

## CIRRICULM VITAE

### **MATTHEW H. LONG**

Biogeochemist

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### ***Education***

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**Ph.D., University of Virginia**                                  Charlottesville, VA                                  May, 2013  
Environmental Science: Ecology, Advisors: Dr. Jay Zieman, Dr. Peter Berg

*Dissertation:* Using Eddy Correlation to Understand the Impacts of Hydrodynamics, Irradiance, and Surface Area on Ecosystem Metabolism Dynamics in Coral Reefs, Seagrass Meadows, and Ice Sheets

**M.S., University of Virginia**                                  Charlottesville, VA                                  January, 2008  
Environmental Science: Ecology, Advisors: Dr. Jay Zieman, Dr. Karen McGlathery

*Thesis:* The Role of Organic Acid Exudates in Liberating Phosphorus from Seagrass-Vegetated Carbonate Sediments

**B.S., Albright College**    Reading, PA    May, 2004  
Environmental Chemistry, Biochemistry, *Magna Cum Laude*, Three-sport NCAA athlete

*Honors Thesis:* The Quantification and Qualification of Furanocoumarins in the Giant Hogweed, *Heracleum mantegazzianum* (Advisor: Dr. Christian Hamann)

### ***Specific Research Interests***

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- Ecosystem metabolism, calcification, and nutrient cycling; the in-situ dynamic drivers of these processes, and their roles in global biogeochemical cycling
  
- Transport of solutes under varying hydrodynamics, submarine groundwater discharge, waves, and Langmuir circulations
  
- Ocean acidification effects on calcifying organisms and the effects on ecosystem processes
  
- Biogeochemical cycling in muddy and flow-dominated permeable sediments and the implications for carbon cycling and ocean acidification due to climate change

- Macrophyte carbon cycling, carbonate sediment dissolution, and nutrient acquisition
- The development of in-situ instrumentation for investigating the processes above. Specifically, the aquatic eddy covariance technique and the development of new sensors and platforms

## ***Research***

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**Ocean Acidification Postdoctoral Scholar** Woods Hole Oceanographic Inst. 2013 - current  
Coastal ocean acidification, biogeochemical cycling, and turbulent transport

**Doctoral Research** University of Virginia 2008 - 2013  
Marine eddy correlation, investigating O<sub>2</sub> metabolism over coral reefs and seagrass beds

**Masters Research** University of Virginia 2004 - 2007  
Organic exudates from seagrasses and phosphorus release in root microenvironments

**Collaborative Field Research** University of Virginia 2007- 2013  
Application of underwater eddy-correlation technique in different environments:  
*Greenland ice sheets, Gulf Coast permeable sediments, Quagga mussel invasion in the Great Lakes, eutrophication in Woods Hole, Mass, permeable sands in Florida Keys, FL*

**Undergraduate Honors Research** Albright College 2003-2004  
Furanocoumarin quantification and qualification in *Heracleum mantegazzianum*  
(Advisor: Dr. Christian Hamann)

**Undergraduate Independent Research** Albright College 2002-2003  
Hydrological and nutrient changes after restoration of habitat for *Clemmys muhlenbergii*  
(Advisor: Dr. David Osgood)

## ***Grants***

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PI \$10,000 The Educational Foundation of America Current  
*Mitigating the Impact of Ocean Acidification via Combined Shellfish-Algae Aquaculture: Creating Coastal Ocean Acidification Refuges while Bioextracting Excess Nutrients (co-PI M. Charette at WHOI)*

PI \$94,000 Chemical Oceanography, National Science Foundation Current  
*EAGER: Development of a Novel High-Resolution O<sub>2</sub>/H<sup>+</sup> Eddy Correlation Technique to Study Carbon Cycling in the Coastal Ocean (co-PIs M. Charette, W. Martin, and D. McCorkle at WHOI)*

- PI \$75,000 Coastal Ocean Institute, Woods Hole Oceanographic Inst. 2013  
*Coastal Ocean Acidification and Carbon Cycling due to Geochemical and Biological Processes: Development of a Novel High-Resolution O<sub>2</sub>/H<sup>+</sup> Eddy Correlation Technique (co-PIs M. Charette, W. Martin, and D. McCorkle at WHOI)*
- PI \$45,000 Jones Environmental and Barley Scholars Grant, UVA 2013  
*Integration of Optical Oxygen Optodes with an Acoustic Doppler Velocimeter to Examine Aquatic Metabolism*
- PI \$5,000 Collaborative Undergrad Research, Albright College 2004  
*Hydrological and Nutrient Changes after Restoration of Habitat for the Bog Turtle, Clemmys muhlenbergii*

## ***Publications***

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- Link to [Google Scholar](#)

