

Jeff S. Bowman

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Current Position:	Assistant Professor. Integrative Oceanography Division, Scripps Institution of Oceanography, University of California at San Diego.
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Degrees Awarded:	Doctor of Philosophy, Oceanography and Astrobiology. University of Washington, 2014. Dissertation title: <i>Life in the cold biosphere: The ecology of psychrophile communities, genomes, and genes.</i> Master of Science, Oceanography. University of Washington, 2010. Bachelor of Science, Biological Oceanography. University of Washington, 2008. Associate of Science with Honors. Bellevue Community College, 2006.
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Additional Education:	JGI MGM Workshop. Joint Genome Institute, 2015. BD Flow Cytometry Course. Becton-Dickson, 2014. University of Hawaii Astrobiology Winter School. University of Hawaii, 2011. Program on Climate Change Summer Institute. University of Washington, 2010. Biological Sequence Analysis Summer Course. Technical University of Denmark, 2010. Nordic-NASA Astrobiology Summer School. University of Iceland, 2009.
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Research Experience:	Postdoctoral Research Scientist. November 2014 to present. Department of Biology and Paleo Environment, Lamont-Doherty Earth Observatory, Columbia University. Supervisor: Hugh Ducklow, PhD, Professor. Graduate Research Assistant. September 2008 to August 2014. School of Oceanography and Astrobiology Program, University of Washington. Supervisor: Jody Deming, PhD, Professor. Undergraduate Research Assistant. August 2006 to September 2008. School of Oceanography, University of Washington. Supervisor: Julian P. Sachs, PhD, Associate Professor.
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Field Experience:	Palmer Station, Antarctica. October-December 2015. ARSV Laurence M. Gould, LMG1401. January-February 2014. Barrow, Alaska. May 2013. McMurdo Station, Antarctica. August-November 2011. Barrow, Alaska. March-April 2011. Barrow, Alaska. April 2010. Barrow, Alaska. February 2010. Icebreaker Oden, LOMROGII. August-September 2010. Barrow, Alaska. April 2009. Cargill Saltworks. June 2008.
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Publications:

