Dr. Aleisha C. Johnson

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RESEARCH INTERESTS

Isotope Geochemistry and Metal Cycling; Paleoredox Proxies; Co-Evolution of Life and the Environment; Magmatic Differentiation; the Composition of Earth's Continental Crust

PROFESSIONAL PREPARATION

Ph.D. Geological Sciences, Arizona State University, 2020. **Advisor**: Ariel D. Anbar

"*Investigations into crustal composition and oxidative weathering in the Archean*"

B.S. Geology, University of Wisconsin – Eau Claire, 2014. **Advisor**: Phillip D. Ihinger

PROFESSIONAL APPOINTMENTS

Postdoctoral Researcher, University of Arizona	2022-Present
NSF EAR Postdoctoral Fellow, University of Chicago	2020-2022
NASA Earth and Space Science Fellow, Arizona State University	2017-2020
Research Assistant, Arizona State University	2014-2017
Teaching Assistant, Arizona State University	2015
Research Assistant, University of Wisconsin – Eau Claire	2012-2014

PEER-REVIEWED PUBLICATIONS

18. **Johnson AC**, Ibañez-Mejia M, Tissot FLH, Zieman L (*in prep*) The Ti isotope composition of modern arc lower crust and implications for the global Ti cycle.
17. Ling EG, Aarons SM, Zhang ZJ, Huang L, **Johnson AC**, Ibañez-Mejia M, Yogodzinski G, Dauphas N, Kelemen P (*in prep*) Titanium isotopic insight into rock formation processes within the Aleutian Island Arc.
16. Kang P, **Johnson AC**, Ibañez-Mejia M, Tissot FLH, Whitney DL, Gordon SM, DesOrmeau J, Fornash KF (*in prep*) The titanium isotopic compositions of subduction components and their influence on the δ49/47Ti of arc magmas and the mantle.
15. Siciliano AA, Heard AW, **Johnson AC,** Anbar AD, Ostrander CM (*in review*) Did the Great Oxidation Event begin 2.5 billion years ago? *Nature Communications*
14. Scoogin SH, **Johnson AC**, Ibañez-Mejia M, Tissot FLH, Memeti V, Chapman JB, Hammerli J (*in review*) Titanium isotope fractionation in continental arc plutonic systems is controlled by silicates rather than oxide crystallization: an example from the Tuolumne Intrusive Complex. *Geochimica et Cosmochimica Acta*
13. **Johnson AC**, Ibañez-Mejia M, Tissot FLH (2025) Advances in measurements of mass-dependent titanium isotope variations. *Analytical Isotope Geochemistry: Techniques and Data Interpretation (Ed. Tripathy G) Springer, 181-198.*
12. Kovalick A, Heard AW, **Johnson AC**, Chan CS, Ootes L, Nielsen SG, Dauphas N, Weber B, Bekker A (2024) Living in their heyday: Iron-oxidizing bacteria bloomed in shallow-marine, subtidal environments at ca. 1.88 Ga. *Geobiology 6, e70003.*
11. Zhang ZJ, Dauphas N, **Johnson AC**, Aarons SM, Bennett VC, Nutman AP, MacLennan S, Schoene B (2023) Titanium and iron isotopic records of granitoid crust production in diverse Archean cratons. *Earth and Planetary Science Letters 620, 118342.*

