Omar Khalil Droubi

650-787-4799 | droubi@wisc.edu | https://okdroubi.com/ |
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Education

University of Wisconsin–Madison Expected June 2027
Ph.D. Geoscience, distributed Ph.D. minor in Data Science *Advisor: Dr. Chloë Bonamici*

Dissertation: Constructing Tectonic-Fluid-Mineralization Histories for Ancient Convergent Margins

University of Wisconsin–Madison August 2022
M.Sc. Geoscience *Advisors: Dr. Annie Bauer and Dr. Chloë Bonamici*

Thesis: Multiphase Petrochronology of Archean Gneiss Complexes

University of California–Santa Barbara June 2020
B.Sc. Earth Science, minor in Spatial Science *Advisor: Dr. Roberta Rudnick*

Thesis: Origins and Evolution of the Lower Crust Beneath Central Madagascar

Research Interests

The integration of field and petrologic observations with geochemical microanalysis and modeling to reconstruct tectonic, metamorphic, fluid, and mineralization histories. These reconstructions are used to study: tectonic and fluid controls on ore mineralization, mechanisms for high temperature metamorphism and melt production in the continents, crystallization and modification of mineral geochronometers during metamorphism and fluid interaction, deep crustal fluid flow, the evolution of tectonics, and craton assembly.

Professional Experience

University of Wisconsin–Madison September 2023 – Present
Graduate Dissertator and Teaching Assistant *Advisor: Dr. Chloë Bonamici*

- **Research:**
  - My PhD dissertation studies the geologic conditions for critical mineral formation and fluid transport during mountain belt formation in USA.
  - I am the lead PI on a project, in collaboration with researchers from UW-Madison, Central Michigan University, and Penn State University, that uses petrochronology to constrain the timing of lithium-rich pegmatite emplacement in northern WI, USA and relate emplacement to the regional tectonic history.
  - I am the sole graduate researcher on an NSF-funded collaboration between PIs from UW-Madison and Northern Arizona University using geochemistry, petrochronology, and numerical modeling to determine the source(s) and timing of metasomatism in western North America during the Laramide orogeny.
- **Mentorship:**
  - Trained and mentored 5+ undergraduate students on conducting research in lab and field-based settings, writing grant proposals, technical writing and presentations, thesis writing, and applying to graduate school.
  - Student mentees from other universities through the Geosciences Education and Mentorship Support (GEMS) program, GSA Geochronology Division Mentorship program, and existing collaborations.
  - Direct experience supporting mentees with Pell grants or requesting physical accommodations.
- **Service:**
  - Acquired funding for and developed "Monday Community Mornings", a weekly community program in the Geoscience Department that promotes collaboration and mentorship between faculty, students, and staff.
  - As former President and current Professional Development chair for the department Geoscience Graduate Student Association (GGSA), I am experienced in communicating with department leadership; organizing career panels, workshops, retreats, and research symposiums; and managing substantial financial budgets.
- **Teaching:**
  - Lab Instructor for Introductory Geology (GEO 100) and Elementary Petrology (GEO 370), where labs reinforce lecture material through hands-on learning, such as working with geologic maps or petrographic microscopes.
  - Core tenets of my teaching include student participation in learning plan design, integrative pedagogy, active learning, community building, and advocacy, which guide lab design and implementation.

The Pennsylvania State University October 2022 – May 2023

Researcher in the LionChron LA-ICP-MS lab *Supervisors: Dr. Andy Smye and Dr. Josh Garber*

- **Research:**
  - Combined LA-ICP-MS and EPMA techniques with diffusion and phase equilibria modeling to study trace-element systematics in minerals from ultrahigh-temperature crustal xenoliths.
  - Results from this work constrain the heating mechanisms for active lower crustal melting in western North America and empirically validate experimentally-determined garnet diffusion mechanisms.
  - Informally mentored several undergraduates and junior graduate students on LA-ICP-MS instrumentation.

University of Wisconsin–Madison September 2020 – August 2022

Graduate Researcher in the ICP-TIMS lab *Advisors: Dr. Annie Bauer and Dr. Chloë Bonamici*

- **Research:**
  - Developed and applied LASS-ICP-MS and EPMA techniques used to interpret titanite and apatite U-Pb ages in some of the oldest rocks on Earth: the Acasta Gneiss Complex and the Watersmeet Gneiss.
  - Developed independent proficiency in the lab and informally mentored other graduate and undergraduate researchers in specific mass spectrometry and clean lab geochemistry methods.

University of California–Santa Barbara October 2017 – July 2020

Undergraduate Researcher and Student Instructor *Supervisors: Dr. Roberta Rudnick and Dr. Francisco Apen*

- **Research:**
  - Conducted Senior Honors thesis researching granulite-facies xenoliths, sampled in Madagascar, combining petrography with LA-ICP-MS, EPMA, and phase equilibria modeling techniques to determine past thermal state of the lower crust in central Madagascar.
  - Acknowledged in Apen et al., 2020 and Apen et al., 2024 for assistance with mineral separation, LA-ICP-MS sample preparation, and field work for lower crustal xenolith studies of Tanzania and Montana, USA.
  - Two weeks in Oman studying and mapping the Semail ophiolite with advanced graduate/undergraduate class.
- **Teaching:**
  - As an undergraduate teaching assistant for Introduction to Geochemistry (EARTH 124 IG) I hosted weekly office hours, graded assignments, and developed practices for presenting constructive feedback and adapting teaching styles to accommodate a wide range of student needs.

