Benjamin W Johnson

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Appointments

2020 - current	Assistant Professor, Department of Geological and Atmospheric Sciences Iowa State University
Oct 2017 - Dec 2019	NSF Postdoctoral Fellow, Department of Geological Sciences, University of Colorado Boulder
Jan 2017- Sept 2017	Postdoctoral Researcher, School of Earth and Ocean Sciences, University of Victoria
Jan-Apr 2017	Sedimentary Geology Instructor, School of Earth and Ocean Sciences, University of Victoria

Education

2012-2017	**Ph.D.**, Earth and Ocean Sciences, University of Victoria
2007-2009	**M.S.**, Geology and Geophysics, University of Utah
2002-2006	**B.S.**, Geology, Biology and Chemistry minor, University of Puget Sound

Publications

Coming up	**Johnson, Benjamin W.**, Ibarra, D. E., and Konecky, B. (Invited review). Water isotopes through time. *Earth and Planetary Science Letters*
	Johnson, Benjamin W, Zawaski, M., and Mojzsis, S. J. (in prep). Geochronology of Archean meta-diamictites near the Stillwater Intrusion, Montana USA
Submitted	**Johnson, Benjamin W.**, Abbott, L., and Wing, B. A. (submitted). Continental hydrothermal systems record paleo-meteoric water isotopes in the San Juan Mountains, Colorado, USA. *Geophysical Research Letters*
In review	**Johnson, Benjamin W**, Mettam, C., and Poulton, S. W. (in review). Combining nitrogen isotopes and redox proxies strengthens paleoenvironmental interpretations: examples from Neoproterozoic Snowball Earth sediments. *Frontiers in Earth Science*

Schmidt, S. K., **Johnson, Benjamin W.**, Solon, A. J., Sommers, P., Darcy, J. L., Cawley, K. M., Vincent, K., Vimercati, L., Fountain, A. G., and Porazinska, D. L. (in review). Microbial biogeochemistry and phosphorus limitation in cryoconite holes on glaciers across the Taylor Valley, McMurdo Dry Valleys, Antarctica. *Biogeochemistry*

2021 Farrell, U. C., Samawi, R., ..., **Johnson, Benjamin W.**, ..., and Sperling, E. A. (2021). The sedimentary geochemistry and paleoenvironments project. *Geobiology*, 19(6):545–556

Hoffman, P. F., Halverson, G. P., Schrag, D. P., Higgins, J. A., Domack, E. W., Macdonald, F. A., Pruss, S. B., Blaettler, C. L., Crockford, P. W., Hodgin, E. B., Bellefroid, E. J., **Johnson, Benjamin W.**, Hodgskiss, M. S., Lamothe, K. G., LoBianco, S. J., Busch, J. F., Howes, B. J., Greenman, W., and Nelson, L. L. (2021). Snowballs in Africa: sectioning a long-lived Neoproterozoic carbonate platform and its bathyal foreslope (NW Namibia). *Earth Science Reviews*, 219:103616

Stueeken, E., Boocock, T., Robinson, A., Mikhail, S., and **Johnson, Benjamin W.** (2021). Hydrothermal recycling of sedimentary ammonium into oceanic crust and the Archean ocean at 3.23 Ga. *Geology*, 49(7):822–826

2020 Lipp, A. G., Shorttle, O., Sperling, E. A., Brocks, J. J., Cole, D. B., Crockford, Peter W.and Del Mouro, L., Dewing, K., Dornbros, S. Q., Emmings, J. F., Farrell, U. C., Jarrett, A., **Johnson, Benjamin W.**, Kabanov, P., Keller, C. B., Kunzmann, M., Miller, A. J., Mills, N. T., O'Connell, B., Peters, S. E., Planavsky, N. J., Ritzer, S. R., Schoepfer, S. D., Wilby, P., and Yang, J. (2021). The composition and weathering of the continents overgeologic time. *Geochemical Perspectives Letters*, 17:21–26

Johnson, Benjamin W. and Wing, B. A. (2020a). Limited Archaean continental emergence reflected in an early Archaean ^{18}O-enriched ocean. *Nature Geoscience*, 13:243–248

2018 **Johnson, Benjamin W.** and Goldblatt, C. (2018a). EarthN: a new Earth System nitrogen cycle model. *Geochemistry, Geophysics, Geosystems*, 19(8):2516–2542

2017 **Johnson, Benjamin W.**, Poulton, S. W., and Goldblatt, C. (2017). Marine oxygen production and open water supported an active nitrogen cycle during the Marinoan Snowball Earth. *Nature Communications*, 8(1):1316