10. Anbar AD, Buick R, Gordon G, **Johnson AC**, Kendall B, Lyons TW, Ostrander CM, Planavsky NJ, Reinhard CT, Stüeken EE (2023) Technical comment on "Reexamination of 2.5-Ga 'whiff' of oxygen interval points to anoxic ocean before GOE". *Science Advances 9, eabq3736*.
9. **Johnson AC,** Zhang ZJ, Dauphas N, Rudnick RL, Foden JD, Toc M (2023) Redox and mineral controls on Fe and Ti isotopic fractionations in the Rindjani calc-alkaline differentiation suite. *Geochimica et Cosmochimica Acta 355, 1-12.*
8. Aarons SM, **Johnson AC,** Rader ST (2021) Forming Earth's continental crust: A non-traditional stable isotope perspective. *Elements*.
7. **Johnson AC,** Ostrander CM, Romaniello SJ, Reinhard CT, Greaney AT, Lyons TW, Anbar AD (2021) Reconciling evidence of oxidative weathering and atmospheric anoxia on Archean Earth. *Science Advances 7, eabj0108.*
6. Aarons SM, Dauphas N, Blanchard M, Zeng H, Nie NX, **Johnson AC**, Greber ND, Hopp T (2021) Clues from *ab initio* calculations on titanium isotopic fractionation in tholeiitic and calc-alkaline magma series. *ACS Earth and Space Chemistry.*
5. Ostrander CM, **Johnson AC,** Anbar AD (2021) Earth's first redox revolution. *Annual Review of Earth and Planetary Sciences 49, 337-366.*
4. Greaney AT, Rudnick RL, Romaniello SJ, **Johnson AC**, Anbar AD, Cummings ML (2021) Assessing molybdenum isotope fractionation during continental weathering as recorded by weathering profiles in saprolites and bauxites. *Chemical Geology, 120103.*
3. Greaney AT, Rudnick RL, Romaniello SJ, **Johnson AC**, Gaschnig RM, Anbar AD (2020) Molybdenum isotope fractionation in glacial diamictites tracks the onset of oxidative weathering of the continental crust. *Earth and Planetary Science Letters 534, 1-9.*
2. **Johnson AC**, Aarons SM, Dauphas N, Nie NX, Zeng H, Helz RT, Romaniello SJ, Anbar AD (2019) Titanium isotopic fractionation in Kilauea Iki lava lake driven by oxide crystallization. *Geochimica et Cosmochimica Acta 264, 180-190.*
1. **Johnson AC**, Romaniello SJ, Reinhard CT, Gregory DD, Garcia-Robledo E, Revsbech NP, Canfield DE, Lyons TW, Anbar AD (2019) Experimental determination of pyrite and molybdenite oxidation kinetics at nanomolar oxygen concentrations. *Geochimica et Cosmochimica Acta 249, 160-172.*

GRANTS AND FUNDING

Current Support

3. Collaborator: NASA Interdisciplinary Consortia for Astrobiology Research (2021-2026) "*What Life Wants: Exploring the Natural Selection of Elements*" (PI: Kaçar)

Past Support

2. PI: NSF EAR Postdoctoral Fellowship ($174,000, 2020-2022) "*Application of Paired Ti and Fe Isotopes to Understand the Evolution of Earth's Upper Continental Crust*"

1. NASA Earth and Space Science Fellowship, Arizona State University ($216,000, 2017-2020) "*How low can we go: Measuring Archean weathering rates in ultra low-O_2 experiments*"

TEACHING EXPERIENCE

2023 **Non-Traditional Stable Isotopes in Geochemistry** (GEOS 596A) UA. Co-Instructor.
2019 **Geochemistry** (GLG 481/598) ASU. Guest lectures, grading, exam proctoring.
2015 **Habitable Worlds** (SES 106, online) ASU. Online discussion boards, grading.
2013 **Mineralogy and Petrology II** (GEOL 313) UW – Eau Claire. Lab teaching assistant.
2012 **Rocky Mountain Field Studies** (GEOL 303) UW – Eau Claire. Field teaching assistant.

INVITED TALKS

2024 USGS Geology Minerals Energy Geophysics (GMEG) Science Center (virtual) "*Titanium isotopes as a new tool for probing the formation and evolution of the continental crust"*

2023 University of Maryland (College Park, MD) "*Titanium isotopes as a new tool for probing the formation and evolution of the continental crust"*

2022 University of Arizona (Tucson, AZ) "*Titanium isotopes as a new tool for probing the formation and evolution of the continental crust"*

2022 Massachusetts Institute of Technology (Boston, MA) "*Reconciling evidence of oxidative weathering and atmospheric anoxia on Archean Earth*"

2022 Massachusetts Institute of Technology (Boston, MA) "*Titanium isotopes as a new tool for probing the formation and evolution of the continental crust"*

2021 Carnegie Institution of Washington Geochemistry Reading Group (Washington, DC) "*Reconciling evidence of oxidative weathering and atmospheric anoxia on Archean Earth*"

2021 Purdue University Geology and Geophysics Seminar Series (West Lafayette, Indiana) "*Reconciling evidence of oxidative weathering and atmospheric anoxia on Archean Earth*"

2020 University of California – Davis Department Colloquium (Davis, California) "*Reconciling O_2 whiffs and sulfur MIF: Constraints on Archean atmospheric redox from oxidative weathering signatures*"