Publications and Theses

Droubi, O.K., Bauer, A.M., Bonamici, C., Nachlas, W.O., Garber, J.M., Tappa, M.J., and Reimink, J.R. (2025). Eoarchean–Paleoproterozoic Tectonothermal History of the Acasta Gneiss Complex Constrained by Titanite and Apatite Petrochronology. Geochemistry, Geophysics, Geosystems, 26(7), e2025GC012294.

Droubi, O.K., Cipar, J.H., Smye, A.J., and Garber, J.M. (2024). Xenolith petrochronology (San Luis Potosi, Mexico) constrains heat sources for Cenozoic ultrahigh-temperature metamorphism in the lower crust. Journal of Geophysical Research: Solid Earth, 129(8), e2024JB029138.

Droubi, O.K., Bauer, A.M., Bonamici, C., Nachlas, W.O., Tappa, M.J., Garber, J.M., and Reimink, J.R. (2023). U-Th-Pb and trace element evaluation of existing titanite and apatite LA-ICP-MS reference materials and determination of 208Pb/232Th-206Pb/238U date discordance in Archaean accessory phases. Geostandards and Geoanalytical Research, 47(2), 337-369.

Droubi, O.K. (2022) Multiphase Petrochronology of Archean Gneiss Complexes: Unraveling polymetamorphic records at the Acasta Gneiss Complex, Northwest Territories, Canada and the Watersmeet Gneiss Dome, MI, USA (Master's thesis, University of Wisconsin-Madison)

Droubi, O.K. (2020). Origins and evolution of the lower crust beneath central Madagascar: Insights from granulite-facies xenoliths in rift basalts (Undergraduate Senior Honors thesis, University of California-Santa Barbara) [available upon request]

Manuscripts in Preparation

Droubi, O.K., Bonamici, C., Bauer, A.M., Garber, J.M., Tappa, M.J., Nachlas, W.O., and Reimink, J.R., Same tectonic history, different records: Petrochronologic insights from interleaved lithologies within the Watersmeet gneiss dome, MI, USA. *(in prep for Geochemistry, Geophysics, Geosystems)*

Awards & Grants

Graduate Awards

- Institute on Lake Superior Geology, Doug Duskin Student Paper Award (2025)
- UW-Madison Dept of Geoscience Weeks Research Assistant Fellowship (2023)
- Geological and Mineralogical Society, Annual Metamorphic Studies Group meeting, Best Student Poster (2023)
- UW-Madison Dept of Geoscience, Outstanding Student Publication (2023)
- UW-Madison Dept of Geoscience Weeks/Senger Research Assistant Fellowship (2021; 2025)
- UW-Madison Advanced Opportunity Fellowship (2020)

Undergraduate Awards

- UC-Santa Barbara Dept of Earth Science, Charles D. Woodhouse Award (2020)
- UC-Santa Barbara Dept of Earth Science, Distinction in the Major Award (2020)
- UC-Santa Barbara Dept of Earth Science, Outstanding Academic Achievement Award (2020)
- Coast Geological Society Award (2020)
- UC-Santa Barbara Dept of Earth Science, Field Award (2019)

Awarded Grants

- Geological Society of America MGPV Division Student Travel Grant (2025)
- Geological Society of America North-Central Section Student Travel Grant (2025)
- Institute on Lake Superior Geology, Eisenbrey Student Travel Award (2025)
- Institute on Lake Superior Geology, Joe Mancuso Student Research Award (2024)
- UW-Madison Dept of Geoscience, Graduate Student Research Grant (2024)
- UW-Madison Dept of Geoscience, Katharine Fowler-Billings Award, "Monday Community Mornings" (2024–2025)
- Geological Society of America Graduate Student Research Grant (2021)
- UC-Santa Barbara Undergraduate Research and Creative Activities (URCA) Grant (2019)

Presentations

Droubi, O. K., Schoonover, E.J., Sirbescu, M.L.C., Garber, J.M., Bonamici, C.E., 2025, Mesoproterozoic Lithium-Cesium-Tantalum Pegmatite Mineralization Constrained by U-Pb Titanite and Apatite Geochronology. Geological Society of America Abstracts with Programs. Vol. 57, No. 6 (Oral)

Droubi, O. K., Craddock Affinati, S., Hoisch, T. D., Blum, T., Kitajima, K., Bonamici, C.E., 2025, Reconstructing Fluid Histories for Metasomatic Rocks in the Big Maria Mountains and Cargo Muchacho Mountains, Southeastern California, using Oxygen Isotopes and U-Pb Geochronology. Geological Society of America Abstracts with Programs. Vol. 57, No. 6 (Oral)

