL, Ackerson MR, George FR, **Holder RM**, Burgess JL, Browning-Hanson JF, Foustoukos DI, Becker N, Viete DR (2021). The Baltimore mafic complex, Maryland: Ophiolite fragments in the Southern Appalachian Orogen. *Geosphere*. doi:10.1130/GES02289.1

↑Published while at University of Michigan↑

↓Published before joining University of Michigan↓

16. Závada P, Štípská P, Hasalová P, Racek M, Jeřábek P, Schulmann K, Kylander-Clark A, **Holder RM** (2020) Monazite geochronology in melt-percolated UHP meta-granitoids: An example from the Erzgebirge continental subduction wedge, Bohemian Massif. *Chemical Geology*. doi:10.1016/j.chemgeo.2020.119919
15. **Holder RM**, Yakymchuk C, Viete DR (2020) Accessory Mineral Eu Anomalies in Suprasolidus Rocks: Beyond Feldspar. *Geochemistry, Geophysics, Geosystems*. doi:10.1029/2020GC009052

14. Štípská P, Schulman K, Racek M, Lardeaux JM, Hacker BR, Kylander-Clark ARC, **Holder RM**, Košuličová M (2019) Finite pattern of Barrovian metamorphic zones: interplay between thermal reequilibration and post-peak deformation during continental collision—insights from the Svratka dome (Bohemian Massif). *International Journal of Earth Sciences*. doi:10.1007/s00531-019-01788-6
13. **Holder RM**, Viete DR, Brown M, Johnson TE (2019) Metamorphism and the evolution of plate tectonics. *Nature*. doi: 10.1038/s41586-019-1462-2
12. **Holder RM**, Hacker BR, Seward GGE, Kylander-Clark ARC (2019) Interpreting titanite U–Pb dates and Zr thermobarometry in high-grade rocks: empirical constraints on elemental diffusivities of Pb, Al, Fe, Zr, Nb, and Ce. *Contributions to Mineralogy and Petrology*. doi:10.1007/s00410-019-1578-2
11. Hacker BR, Kylander-Clark ARC, **Holder RM** (2019) REE partitioning between monazite and garnet: Implications for petrochronology. *Journal of Metamorphic Geology*. doi:10.1111/jmg.12458
10. **Holder RM**, Hacker BR (2019) Fluid-driven resetting of titanite following ultrahigh-temperature metamorphism in southern Madagascar. *Chemical Geology*. doi:10.1016/j.chemgeo.2018.11.017
9. **Holder RM**, Sharp ZD, Hacker BR (2018) LinT, a simplified approach to oxygen-isotope thermometry and speedometry of high-grade rocks: An example from ultrahigh-temperature gneisses of southern Madagascar. *Geology*. doi:10.1130/G40207.1
8. **Holder RM**, Hacker BR, Horton F, Rakotondrazafy AFM (2018) Ultrahigh-temperature osumilite gneisses in southern Madagascar record combined heat advection and high rates of radiogenic heat production in a long-lived high-temperature orogen. *Journal of Metamorphic Geology*. doi:10.1111/jmg.12316
7. Peřestý V, Lexa O, **Holder RM**, Jerabek P, Racek M, Štípská P, Schulmann K, Hacker B (2016) Metamorphic inheritance of Rheic passive margin evolution and its early Variscan overprint in the Teplá-Barrandian Unit, Bohemian Massif. *Journal of Metamorphic Geology*. doi:10.1111/jmg.12234
6. Štípská P, Powell R, Hacker BR, **Holder RM**, Kylander-Clark ARC (2016) Uncoupled U/Pb and REE response in zircon during the transformation of eclogite to mafic and intermediate granulite (Blanský les, Bohemian Massif). *Journal of Metamorphic Geology*. doi:10.1111/jmg.12193
5. Horton F, Hacker BR, Kylander-Clark ARC, **Holder RM**, Jöns N (2016) Focused radiogenic heating of middle crust caused ultrahigh temperatures in southern Madagascar. *Tectonics*. doi:10.1002/2015TC004040
4. **Holder RM**, Hacker BR, Kylander-Clark ARC, Cottle JM (2015) Monazite trace-element and isotopic signatures of (ultra)high-pressure metamorphism: examples from the Western Gneiss Region, Norway. *Chemical Geology*. doi:10.1016/j.chemgeo.2015.04.021
3. Hacker BR, Kylander-Clark ARC, **Holder RM**, Andersen T, Peterman E, Walsh E, Munnikhuis J (2015) Monazite response to ultrahigh-pressure subduction from U-Pb dating by laser-ablation split-stream ICP-MS. *Chemical Geology*. doi:10.1016/j.chemgeo.2015.05.008
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1. Broussolle A, Štípská P, Lehmann J, Schulmann K, Hacker BR, **Holder RM**, Kylander-Clark ARC, Hanžl P, Racek M, Hasalová P, Lexa O, Hrdličková K, Buriánek D (2015) P–T–t–D record of crustal-scale horizontal flow and magma assisted doming in the SW Mongolian Altai. *Journal of Metamorphic Petrology*. doi:10.1111/jmg.12124