PRESENTATIONS AND CONTRIBUTED ABSTRACTS

38. Muñoz-Alfaro J, Garrido CJ, **Johnson AC**, Ibañez-Mejia M, Tissot FLH, Padrón-Navarta JA, König S (2025) Fate of HFSE in subduction zones during slab deserpentinization: New constraints from titanium isotopes. *Goldschmidt*
37. Gregory DD, Chappaz A, Lyons TW, **Johnson AC**, McAdam FM, Perea DE, Taylor SD, Kukkadapu R, Cliff J, Swing MR (2025) The effects and importance of trace element heterogeneities during pyrite oxidation. *Goldschmidt*
36. Edmans E, **Johnson AC**, Anbar AD (2025) Revisiting ancient seawater molybdenum concentrations with mass balance models. *Goldschmidt*
35. Siciliano AA, Ostrander CM, Heard AW, **Johnson AC,** Anbar AD (2025) When did the Great Oxidation Event begin? *Goldschmidt*
34. **Johnson AC**, Ibañez-Mejía M, Tissot FLH, Zieman L (2024) The Ti isotope composition of the Andean lower continental crust: Implications for lower crustal foundering and the co-evolution of crustal and mantle geochemistry. *Goldschmidt* (oral presentation).
33. Kovalick A, Bekker A, Heard AW, Johnson AC, Dauphas N, Chan CS, Ootes L (2024) Were microaerophilic iron-oxidizing bacteria responsible for the deposition of ca. 1.88 ga granular iron formations? *Goldschmidt*
32. Ibañez-Mejía M, Tissot FLH, **Johnson AC**, Kraft R (2024) Simultaneous determination of Hafnium radiogenic (ε 176 Hf) and mass-dependent (δ 179/177 Hf) isotope variations in rocks and minerals using a 174Hf-179Hf double spike. *Goldschmidt*
31. Ling EG, Aarons SM, Zhang ZJ, Huang L, **Johnson AC**, Dauphas N, Yogodzinski G, Kelemen P (2024) Titanium isotopic insights into partial melting versus magma mixing in the Aleutian arc. *Goldschmidt*
30. Bloch E, Ibañez-Mejía M, Watkins JM, Foley ML, **Johnson AC**, Turner S, Tissot FLH, Mallik A, Ulmer P (2024) Diffusive isotope fractionation of Zr in silicate melts. *Goldschmidt*
29. Kang P, **Johnson AC**, Ibañez-Mejía M, Tissot FLH, Whitney DL, Gordon SM, DesOrmeau J, Fornash KF (2024) The influence of subducted components on the Ti isotopic composition of arc magmas. *Goldschmidt*