### *In review:*

**Long MH**, Mooney TA, Zakroff C. Extreme low oxygen and decreased pH conditions naturally occur within developing squid egg capsules. **Biology Letters** (*Submitted*)

### *Peer-reviewed:*

**Long MH**, Berg P, McGlathery KJ, Zieman JC. Sub-tropical seagrass ecosystem metabolism measured by eddy correlation. **Marine Ecology Progress Series**. (*Accepted*)

**Long MH**, Charette MA, Martin WR, McCorkle DC. Oxygen metabolism and pH in coastal ecosystems: Eddy Covariance Hydrogen ion and Oxygen Exchange System (ECHOES). **Limnology and Oceanography: Methods** (*Accepted*)

**Long MH**, Berg P, Falter JL. Seagrass Metabolism across a productivity gradient using the eddy correlation, Eulerian control volume, and biomass addition techniques. **Journal of Geophysical Research: Oceans**. (*Accepted*)

**Long MH**, Berg P, De Beer D, Zieman J (2013) In situ coral reef oxygen metabolism: An eddy correlation study. **PloS ONE** 8: e58581. DOI: 10.1371/journal.pone.0058581

Berg P, **Long MH**, Huettel M, McGlathery K, Rheuban J, Giblin A, Howarth R, Marion R, Foreman K. (2013) Eddy correlation measurements of oxygen fluxes for permeable sediments exposed to varying current flows. **Limnology and Oceanography** 58: 1329-1343. DOI: 10.4319/lo.2013.58.4.1329

**Long MH**, Rheuban J\*, Berg P, Zieman JC (2012) A comparison and correction of light intensity loggers to photosynthetically active radiation sensors. **Limnology and Oceanography Methods** 10: 416-424. DOI 10.4319/lom.2012.10.416  
\*undergraduate mentee

**Long MH**, Berg P, Koopmans D, Rysgaard S, Glud R (2012) Oxygen exchange and ice melt measured at the ice-water interface by eddy correlation. **Biogeosciences** 9: 1957–1967. DOI: 10.5194/bg-9-1957-2012

Liao Q, Bootsman HA, Xiao J, Klump JV, Hume A, **Long MH**, Berg P (2009) Development of an in situ Underwater Particle Image Velocimetry (UWPIV) System. **Limnology and Oceanography Methods** 7: 169-184. DOI: 10.4319/lom.2009.7.169

**Long MH**, McGlathery K, Zieman JC, Berg P (2008) The role of organic acid exudates in liberating phosphorus from seagrass-vegetated carbonate sediments. **Limnology and Oceanography** 53: 2616-2626. DOI: 10.4319/lo.2008.53.6.2616

Theses:

**Long MH** (2013) Ecosystem metabolism in challenging environments with eddy correlation: seagrass beds, coral reefs, and arctic ice sheets. Ph.D. Thesis. University of Virginia.

**Long, MH** (2007) Organic acid exudates from seagrasses and phosphorus liberation in carbonate sediments. M.S. Thesis. University of Virginia.

**Teaching**

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Lecture-based:

**Instructor / Lecturer** University of Virginia 2009-2013  
Marine biology and coral reef ecology: 3 week course in San Salvador, Bahamas

**Teaching Assistant** University of Virginia 2004-2011  
Fundamentals of Ecology, Aquatic Ecology (combined lectures and labs)

**Guest Lecturer** Charlottesville High School 2011-2013  
Lectured on environmental science and conducting research

Lab-based:

**Teaching Assistant** University of Virginia 2004-2011  
Marine Environment and Organisms, Aquatic Methods, Estuarine Ecology

<b>Teaching Assistant</b>	Albright College	2002-2004
	Organic Chemistry, assisted students in conducting experiments	

Mentoring:

<b>Undergraduate Mentor</b>	University of Virginia, WHOI	2005-present
	Mentored numerous undergraduates conducting research in the laboratory and field	

<b>Academic Athletics Tutor</b>	University of Virginia	2010-2013
	Tutored NCAA athletes in a number of science subjects	

Awards and Honors

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**Ocean Acidification Postdoctoral Scholarship.** 2013. Woods Hole Oceanographic Institution.

