Carl Howard Lamborg

Assistant Scientist
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Date of Birth: Nov. 25, 1963
Place of Birth: Cambridge, MA
Nationality: USA

Education:

University of Connecticut. Doctor of Philosophy – Oceanography (Chemical), 2003
University of Michigan. Master of Science - Environmental Chemistry, 1992
Oberlin College. Bachelor of Arts - Chemistry (with Honors), 1986

Relevant Experience:

2006-present: Assistant Scientist, Woods Hole Oceanographic Institution, Dept. of Marine Chemistry and Geochemistry.
2003-2006: Post-doctoral Scholar/Investigator, Woods Hole Oceanographic Institution, Dept. of Marine Chemistry and Geochemistry.
1996-2003: Graduate Research Assistant, The Univ. of Connecticut, Dept. of Marine Sciences.
1996-2003: Guest Lecturer for *Marine Biogeochemistry* and *Chemical Oceanography,* The Univ. of Connecticut, Depart. of Marine Sciences.
1992-1996: Research Assistant II, The Univ. of Connecticut, Depart. of Marine Sciences.
1990-1992: Graduate Research Assistant, The Univ. of Michigan, Sch. of Public Health, Depart. of Environmental Health Sciences.
1986-1990: Research Assistant II, Harvard University, Harvard Sch. of Public Health, Depart. of Environmental Monitoring and Exposure Assessment.
1989-1990: Teaching Assistant for *Environmental Management*, Harvard Extension School.
1985-1986: Laboratory Teaching Assistant for *General Chemistry* and *Quantitative Analysis*, Oberlin College.

Fields of Specialization/Interest:

Aquatic and Atmospheric Chemistry, Mercury Biogeochemistry, Chemical Oceanography, Marine Pollution, Limnology, Paleolimnology and -oceanography, Low-Temperature Isotope and Radioisotope Geochemistry, Geochronology, Geochemical Instrumentation, Cosmochemistry, Geomicrobiology, Bioinorganic Chemistry and Modeling.

Awards:

2000: Andres J. Nalwak Award, for service to the Dept. of Marine Science, University of Connecticut
2003: WHOI Post-doctoral Scholarship, endowed by Penzance Discretionary Fund

Professional Organizations:

American Geophysical Union
American Chemical Society
American Society of Limnologists and Oceanographers
The Oceanography Society

Publications:

Lamborg, C.H., K. Von Damm, W.F. Fitzgerald, C.R. Hammerschmidt and R.A. Zierenberg (2006) Hg and Monomethylmercury in Fluids from Sea Cliff Submarine Hydrothermal Field, Gorda Ridge. *Geophys. Res. Lett.* **33**/17: L17606, 10.1029/2006GL026321.

Santschi, P.H., J.W. Murray, M. Baskaran, C. Benitez-Nelson, T. Eglinton, N.S. Fisher, L.D. Guo, C.-C. Hung, C. Lamborg, B. Moran, U. Passow and M. Roy-Barman (2006) Thorium speciation in seawater. *Marine Chem.* **100**/3-4: 250-268.

Buesseler, K., C. Benitez-Nelson, S.B. Moran, A. Burd, M. Charette, J.K. Cochran, L. Coppola, N. Fisher, S. Fowler, W. Gardner, L. Guo, O. Gustafsson, C. Lamborg, P. Masque, J.C. Miquel, U. Passow, P. Santschi, N. Savoye, G. Steward, T. Trull, (2006) Ratios of particulate carbon to thorium-234: what do they tell us and how can they be used to estimate sinking fluxes out of the upper ocean. *Marine Chem.* **100**/3-4: 213-233.

Hammerschmidt, C.R., W.F. Fitzgerald, C.H. Lamborg, P.H. Balcom, C.-M. Tseng (2006) Biogeochemical Cycling of Methylmercury in Lakes and Tundra Watersheds of Arctic Alaska. *Environ. Sci. & Tech.* **40**/4: 1204-1211.

Fitzgerald, W.F., D.R. Engstrom, C.H. Lamborg, C.-M. Tseng, P.H. Balcom and C.R. Hammerschmidt (2005) Modern and historic atmospheric mercury fluxes in northern Alaska: Global sources and Arctic depletion. *Environ. Sci. & Tech.* **39**: 557-568.

Lamborg, C.H., W.F. Fitzgerald, A. Skoog and P.T. Visscher (2004) The abundance and source of mercury-binding organic ligands in Long Island Sound. *Marine Chem.* **90**: 151-163.

Balcom, P.H., W.F. Fitzgerald, G.M. Vandal, C.H. Lamborg, K.R. Rolfhus, C.S. Langer and C.R. Hammerschmidt (2004) Mercury sources and cycling in the Connecticut River and Long Island Sound. *Marine Chem.* **90**: 53-74.