- A Arfken, Song, B, Bowman, JS, Piehler, M. *Denitrification potential of the eastern oyster microbiome using a 16S rRNA gene based metabolic inference approach. PLoS one*, 2017. 12:9 e0185071. DOI: 10.1371/journal.pone.0185071.
- JS Bowman, Amaral-Zettler, L, Rich, J, Luria, C, Ducklow, H. *Bacterial community segmentation facilitates the prediction of ecosystem function along the western Antarctic Peninsula. ISME Journal*, 2017. 11 1460-1471. DOI:10.1038/ismej.2016.204.
- JS Bowman, Vick-Majors, TJ, Morgan-Kiss, R, Vesback, C, Ducklow, HW, Priscu, JC. *Microbial community dynamics in two polar extremes: The lakes of the McMurdo Dry Valleys and the West Antarctic Peninsula marine ecosystem. BioScience*, 2016. 66:10 829–847. DOI:10.1093/biosci/biw103.
- S Domagal, et al. *The Astrobiology Primer v2.0. Astrobiology*, 2016. 16:8 561–653. DOI:10.1089/ast.2015.1460.
- JS Bowman and Deming, JW. *Wind-driven distribution of bacteria in coastal Antarctica: Evidence from the Ross Sea region. Polar Biology*, 2016. 40:1. DOI:10.1007/s00300-016-1921-2.
- JS Bowman. *The relationship between sea ice bacteria community structure and biogeochemistry: A synthesis of current knowledge and known unknowns. Elementa: Science of the Anthropocene*, 2015. 3:000072. DOI:10.12952/journal.elementa.000072.
- JS Bowman, Ducklow, HW. *Microbial communities can be described by metabolic structure: A general framework and application to a seasonally variable, depth-stratified microbial community from the coastal West Antarctic Peninsula. PLoS one*, 2015. 10:8. DOI:10.1371/journal.pone.0135868.
- JS Bowman and Deming, JW. *Alkane hydroxylase genes in psychrophile genomes and the potential for cold active catalysis. BMC Genomics*, 2014. 15:1120. DOI:10.1186/1471-2164-15-1120.
- L Miller, Fripiat, F, Else, B, Bowman, JS, Brown, K, Collins, ER, Ewert, M, Fransson, A, Gosselin, M, Lannuzel, D, Meiners, K, Michel, C, Nishioka, J, Nomura, D, Papadimitriou, S, Russell, L, Sørensen, L, Thomas, D, Tison, JL, A van Leeuwe, M, Vancoppenolle, M, Wolff, E, Zhou, J. *Methods for biogeochemical studies of sea ice: Where we are and where we are going. Elementa: Science of the Anthropocene*, 2014. 3:000038. DOI:10.12952/journal.elementa.000038.
- DG Barber, Ehn, J, Pucko, M, Rysgaard, S, Deming, J, Bowman, JS, Papakyriakou, T, Galley, R, Sogaard, D. *Frost flowers on young sea ice: The climatic, chemical, and microbial significance of an emerging ice type. JGR Atmospheres*, 2014. 119:11 11593–11612. DOI:10.1002/2014JD021736.
- A Hauptmann, Stibal, M, Baelum, J, Sicheritz-Pontén, T, Brunak, S, Bowman, JS, Hansen, L, Jacobsen, C, Blom, N. *Bacterial diversity in snow on North Pole ice floes. Extremophiles*, 2014. 18:6 945–951. DOI:10.1007/s00792-014-0660-y.
- JS Bowman, Berthiaume, C, Armbrust, V, Deming, JW. *The genetic potential for key biogeochemical processes in Arctic frost flowers and young sea ice revealed by metagenomic analysis. FEMS Microbial Ecology*, 2014. 89 376–387. DOI:10.1111/1574-6941.12331.
- JS Bowman, Larose, C, Vogel, T, Deming, JW. *Selective occurrence of Rhizobiales on the surface of young sea ice near Barrow, Alaska and distribution in the polar marine*

rare biosphere. *Environmental Microbiology Reports*, 2013. 5 575–582.
DOI:10.1111/1758-2229.12047.

EE Stüeken, Anderson, RE, Bowman, JS, Brazelton, WJ, Colangelo-Lillis, J, Goldman, AD, Som, SM, Baross, JA. *Did life originate in a global chemical reactor?* *Geobiology*, 2013. 11 101–126. DOI:10.1111/gbi.12025.

M Wietz, Mansson, M, Bowman, JS, Blom, N, Ng, Y, Gram, L. *Wide distribution of closely related, antibiotic-producing strains throughout the Arctic Ocean*. *Applied Environmental Microbiology*, 2012. 78:6 2039–2042. DOI:10.1128/AEM.07096-11.

JS Bowman, Rasmussen, S, Blom, N, Deming, JW, Rysgaard, S, Sicheritz-Pontén, T. *Microbial community structure of Arctic multiyear sea ice and surface seawater by 454 sequencing of the 16S RNA gene*. *ISME Journal*, 2011. 6 11–20.
DOI:10.1038/ismej.2011.76.

JS Bowman and Deming, JW. *Elevated bacterial abundance and exopolymers in saline frost flowers and implications for atmospheric chemistry and microbial dispersal*. *Geophysical Research Letters*, 2010. 37 L13501. DOI:10.1029/2010GL043020.

Conference Presentations:

Bowman, JS. *Identification of microbial community traits and application to ecophysiological modeling*. Oral presentation. August, 2018, 3rd Workshop on Trait Based Approaches to Ocean Life, Bergen, Norway.

Bowman, JS, Collins, JR, Gast, R, Hansel, C, Van Mooy, B, Ducklow, H. *Patterns in microbial gene expression during the transition from winter to spring along the western Antarctic Peninsula*. Oral presentation. July, 2017, SCAR Biology Symposium, Leuven, Belgium.