Craddock Affinati, S., **Droubi, O. K.**, Hoisch, T. D., Bonamici, C.E., Cummings, C., Durica, Z., Epstein, G., Haxel, G.B., Jacobson, C.E., 2025, Miocene ages of monazite and titanite in Orocopia Schist and included metasomatized rocks at Cemetery Ridge, southwest Arizona. Geological Society of America Abstracts with Programs. Vol. 57, No. 6 (Oral)

Hoisch, T. D., Craddock Affinati, S., **Droubi, O. K.**, Mastorakos, B., Bonamici, C.E., Jacobson, C.E., Epstein, G., Haxel, G.B., 2025, Pressure-temperature path from the Laramide shallow-angle subduction channel determined from Orocopia Schist, Chocolate Mountains, southeastern California, and implications for evolution of the subduction system. Geological Society of America Abstracts with Programs. Vol. 57, No. 6 (Oral)

Droubi, O. K., Schoonover, E.J., Sirbescu, M.L.C., Garber, J.M., Bonamici, C.E., 2025, Geochronology of lithium mineralization in the Florence pegmatite field, WI, USA. 71st Annual Meeting on the Proceedings of the Institute on Lake Superior Geology. [Doug Duskin Student Paper Award] (Oral)

Droubi, O. K., Garber, J.M., Smye, A.J. 2023, Trace-element zoning in garnet from lower crustal xenoliths preserves record of crustal anatexis in response to Mexican Basin and Range extension. Metamorphic Studies Group research in progress (RiP) meeting. [Best Student Poster Award]

Droubi, O. K., Bonamici, C.E., Bauer, A.N., Nachlas, W.O., Garber, J.M., 2022, Tectonothermal evolution of the southern Laurentian margin from the Neoarchean to the Paleoproterozoic recorded in the Watersmeet Gneiss Dome, MI, USA. Geological Society of America Abstracts with Programs. Vol 54, No. 5 doi: 10.1130/abs/2022AM-380276. (Oral)

Droubi, O. K., 2022, Building Python-based analytical software for EPMA. Geological Society of America Annual Meeting, Pre-GSA Workshop: Connecting emerging lab data management capabilities to community geochemistry systems. (Oral)

Droubi, O. K., Bonamici, C.E., Bauer, A.N., Nachlas, W.O., Tappa, M.J., 2021, Titanite petrochronology of the Acasta Gneiss Complex, Northwest Territories, Canada. American Geophysical Union Fall Meeting, Abstract V15A-0089.

Professional Skills

Leadership and Collaboration: Through leadership on research teams and in numerous student organizations, I have publishing journal articles and organized events and programming. I lead by inviting and acknowledging contributions from all team members, helping teams break down complex goals, delegating responsibilities, and achieving deadlines.
Technical and Grant Writing: Personally secured over $8000 in research and travel grant funding, over $1000 in funding for service projects, and additional funding through supervised undergraduate grant proposals. My publication record of two theses and three published journal articles is testament to my strong technical writing.
Mentorship and Teaching: Experienced at teaching introductory to advanced geoscience course material. My philosophy of using wholeness-based practices and integrating students into cohorts and communities that foster diverse perspectives has resulted in successful supervision and mentorship of many undergraduates, including first-generation college students, Pell grant recipients, and students with physical impairments.
Professional Development and Community Building: Experienced with developing and organizing community-building and professional development programming across different career levels in an academic setting, such as "Monday Community Mornings", student research symposiums, banquets, retreats, and workshops.
Budget Management: Experienced at creating budgets, budget justifications and cost-comparisons, working with administrators on budgets, and doing internal audits and bookkeeping for research funds, as well as organizational funds.
Instrumentation: To use the advanced microanalytical techniques in my research I have developed the experience to independently operate the following instruments: Thermo Scientific Element XR HR-ICPMS and iCAP RQ-ICP-MS, Agilent 8900x MS/MS ICPMS, Nu Plasma II MC-ICP-MS, CAMECA IMS 1280, CAMECA SXFiveFE and SX-100 EPMA, Hitachi S3400N VP-SEM, Horiba LabRAM HR Evolution Raman
Field Work :Over 100 days of field experience as a leader, teacher, assistant, and student making geologic maps, taking structural measurements, and/or sampling for geology research. Experienced camper, backpacker, and rock climber.
Data Science: Advanced skills in data compilation, management, and analysis using Python, GIS, and Microsoft Excel. Specific strengths include manipulating large datasets, automated report generation, geospatial data analysis, machine learning for statistical analysis, natural language processing, and graphic user interface development.
Software: Python, MS Office Suite, Iolite, QGIS/ArcPro, Adobe Suite, IsoplotR, Probe for EPMA, PerpleX, Theriak-Domino
Certifications: Adult Mental Health First Aid (Sep 2025); American Red Cross Adult and Pediatric First Aid/CPR/AED (Sep 2025).