

## CURRICULUM VITAE

BRAD MAURICE BEBOUT

Exobiology Branch

Mail Stop 239-4

NASA Ames Research Center

Moffett Field, CA 94035-1000

Telephone: (650) 604-3227, Fax: (650) 604-1088

E-mail: Brad.M.Bebout@nasa.gov

### EDUCATION

1983 B.A. in Biology, University of California, Santa Cruz

1988 M.S. in Marine Sciences, University of North Carolina at Chapel Hill

1992 Ph.D. in Marine Sciences, University of North Carolina at Chapel Hill

### RECENT PROFESSIONAL BACKGROUND

2002-present Research Associate, Institute of Marine Sciences, University of California, Santa Cruz, (courtesy adjunct appointment)

1997 Research Scientist, Exobiology Branch, NASA Ames Research Center, Moffett Field, California

1995-1997 Horn Point Environmental Laboratory Post-doctoral Fellow, Horn Point Environmental Lab, Cambridge, Maryland

1992-1995 Post-doctoral Researcher, Microsensor Group, Max Planck Institute for Marine Microbiology, Bremen, Germany

1988-1992 Research Assistant, Institute of Marine Sciences, University of North Carolina at Chapel Hill, Morehead City, NC

### HONORS AND AWARDS

2003 Space Act and *NASA Tech Brief* Awards "SemanticOrganizer: A Semantic Hypermedia System for Team-based Distribution Information Sharing" (finalist for 2003 NASA Software of the Year Award)

1990 Planetary Biology Internship, NASA Ames Research Center

1989 Geological Society of America Graduate Student Research Grant

1988 Best Student Paper Award, AGU/ASLO Ocean Sciences Meeting, New Orleans, Louisiana

### RESEARCH INTERESTS

General microbial ecology; benthic photosynthetic communities; ancient microbial communities and their extant representatives; microsensor technology; sediment optics; ultraviolet radiation effects on benthic photosynthesis; mass transport across the sediment water interface; nutrient cycling in microbial mat communities and other shallow water environments; benthic and planktonic nitrogen fixation; remote instrument control and collaboration technologies