Bowman, JS and Ducklow, H. *Patterns in microbial gene expression during the transition from winter to spring along the western Antarctic Peninsula*. Poster presentation. March, 2017, Gordon Research Conference Polar Marine Science, Ventura, CA, USA.

Bowman, JS, Kavanaugh, M, Doney, S, Ducklow, H. *Characterizing temporal and spatial ecosystem variability with objectively defined biomes in a twenty-plus year time series from the West Antarctic Peninsula*. Oral presentation. February, 2017, Aquatic Sciences Meeting, Honolulu, HI, USA.

HW Ducklow, Stukel, MR, Bowman, JS, Kim, H, Cassar, N, Eveleth, R, Li, Z, Doney, S, Saille, SF, Jickells, TD, Baker, A, Chance, R. *Exploring estimates of net community production and export along the Western Antarctic Peninsula (WAP), 1993-2014*. Oral presentation (invited). December, 2016, AGU Annual Meeting, San Francisco, CA, USA.

JS Bowman, Neumann, B, Ducklow, H. *Socio-ecological valuation of ecosystem services along the West Antarctic Peninsula*. Poster presentation. October, 2016, ILTER Open Science Conference, Kruger National Park, South Africa.

JR Collins, Edwards, BR, Fredricks, HF, Bowman, JS, Ducklow, HW, Van Mooy, BAS. *Discovery and identification of oxidative stress in biomarkers in marine phytoplankton using a novel lipidomics strategy*. Oral presentation. August, 2016, ISME16, Montreal, Canada.

JS Bowman, Vick-Majors, TJ, Morgan-Kiss, R, Vesback, C, Ducklow, HW, Priscu, JC. *Convergent microbial ecosystem functions in the McMurdo and Palmer LTERs, two Antarctic aquatic extremes*. Oral presentation. August, 2016. SCAR Open Science Meeting, Kuala Lumpur, Malaysia.

JS Bowman and Ducklow, HW. *Redefining ocean biomes and identifying microbial dark matter with the Tara Oceans dataset*. Poster presentation. June, 2016. GRS/GRC Marine Microbes, Girona, Spain.

JS Bowman, Amaral-Zettler, LA, Rich, J, Luria, C, Ducklow, H. *The functional implications of bottom up and top down controls on marine bacteria in Arthur Harbor, a highly productive coastal setting on the West Antarctic Peninsula*. Oral presentation. February, 2016. Ocean Sciences Meeting, New Orleans, LA.

S Pfirman and Bowman, JS. *“Responding to Climate Change Course”: Research Integration*. Oral presentation. December, 2015. American Geophysical Union Annual Meeting, San Francisco, CA.

JS Bowman and Ducklow, HW. *Inferring microbial ecosystem function from community structure*. Poster presentation. October, 2015. OCB scoping workshop: Trait-based approaches to ocean life, Waterville, NH.

JS Bowman, Vick-Majors, TJ, Morgan-Kiss, R, Takacs-Vesbach, C, Priscu, J, Ducklow, HW. *Assessing microbial ecosystem function across two polar extremes*. Poster presentation. August, 2015. LTER ASM, Estes Park, CO.

JS Bowman and Ducklow, HW. *Describing polar marine microbial communities by their metabolic structure: Can we bridge the gap between community structure and ecosystem function?* Poster presentation. March, 2015. GRS/GRC Polar Marine Science, Barga, Italy.

JS Bowman, Deming, JW, Collins, RE. *Increased rates of horizontal gene transfer in psychrophilic genomes and potential links to the Phanerozoic climate record*. Oral presentation. August, 2014. ISME15, Seoul, S. Korea.

JS Bowman, Deming, JW. *Prevalence of horizontal gene transfer among cold adapted microbes and implications for crude oil bioremediation in the polar environment*. Poster presentation. September, 2013. Polar and Alpine Microbiology Conference, Big Sky, MT.

JS Bowman, Berthiaume, CT, Armbrust, VE, Deming, JW. *Metagenomic analysis of an unexpected community of widely distributed Rhizobiales in Arctic frost flowers*. Poster Presentation. March, 2013. Gordon Research Conference on Polar Marine Science, Ventura, CA.