Johnson, Benjamin W. and Goldblatt, C. (2017). A secular increase in continental crust nitrogen during the Precambrian. *Geochemical Perspectives Letters*, 4:24–28

Johnson, Benjamin W, Drage, N., Spence, J., Hanson, N., El-Sabaawi, R., and Goldblatt, C. (2017). Measurement of geologic N using mass spectrometry, colourimetry, and a newly adapted fluorometry technique. *Solid Earth*, 8(2):307–318

	Hoffman, P. F., Lamothe, K. G., LoBianco, S. J., Hodgskiss, M. S., Bellefroid, E. J., **Johnson, Benjamin W**, Hodgin, E. B., and Halverson, G. P. (2017). Sedimentary depocenters on Snowball Earth: Case studies from the Sturtian Chuos Formation in northern Namibia. *Geosphere*, 13(3):811–837
2016	Stüeken, E., Kipp, M., Koehler, M., Schwieterman, E., **Johnson, Benjamin W**, and Buick, R. (2016). Modeling pN2 through geologic time: Implications for atmospheric biosignatures. *Astrobiology*, 16(12):949–963
	Hoffman, P. F., Bellefroid, E. J., **Johnson, Benjamin W.**, Hodgskiss, M. S., Schrag, D. P., and Halverson, G. P. (2016b). Early extensional detachments in a contractional orogen: coherent, map-scale, submarine slides (mass transport complexes) on the outer slope of an ediacaran collisional foredeep, eastern kaoko belt, namibia 1. *Canadian Journal of Earth Sciences*, 53(11):1177–1189
	Hoffman, P., Bellefroid, E., Crockford, P., de Moor, A., Halverson, G., Hodgin, E., Hodgkiss, M., Holtzman, B., Jasechko, E., **Johnson, B.W.**, and Lamothe, K. (2016a). A misfit Cryogenian diamictite in the Vrede domes, Northern Damara Zone, Namibia: Chuos (Sturtian) or Ghaub (Marinoan) Formation? Moraine or Palaeovalley? *Comminications of the Geological Survey of Namibia*, 17:1–16
2015	**Johnson, Ben W** and Goldblatt, C. (2015). The nitrogen budget of earth. *Earth Science Reviews*, 148:150–173
2012	Schauer, A. J., Kunasek, S. A., Sofen, E. D., Erbland, J., Savarino, J., **Johnson, Ben W.**, Amos, H. M., Shaheen, R., Abaunza, M., Jackson, T. L., Thiemens, M. H., and Alexander, B. (2012). Oxygen isotope exchange with quartz during pyrolysis of silver sulfate and silver nitrate. *Rapid Communications in Mass Spectrometry*, 26(18):2151–2157

Invited Seminars

2022:	**The interaction between emergent continents and terrestrial nutrient cycling**, University of Iowa, Geology department seminar
2021:	**Oxygen isotope history of seawater and continental emergence**, Indiana University, department Seminar
	Oxygen isotope history of seawater and continental emergence, University of Bern, department seminar
2020:	**Oxygen isotope history of seawater and continental emergence**, University of Miami Geotopics Seminar
	Oxygen and nitrogen under the ice: evidence for active nutrient cycling during Snowball Earth, Thermo seminar series

2019:	**The oxygen isotope history of seawater: a new perspective on an old sedimentological problem**, Iowa State University department seminar
	The oxygen isotope history of seawater: a new approach to a classic problem, University of British Columbia, department seminar
	Connecting the spheres: how the geosphere, atmosphere, oceans, and biosphere interacted during the Precambrian Geobiology 2019 Meeting, Banff, Alberta, Canada
2017:	**A new Earth system nitrogen cycle model** St. Andrew's University
	Nitrogen in the Earth System: from planet birth to Snowball Earth University of Leeds
2016:	**Nitrogen in the Earth System: from planet birth to Snowball Earth**

Grants, honors, awards, and scholarships

I am a PI on all listed, except those with a *, where I am Co-I or collaborator, Total post-undergraduate funding: **$192,775**

Faculty

Pending	
January, 2022	*NSF Biology Integration Institute, $350,000 , nitrogen isotope signals of photosynthesis
Fall 2021	Sloan Fellowship, $75,000, Continental emergence
	American Chemical Society Petroleum Research Fund, $125,000, Plant fossil isotope studies
Planned	
February 2022	NSF Petrology, $440,000, Continental emergence
March 2022	NSF EAGER, $300,000, Oxygen isotope data processing
May 2022	NASA Astrobiology, $250,000, Snowball Earth redox geochemistry
January 2023	NSF Frontiers Research in Earth Sciences, $1.5 million, Western US paleoaltimetry
Awarded	

Fall 2020-Fall 2021	Iowa State University - Geology Undergraduate Research Grant - $4,200
Summer 2021	*NASA Exbiology, David Catilng Lead

Postdoctoral

2018	University of Colorado - Boulder Geology Department Undergraduate Mentoring - $1,000
	American Philosophical Society Lewis and Clark Astrobiology Field Work Grant - $4,430
2017-2019	National Science Foundation EAR Postdoctoral Fellowship - $87,000 per year .