### PROFESSIONAL ORGANIZATIONS

American Geophysical Union

American Society of Limnology and Oceanography

Phycological Society of America

## PUBLICATIONS

- Dillon J.G., S.R. Miller, B.M. Bebout, M. Hullar, N. Pinel, D.A. Stahl 2009. Spatial and Temporal Variability in a Stratified Hypersaline Microbial Mat Community. *FEMS Microbiology Ecology* **68**:46-58.
- Potter, E.G., B.M. Bebout, and C Kelley 2009. Isotopic Composition of Methane and Inferred Methanogenic Substrates Along a Salinity Gradient in a Hypersaline Microbial Mat System. *Astrobiology* **9**:383-390.
- Kunin, V., J. Raes, J. K. Harris, J. R. Spear, J. J. Walker, N. Ivanova, C. von Mering, B. M. Bebout, N. R. Pace, P. Bork, and P. Hugenholtz. 2008. Millimeter-scale genetic gradients and community-level molecular convergence in a hypersaline microbial mat. *Molecular Systems Biology* **4**:198.
- Smith, J. M., S. J. Green, C. A. Kelley, L. E. Prufert-Bebout, and B. M. Bebout. 2008. Shifts in methanogenic community structure and function associated with long-term manipulation of sulfate and salinity in a hypersaline microbial mat. *Environmental Microbiology* **10**:386-394.
- Dillon J. G., S. Fishbain, S. R. Miller, B. M. Bebout, K. S. Habicht, S. M. Webb, and D. A. Stahl. 2007. High rates of sulfate reduction in a low-sulfate hot spring microbial mat are driven by a low level of diversity of sulfate-respiring microorganisms. *Applied and Environmental Microbiology* **73**:5218–5226.
- Fleming, E. D., B. M. Bebout, and R. W. Castenholz. 2007. Effects of salinity and light intensity on the resumption of photosynthesis in rehydrated cyanobacterial mat from Baja California Sur, Mexico. *Journal of Phycology* **43**:15-24.
- Kelley, C. A., L. E. Bebout, and B. M. Bebout. 2006. Changes in carbon cycling ascertained by stable isotopic analyses in a hypersaline microbial mat. *Journal of Geophysical Research-Biogeosciences* **111**:G04012.
- Moisander, P. H., L. Shiue, G. F. Steward, B. D. Jenkins, B. M. Bebout, and J. P. Zehr. 2006. Application of a *nifH* oligonucleotide microarray for profiling diversity of N<sub>2</sub>-fixing microorganisms in marine microbial mats. *Environmental Microbiology* **8**: 1721-1735.
- Ley, R.E., J. K. Harris, J. Wilcox, J. R. Spear, S. R. Miller, B M. Bebout, J. A. Maresca, D. A. Bryant and N. R. Pace. 2006. Unexpected diversity and complexity from the Guerrero Negro hypersaline microbial mat. *Applied and Environmental Microbiology* **72**:3685-3695.
- Decker, K. L. M., C. S. Potter, B. M. Bebout, D. J. Des Marais, S. Carpenter, M. Discipulo, T. Hoehler, S. R. Miller, B. Thamdrup, K. Turk, and P. T. Visscher. 2005. Mathematical simulation of the diel O, S, and C biogeochemistry of a hypersaline microbial mat. *FEMS Microbiology Ecology* **52**: 377-395.
- Bebout, B. M., T. M. Hoehler, B. Thamdrup, D. Albert, S. P. Carpenter, K. Turk, M. Hogan, and D. J. Des Marais. 2004. Methane production by microbial mats under low sulfate concentrations. *Geobiology* **2**: 87-96.
- Miller, S. R., and B. M. Bebout. 2004. Variation in sulfide tolerance of photosystem II in phylogenetically diverse cyanobacteria from sulfidic habitats. *Applied and Environmental Microbiology* **70**: 736-744.
- Omoregie, E. O., L. L. Crumbliss, B. M. Bebout, and J. P. Zehr. 2004. Comparison of diazotroph community structure in *Lyngbya* sp. and *Microcoleus chthonoplastes* dominated microbial mats from Guerrero Negro, Baja, Mexico. *FEMS Microbiology Ecology* **47**: 305-318.
- Omoregie, E. O., L. L. Crumbliss, B. M. Bebout, and J. P. Zehr. 2004. Determination of nitrogen-fixing phylotypes in *Lyngbya* sp. and *Microcoleus chthonoplastes* cyanobacterial mats from Guerrero Negro, Baja, Mexico. *Applied and Environmental Microbiology* **70**: 2119-2128.