JS Bowman and Deming, JW. *The distribution and cold adapted character of putative hydrocarbon degradation genes among the genomes of cold adapted microbes*. Oral presentation. January, 2013. Gulf Oil and Ecosystems Conference, New Orleans, LA.

JW Deming, Bowman, JS, Ewert, M, Collins, RE. *Microbial life at the boundary between sea ice and atmosphere*. Poster presentation. April, 2012. IPY, Montreal, Quebec, Canada.

JS Bowman, Larose, C, Vogel, T, Deming, JW. *Evidence for strong selective enrichment of bacteria within frost flowers on the surface of Arctic sea ice*. Oral presentation. February, 2012. Ocean Sciences Meeting, Salt Lake City, UT.

JS Bowman, Schmidt, BE, Blankenship, DD. *Life in Ice: Defining the habitability of Europa*. Poster Presentation. October, 2011. AAS Division of Planetary Science Annual Meeting, Nantes, France.

JS Bowman, Chan, KYK, Durkin, C, Hennon, G, Smith, D, Sullivan, B. *Is diversity related to service provision across an ecosystem? An estuarine case study*. Oral

presentation. September, 2011. World Conference on Marine Biodiversity, Aberdeen, Scotland.

JS Bowman and Deming, JW. *Integrating sequence based biology with biogeochemical and physical studies*. Poster presentation, June 2011. OASIS Science Meeting, Telluride, CO.

JS Bowman, Rasmussen, S, Blom, N, Deming, JW, Thomas, SP. *Determining microbial community structure in MYI with mid-depth sequencing*. Oral presentation, March 2011. Gordon Research Seminar on Polar Marine Science, Ventura, CA.

JS Bowman, Rasmussen, S, Blom, N, Deming, JW, Thomas, SP. *Determining microbial community structure in MYI with mid-depth sequencing*. Poster presentation, March 2011. Gordon Research Conference on Polar Marine Science, Ventura, CA

JS Bowman. *Planets and Pedagogy: An astrobiology course for science educators*. Poster presentation, January 2011. UH NAI Winter School, Hilo, HI.

JS Bowman and Schmidt, B. *Putting the biology back in astrobiology for EJSM: How ice penetrating radar can define key habitat parameters*. Poster presentation, December 2010. American Geophysical Union Annual Meeting, San Francisco, CA.

JS Bowman. *A possible role for surface ice features in the origin of life*. Oral presentation, June 2010. Astrobiology Graduate Conference, Tällberg, Sweden.

JS Bowman and Deming, JW. *SCIFAR: A novel method for measuring microbial respiration at very low temperatures*. Poster presentation, April 2010. Astrobiology Science Conference, Houston, TX.

JS Bowman. *Implications of a hydrated gel on the sea surface microlayer for prebiotic chemistry and the origin of life*. Poster presentation, January 2010. Gordon Research Conference on the Origin of Life, Galveston, TX.

JS Bowman and Deming, JW. *Elevated bacterial abundance in laboratory grown and naturally occurring frost flowers under late winter conditions*. Poster presentation, December 2009. American Geophysical Union Annual Meeting, San Francisco, CA.

JS Bowman. *Extracellular polymers produced in abundance by microorganisms in saline ice: A potential biomarker for mid-IR spectroscopic observations of Europa?* Oral presentation, July 2009. Astrobiology Graduate Conference, Seattle, WA.

JS Bowman and Deming, JW. *Marine frost flowers as analogues for extraterrestrial environments of very low temperature and low water activity*. Poster presentation, June 2009. NASA-Nordic Astrobiology Summer Program, Reykjavik, Iceland.

JS Bowman and Deming, JW. *Microbial responses to sea ice conditions encountered during an arctic winter*. Poster presentation, November 2008. IMPETUS, St. Petersburg, Russia.

JS Bowman and Sachs, J. *Developing an indicator of salinity from membrane lipids in halophilic microorganisms*. Oral presentation, June 2008. American Society of Limnologists and Oceanographers Summer Meeting, St. John's, Newfoundland.

