

William J. Brazelton

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A. Professional Preparation

University of Minnesota	Genetics and Cell Biology	B.S. 2002
University of Washington	Biological Oceanography	M.S. 2005
University of Washington	Biological Oceanography and Astrobiology	Ph.D. 2010

B. Appointments

Associate Professor	University of Utah	2020 to present
Assistant Professor	University of Utah	2013 to 2020
Postdoctoral Researcher	East Carolina University	2012 to 2013
Postdoctoral Fellow	NASA Astrobiology Institute	2010 to 2012

C. Teaching

BIOL 3270/5270 Microbial Ecosystems 2015-present
Self-designed course that explores microbial diversity with an ecological and environmental perspective through scientific literature, student presentations, and lab and computer activities.

BIOL 1620 Fundamentals of Biology II 2019-present
New course to replace BIOL 2010 with more classroom engagement and active learning.

BIOL 1625 Fundamentals of Biology II Laboratory 2019
Not the lead instructor, but I participated in the design and implementation of the course.

BIOL 2010 Evolution and Diversity of Life 2015-2018
Core introductory BIOL course with enrollment of ~200, co-taught with Sarah Bush.

D. Mentorship

Current postdoctoral fellows (2): Julia McGonigle (NASA Postdoctoral Fellow), Cecilia Prator (NSF Postdoctoral Fellow)

Previous postdoctoral researcher (1): Katrina Twing.

Previous graduate students (3): Julia McGonigle (Ph.D.), Shahrzad Motamedi (Ph.D.), Christopher Thornton (M.S).

Current undergraduate students (4): Alessandrina Hoffman, Briggs Miller, Jake Lowe, Abbey Rees.

Previous undergraduate students (12): Lizethe Pendleton, Madison Block, Mikayla Wheeler, Sarah Hludzinski, Alex Hyer, Cody Dangerfield, Sydney Yoder, Michaela Lemen, LeAundra Jeffs, Mac Pierce, Emily Dart, Ethan Powell.

E. University Service

Current Doctoral Committees (9): Kendra Autumn (Biology), Alexander Bradshaw (Biology), Dale Cummings (Chemistry), Maggie Doolin (Biology), Casey Duncan (Geology and Geophysics), Peyton Russelburg (Biology), Quinn Sahulka (Civil & Environmental Engineering), Pratibha Sapkota (Civil & Environmental Engineering), Tess Stapleton (Biology)

Previous Doctoral Committees (7): Justin Panich (Biology), Eleonore Frouin (Aix-Marseille U.), Sunayna Dasgupta (Civil and Environmental Engineering), Jie Ma (Mathematics), Ananda Bhattacharjee (Civil & Environmental Engineering), Ky-Phuong Luong (Biology), Steven Esquivel (Biology).

School of Biological Sciences Committees: Curriculum Committee (2019-present), Seminar Series (Chair, 2020-present), Curriculum Reform Task Force (2017-2019), , BioKids Child Care (2018-2020), Graduate Admissions (2013-2016), Biology Undergraduate Research Program (2015-2017), Honors (2016-2017).

University Committees: Earth Core faculty oversight (2019-), VPCAT mentoring program (2019-present), UROP proposal reviews (2016-present), UROP award reviews (2016-2017).

F. Additional Service

Manuscript reviewer for *Applied and Environmental Microbiology, Astrobiology, Deep Sea Research, Elements, Environmental Microbiology, Environmental Science and Pollution Research, FEMS Microbial Ecology, Frontiers in Microbiology, Geobiology, ISME Journal, mBio, Microorganisms, Nature Communications, PeerJ, PLoS ONE, PNAS*

Academic Editor for *PLoS ONE*

Proposal reviewer for NSF, NSF-GRFP, NASA, NASA Postdoctoral Program, C-DEBI, Deep Carbon Observatory, Schmidt Ocean Institute

Scientific organizing committee, Serpentine Days, Italy, 2020

Co-organizer of NASA Serpentinization Systems Science 'Workshop Without Walls', 2016

G. Project Management

Return to Lost City Expedition 2018. I was co-Chief Scientist (with Chief Scientist Susan Lang) on an oceanographic expedition to sample the Lost City deep-sea hydrothermal vent field in September-October 2018. The samples and data collected during this expedition are the basis of several current projects in my lab and follow from >16 previous publications on this topic.