## Other Scholarly Contributions

### *Conference Abstracts* †Graduate student presenter ‡Postdoctoral researcher presenter

78. Aguilar Jr, D, **Holder RM**, Zhao P, Zhou X, Erdei E, Colacino JA (2026) Uranium, Lead and Other Toxic Metals Mapped in New Mexican Women's Triple-Negative Breast Cancer Samples. Society of Toxicology
77. Gordon B, Lange R, **Holder RM** (2025) The age of the Benton Range, CA high-SiO<sub>2</sub> rhyolite dike swarm from U–Pb zircon geochronology: tectonic implications. AGU
- †76. Neumann S, **Holder RM**, Connop C (2025) Understanding the Subduction Mélange Rocks of Cedros Island, Baja California, Mexico Using U-Pb Dating, ZIR, and QUG. AGU
- †75. Xu Y, **Holder RM**, Neumann S, Connop C (2025) Rapid exhumation of the subduction mélange of Cedros Island, Baja California, Mexico from compositional zoning of garnet. AGU
74. **Holder RM**, Xu Y, Hames W (2025) Rapid cooling of the Neoproterozoic Quetico metamorphic belt challenges the paradigm of long-lived, slow-cooling Archean metamorphism. GSA
- ‡73. Connop CH, **Holder RM**, Neumann SR, Xu Y, Hernández-Uribe D, Wang JW, Kapp P, He JJY, Worthington J (2025) Early Metamorphism of High-Grade Blocks from the Subduction Mélange of Cedros Island, Baja California, Mexico: Insights from Garnet Lu-Hf Geochronology. GSA
72. Roy S, **Holder RM**, Ramezani J, Hames WE, Webb LE, Guice GL, George FR, Stokes MR, Brenner DC, Nelson LL, Viete DR (2025) Barrovian metamorphic episodes in the Lake Superior Area, Michigan (USA): Insights into Paleoproterozoic mid-crustal thermal evolution. GSA
71. Hernández-Uribe D, Pramanik S, **Holder RM**, Kapp P, Wang JW, He JJY, Worthington J (2025) Tectonothermal constraints of high-grade blocks in the Puerto Nuevo subduction mélange. GSA Penrose Conference - International Eclogites Conference
70. **Holder RM**, Hernández-Uribe D, Wang JW, Connop CH, Neumann SR, Xu Y, Kapp P, He JJY, Worthington J (2025) Empirical constraints on the long-term evolution of subduction-zone thermal structure: P–T–t estimates from the Cedros Island subduction complex, Baja California. GSA Penrose Conference - International Eclogites Conference
- ‡69. Connop CH, **Holder RM**, Neumann SR, Xu Y, Hernández-Uribe D, Wang JW, Kapp P, He JJY, Worthington J (2025) The age of enigmatic high-grade blocks in subduction mélange of Cedros Island and their relationship to the tectonic evolution of the North American Cordillera: Garnet Lu-Hf and Sm-Nd geochronology. GSA Penrose Conference - International Eclogites Conference
- †68. Xu Y, **Holder RM** (2024) Did Metamorphic Terranes Cool Slower In the Past? Investigating Cooling Rates from Garnet Diffusion Chronometry on the Neoproterozoic Quetico Subprovince, Canada. AGU
67. Pramanik S, Hernández-Uribe D, **Holder RM** (2024) Pressure–Temperature evolution of high-pressure blocks of the Puerto Nuevo mélange complex (Baja California Sur, Mexico). GSA
- †66. Schroeder HY, **Holder RM** (2024) Analysis of tectonic activity from modern thermobarometry during the late Archean in the English River Subprovince, Ontario Canada. *Granulites & Granulites*
- †65. Xu Y, Holder RM (2024) Did Archean Metamorphic Terranes Cool Slower? Garnet Diffusion Study of the Quetico Subprovince, Canada. *Granulites and Granulites*
64. **Holder RM** (2024) Tracking partial melting with LREE content of monazite. *Granulites & Granulites*
- †63. Street JD, Holder RM (2024) The behaviour of Uranium, Thorium and Potassium during melting: Insights from the Palaeoproterozoic Metapelites of the Mojave Crustal Province. *Goldschmidt*
62. Kaare-Rasmussen J, Horton F, **Holder RM**, Kylander-Clark A, Bouvier A-S, Müntener O, Rakotondrazafy AFM (2024) Elevated mantle heat flow after lithospheric foundering causes differentiation and metamorphism during orogenesis. *Goldschmidt*
61. Ryb U, Ben-Israel M, **Holder RM**, Nelson LL, Smith EF, Kylander-Clark ARC (2024) Late Paleozoic Oxygenation of Marine Environments constrained by Dolomite U-Pb Dating. *Goldschmidt*
- †60. Xu Y, **Holder RM** (2024) Cooling of an Archean metamorphic terrane: garnet diffusion study of the Quetico Subprovince, Canada. *Institute on Lake Superior Geology*