Invited Talks:

NASA Outer Planets Assessment Group. *Ocean observations on Earth and what they mean for the outer planets*. La Jolla, CA, 2017.

International Medical University. *Connecting microbial community structure with ecosystem function*. Kuala Lumpur, August, 2016.

NASA Roadmaps to Ocean Worlds. *Polar microbial ecology and the search for totally normal life.* Phoenix, AZ, USA. May, 2016.

Woods Hole Oceanographic Institution. *Towards an understanding of microbial ecosystem function in the polar ocean.* Falmouth, MA, USA. May, 2016.

Scripps Institution of Oceanography. *Towards an understanding of microbial ecosystem function in the polar ocean.* La Jolla, CA, USA. April, 2016.

University of São Paulo. *Combining metabolic inference and flow cytometry to understand the functional implications of bottom up and top down controls on marine bacteria along the West Antarctic Peninsula.* São Paulo, Brazil. April, 2016.

North Carolina State University. *Towards a better understanding of microbial ecosystem function in the polar ocean.* Raleigh, NC, USA. January, 2016.

Massachusetts Institute of Technology. *Inferring metabolism from phylogeny: Can we make the jump from community structure to ecosystem function?* Boston, MA, USA. May, 2015.

Rutgers University. *Inferring metabolism from phylogeny: Can we make the jump from community structure to ecosystem function?* New Brunswick, NJ, USA. April, 2015.

Lamont-Doherty Earth Observatory, Columbia University. *The role of horizontal gene transfer in cold adaptation and potential links to the Phanerozoic climate record.* Palisades, NY, USA. November, 2013.

Woods Hole Oceanographic Institution. *Easy as HGT: Evaluating the role of horizontal gene transfer in cold-adapted microbial communities and the specific case of frost flowers.* Falmouth, MA, USA. November, 2013.

Jet Propulsion Lab. *Frost flowers and young sea ice: A genomic view of an unusual marine environment.* Pasadena, CA, USA. March, 2013.

Teaching:

Co-Instructor with Dr. Stephanie Pfirman, Barnard College at Columbia University. *EESC 3045, Responding to Climate Change.* Spring, 2015.

Seminar Leader, University of Washington. *OCEAN 599, Bioinformatics Seminar.* Spring, 2012.

Contract Instructor, North Central School District Math-Science Partnership. Wenatchee, WA. August, 2011.

Contract Instructor, North Central School District Math-Science Partnership. Wenatchee, WA. August, 2010.

Co-Instructor with Carrie Tzou, University of Washington. *BEDUC 592, Fundamentals of Astrobiology for Science Educators.* Fall, 2010.

Teaching Assistant, University of Washington. *ASTBIO 115, Introduction to Astrobiology.* Fall, 2009.

Professional Service:

Associate Editor. *Elementa: Science of the Anthropocene.* 2017 to present.

Journal Reviewer, *Applied and Environmental Microbiology, Aquatic Microbial Ecology, Arctic, Biology Letters, Deep Sea Research II, Environmental Microbiology, Ecosystems, Elementa, Environmental Microbiology Reports, FEMS Microbial Ecology, ICES Journal of Marine Science, International Journal of Astrobiology, International Journal of Speleology, JGR Atmospheres, Limnology and Oceanography, Microbial Biotechnology, Microbial Ecology, Microbiology, PLoS one, Polar Biology, Science Reports, Symbiosis.*

SCOR WG-152, ECV-Ice: Measuring Essential Climate Variables in Sea Ice. Associate member. 2017 to present.

NASA Outer Planets Assessment Group. Steering committee. 2016 to present.

SCAR SSG-LS. APECS representative (observer). 2016 to present.

NASA Roadmaps to Ocean Worlds Team. Member. 2016.

SCOR WG-140, BEPSII: Biological Exchange Processes at the Sea-Ice Interface. Associate member. March 2013 to 2016.

US-APECS Board. 2015.