IODP Expedition 357: Serpentinization and Life. As a member of the science party, I worked with Co-Chief Scientist Beth Orcutt to design and implement sampling procedures optimized for contamination control of ultralow biomass rock core samples. Our work on this project has led to one publication thus far (Motamedi et al. 2020) and another submitted manuscript (Pendleton et al. Submitted).

NASA Astrobiology Institute Rock-Powered Life Team. My lab is coordinating efforts to generate and analyze metagenomic sequences of microbial communities inhabiting subsurface rocks collected by various drilling projects associated with the 'Rock-Powered Life' team, a member of the NASA Astrobiology Institute (CAN-7). In addition to the two main

projects above, I have collaborated on several other projects with the Rock-Powered Life team, including two publications in 2020 on the Coast Range Ophiolite Microbial Observatory (Seyler et al. 2020, Sabuda et al. 2020).

Adaptation, Mitigation, and Biophysical Feedbacks in the Changing Bonneville Salt Flats. In collaboration with PI Brenda Bowen, my lab is leading microbial diversity analyses of samples collected from the salt flats, a potential Mars analog site for life detection. We published the first environmental DNA sequencing survey of bacterial and archaeal diversity at the salt flats (McGonigle et al. 2019), and another paper with a metagenomic analysis is in preparation (McGonigle et al. In Preparation).

Metagenomic surveillance of antibiotic resistance genes emerging from natural systems. Collaboration with James VanDerslice (Dept. of Family and Preventative Medicine), Windy Tanner (Dept. of Internal Medicine), and Ramesh Goel (Dept. of Civil and Environmental Engineering) to track the dispersal of specific antibiotic resistance genes by sequencing metagenomes of water samples collected from watersheds associated with discharge of human and animal wastes. This work has led to one publication thus far (Thornton et al., 2020), and the students in my Microbial Ecosystems course continue to work with the datasets every year.

H. Peer-Reviewed Publications

- Pendleton, HL, Twing, KI, Motamedi, S, and **Brazelton, WJ** (Submitted) Potential microbial contamination from drilling lubricants into subseafloor rock cores. *Scientific Drilling*.
- Thornton, CT, Tanner, W, VanDerslice, J, **Brazelton, WJ** (In Press) The influence of wastewater treatment on the resistome of an urban watershed. *GigaScience*.
- Lang, SQ and **Brazelton, WJ** (2020) Habitability of the marine serpentinite subsurface: a case study of the Lost City hydrothermal field. *Philosophical Transactions of the Royal Society A* 378 (2165). doi: <https://doi.org/10.1098/rsta.2018.0429>.
- Motamedi, S, Orcutt, BN, Früh-Green, GL, Twing, KI, Pendleton, HL, **Brazelton, WJ** (2020) Microbial residents of the Atlantis Massif's shallow serpentinite subsurface. *Applied and Environmental Microbiology*; doi: <https://doi.org/10.1128/AEM.00356-20>.
- McGonigle, JM, Lang, SQ, **Brazelton, WJ** (2020) Genomic evidence for formate metabolism by Chloroflexi as the key to unlocking deep carbon in Lost City microbial ecosystems. *Applied and Environmental Microbiology* 86 (8). doi: <https://doi.org/10.1128/AEM.02583-19>.
- Sabuda, MC, **Brazelton, WJ**, Putnam, LI, McCollom, TM, Hoehler, TM, Kubo, MDY, Cardace, D, Schrenk, MO (2020) A dynamic microbial sulfur cycle in a serpentinitizing continental ophiolite. *Environmental Microbiology*. doi: <https://doi.org/10.1111/1462-2920.15006>.
- Seyler, LM, **Brazelton, WJ**, McLean, C, Putman LI, Hyer A, Kubo MDY, Hoehler T, Cardace D, Schrenk MO (2020) Carbon assimilation strategies in ultrabasic groundwater: clues from the integrated study of a serpentinitization-influenced aquifer. *mSystems* 5:e00607-19. doi: <https://doi.org/10.1128/mSystems.00607-19>.
- Orcutt, BN, Bradley, J, **Brazelton, WJ**, Estes, ER, Goordial, JM, Huber, JA, Jones, RM, Mahmoudi, N, Marlow, JJ, Murdock, S, Pachiadaki, M (2020). Impacts of deep-sea mining on microbial ecosystem services. *Limnology and Oceanography*, doi: <https://doi.org/10.1002/lno.11403>.