Hammerschmidt, C.R., W.F. Fitzgerald, C.H. Lamborg, P.H. Balcom and P.T. Visscher (2004) Biogeochemistry of methylmercury in sediments of Long Island Sound. *Marine Chem.* **90**: 31-52.

Arimoto, R., C. Schloesslin, D. Davis, A. Hogan, P. Grube, W. Fitzgerald and C. Lamborg (2004) Lead and mercury in aerosol particles from the South Pole collected during ISCAT-2000. *Atmos. Environ.* **38**: 5485-5491.

Tseng, C.-M., C.H. Lamborg, W.F. Fitzgerald and D.R. Engstrom (2004) Cycling of dissolved elemental mercury in arctic Alaskan lakes. *Geochim. Cosmochim. Acta*. **68**/6: 1173-1184.

Rolfhus, K.R., W.F. Fitzgerald, C.H. Lamborg and P. Balcom (2003) Evidence for enhanced mercury lability in response to estuarine mixing. *J. Geophys. Res* **108**/C11: Art. No. 3353.

Fitzgerald, W.F. and C.H. Lamborg (2003) Geochemistry of mercury in the environment. In: Treatise on Geochemistry, Vol. 9, Chp 4., Elsevier Publ.

Lamborg, C.H., C.-M. Tseng, W.F. Fitzgerald, P. Balcom, C.R. Hammerschmidt (2003) Determination of the mercury complexation characteristics of dissolved organic matter in natural waters by "reducible mercury" titrations. *Environ. Sci. & Tech.* **37**/15: 3316-3322.

Tseng, C.-M., P. Balcom, C.H. Lamborg and W.F. Fitzgerald (2003) Dissolved elemental mercury investigations in Long Island Sound using on-line Au amalgamation-flow injection analysis. *Environ. Sci. & Tech.* **37**/6: 1183-1188.

Lamborg, C.H., W.F. Fitzgerald, W.F., A.W.H. Damman, J.M. Benoit, P.H. Balcom and D.R. Engstrom (2002) Contemporary and historical eolian depositional fluxes of mercury: archival records in ombrotrophic bogs and lake sediments from Nova Scotia and New Zealand. *Global Biogeochem. Cycles.* **16**/4: 1104, doi: 10.1029/2001GB001847.

Lamborg, C.H., W.F. Fitzgerald, J. O'Donnell and T. Torgersen (2002) An examination of global-scale mercury biogeochemistry using a non-steady state compartment model which features interhemispheric gradients in the atmosphere as constraints. *Geochimica et Cosmochimica Acta* **66**/7:1-14.

Fitzgerald, W.F., G.M. Vandal, K.R. Rolfhus, C.H. Lamborg and C.S. Langer (2000) Mercury emissions and cycling in the coastal zone. *J. Environ. Sci.* **12**: 92-101.

Lamborg, C.H., W.F. Fitzgerald, W.C. Graustein and K.K. Turekian (2000) An examination of the atmospheric chemistry of mercury using ^{210}Pb and ^{7}Be. *J. Atmos. Chem.* **36**/3: 325-338.

Lamborg, C.H., K.R. Rolfhus, W.F. Fitzgerald and G. Kim (1999) Atmospheric cycling and air-sea exchange of Hg in the South and equatorial Atlantic. *Deep-Sea Res. II*. 46: 957-977.

Ackermann, M.N., W.G. Fairbrother, N.S. Amin, C.J. Deodene, C.H. Lamborg, P.T. Martin (1996) Tetracarbonylmolybdenum complexes of 2-(phenylazo) pyridine ligands. Correlations of molybdenum-95 chemical shifts with electronic, infrared, and electrochemical properties. *J. Organomet. Chem.* **523**/2: 145-151.

Lamborg, C.H., W.F. Fitzgerald, G.M. Vandal and K.R. Rolfhus (1995) Atmospheric mercury in northern Wisconsin: sources and species. *Water, Air and Soil Pollution*. **80**: 189-198.

Vandal, G.M., W.F. Fitzgerald, K.R. Rolfhus and C.H. Lamborg (1995) Modeling the elemental mercury cycle in Pallette Lake, Wisconsin, USA. *Water, Air and Soil Pollution*. **80**: 529-538.

Keeler, G.J., M.E. Hoyer and C.H. Lamborg (1994) Measurements of atmospheric mercury in the Great Lakes Basin. In: *Mercury Pollution: Integration and Synthesis. Chp. II.5* pp. 231-241.