- Visscher, P. T., S. E. Hoefft, T. L. Surgeon, D. R. Rogers, B. M. Bebout, J. S. Thompson, Jr., and R. P. Reid. 2002. Microelectrode measurements in stromatolites: Unraveling the Earth's past?, p. 265-282. *In* M. Taillefert and T. F. Rozan [eds.], *Environmental Electrochemistry: Analysis of Trace Element Biogeochemistry*. American Chemical Society.
- Bebout, B. M., S. P. Carpenter, D. J. Des Marais, M. Discipulo, T. Embaye, F. Garcia-Pichel, T. M. Hoehler, M. Hogan, L. L. Jahnke, R. M. Keller, S. R. Miller, L. E. Prufert-Bebout, C. Raleigh, M. Rothrock, and K. Turk. 2002. Long term manipulations of intact microbial mat communities in a greenhouse collaboratory: Simulating Earth's present and past field environments. *Astrobiology* **2**: 383-402.
- Hoehler, T. M., D. B. Albert, M. J. Alperin, B. M. Bebout, C. S. Martens, and D. J. Des Marais. 2002. Comparative ecology of H<sub>2</sub> cycling in sedimentary and phototrophic ecosystems. *Antonie van Leeuwenhoek* **81**: 575-585.
- Hoehler, T. M., B. M. Bebout, and D. J. Des Marais. 2001. The role of microbial mats in the production of reduced gases on the early Earth. *Nature* **412**: 324-327.
- Visscher, P. T., R. P. Reid, and B. M. Bebout. 2000. Microscale observations of sulfate reduction: Correlation of microbial activity with lithified micritic laminae in modern marine stromatolites. *Geology* **28**: 912-922.
- Reid, R. P., P. T. Visscher, A. W. Decho, J. F. Stolz, B. M. Bebout, C. Dupraz, I. G. Macintyre, H. W. Paerl, J. Pinckney, L. Prufert-Bebout, T. F. Steppe, and D. J. Des Marais. 2000. The role of microbes in accretion, lamination and lithification in modern marine stromatolites. *Nature* **406**: 989-992.
- Visscher, P. T., R. P. Reid, B. M. Bebout, S. E. Hoefft, I. G. Macintyre, and J. A. Thompson, Jr. 1998. Formation of lithified micritic laminae in modern marine stromatolites (Bahamas): The role of sulfur cycling. *American Mineralogist* **83**: 1482-1493.
- Ferdelman, T. G., C. Lee, S. Pantoja, J. Harder, B. M. Bebout, and H. Fossing. 1997. Sulfate reduction and methanogenesis in a *Thioploca*-dominated sediment off the coast of Chile. *Geochimica et Cosmochimica Acta* **61**: 3065-3079.
- Garcia-Pichel, F., and B. M. Bebout. 1996. Penetration of ultraviolet radiation into shallow water sediments: High exposure for photosynthetic communities. *Marine Ecology Progress Series* **131**: 257-262.
- Paerl, H. W., M. Fitzpatrick, and B. M. Bebout. 1996. Seasonal nitrogen fixation dynamics in a marine microbial mat: Potential roles of cyanobacteria and microheterotrophs. *Limnology and Oceanography* **41**: 419-427.
- Pinckney, J., H. W. Paerl, and B. M. Bebout. 1995. Salinity control of benthic microbial mat community production in a Bahamian hypersaline lagoon. *Journal of Experimental Marine Biology and Ecology* **187**: 223-237.
- Bebout, B. M., and F. Garcia-Pichel. 1995. UVB-induced vertical migrations of cyanobacteria in a microbial mat. *Applied and Environmental Microbiology* **61**: 4215-4222.
- Pinckney, J., H. W. Paerl, R. P. Reid, and B. Bebout. 1995. Ecophysiology of stromatolitic microbial mats, Stocking Island, Exuma Cays, Bahamas. *Microbial Ecology* **29**: 19-37.
- Kohlmeyer, J., B. Bebout, and B. Volkmann-Kohlmeyer. 1995. Decomposition of mangrove wood by marine fungi and teredinids in Belize. *P.S.Z.N.I. Marine Ecology* **16**: 27-39.
- Bebout, B. M., H. W. Paerl, J. E. Bauer, D. E. Canfield, and D. J. Des Marais. 1994. Nitrogen cycling in microbial mat communities: The quantitative importance of N-fixation and other sources of N for primary productivity, p. 265-271. *In* L. J. Stal and P. Caumette [eds.], *Microbial Mats: Structure, Development and Environmental Significance*. NATO ASI Series. Springer-Verlag.