Graduate Student

2012-2014	University of Victoria Fellowship - $12,000-$15,000.
2012	University of Victoria Outstanding Graduate Entrance Awards - $10,000.
2009	University of Utah Geology and Geophysics Department Outstanding Teaching Assistant Award.
2008	Geological Society of America Graduate Student Research Grant -$1,100

Undergraduate :

2006	University of Puget Sound University Enrichment Committee Award, award for senior thesis analytical work - $400
2005	University of Puget Sound Undergraduate Summer Research Grant, Grant given to support field work in Utah for my senior thesis project - $3,000.

Teaching Experience

Iowa State University

2020-current	History of the Earth: GEOL102 plus Lab section, between 60-80 students each Spring
2021-current	Introduction to Oceanography: GEOL 108, about 80-100 students each Fall
2022	Field Camp: GEOL 302, about 20-30 students each Summer

University of Victoria

Spring 2017	Sedimentary Geology (EOS 201), 45 students
2012-2016	**Teaching Assistant** Courses (#): Geochemistry (240); Earth System Evolution (260); Earth Science Field School (300); Paleobiology (330); Isotopes in Natural Sciences (335); Earth System Science (460)

University of Utah

2007-2009	**Teaching Assistant** Courses (#): Earthquakes and Volcanoes (two semesters, 1030); Geology of the National Parks (1050); Paleobiology (3180); Exploring Earth (1010); Earth Materials II (3090)

Advising

Iowa State	PhD student, Fall 2021-current; MS student, Spring 2021- current; 4 Undergraduate researchers Fall 2020, 2 in Spring 2021, 1 Fall 2021
University of Colorado Boulder	Undergraduate honors thesis (2018-2019)
University of Victoria	Two undergraduate summer research assistants (2016-2017), work from one contributed to peer-reviewed paper

Service

Fall 2020-present	Diversity, Equity, and Inclusion committee
	Climate Science Major development committee
December 2020-present	Assistant Teaching Professor of Climate Science search committee
Fall 2020-present	Geology Undergraduate Research Grant Committee

Research Experience

Research statement

I consider myself an Earth System Scientist. Questions involving the long-term evolution of the Earth and interactions between the geosphere, biosphere, and atmosphere drive my intellectual pursuit. I seek research topics that combine geologic field work, geochemical analysis, and modelling in a coherent and complimentary manner. The comparison of Earth to other terrestrial planets and planetary evolution in general are fascinating.

Tools and Techniques I am proficient in the use of many pieces of scientific equipment. I currently run the Earth System Evolution Lab (EaSEL), which has a Thermo Delta V Plus mass spectrometer with elemental anaylzer. We measure C, N, S, O, and H isotopes. I also help run our rock shop at Iowa State, which includes standard rock saws, disc mill, jaw crusher, ball mill, and shatterbox. In past work, I have used: High pressure liquid chromatography; pipetters; isotope extraction lines and laser ablation techniques, electron microprobes; SEM; absorbance and fluorometric spectrometers; rock saws/thin section equipment; petrographic microscopes; paleomagnetic drills; X-ray diffraction; X-ray fluorescence; and mineral separation techniques (Frantz, HF treatment, heavy liquid, clean lab centrifuge, dental drill, etc.).

Reviewer responsibilities

Journal Reviews
I have reviewed articles in the following journals:

Geochemical Perspectives Letters, Astrobiology, Earth and Planetary Science Letters

Geostandards and Geoanalytical Research, Geochimica et Cosmochimica Acta

Geobiology, Solid Earth, Molecular Biology and Evolution

Panel reviews
I have participated in NASA reviews in the areas of Habitability and Microbiology.