**Outstanding Student Presentation.** 2012. Ocean Sciences Meeting, ASLO / AGU / TOS.

**Best Oral Presentation.** 2012. 28<sup>th</sup> Eviroday, University of Virginia.

**Robert J. Huskey Travel Fellowship.** 2011, 2012, 2013. University of Virginia.

**2<sup>nd</sup> Best Oral Presentation.** 2011. 27<sup>th</sup> Eviroday, University of Virginia.

**Society of Fellows Travel Fellowship.** 2010. University of Virginia.

**Best Oral Presentation.** 2009. 25<sup>th</sup> Eviroday, University of Virginia.

**Joseph K. Roberts Award.** 2008. University of Virginia.

**2<sup>nd</sup> Best Oral Presentation.** 2007. Coastal and Estuarine Research Federation.

**University of Virginia Fellowships.** Spring 2005, 2006, 2009 - 2012; Fall 2008, 2011 - 2013

**Departmental Distinction in Chemistry.** 2004. Albright College.

**Biology Department Award.** 2004. Albright College.

**Chemistry Faculty Award.** 2004. Albright College.

**NCAA Scholar Athlete.** *Cross Country, Indoor & Outdoor Track.* 2000-2004. Albright College.

**Jacob Albright Scholar.** 2004. Albright College.

**Eagle Scout,** Boy Scouts of America. Vigil Honor member, Order of the Arrow.

Select Presentations

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Invited Seminars:

**Long MH.** Development of a novel high resolution  $O_2/H^+$  eddy correlation technique: Coastal ocean acidification and carbon cycling due to geochemical and biological processes. Ocean and Climate Change Institute Meeting. **Invited Seminar.** May 2014.

**Long MH.** Ecosystem metabolism in challenging environments: Seagrass beds, coral reefs and Arctic ice sheets. Marine Biological Laboratory. **Invited Seminar.** March 2014.

**Long MH.** Eddy correlation: Challenges, field application, and recommendations. 4<sup>th</sup> Annual Eddy Correlation Workshop. **Invited Seminar.** February 2014.

**Long MH, Berg P, De Beer D, Zieman JC.** High-resolution metabolic rates of subtropical seagrass beds evaluated with the in situ eddy correlation technique. Woods Hole Oceanographic Institution. **Invited seminar.** June 2013.

**Long MH, Berg P, McGlathery K, De Beer D, Zieman JC.** Tropical seagrass meadows and coral reefs: An examination of productivity and biogeochemical cycling. Albright College. **Invited seminar.** March 2011.

Presentations:

Dunn A\*, Stanley RS, **Long MH.** Oxygen fluxes in Waquoit Bay: Comparing triple oxygen isotopes to eddy covariance techniques. Department of Chemistry. Wellesley College. Poster. October 2014. *\*undergraduate mentee*

**Long MH, Charette MA, McCorkle DC, Martin W.** Carbon cycling in benthic ecosystems: Development of an Eddy Correlation Hydrogen ion and Oxygen Exchange System (ECHOES). Applied Ocean Physics & Engineering, WHOI. Seminar. September 2014.

**Long MH, McCorkle DC, Charette MA, Martin W.** High resolution, in situ pH and oxygen fluxes using a new eddy correlation system to examine ocean acidification and ecosystem metabolism. Ocean Sciences Meeting, ASLO / AGU/ TOS. Presentation. February 2014.

**Long MH.** High-resolution Metabolic Rates of Subtropical Seagrass Beds Evaluated with the in situ Eddy Correlation Technique. Postdoc Symposium, WHOI. Presentation, October 2013.

**Long MH, Berg P, Zieman JC, De Beer D, Koopmans, D, Rysgaard S, Glud RN.** Ecosystem Metabolism in Challenging Environments with Eddy Correlation: Seagrass Beds, Coral Reefs, and Arctic Ice Sheets. University of Virginia. Seminar. March 2013.

**Long MH, Berg P, De Beer D, Zieman JC.** High-resolution metabolic rates of subtropical seagrass beds evaluated with the in situ eddy correlation technique. Ocean Sciences Meeting, ASLO / AGU/ TOS. Presentation. February 2013.

Berg P, Huettel M, **Long MH.** Effects of Advective Flow in Permeable Sediment Measured

By Eddy Correlation. ASLO 2013 Aquatic Sciences Meeting February 2013.

**Long MH**, Berg P, De Beer D, Zieman JC. In-situ metabolism dynamics of subtropical coral reefs and seagrass beds determined by eddy correlation. Benthic Ecology Meeting. Presentation. March 2012.

**Long MH**, Berg P, De Beer D, Zieman JC. Metabolism of subtropical coral reefs and seagrass beds determined by eddy correlation. Ocean Sciences Meeting, ASLO / AGU/ TOS. Presentation. February 2012. **Awarded: Outstanding Student Presentation.**

Berg P, **Long MH**, Rheuban J, Koopmans D, Huettel M. Dynamic changes in eddy correlation measurements of benthic oxygen fluxes. Ocean Sciences Meeting, ASLO / AGU/ TOS. Poster. February 2012.