59. Gonzalez-Duran AF, Simon AC, **Holder RM**, Thompson JFH, Wade D, Ryan C (2024) Overlapping Alkalic Porphyry Cu-Au and Magnetite-Apatite mineralization in the Iron Mask Batholith, British Columbia, Canada. IGC
58. Weaver L, Kelson JR, **Holder RM**, Niemi NA, Badgley C (2024) On the role of tectonics in stimulating the Cretaceous diversification of mammals. NAPC
57. Kaare-Rasmussen J, Horton F, **Holder RM**, Kylander-Clark ARC, Bouvier A-S, Müntener O, Rakotondrazafy M, Paquette J-L (2023) Mantle heat advection not responsible for ultrahigh-temperature metamorphism in Madagascar. AGU
56. Horton F, **Holder RM**, Rakotondrazafy AFM (2023) Petrochronologic 4D reconstruction of the Malagasy orogen. AGU
- †55. Street JD, **Holder RM** (2023) Low-pressure granulite metamorphism in the Ivanpah and southern McCullough Mountains. GSA
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- †53. **Holder RM**, Viete DR (2023) Secular change in global tectonics since the Neoproterozoic: A New Perspective from Metamorphic Isograd Sequences. GSA
- †52. **Holder RM**, Horton F, Swindle C (2023) Structurally Trapped ultrahigh-temperature metamorphism in the core of the East-African Orogeny, Southern Madagascar. GSA
51. Cerling T, Huth T, Marchetti D, Passey B, Ellwein A, Mahan S, Bard E, Rostek F, Tuna T, Blum T, **Holder R** (2023) Sub-millennial scale reconstruction of late Quaternary critical zones in Utah, USA using laminated soil carbonate rinds. Goldschmidt
- †50. Street JD, **Holder RM** (2023) High-temperature granulite metamorphism in the Ivanpah and southern McCullough mountains ranges. NC-GSA
- †49. Schroeder H, **Holder RM**, Roy S (2023) Analysis of tectonic activity during the late Archean in the English River Subprovince, Ontario Canada. NC-GSA
- †48. Xu Y, **Holder RM**, Viete DR (2023) Interrogating the record of Archean tectonics from the metamorphic record of the Minnesota River Valley, USA. NC-GSA
47. **Holder RM**, Viete DR (2023) The metamorphic rock record through Earth's history. NC-GSA
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45. Huth T, Marchetti D, Passey B, Cerling T, Ellwein A, Mahan S, Bard E, Rostek F, Tuna T, Blum T, **Holder R** (2022) High-resolution analytical techniques in the development of a novel paleoclimate archive; Laminated soil carbonate rinds as a tool for investigating late Quaternary climate-vegetation links. AGU
- †44. Xu Y, **Holder RM**, Viete DR (2022) Interrogating the record of Archean tectonics from the metamorphic record of the Minnesota River Valley, USA. AGU
43. Myers ML, Condit C, Warren J, **Holder RM**, Cooperdock EHG, Guevara V, Rader E, Bauer A, Mixon E (2022). Petronet: A petrology and high-temperature geochemistry community build with an antiracist and inclusive framework. AGU
- †42. Street JD, **Holder RM** (2022) High-Temperature Granulite Metamorphism in the Ivanpah and Southern McCullough Mountain Ranges. AGU
41. Su X, Zhang Y, Liu Y, **Holder RM** (2022) In-gassing of Na, K and Cu in Lunar 15366 Green Glass Beads. AGU
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39. Guice G, **Holder RM**, Viete DR (2022) A Paleoproterozoic record of modern-style subduction initiation? Evidence from the 1.9 Ga Pembine Ophiolite, Wisconsin (USA). GSA
- ‡38. Hernández-Uribe D, **Holder RM** (2022) Eclogite thermobarometry: a comparison between conventional thermobarometry and phase equilibrium modeling. International Eclogites Conference