28. Scoggin S, **Johnson AC**, Ibañez-Mejía M, Tissot FLH, Chapman JB, Memeti V, Hammerli J (2024) The behavior of Ti isotopes during continental batholith construction: Insights from whole rock and mineral separates of the Tuolumne Intrusive Complex. *Goldschmidt*
27. Marroquin-Gómez MP, Ibañez-Mejía M, **Johnson AC** (2024) Geochemistry of the Northern Andean Volcanic Zone, Colombia. *EGU*
26. Zhang ZJ, Dauphas N, **Johnson AC**, Aarons SM, Bennett VC, Nutman AP, MacLennan S, Schoene B (2023) Ti and Fe isotopic signatures of basalt melting and crustal reworking in Archean granitoids. *Goldschmidt*
25. Anbar AD, Buick R, Gordon G, **Johnson AC**, Kendall B, Lyons TW, Ostrander CM, Planavsky NJ, Reinhard CT, Stüeken EE (2023) Progressive Planetary Oxygenation: Multiple Lines of Evidence Confirm an Archean Oxidation Event at 2.5 Ga. *Goldschmidt*
24. Ibanez-Mejía M, Zieman L, Rooney AD, Kang P, Ascencio P, **Johnson AC**, Bloch EM, Pardo-Villaveces N (2023) The petrology and Re-Os isotope geochemistry of young arc-derived pyroxenites from the Andean Northern Volcanic Zone. *Goldschmidt*
23. Siciliano Rego E, Dauphas N, White J, **Johnson AC**, Zhang ZJ (2023) Titanium isotopic insights into peralkaline magma differentiation. *Goldschmidt*
22. Edmans E, Ostrander CM, **Johnson AC**, Anbar AD (2022) Extending molybdenum adsorption experiments to simulated Archean seawater: the effects of silica saturation. *AGU*
21. **Johnson AC,** Zhang Z, Dauphas N, Rudnick RL, Foden J (2022) Drivers of titanium isotope fractionation in magmatic series: A case study of Rindjani Volcano, Indonesia. *Goldschmidt* (poster)
20. Kovalick A, Bekker A, Heard A, **Johnson AC**, Dauphas N, Chan C, Ootes L (2021) Were Microaerophilic Iron-Oxidizing Bacteria Responsible for the Deposition of the ca. 1.88 Ga Granular Iron Formations? *GSA*
19. Anbar AD, Ostrander CM, **Johnson AC**, Catling DC (2020) Redox Revolutions on Earth and Beyond: Implications for Life Detection on Extrasolar Worlds. *AGU*
18. **Johnson AC,** Romaniello SJ, Ostrander CM, Reinhard CT, Lyons TW, Anbar AD (2020) Assessing the Availability of Mo in Archean Oceans: Implications for N fixation. *Geobiology Gordon Research Conference* (poster)
17. **Johnson AC**, Greaney AT, Toc M, Rudnick RL, Foden J, Anbar AD (2019) Molybdenum isotope fractionation in arc settings: Implications for the distribution of Mo in the continental crust. *AGU* (oral presentation)
16. **Johnson AC,** Romaniello SJ, Ostrander CM, Reinhard CT, Lyons TW, Anbar AD (2019) Assessing the bioavailability of Mo in Archean oceans. *GSA* (oral presentation)
15. **Johnson AC,** Aarons SM, Dauphas N, Nie NX, Zeng H, Helz RT, Romaniello SJ, Anbar AD (2019) Titanium isotopic fractionation in Kilauea Iki lava lake is driven by oxide crystallization. *Goldschmidt* (oral presentation)
14. **Johnson AC**, Romaniello SJ, Reinhard CT, Gregory DD, Garcia-Robledo E, Revsbech NP, Canfield DE, Lyons TW, Anbar AD (2018) Constraints on Earth's Stepwise Oxygenation from Sulfide Oxidation Experiments at Low pO_2. *Goldschmidt* (oral presentation).
13. Greaney AT, Rudnick RL, Romaniello SJ, **Johnson AC**, Gaschnig RM, Anbar AD (2017) Molybdenum isotopes reveal oxidation of Earth's continental crust during the 2.4 Ga Great Oxidation Event. *AGU*
12. Gregory DD, Lyons T, Cliff JB, Perea DE, **Johnson AC**, Romaniello SJ, Large RR (2017) The effects of trace element content on pyrite oxidation rates. *AGU*
11. **Johnson AC**, Romaniello SJ, Reinhard CT, Gregory DD, Garcia-Robledo E, Revsbech NP, Canfield DE, Lyons TW, Anbar AD (2017) Quantifying Archean oxygenation – Insights from sulfide oxidation experiments at low pO_2. *GSA* (oral presentation)
10. **Johnson AC**, Romaniello SJ, Reinhard CT, Gregory DD, Garcia-Robledo E, Revsbech NP, Canfield DE, Lyons TW, Anbar AD (2017) Archean oxidative weathering: Insights from sulfide oxidation experiments at ultra-low pO_2. *Goldschmidt* (oral presentation)

9. **Johnson AC**, Romaniello SJ, Reinhard CT, Gregory DD, Garcia-Robledo E, Revsbech NP, Canfield DE, Lyons TW, Anbar AD (2017) Reconciling O_2 whiffs and sulfur MIF. *Southern California Geobiology Symposium* (oral presentation)
8. **Johnson AC**, Romaniello SJ, Reinhard CT, Gregory DD, Garcia-Robledo E, Revsbech NP, Canfield DE, Lyons TW, Anbar AD (2016) Reconciling "whiffs" of O_2 with the Archean MIF S record: Insights from sulfide oxidation experiments
    - *Astrobiology Science Conference 2017* (oral presentation)
    - *AGU 2016* (poster)
7. Romaniello SJ, Ostrander CM, **Johnson AC**, Planavsky N, Anbar AD (2016) What the flux? Deriving empirical estimates of riverine Mo fluxes over Earth history. *AGU*
6. **Johnson AC**, Romaniello SJ, Reinhard CT, Gregory DD, Garcia-Robledo E, Revsbech NP, Canfield DE, Lyons TW, Anbar AD (2016) Mobilizing molybdenum: Interpreting Archean oxidative weathering signatures. *Goldschmidt* (oral presentation)
5. **Johnson AC**, Romaniello SJ, Reinhard CT, Gregory DD, Garcia-Robledo E, Revsbech NP, Canfield DE, Lyons TW, Anbar AD (2015) Oxidative weathering of Archean sulfides: Implications for the Great Oxidation Event. *AGU*
4. **Johnson AC**, Wipperfurth SA, Ihinger PD (2014) High-Resolution Infrared Characterization of Hydrothermal Quartz: Toward Identifying the Chemical Signature of Varying Fluid Regimes Within the Swiss Alps. *UWEC CERCA* (poster)
3. **Johnson AC**, Wipperfurth SA, Lindblad TA, Ihinger PD (2013) Chemical Fingerprint of Hydrothermal Quartz Crystals Sampled Along a Traverse Across the Swiss Alps (poster)
    - *GSA National Conference 2013*
    - *UWEC McNair Seniors Colloquia 2013*
    - *National McNair Research Conference 2013*
2. Wipperfurth SA, **Johnson AC**, Lindblad TA, Ihinger PD (2013) Tracking Growth Evolution in Contemporaneous Hydrothermal Quartz: High Resolution FTIR Characterization of Crystals Sampled at Windgällenhütte, Switzerland. *GSA*
1. **Johnson AC**, Wipperfurth SA, Lindblad TA, Ihinger PD (2013) Chemical Fingerprint of Quartz Crystals Sampled Along a Metamorphic Gradient Across the Swiss Alps. *UWEC CERCA* (Provost Honor Symposium oral presentation).