**Long MH**, Berg P, Koopmans D, Rysgaard S, Glud R. Oxygen metabolism and ice melt measured at the water-ice interface by eddy correlation. 28<sup>th</sup> annual Envirodays. University of Virginia. Presentation. January 2012. **Awarded: Best Oral Presentation.**

**Long MH**, Berg P, Rheuban J\*, Zieman JC. Entire reef system O<sub>2</sub> metabolism measured *in situ* by eddy correlation. Aquatic Sciences Meeting, ASLO. Presentation. February 2011. *\*undergraduate mentee*

**Long MH**, Berg P, Rheuban J\*, Zieman JC. Entire reef system O<sub>2</sub> metabolism measured *in situ* by eddy correlation. 27<sup>th</sup> annual Enviroday. University of Virginia. Presentation. January 2011. **Awarded: 2<sup>nd</sup> Best Oral Presentation.** *\*undergraduate mentee*

**Long MH**, Berg P, Rheuban J\*, Zieman JC. Eddy Correlation measurements of benthic oxygen fluxes for coral reefs. Ocean Sciences Meeting, ASLO / AGU/ TOS. Poster. February 2010. *\*undergraduate mentee*

Berg P, **Long MH**, Foreman K, Giblin A, Howarth B, Huettel M, Marino R, McGlathery K, Rheuban, JE. Eddy Correlation measurements of benthic oxygen fluxes for permeable sediments. Ocean Sciences Meeting, ASLO / AGU/ TOS. Presentation. February 2010.

**Long MH**, Berg P, Zieman JC. Total ecosystem fluxes of calcium using the underwater eddy correlation technique. 25<sup>th</sup> annual Enviroday. University of Virginia. Presentation. January 2009. **Awarded: Best Oral Presentation.**

Berg P, Hume A, Huettel M, **Long MH**, Klump V, Savidge W. Eddy correlation measurements of benthic oxygen exchange: An update on the technique and results from new deployments. Aquatic Sciences Meeting, ASLO. Presentation. January 2009.

**Long MH**, McGlathery K, Zieman JC, Berg P. The role of organic acid exudates in liberating phosphorus from seagrass-vegetated carbonate sediments. Coastal and Estuarine Research Federation. November 2007. **Awarded: 2<sup>nd</sup> Best Oral Presentation.**

**Long MH**, Hamann C. Furanocoumarin qualification and quantification in *Heracleum mantegazzianum* (Giant Hogweed). Honors Research Symposium. Albright College. Presentation. May 2004.

**Long MH**, Osgood D. Habitat assessment for *Clemmys muhlenbergii* (bog turtle) after vegetation restoration. NCUR conference. Presentation. October 2003.

## ***Collaborators***

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### *Last 48 months:*

P. Berg (Univ. Virginia), M. Charette (Woods Hole Oceanographic Inst.), D. De Beer (Max Plank Inst. Marine Microbiology), S. Doney (Woods Hole Oceanographic Inst.), J. Falter (Univ. Western Australia), A. Giblin (Marine Biological Lab.), R. Glud (Univ. Arhus), M. Huettel (Florida State Univ.), A. Hume (Univ. Virginia), R. Howarth (Cornell Univ.), M. Kavanaugh (Woods Hole Oceanographic Inst.), D. Koopmans (Univ. Virginia), R. Marino (Cornell Univ.), W. Martin (Woods Hole Oceanographic Inst.), D. McCorckle (Woods Hole Oceanographic Inst.), K. McGlathery (Univ. Virginia), A. Mooney (Woods Hole Oceanographic Inst.), J. Rheuban (Woods Hole Oceanographic Inst.), M. Scully (Woods Hole Oceanographic Inst.), S. Rysgaard (Greenland Inst. Climate Change), D. Sogaard (Greenland Inst. Climate Change), R. Stanley (Woods Hole Oceanographic Inst.), J. Trowbridge (Woods Hole Oceanographic Inst.), J. Zieman (Univ. Virginia)

## ***Synergistic Activities***

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- Invited to and presented at expert workshops on the application and use of the eddy correlation technique (Association for the Sciences of Limnology and Oceanography, 2011 - 2014)
- Reviewer for: National Science Foundation, Limnology and Oceanography, Ecosystems, Biogeosciences, Marine Ecology Progress Series, Environmental Monitoring and Assessment, Frontiers in Marine Science, and Physical Sensors
- Conducted seminars and field instruction on the theory, use, and data analysis of the eddy correlation technique for researchers beginning eddy correlation research from various institutions (Univ. Arhus, Univ. Brisbane, Florida State Univ., Greenland Inst. Climate Change, Max Plank Inst. for Marine Microbiology, Univ. Milwaukee-Wisconsin, Monash Univ.)
- Tutored NCAA Division I athletes in math and sciences, mentored over a dozen undergraduates in the field and the laboratory, taught a number of undergraduate laboratory courses
- Received Outstanding Presentation Awards at the Coastal and Estuarine Research Federation (1x), the Association for the Study of Limnology and Oceanography (1x), and the Annual Enviroday Conference, University of Virginia (3x)