- Stal, L. J., H. W. Paerl, B. M. Bebout, and M. Villbrandt. 1994. Heterocystous versus non-heterocystous cyanobacteria in microbial mats, p. 403-414. *In* L. J. Stal and P. Caumette [eds.], *Microbial Mats: Structure, Development and Environmental Significance*. NATO ASI Series. Springer-Verlag.
- Paerl, H. W., B. M. Bebout, C. A. Currin, M. W. Fitzpatrick, and J. L. Pinckney. 1994. Nitrogen fixation dynamics in microbial mats, p. 325-337. *In* L. J. Stal and P. Caumette [eds.], *Microbial Mats: Structure, Development and Environmental Significance*. NATO ASI Series. Springer-Verlag.
- Paerl, H. W., B. M. Bebout, S. B. Joye, and D. J. Des Marais. 1993. Microscale characterization of dissolved organic matter production and uptake in marine microbial mat communities. *Limnology and Oceanography* **38**: 1150-1161.
- Bebout, B. M., M. W. Fitzpatrick, and H. W. Paerl. 1993. Identification of the sources of energy for nitrogen fixation and physiological characterization of the nitrogen-fixing members of a marine microbial mat community. *Applied and Environmental Microbiology* **59**: 1495-1503.
- Paerl, H. W., and B. M. Bebout. 1992. Oxygen dynamics in *Trichodesmium* spp. aggregates, p. 43-60. *In* E. J. Carpenter, D. G. Capone and J. G. Rueter [eds.], *Marine Pelagic Cyanobacteria: Trichodesmium and other Diazotrophs*. Kluwer Academic Press.
- Paull, C. K., A. C. Neumann, B. Bebout, V. Zabielski, and W. Showers. 1992. Growth rate and stable isotopic character of modern stromatolites from San Salvador, Bahamas. *Palaeogeogr. Palaeoclimatol. Palaeoecol.* **95**: 335-344.
- Carpenter, E. J., J. Chang, M. Cottrell, J. Schubauer, H. W. Paerl, B. M. Bebout, and D. G. Capone. 1990. Re-evaluation of nitrogenase oxygen-protective mechanisms in the planktonic marine cyanobacterium *Trichodesmium*. *Marine Ecology Progress Series* **65**: 151-158.
- Paerl, H. W., B. M. Bebout, and L. E. Prufert. 1989. Bacterial associations with marine *Oscillatoria* sp. (*Trichodesmium* sp.) populations: Ecophysiological implications. *Journal of Phycology* **25**: 773-784.
- Paerl, H. W., B. M. Bebout, and L. E. Prufert. 1989. Naturally occurring patterns of oxygenic photosynthesis and N<sub>2</sub> fixation in a marine microbial mat: Physiological and ecological ramifications, p. 326-341. *In* Y. Cohen and E. Rosenberg [eds.], *Microbial Mats: Physiological Ecology of Benthic Microbial Communities*. American Society for Microbiology.
- Paerl, H. W., B. M. Bebout, and L. E. Prufert. 1988. Physiological ecology and environmental control of N<sub>2</sub> fixation in marine and freshwater microbial associations, p. 711-716. *In* H. Bothe, F. J. de Bruijn and W. E. Newton [eds.], *Nitrogen Fixation: Hundred Years After*. Gustav Fischer, Stuttgart.
- Paerl, H. W., and B. M. Bebout. 1988. Direct measurement of O<sub>2</sub>-depleted microzones in marine *Oscillatoria*: Relation to N<sub>2</sub> fixation. *Science* **241**: 442-445.
- Bebout, B. M., H. W. Paerl, K. M. Crocker, and L. E. Prufert. 1987. Diel interactions of oxygenic photosynthesis and N<sub>2</sub> fixation (acetylene reduction) in a marine microbial mat community. *Applied and Environmental Microbiology* **53**: 2353-2362.
- Bebout, B., J. Kohlmeyer, S. Schatz, and M. Haibach. 1987. Temperature-dependent growth in isolates of *Corollospora maritima* Werderm. (Ascomycetes) from different geographical regions. *Journal of Experimental Marine Biology and Ecology* **106**: 203-210.
- Kohlmeyer, J., and B. Bebout. 1986. On the occurrence of marine fungi in the diet of *Littorina anguilifera* and observations on the behavior of the periwinkle. *P.S.Z.N.I. Marine Ecology* **7**: 333-343.