FIELD EXPERIENCE

2022 **Cabo Ortegal, Pyrenees, Ronda, Spain** – Mantle melting, depletion, and refertilization traced by isotopes (mantle xenolith sampling)

2018 **Rio Tinto, Spain** – Metal cycling in rivers from acid mine drainage (water sampling)

2012 **Swiss Alps, Switzerland** – Trace element cycling in synorogenic hydrothermal systems (sampling of hydrothermal quartz crystals)

LABORATORY AND ANALYTICAL EXPERIENCE

- **Thermo Neoma MS/MS MC-ICP-MS** (2 years) for measurement of Hf, Nd, and Zr isotopes in both laser and solution modes.
- **Thermo Neptune MC-ICP-MS** (6 years) for measurement of Mo, Fe, Ti, and Zr isotopes by solution.
- **Thermo Element and ICAP-Q ICP-MS** (2 years) for measurement of major and trace elements.
- Extensive experience in **Class 1000 geochemical clean rooms**. Experience developing isotope double spikes, novel column chemistries, etc.

PROFESSIONAL SERVICE

First Year Metcalf Summer Match Research Mentor	2022
Leadership Alliance Program Mentor	2021
NSF Proposal Reviewer	2020-2021
AZ Astrobiology Organizing Committee Member	2020, 2023
NASA FINESST19 Planetary Program Reviewer	2019
Goldschmidt Conference Session Chair	2019
AGU Conference Session Chair	2016

Departmental Service and Outreach

Head Judge for UA's GeoDaze 2024	2024
Geochemistry Judge for UA's GeoDaze 2023	2023, 2025
Volunteer for Letters to a Pre-Scientist	2019, 2021
ASU Sundial Freshman Mentor	2019
Guest Scientist for Brains On! Podcast	2019
Volunteer for ASU Ask an Earth and Space Scientist Webpage	2019
Volunteer for "Life as an Earth and Planetary Scientist" online video series	2018
ASU GPSA Research Grant Reviewer	2018-2019
ASU GPSA Travel Grant Reviewer	2017-2019
Grand Canyon Prep Science Fair Judge	2015

HONORS

Featured Article in ASU Now	2020, 2021
Graduate Student Excellence Award	2019
Graduate College Travel Award	2018
GPSA Travel Award	2018
University Graduate Fellowship	2014
TriO Day Achiever Award	2014
Outstanding Senior Award	2013
Myers/Willis Field Camp Scholarship	2013
Field Camp I Excellence Award	2013
Ronald E. McNair Post Baccalaureate Achievement Program	2012-2014
Golder Associates Geology Major Scholarship	2012
Leoba Hogan Scientific Research Scholarship	2012

PROFESSIONAL AFFILIATIONS

Geological Society of America || American Geophysical Union || Geochemical Society || National Association of Geoscience Teachers

WORKSHOPS ATTENDED

"Preparing for an Academic Career" (2019) National Association of Geoscience Teachers (NAGT) – Earth Educators Rendezvous, Vanderbilt and UT – Nashville, TN.

"Succeeding in Academia/Finding and Succeeding Outside of Academia" (2018) Goldschmidt Conference, Boston MA.

"Solid Earth Dynamics and Climate – Mantle Interactions with the Hydrosphere & Carbosphere" (2015) Cooperative Institute for Dynamic Earth Research (CIDER), UC – Berkeley.