Lamborg, C.H., M.E. Hoyer, G.J. Keeler, I. Olmez and X. Huang (1994) Particulate-phase mercury in the atmosphere: collection/analysis method development and applications. In: *Mercury Pollution: Integration and Synthesis. Chp. II.5* C.J. Watras and J.W. Huckabee (eds.) Lewis Pub. Boca Raton. pp. 231-241.

Lamborg, C.H., W.F. Fitzgerald, G.M. Vandal and K.R. Rolfhus (1993) Atmospheric mercury in northern Wisconsin: chemical characterization and fluxes. In: The Proceedings of the 9th Intl. Conf. on Heavy Metals in the Environment. R.J. Allen and J.O. Nriagu (eds.), CEP Consultants Ltd. Edinburgh.

Vandal, G.M., W.F. Fitzgerald, C.H. Lamborg, and K.R. Rolfhus (1993) The production and evasion of elemental mercury in lakes: a study of Pallette Lake, northern Wisconsin. In: The Proceedings of the 9th Intl. Conf. on Heavy Metals in the Environment. R.J. Allen and J.O. Nriagu (eds.), CEP Consultants Ltd. Edinburgh.

Papers in Review or Preparation

Lamborg, C.H., K.O. Buesseler, J. Valdes, C. Bertrand, D. Steinberg, S. Wilson, S. Pike, J. Andrews (in preparation) Vertical fluxes of minor and trace elements measured by sediment traps at two sites in the North Pacific Ocean.

Lamborg, C.H., K.O. Buesseler, J. Bishop, K. Casciotti, B. Van Mooy (in preparation) In vitro remineralization rates of large marine particles collected during VERTIGO.

Buesseler, K.O., C.H. Lamborg, J. Valdes, S. Manganini, S. Pike and J. Andrews (in preparation) Particle fluxes in the mesopelagic "twilight zone" at Station ALOHA.

Lamborg, C.H., O. Yigiterhan, W.F. Fitzgerald, P. Balcom and C. Hammerschmidt (in review) Vertical distributions of Hg species in the Black Sea.

Bone S., M. Charrette, C. Lamborg (in review) Hg cycling in the fresh-seawater interface of a subterranean estuary.

Presentations/Posters:

2nd International Conference on Mercury as a Global Pollutant, May 1992, Monterey, CA
9th International Conference on Heavy Metals in the Environment, September, 1993, Toronto, Ontario
3rd International Conference on Mercury as a Global Pollutant, July 1994, Whistler, British Columbia
American Chemical Society National Meeting, August 1995, Chicago, IL
Long Island Sound Research Symposium, October 1996, Hartford, CT
4th International Conference on Mercury as a Global Pollutant, August 1996, Hamburg, Germany
Gordon Conference on Chemical Oceanography, August 1997, Meriden, NH
AGU/ASLO Ocean Sciences Meeting, February 1998, San Diego, CA
Gordon Conference on Chemical Oceanography, August 1999, Meriden, NH
5th International Conference on Mercury as a Global Pollutant, May 1999, Rio de Janeiro, Brazil
11th International Conference on Heavy Metals in the Environment, August 2000, Ann Arbor, MI
6th International Conference on Mercury as a Global Pollutant, October 2001, Minamata, Japan
American Chemical Society National Meeting. April 2002, Orlando, FL
Dissertation Symposium on Chemical Oceanography (DISCO) XVII, May 2002, Honolulu, HI
ASLO, February 2003, Salt Lake City, UT.
Gordon Conference on Chemical Oceanography, August 2003, Meriden, NH
ASLO/TOS Ocean Sciences, February, 2004, Honolulu, HI
National Atmospheric Deposition Program Annual Technical Meeting, September, 2004, Halifax, NS
ASLO, June 2005, Santiago de Compostella, Spain.
ASLO/AGU/TOS Ocean Sciences, February 2006, Honolulu, HI
8th International Conference on Mercury as a Global Pollutant, August 2006, Madison WI.

Graduate Advisors:

Drs. William Fitzgerald, James O'Donnell, Annelie Skoog and Pieter Visscher

Post-doctoral Advisor/Sponsor:

Dr. Ken Buesseler

Current Projects

Minor and Trace Element Cycling in Sinking Marine Particles, NSF-OCE #0454148 – Principal Investigator

Vertical Transport in the Global Ocean, NSF-OCE #0301139 (K. Buesseler, Principal Investigator) – *Participant*

Natural and Anthropogenic Sources of Mercury to the Atmosphere: Global and Regional Contributions, EPA-STAR #R829796 (W. Fitzgerald and D. Engstrom, Principal Investigators) –*Participant*

Biogeochemical Cycling and Fate of Mercury and Methylmercury in the Arctic Alaskan Lakes, NSF-OPP #0425562 (W. Fitzgerald, Principal Investigator) – *Participant*