Conference Sessions Chaired

2020	Goldschmidt Annual Meeting - Characterizing the combined evolution of the Archean ocean-atmosphere-biosphere system
2014-2021	AGU Fall Meeting - Evolution of the Earth System
2019	Goldschmidt Annual Meeting - Theme 7 (Co-evolution of Earth and Life through time) Organizer
2019	Goldschmidt Annual Meeting - The rise of complex multicellular life and ecologies and their role in the Earth System, both past and present
2016	Goldschmidt Annual Meeting - The Deep Nitrogen Cycle and the Evolution of Planetary Atmospheres

Select conference abstracts

* - talk, ** - student presentation

2021 **Johnson, Benjamin W**, Mettam, C., and Poulton, S. W. (2021). Combining nitrogen isotopes and redox proxies strengthens paleoenvironmental interpretations: examples from Neoproterozoic Snowball Earth sediments. In *AGU Fall Meeting Abstracts*

2020 *__Johnson, Benjamin W.__ and Wing, B. A. (2020b). Utilizing continental hydrothermal systems as a record of ancient precipitation oxygen isotopes: examples from the Miocene San Juan Mountains. In *AGU Fall Meeting Abstracts*

*__Johnson, Benjamin W.__Johnson, B. W., Zawaski, M., and Mojzsis, S. J. (2020). Earth's earliest ice ages: new zircon geochronology of Archean glacial diamictites from Montana . In *Geological Society of America Abstracts with Programs*

2019 **Johnson, Benjamin W.**, Hurley, S. J., and Wing, B. A. (2019). Limited continental emergence before 3.2 billion years recorded in oceanic crust oxygen isotopes. In *AGU Fall Meeting Abstracts*

Daigle, L. W., Metcalf, J., Flowers, R., and **Johnson, Benjamin W. (2019). (U-Th)/He thermochronology constraints on the Phanerozoic exhumation history of the eastern Pilbara Craton, Australia. In *GSA Annual Meeting*

2018 *__Johnson, Benjamin W.__ and Wing, B. A. (2018). Hydrothermally altered ocean crust constrains the oxygen isotope composition of 3.2 Ga seawater, Pilbara Craton, Australia . In *Goldschmidt Annual Meeting*

Johnson, Benjamin W. and Goldblatt, C. (2018b). EarthN: a new Earth System nitrogen cycle model. *Gordon Geobiology Conference*

2017 *__Johnson, Benjamin W__ and Goldblatt, C. (2017a). A new model of the Earth system nitrogen cycle: how plates and life affect the atmosphere. In *Habitable Worlds*

*__Johnson, Benjamin W__ and Goldblatt, C. (2017b). A new model of the Earth System nitrogen cycle through time: how biology, plate tectonics, and the atmosphere interact to influence planetary habitability and nutrient cycles. In *Astrobiology Science Conference*

2016 **Johnson, B.W.** and Goldblatt, C. (2016). Modelling the Earth system nitrogen cycle: feedbacks between biology, plate tectonics, and atmospheric evolution. *American Geophysical Union Fall Meeting*

	Johnson, B.W., Hoffman, P. F., and Goldblatt, C. (2016). Oxygen and Nitrogen Under the Ice: Trace Elements and δ^{15}N Evidence for Oxic Weathering and Oxygenated Waters during the Snowball Earth Marinoan Glaciation, Ghuab Formation, Namibia. *Goldschmidt Annual Meeting*
2015	*__Johnson, Benjamin W__ and Goldblatt, C. (2015). Nitrogen budget of earth: Insights into volatile cycling in the deeper planet. *Goldschmidt Annual Meeting*
2009	*__Johnson, Ben W__, Bowman, J. R., Nash, B., Valley, J., and Bartley, J. M. (2009). Oxygen isotope, TitaniQ, and cathodoluminescence analyses of the Alta Stock, UT: Preliminary insights into pluton assembly. In *Geological Society of America Abstracts with Programs*, volume 41, page 43
2006	**Johnson, Ben W**, Gillette, D. D., and Horton, T. W. (2006). Stable isotope stratigraphy of a therizinosaur-bearing section of the Tropic shale near Big Water, Utah. In *102nd Annual Meeting of the Cordilleran Section, GSA, 81st Annual Meeting of the Pacific Section, AAPG, and the Western Regional Meeting of the Alaska Section, SPE*

Short courses and training

NASA NExSS Astrobiology Winter School - This week-long short course served to orient young scientists from a variety of backgrounds in the basic aspects of geology, astronomy, physics, and biology as they are applicable to astrobiology. We learned through lectures, field trips, but most importantly through a mock-grant proposal bringing together people with various expertise.

Community Outreach

2022: **Science Bound** We will develop several activities aimed at middle and high schoolers, as part of a program that provides support for students interested in STEM from 8th grade through college.

2016: **What does it take to hammer a rock on another planet?** I presented an overview of solar system geology and recent NASA missions to a group of students, aged 10-18 at a local, independent school.

2012-2016: **School Climate Lab visits** At the University of Victoria, we regularly had class visits from students in grades 4-5. During these visits, we did science demonstrations illustrating important concepts relating to weather and climate

2009: **Peruvian Lodge, Alta Ski Area, Utah** Spoke to a general audience about the geologic history of Utah and my M.S. thesis work.