

Laura Hmelo

PhD Candidate

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Research Interests

1. Biogeochemical processes associated with marine biofilms, in particular
 - The significance of cell-cell communication (quorum sensing) in natural marine biofilms
 - The development of novel analytical techniques to isolate and identify communication signals
2. Epibiotic community interactions on marine phytoplankton
3. The role of bacterial cell-cell communication in the mediation of carbon cycle-relevant processes (e.g. exoenzyme production)

Education

Massachusetts Institute of Technology- Woods Hole Oceanographic Institution
Joint Program in Oceanography, Cambridge, MA, 2004- present

- Thesis advisor: Dr. Benjamin Van Mooy
- "*Interactions between microbial communities associated with living and detrital particles in the ocean*"
- Anticipated graduation, June 2010

Carleton College, Northfield, MN, 1998-2002

- Bachelor of Arts in Chemistry; *Magna Cum Laude*

Sea Education Association Sea Semester, Woods Hole, MA, 2002

Awards and Honors

Agouron Institute summer course, "Microbial Oceanography: from Genomes to Biomes," student, 2007

NSF Graduate Fellow, 2005-2008

MIT Presidential Graduate Fellow, 2004-2005

Sigma Xi, 2002

SEA Dean's Award (academic scholarship), 2001

Woods Hole Oceanographic Institution Summer Student Fellow, 2001

Professional Experience

Technical Assistant, University of Bremen, Germany, 2003-2004

- Supervisor: Dr. Kai-Uwe Hinrichs
- Organic geochemistry; GC-MS; HPLC-irMS

Research Assistant II, Woods Hole Oceanographic Institution, Woods Hole, MA, 2002-2003

- Supervisor: Dr. Kai-Uwe Hinrichs
- Organic geochemical analysis of complex organic mixtures from marine sediment extracts by GC-MS; analysis of marine sediment-headspace gas hydrocarbon composition by gas chromatography; extraction of volatile fatty acids from sediment pore water for isotopic analysis

Peer-reviewed Publications

Hmelo, L. and Van Mooy, B. (2008) Kinetic constraints on acylated homoserine lactone-based quorum sensing in marine environments, *Aquatic Microbial Ecology*, **54**, 127-133.

Heuer, V., Elvert, M., Tille, S., Krummen, M., Prieto Mollar, X., **Hmelo, L.R.**, and Hinrichs, K.-U. (2006) Online $\delta^{13}\text{C}$ analysis of volatile fatty acids in sediment/porewater systems by liquid chromatography-isotope ratio-mass spectrometry, *Limnology and Oceanography: Methods*, **4**, 346-357.

Hinrichs, K.-U., Hayes, J.M., Bach, W., Spivack, A.J., **Hmelo, L.R.**, Holm, N.G., Johnson, C.G., Sylva, S.P. (2006) Biological formation of ethane and propane in the deep marine subsurface, *PNAS*, **103**, 14684-14689.

Hinrichs, K.-U., **Hmelo, L.** & Sylva, S.P. (2003) Late Pleistocene variations in the marine methane cycle recorded by molecular biomarkers of methanotrophic prokaryotes, *Science*, **299**, 1214-1217.

Non-peer-reviewed Publications

Hmelo, L. (2008) Listening in as bacteria 'talk' to one another, *Oceanus*, **47** (1), 16-19.

Publications in preparation

Hmelo, L., Mincer, T.J., and Van Mooy, B.A.S. (2010) Bacterial communication regulates the degradation of sinking organic matter in the sea, *in review*

Hmelo, L., Van Mooy, B.A.S., and Mincer, T.J., *Trichodesmium thiebautii* colonies at the Bermuda Atlantic Time Series station are associated with distinctive epibiont populations, *expected submission date May 2010*

Invited Talks

"Bacterial quorum sensing and the marine carbon cycle" November 9, 2009, Department of Microbiology, University of Washington, Seattle

"Chemical communication and the carbon cycle" June 25, 2009, Clayquot Field Station, Tofino, B.C.