37. Su X, Zhang Y, Liu Y, **Holder R** (2022) Cooling Time Scales of Lunar 74220 Orange Glass Beads from Na and Cu Profiles. Goldschmidt
36. Viète D, Becker N, Burgess J, Junkin W, George F, **Holder RM** (2022) The Baltimore Mafic Complex: Key record of earliest convergence in the central Appalachians. NE/SE-GSA CANCELED due to pandemic
35. Ben-Israel M, Ryb U, **Holder RM**, Kylander-Clark A (2021) U–Pb dating constraints on dolomite formation environments. AGU
34. Rodríguez-Mustafa MA, Blakemore D, Simon AC, **Holder RM**, del Real I, Barra F, Reich M, Thompson JFH, Hames WE (2021) Magnetite, apatite, titanite, and actinolite geochronology of the Candelaria iron oxide-copper-gold (IOCG) deposit, Chile. GSA
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29. Ben-Israel M, Ryb U, **Holder RM**, Kylander-Clark ARC (2021) U-Pb dating and clumped isotopes constraints on massive-dolomite formation environments. Goldschmidt
28. Gutiérrez-Aguilar F, Hernández-Uribe D, **Holder RM**, Condit C (2021) The Mw7.1 September 19th Puebla-Morelos (Mexico) earthquake triggered by brucite and antigorite dewatering. EGU
27. **Holder RM**, Viète DR, Brown M, Johnson T (2020) Metamorphism and the evolution of plate tectonics. AGU
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24. Guice GL, Ackerson MR, **Holder RM**, George FR, Browning-Hanson JF, Burgess JL, Foustoukos DI, Becker NA, Nelson WR, Viète DR (2020) The Baltimore Mafic Complex, Maryland: ophiolite fragments in the southern Appalachian Orogen? GSA

↑Presented while at University of Michigan↑

↓Presented before joining University of Michigan↓

23. Viète DR, **Holder RM** (2020) Accretionary orogenesis in the Lake Superior region, USA: modern-like tectonics during the Paleoproterozoic. EGU
22. Burgess J, Becker NA, **Holder RM**, Piccoli PM, Viète DR (2020) Geochemical and thermobarometric constraints on the Perry Hall and tectonically associated gneisses from the Baltimore area piedmont, Maryland. NE/SE-GSA CANCELED due to pandemic
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20. Becker NA, Browning-Hanson J, **Holder RM**, Nelson WR, Burgess JL, Viète DR (2020) Geochemical progression in lavas and shallow intrusives of the Appalachian–Caledonian Leka ophiolite complex, Norway. NE/SE-GSA CANCELED due to pandemic
19. Viète DR, **Holder RM** (2019) Modern-style metamorphism in the Paleoproterozoic: A product of stochasticity in ‘time to subduction initiation’ within ocean basins? GSA

