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 3410 Ecology and Evolution 2022
Upper-level course for Biology majors, co-taught with Amanda Hoepfner.

BIOL 3270/5270 Microbial Ecosystems 2015-2022
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 2019-2021
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

Postdoctoral researchers (3): Julia McGonigle (NASA Postdoctoral Fellow), Cecilia Prator (NSF Postdoctoral Fellow), Katrina Twing.
Graduate students (3): Christopher Thornton (M.S.), Shahrzad Motamedi (Ph.D), Julia McGonigle (Ph.D.)
Undergraduate students (16): Alessandrina Hoffman, Briggs Miller, Jake Lowe, Lizethe Pendleton, Madison Block, Mikayla Wheeler, Abbey Rees, Sarah Hludzinski, Alex Hyer, Cody Dangerfield, Sydney Yoder, Michaela Lemen, LeAundra Jeffs, Mac Pierce, Emily Dart, Ethan Powell.

E. University Service

Doctoral Committees (21): Kendra Autumn (Biology), Natalia Backman (Biology), Maggie Doolin (Biology), Eli Horvath (Medicinal Chemistry), Vincent Mays (Biology), Quinn Sahulka (Civil & Environmental Engineering), Bhavneet Singh (Public Health), Sarai Smith (Biology), Tess Stapleton (Biology), Pratibha Sapkota (Civil & Environmental Engineering), Peyton Russelburg (Biology), Alexander Bradshaw (Biology), Dale Cummings (Chemistry), Justin Panich (Biology), Casey Duncan (Geology and Geophysics), 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: Seminar Committee (Chair, 2020-2022), Curriculum Committee (2019-2022), Curriculum Reform Task Force (2017-2019), BioKids (2018-2020), Graduate Admissions (2013-2016), Biology Undergraduate Research Program (2015-2017), Honors (2016-2017).

University Committees: College of Science Seed Grant reviewer (2020), VPCAT mentoring program (2019-2020), UROP proposal reviews (2016-2022), Special 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, Microbial Ecology, Microorganisms, Nature Communications, PeerJ, PLoS ONE, PNAS*

Academic Editor for *PeerJ, PLoS ONE, and Frontiers in Microbiology*

Proposal Review Panels for NSF Postdoctoral Fellows (2021-2022), NSF Graduate Research Fellows (2015), NASA Exobiology (2014).

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

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

G. Current Projects

1. Investigating the Lost City as an Ultramafic Urban Center of the Subseafloor, Fueled by Energy and Carbon from the Mantle. I was Co-Chief Scientist (with Chief Scientist Susan Lang, U. South Carolina) on an oceanographic expedition to sample the Lost City deep-sea hydrothermal vent field in September 2018. NSF funding ($259,579 to Utah, plus additional grants to collaborators) expired in 2021, and the collected data are the basis for multiple manuscripts and funding proposals in preparation, in addition to the 4 papers from this project already published.

2. International Ocean Discovery Program Expedition 399: Building Blocks of Life, Atlantis Massif. I am one of three microbiologists participating in this international, highly interdisciplinary ocean drilling expedition that will collect samples of the unexplored biosphere

within mantle rocks uplifted to the seafloor. Funding includes 3 months of my salary plus ~$18,000 for research costs following the expedition. In addition, all costs for travel and supplies during the expedition are covered by IODP. The precious, one-of-a-kind samples collected during this expedition will be the basis of multiple funding proposals following the expedition. The expedition is in April-June 2023.

3. Adaptation, Mitigation, and Biophysical Feedbacks in the Changing Bonneville Salt Flats. In collaboration with PI Brenda Bowen (Dept. of Geology and Geophysics), my lab is leading microbial diversity analyses of samples collected from the salt flats and integrating the data with geochemical and hydrological data collected by Bowen and collaborators. NSF funding expired in 2021, and Ph.D. student Julia McGonigle published two papers from the project. The data generated during this project continue to be analyzed and prepared for potential papers and research proposals.

4. Combating Multidrug-Resistant Urinary Tract Infections in Spinal Cord Injury Patients. This is an interdisciplinary research project that brings together researchers and clinicians from Health Sciences and the U main campus. I am co-leading one component of the project that focuses on the natural microbial communities that inhabit the urinary tract and how these communities respond to drug treatments. My primary role is to lead the large-scale analyses of genomic and metagenomic data generated during the project. The total award amount is $1,903,264 to PI Matthew Mulvey. September 2022 – August 2025.

5. Wastewater surveillance approaches for antimicrobial resistant genes and organisms in healthcare settings within the Western U.S. Region. This project is funded by a contract from the Centers for Disease Control to monitor antimicrobial resistance in wastewater associated with local healthcare facilities. This is a highly collaborative project that includes researchers from Health Sciences and the U main campus, and my primary role is to lead the analyses of genomic and metagenomic data. The total award amount is $2,000,000 to PI Matthew Samore. September 2022 – February 2027.