NASA OPAG Biannual Meeting. Local organizer, 2017.

BEPSII Annual Meeting. Local organizing committee, 2017.

SCAR Open Science Conference, Session S23: Microbes, diversity, and ecological roles. Co-convener. August 2016, Kuala Lumpur.

SCAR Open Science Conference, AntEco side-meeting; Harmonizing molecular and functional analysis of Antarctic microbiomes. Co-organizer. August 2016, Kuala Lumpur.

2015 LTER ASM: LTER based perspectives on analyzing microbial community structure, function, and process. Working Group Co-Organizer. September, 2015.

EarthCube All-hands Meeting. Organizing committee. February 2015 to May 2015.

Astrobiology Science Conference (AbSciCon). Organizing committee. July 2014 to July 2015.

ISME 15: Biodiversity, Adaptation, and Interaction in Extreme Environments. Session chair. August 2014, Seoul, Korea.

Gordon Research Seminar Polar Marine Science. Conference chair. March 2013, Ventura, CA.

Proposal Reviewer: INACH, NASA, NERC, NSF.

Outreach:

Blog, www.polarmicrobes.org. August 2011 to present.

Participant, AAAS-CASE Workshop. May 2014.

Science Advisor, *Wild Canada*. May 2013.

Science Advisor, The Weather Channel. *Earth's Strangest Weather: Arctic Blooms*. March 2013.

Question Reviewer, National Science Bowl. December 2011.

Invited Presenter, Ballard High School. October 2010.

Question Writer, National Science Bowl. August 2010, December 2010, May 2011, June 2013.

Invited Presenter, Novozymes. June 2010.

Science Communication Fellow, Pacific Science Center. 2010 to 2013.

Invited Panelist, Seattle Central Community College. September 2009.

Invited Presenter, Garfield High School. September 2009.

Presenter, Theodore Jacobsen Observatory. 2007-2009.

Scientist Like Me, Pacific Science Center. June 2009 to September 2009.

Invited Presenter, University of Washington Department of Education. December 2009.

Military Service:	2nd Airborne Ranger Battalion. Infantry mortar team leader, E5 (last position held). Ft. Lewis, WA. August 1999 to December 2003. Select awards: Ranger Tab, Combat Infantryman's Badge, Battalion Soldier of the Year, 2001.
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Awards and Funding:	<p><i>Development of an automated sampler for the identification of high-frequency microbial community transitions.</i> UCSD Faculty Senate, 2016. \$14,614.</p> <p><i>Preliminary assessment of the influence of ice cover on microbial carbon and energy acquisition during the Antarctic winter-spring seasonal transition (EAGER).</i> NSF-OPP 1641019, 2016. \$143,240.</p> <p><i>Transcriptional analysis of energy transformations and carbon acquisition during the Antarctic spring seasonal transition.</i> JGI Small-Scale CSP, 2016.</p> <p>Lamont-Doherty Postdoctoral Fellowship. November 2014-November 2016.</p> <p>EPA STAR Fellowship. June 2011.</p> <p>Moore Foundation Travel Grant. March 2010.</p> <p>Soffen Memorial Fund. December 2009</p> <p>Allen Library Research Award. June 2008.</p> <p>National Science Foundation IGERT Fellowship. September 2008-June 2011.</p> <p>National Science Foundation Graduate Research Fellowship Honorable Mention. April 2008.</p> <p>Washington Sea Grant Science Writing Fellowship. April, 2008.</p> <p>Levinson Emerging Scholar. November 2007.</p> <p>Mary Gates Scholar. November 2007.</p> <p>Dean's List. Winter 2007, Spring 2007, Fall 2007, Spring 2008. College of Ocean and Fisheries Science, University of Washington.</p>
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Societies:	<p>International Society of Microbial Ecologists. 2014.</p> <p>American Association for the Advancement of Science. 2009.</p> <p>American Geophysical Union. 2009.</p> <p>Association of Polar Early Career Scientists. 2008.</p> <p>American Society of Limnologists and Oceanographers. 2008.</p>
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