Abstracts and Presentations

Hmelo, L.R., Mincer, T. and Van Mooy, B., Quorum sensing by particle-associated bacteria affects attenuation of particulate organic carbon flux in the oceans, AGU-ASLO Ocean Sciences Meeting, 2010 (talk)

Hmelo, L.R., Mincer, T., and Van Mooy, B., Characterization of epibiotic bacterial communities associated with wild-type and laboratory cultured *Trichodesmium*, ASLO Aquatic Sciences Meeting, 2009. (poster)

Hmelo, L.R. and Van Mooy, B., Kinetic constraints on quorum quenching processes in seawater. 108th General Meeting of the American Society for Microbiology, 2008. (poster)

Hmelo, L. R. and Van Mooy, B., Investigation of Acylated Homoserine Lactones in Marine Environments using Electrospray Ionization Mass Spectrometry. ASLO Aquatic Sciences Meeting, 2007. (talk)

- Hinrichs, K.-U., Hayes, J.M., Bach, W., Spivack, A.J., **Hmelo, L.R.**, Holm, N.G., Johnson, C.G., Biological Formation of Ethane and Propane in the Deep Marine Subsurface., *Geophysical Research Abstracts* **7**, 09120, 2005.
- Hinrichs, K.-U., Sturt, H.F., **Hmelo, L.R.**, Smith, K.J., Holm, N.G., & ODP Leg 201 Shipboard Scientific Party. Organic signatures of life in the marine subsurface. NASA Astrobiology Institute, General Meeting, 2003.
- Hmelo, L.R.**, Sylva, S.P., & Hinrichs, K.-U. Past variations of methanotrophy and ecosystem response recorded by molecular biomarkers, *Eos Trans. AGU*, (83) 47, Fall Meet. Suppl., 2002. (poster)
- Hmelo, L.R.** & Hinrichs, K.-U. Melting of marine methane hydrates in geologic history: What do biomarkers tell us? *Eos. Trans. AGU*, 83(4), Ocean Sciences Meet. Suppl., 2002. (poster)
- Hinrichs, K.-U. & **Hmelo, L.R.** A molecular-isotopic record of methane hydrate dissociation during the late Quaternary. GSA Annual meeting, 2001.

Field Work

R/V Sonne 174-1, October 2003
R/V Oceanus 146, June 2006
R/V Endeavor 433, April 2007
R/V Kilo Moana, July 2007
R/V Roger Revelle, September-October 2007
R/V Atlantic Explorer, September 2008
R/V Barnes, June 2009

Teaching

Participant, *Preparing for an Academic Career in the Geosciences: Workshop for Graduate Students and Post-Doctoral Fellows*, 2009

Sessions included: Teaching science: What research tells us about science and learning, Designing effective science courses, Effective methods for assessing learning in class, Designing effective classroom/laboratory activities, Preparing a syllabus, Teaching climate change using social change strategies

Co-designed and taught WHOI January-term undergraduate course,
"Human Impacts on Marine Systems", 2009

Student, Communicating Ocean Sciences course, 2008

Course description: For students interested in improving their ability to communicate scientific knowledge by using inquiry-based science teaching methods. Students will practice communicating scientific knowledge and receive mentoring on how to improve their presentations. The course will include specifics on undergraduate instruction, and six weeks of supervised teaching in a local school classroom.

Ocean Sciences Enrichment Teacher, 3rd Grade, Mullen Hall Elementary School, Falmouth, MA, Spring 2008

Supervised high school student research project "Microbial diversity associated with shell disease of impounded lobsters," Jessie Harvey, 2008

Teaching Assistant for Introductory Chemistry Lab at Carleton College, Winter and Spring terms 2002

Service

Reviewer for *Biofouling*, 2008

WHOI Biogeochemistry seminar series coordinator, WHOI, 2008-present

Falmouth Public School's Science Fair Judge, 2007 and 2008, and student mentor, 2003

Elected Graduate Student Representative, WHOI, 2006-2007

Member, Carleton College Environmental Advisory Committee, 3/00-6/02; Student-chair, 2002

Professional Affiliations

American Chemical Society

American Society for Limnology and Oceanography

International Society for Microbial Ecology

Other Activities

AAUS Scientific Diver

Member, US Student Climate Summit at the United Nations Kyoto Protocol negotiations (COP 6), 2000

References available upon request