- Dangerfield, CR, Frehner, EH, Buechley, ER, Şekercioğlu, C, **Brazelton, WJ** (2020) Succession of bacterial communities on carrion is independent of vertebrate scavengers. *PeerJ* 8, e9307. doi: <https://doi.org/10.7717/peerj.9307>.
- McGonigle, JM, Bernau, JA, Bowen, BB, **Brazelton, WJ** (2019) Robust archaeal and bacterial communities inhabit shallow subsurface sediments of the Bonneville Salt Flats. *mSphere* 4: e00378-19. doi: <https://doi.org/10.1128/mSphere.00378-19>.
- Lang SQ, Früh-Green GL, Bernasconi SM, **Brazelton WJ**, Schrenk MO, McGonigle JM (2018) Deeply-sourced formate fuels sulfate reducers but not methanogens at Lost City hydrothermal field. *Scientific Reports* 8:755. doi:10.1038/s41598-017-19002-5
- Früh-Green, G. L., **et al.** (2018). Magmatism, serpentinization and life: Insights through drilling the Atlantis Massif (IODP Expedition 357). *Lithos* 323, 137-155.
- Brazelton WJ**, Thornton CN, Hyer A, Twing KI, Longino AA, Lang SQ, Lilley MD, Früh-Green GL, Schrenk MO. (2017) Metagenomic identification of active methanogens and methanotrophs in serpentinite springs of the Voltri Massif, Italy. *PeerJ* 5:e2945 doi: 10.7717/peerj.2945
- Fuchsman, CA, Collins, RE, Rocap, G, **Brazelton, WJ** (2017) Effect of the environment on horizontal gene transfer between bacteria and archaea. *PeerJ* 5:e3865. doi: 10.7717/peerj.3865.
- Brazelton, WJ** (2017) Quick Guide: Hydrothermal vents. *Current Biology* 27(11): R450-452. doi: 10.1016/j.cub.2017.02.022.
- Amador, ES, Bandfield, JL, Kelley, DS, **Brazelton, WJ** (2017) The Lost City Hydrothermal Field as a spectroscopic and astrobiological Analog for Nili Fossae, Mars. *Astrobiology* 17(11): 1138-1160. doi: 10.1089/ast.2016.1606.
- Crespo-Medina, M, Twing, KI, Sánchez-Murillo, R, **Brazelton, WJ**, McCollom, TM, Schrenk, MO (2017) Methane dynamics in a tropical serpentinizing environment: the Santa Elena Ophiolite, Costa Rica. *Frontiers in Microbiology*. doi: 10.3389/fmicb.2017.00916.
- Twing, KI, **Brazelton, WJ**, Kubo, MDY, Hyer, AJ, Cardace, D, Hoehler, TM, McCollom, TM, Schrenk, MO (2017). Serpentinization-influenced groundwater harbors extremely low diversity microbial communities adapted to high pH. *Frontiers in Microbiology* 8, 308. doi: 10.3389/fmicb.2017.00308.
- Dangerfield, CD, Nadkarni, NM, **Brazelton, WJ** (2017) Canopy soil bacterial communities altered by severing host tree limb. *PeerJ* 5:e3773. doi: 10.7717/peerj.3773.
- Royle, JP, Chan, MA, **Brazelton, WJ** (2017) Red Hill Hot Spring mineralogy and hydrothermal microbial environments near Monroe, Sevier county, Utah. *Geology and Resources of the Wasatch: Back to Front*. Utah Geological Association Guide Book Publication 46.
- Früh-Green, GL, Orcutt, BN, Green, SL, Cotterill, C, and the **Expedition 357 Scientists** (2017) *Atlantis Massif: Serpentinization and Life*. Proceedings of the International Ocean Discovery Program, 357: College Station, TX (International Ocean Discovery Program). doi: 10.14379/iodp.proc.357.2017.
- Morill, PL, **Brazelton, WJ**, Kohl, L, Rietze, A, Miles, SM, Kavanagh, H, Schrenk, MO, Ziegler, SE, Lang, SQ (2014) Investigations of potential microbial methanogenic and carbon monoxide utilization pathways in ultra-basic reducing springs associated with present-