18. **Holder RM**, Hacker BR, Kylander-Clark ARC, Seward GGE (2019) Interpreting titanite U–Pb dates and Zr temperatures in high-grade rocks: Empirical constraints on elemental diffusivities. GSA
17. **Holder RM**, Hacker BR (2018) Prolonged fluid-driven resetting of titanite following ultrahigh-temperature metamorphism in southern Madagascar. AGU
16. Swindle C, **Holder RM** (2018) Mechanisms of granulite formation in an archetypal accretion-to-collision orogen: pseudosections and monazite petrochronology from southern Madagascar. AGU
15. Viete DR, **Holder RM** (2018) Geodynamics of (U)HT granulite metamorphism: a view from ‘accessory’ terranes. Granulites and Granulites
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13. **Holder RM**, Hacker BR (2017) Titanite chronology, thermometry, and speedometry of ultrahigh-temperature (UHT) calc-silicates from south Madagascar: U–Pb dates, Zr temperatures, and lengthscales of trace-element diffusion. AGU
12. **Holder RM**, Hacker BR (2017) Titanite petrochronology of ultrahigh-temperature (UHT) calc-silicates from southern Madagascar: laser-ablation split-stream ICP-MS spot analyses, depth profiles, and quantified trace-element x-ray maps. EGU
11. **Holder RM**, Hacker BR (2016) The importance of intracrustal magmatic heat advection in large hot orogens: the Ediacaran-Cambrian ultrahigh-temperature domain of southern Madagascar. AGU
10. Hacker BR, Kylander-Clark ARC, **Holder RM**, Nuriel P (2016) U–Pb dating of Calcite by LA-ICPMS. AGU
9. **Holder RM**, Hacker BR, Kylander-Clark ARC, Everson A (2016) Development of calcite reference materials for *in-situ* U–Pb dating and trace-element analysis. GSA Annual Meeting
8. **Holder RM**, Hacker BR (2016) Intracrustal magmatic heat advection in the Ediacaran UHT domain of Madagascar. GSA
7. **Holder RM**, Hacker BR, Horton F (2015) Protracted high-grade metamorphism in southern Madagascar: P-T-t paths of the Anosyen, Androyen, and Ikalamavony domains. Granulites and Granulites
6. **Holder RM**, Hacker BR, Kylander-Clark ARC, Cottle JM (2014) Monazite trace-element and isotopic signatures of high-pressure metamorphism: examples from the Western Gneiss Region, Norway. AGU
5. Perestý V, **Holder RM**, Lexa O, Racek M, Jerábek P (2014) Petrochronological and structural arguments for upper plate thickening and relamination of the lower plate buoyant material in the Variscan Bohemian Massif. EGU
4. **Holder RM**, Hacker BR, Kylander-Clark ARC (2013) Monazite Petrochronology from the UHP Western Gneiss Region, Norway. AGU
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2. Perestý V, **Holder RM**, Lexa O, Racek M, Hacker BR (2013) Polyphase tectonometamorphic evolution of the Teplá Crystalline Complex: New structural, petrological, and geochronological data. GeoPilsen
1. Hacker BR, Kylander-Clark ARC, Horton F, **Holder RM** (2013) Applying U/Th-Pb and trace-element LASS petrochronology to understanding high-temperature metamorphism. GSA

### ***Community dataset***

Holder RM and Viete DR (2024) A Compilation of Metamorphic Isograd Sequences and Their Ages, Version 1.0. Interdisciplinary Earth Data Alliance (IEDA). doi.org/10.26022/IEDA/112748

### ***Code***

Python code for batch-processing of Al-in-orthopyroxene thermobarometry corrected for retrograde Fe–Mg diffusion (after method of Pattison et al., 2003; 2019). [github.com/rmholdergeo/batchRCLC](https://github.com/rmholdergeo/batchRCLC)