6. Mechanistic Understanding of Coupled Bio-Geo-Chemo-Physical Phenomena Underlying Permafrost Thaw in Response to A Changing Climate. This is an interdisplinary collaboration between the University of Utah and Cornell University to investigate fundamental physical, chemical, and microbiological processes associated with permafrost thaw, in response to a call for novel approaches to the problem from the Department of Defense Multidisciplinary University Research Initiative. My primary role is to coordinate the environmental sampling of microbiological samples and to lead the analysis of environmental DNA sequence data. Total requested amount for Utah: $2,498,506. Pending decision.

H. Publications with U. Utah Affiliation (U. Utah mentees underlined**)**

McGonigle, J. M., Bernau, J. A., Bowen, B. B., & **Brazelton, W. J.** (2022). Metabolic Potential of Microbial Communities in the Hypersaline Sediments of the Bonneville Salt Flats. *Msystems*, e00846-22. DOI: 10.1128/msystems.00846-22.

Twing, K.I., Ward, L.M., Kane, Z.K., Harding, A.O., Price, R.E., Pendleton, H.L., Giovannelli, D., **Brazelton, W.J.** and McGlynn, S.E. (2022) Microbial Ecology of a Shallow Alkaline Hydrothermal Vent: Strýtan Hydrothermal Field, Eyjafördur, Northern Iceland. *Frontiers in Microbiology*. DOI: doi: 10.3389/fmicb.2022.960335.

Brazelton WJ, McGonigle JM, Motamedi S, Pendleton HL, Twing KI, Miller BC, Lowe WJ, Hoffman AM, Prator CA, Chadwick GL, Anderson RE, Thomas E, Butterfield DA, Aquino KA, Früh-Green GL, Schrenk MO, Lang SQ. 2022. Metabolic strategies shared by basement residents of the Lost City hydrothermal field. *Applied and Environmental Microbiology*: e00929-22. DOI: 10.1128/aem.00929-22.

Trutschel, L. R., Chadwick, G. L., Kruger, B., Blank, J. G., **Brazelton, W. J.,** Dart, E. R., & Rowe, A. R. (2022). Investigation of microbial metabolisms in an extremely high pH marine-like terrestrial serpentinizing system: Ney Springs. *Science of The Total Environment*, *836*, 155492.

Chadwick, GL, Skennerton, CT, Laso-Pérez, R, Leu, AO, Speth, DR, Yu, H, Morgan-Lang, C, Hatzenpichler, R, Goudeau, D, Malmstrom, R, **Brazelton, WJ**, Woyke, T, Hallam, SJ, Tyson, GW, Wegener, G, Boetius, A, Orphan, VJ. (2022) Comparative genomics reveals electron transfer and syntrophic mechanisms differentiating methanotrophic and methanogenic archaea. *PLoS biology*, *20*(1), e3001508.

Sabuda, MC, Putman, LI, Hoehler, TM, Kubo, MD, **Brazelton, WJ**, Cardace, D, Schrenk, MO. (2021) Biogeochemical Gradients in a Serpentinization-influenced Aquifer: Implications for Gas Exchange between the Subsurface and Atmosphere. *Journal of Geophysical Research: Biogeosciences*. *126*(8), e2020JG006209.

Putman, LI, Sabuda, MC, **Brazelton, WJ**, Kubo, MD, Hoehler, TM, McCollom, T, Cardace, D, Schrenk, MO. (2021) Microbial communities in a serpentinizing aquifer are assembled through strong concurrent dispersal limitation and selection. *mSystems*. *6*(5), e00300-21.

Pendleton, HL, Twing, KI, Motamedi, S, and **Brazelton, WJ** (2021) Potential microbial contamination from drilling lubricants into subseafloor rock cores. *Scientific Drilling*. 29, 49–57, https://doi.org/10.5194/sd-29-49-2021.

Lang, SQ, Lilley, MD, Baumberger, T, Früh-Green, GL, Walker, SL, **Brazelton, WJ**, Kelley, DS, Elend, M, Butterfield, DA, Mau, AJ. (2021) Extensive decentralized hydrogen export from the Atlantis Massif. *Geology.* doi: https://doi.org/10.1130/G48322.1.

Hand, K., Phillips, C. B., Chyba, C. F., Toner, B., Katija, K., Orphan, V., ... & Roussel, A. (2021). On the Past, Present, and Future Role of Biology in NASA's Exploration of our Solar System. Bulletin of the American Astronomical Society, 53(4), 229.

Thornton, CT, Tanner, W, VanDerslice, J, **Brazelton, WJ** (2020) Localized effect of treated wastewater effluent on the resistome of an urban watershed. *GigaScience*. 9 (11): giaa125, https://doi.org/10.1093/gigascience/giaa125.

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.

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.

Dangerfield, CR, Frehner, E, Buechley, E, Sekercioglu, 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.

Sabuda, MC, **Brazelton, WJ**, Putnam, LI, McCollom, TM, Hoehler, TM, Kubo, MDY, Cardace, D, Schrenk, MO (2020) A dynamic microbial sulfur cycle in a serpentinizing 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 serpentinization-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.

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.

Roylance, 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.

I. Earlier Publications

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 viriosphere: 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 H_2 oxidation and H_2 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.

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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.