- day continental serpentinization: the Tablelands, NL, CAN. *Frontiers in Microbiology*. 5: 613. doi: 10.3389/fmicb.2014.00613.
- Schrenk, M.O., **W.J. Brazelton**, S.Q. Lang (2013) Serpentinization, carbon, and deep life. *Reviews in Mineralogy and Geochemistry*. 75:575-606. doi: 10.2138/rmg.2013.75.1
- Brazelton, W.J.**, P.L. Morrill, N. Szponar, M.O. Schrenk (2013) Bacterial communities associated with subsurface geochemical processes in continental serpentinite springs. *Applied and Environmental Microbiology*. 79(13):3906. doi: 10.1128/AEM.00330-13.
- Méhay, S., G.L. Früh-Green, S.Q. Lang, S.M. Bernasconi, **W.J. Brazelton**, M.O. Schrenk, P. Schaeffer, P. Adam (2013) Record of archaeal activity at the serpentinite-hosted Lost City Hydrothermal Field. *Geobiology*. 11: 570–592. doi: 10.1111/gbi.12062
- Anderson, R. E., **W.J. Brazelton**, J.A. Baross (2013) The deep virosphere: assessing the viral impact on microbial community dynamics in the deep subsurface. *Reviews in Mineralogy & Geochemistry*, 75, 649–675. doi:10.2138/rmg.2013.75.20
- Szponar, N., **W.J. Brazelton**, M.O. Schrenk, D.M. Bower, A. Steele, P.L. Morrill (2013) Geochemistry of a continental site of serpentinization, the Tablelands Ophiolite, Gros Morne National Park: A Mars analogue. *Icarus*. 224: 286-296.
- Stüeken, E. E., R.E. Anderson, J.S. Bowman, **W.J. Brazelton**, J. Colangelo-Lillis, A.D. Goldman, S.M. Som, J.A. Baross (2013) Did life originate from a global chemical reactor? *Geobiology*. 11: 101–126. doi: 10.1111/gbi.12025
- Brazelton, W.J.**, B. Nelson, M.O. Schrenk (2012) Metagenomic evidence for H₂ oxidation and H₂ production by serpentinite-hosted subsurface microbial communities. *Frontiers in Extreme Microbiology*. 2:268. doi: 10.3389/fmicb.2011.00268.
- Biddle, J. F., J.B. Sylvan, **W.J. Brazelton**, B.J. Tully, K.J. Edwards, C.L. Moyer, J.F. Heidelberg, W.C. Nelson (2012) Prospects for the study of evolution in the deep biosphere. *Deep Subsurface Microbiology*. 2: 265. doi: 10.3389/fmicb.2011.00285.
- Anderson, R.E., **W.J. Brazelton**, J.A. Baross (2011) Is the genetic landscape of the deep biosphere affected by viruses? *Frontiers in Extreme Microbiology*. 2:219.
- Brazelton, W.J.**, M.P. Mehta, D.S. Kelley, J.A. Baross (2011) Physiological differentiation within a single-species biofilm fueled by serpentinization. *mBio*. 2, e00127-11.
- Fuchsman, C.A., J.B. Kirkpatrick, **W.J. Brazelton**, J.W. Murray, J.T. Staley (2011) Metabolic strategies of free-living and aggregate associated bacterial communities inferred from biological and chemical profiles in the Black Sea suboxic zone. *FEMS Microbial Ecology*. DOI: 10.1111/j.1574-6941.2011.01189.x
- Anderson, R.E., **W.J. Brazelton**, J.A. Baross (2011) Viral metagenomics and CRISPR spacer analyses reveal a unique viral assemblage at a deep-sea hydrothermal vent in the Main Endeavour Field, Juan de Fuca Ridge. *FEMS Microbial Ecology*. 77: 120-133.
- Brazelton, W.J.** and J.A. Baross (2010) Metagenomic comparison of two *Thiomicrospira* lineages inhabiting contrasting deep-sea hydrothermal environments. *PloS One*. 5(10): e13530.
- Brazelton, W.J.**, M.L. Sogin, J.A. Baross (2010) Multiple scales of diversification within natural populations of archaea in hydrothermal chimney biofilms. *Environmental Microbiology Reports*. 2(2): 236-242.
- Brazelton, W.J.**, K.A. Ludwig, M.L. Sogin, E.N. Andreishcheva, D.S. Kelley, C-C. Shen, R. L. Edwards, J.A. Baross (2010) Archaea and bacteria with surprising microdiversity show

- shifts in dominance over 1000-year time scales in hydrothermal chimneys. *Proceedings of the National Academy of Sciences USA*. 107: 1612-1617. doi:10.1073/pnas.0905369107.
- Brazelton, W.J.** and J.A. Baross (2009) Abundant transposases encoded by the metagenome of a hydrothermal chimney biofilm. *The ISME Journal*. 3: 1420-1424.
- Brazelton, W.J.** and W.T. Sullivan III (2009) Understanding the 19th century origins of disciplines: lessons for astrobiology today? *International Journal of Astrobiology*. 8(4): 257-266.
- Brazelton, W. J.**, M.O. Schrenk, D.S. Kelley, J.A. Baross (2006) Methane- and sulfur-metabolizing microbial communities dominate in the Lost City Hydrothermal Field ecosystem. *Applied and Environmental Microbiology* 72: 6257-6270.
- Kelley, D. S., J.A. Karson, G.L. Früh-Green, D. Yoerger, T.M. Shank, D.A. Butterfield, J.M. Hayes, M.O. Schrenk, E. Olson, G. Proskurowski, M. Jakuba, A. Bradley, B. Larson, K. Ludwig, D. Glickson, K. Buckman, A.S. Bradley, **W.J. Brazelton**, K. Roe, M.J. Elend, A. Delacour, S.M. Bernasconi, M.D. Lilley, J.A. Baross, R.E. Summons, S.P. Sylva (2005) A Serpentinite-Hosted Ecosystem: The Lost City Hydrothermal Field. *Science*. 307:1428-1434.
- Kathir P, M. LaVoie, **W.J. Brazelton**, N.A. Haas, P.A. Lefebvre, C.D. Silflow (2003) Molecular map of the *Chlamydomonas reinhardtii* nuclear genome. *Eukaryotic Cell* 2(2):362-79.
- Brazelton, W.J.**, C.D. Amundsen, C.D. Silflow, P.A. Lefebvre (2001) The bld1 mutation identifies the *Chlamydomonas* osm-6 homolog as a gene required for flagellar assembly. *Current Biology* 11(20):1591-4.

I. Other Publications

The Lost City 2018 Expedition website and blog:

<https://lostcity.utah.biology.utah>

Früh-Green, G.L., Orcutt, B.N., Green, S.L., Cotterill, C., and the **Expedition 357 Scientists**, 2016. *Atlantis Massif Serpentinization and Life*. Proceedings of the International Ocean Discovery Program, 357: College Station, TX (International Ocean Discovery Program). doi: 10.14379/iodp.proc.357.2017.

Domagal-Goldman, S. D., Wright, K. E., **et al.** (2016). The Astrobiology Primer v2.0. *Astrobiology* 16(8): 561-653.

Johnson, H. P. and **LEXEN Scientific Party** (2003) Probing for life in the ocean crust with the LEXEN program. *Eos, Transactions American Geophysical Union*, 84(12), 109-112.