

ELSIE M. SUNDERLAND

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MAJOR RESEARCH AREAS

I study how biogeochemical processes affect the fate, transport and food-web bioaccumulation of trace metals and organic chemicals in aquatic ecosystems. I develop and apply models at a variety of scales ranging from ecosystems to global applications to characterize how changes in climate and emissions affect human and ecological health, and the potential impacts of regulatory activities.

EDUCATION

- 2003 **Ph.D., Simon Fraser University, Canada**
Environmental Toxicology, School of Resource & Environmental Management. Dissertation
Title: *Development of a Marine Mercury Cycling Model*. Senior Supervisor: Frank A.P.C. Gobas.
- 1997 **B.Sc., McGill University, Canada**
Received with Great Distinction in Environmental Science.

PROFESSIONAL EXPERIENCE

Harvard University, Cambridge MA, USA

- 2010-present Mark and Catherine Winkler Assistant Professor of Aquatic Science, Department of
Environmental Health, Harvard School of Public Health
- 2010-present Associate, Harvard School of Engineering and Applied Sciences
- 2008-2010 Research Associate, Harvard School of Engineering and Applied Sciences & Harvard Center for
Risk Analysis

U.S. Environmental Protection Agency, Washington DC, USA

- 2003-2008 Worked in the following EPA HQ Offices: *Office of the Science Advisor; National Center for
Environmental Research; National Center for Environmental Economics; Office of Science Policy*
- Positions and responsibilities included: Senior Staff, EPA Council for Regulatory
Environmental Modeling. Led cross-Agency workgroup drafting guidance on the development,
evaluation and application of environmental models used to inform regulatory decisions.
Responded to National Research Council panel recommendations on the use of models at EPA.
- Developed policy recommendations for improvement of nearshore water quality in the Great
Lakes as the representative for the International Air Quality Planning Board (IAQAB) of the
International Joint Commission (IJC).
- Worked as one of the Agency's lead scientists developing federal regulations for atmospheric
emissions of hazardous air pollutants from coal-fired utilities. Responsibilities included regular
briefings of senior Agency officials, White House staff and environmental journalists; crafting of
legal language for the Federal Register, and Regulatory Impact Assessments.

McGill Center for Climate Change Research & Limnology Research Group, Montreal PQ, Canada

- 1995-1997 Research Assistant in paleoecology laboratory and field technician studying eutrophication in
coastal estuaries of Prince Edward Island, Canada.

Lunenburg Municipal Government, Bridgewater NS, Canada

1994-1995 Assisted in the development of the first fully integrated-four waste stream management system in North America (large scale recycling and composting). Responsibilities included developing financial model to predict plant feasibility based on per ton tipping costs and recycling revenues; public relations and community outreach.

PERSONAL

Citizenship: dual, Canada and United States.

TEACHING

2013-present **Primary Instructor**, Seminar on Global Pollution Issues. Undergraduate Course, Environmental Science and Engineering (ES-169), Harvard School of Engineering and Applied Sciences.

2011-present **Primary Instructor**, Risk Assessment (RDS-500); Graduate Course, Department of Environmental Health, Harvard School of Public Health.

2011 **Co-Instructor**: Environmental Science (ENVR E-215); Harvard Extension School.

2009-present **Faculty**, Analyzing Risk: Science, Assessment, and Management; Center for Continuing Professional Education, Harvard School of Public Health.

2008 **Developed curriculum** and instructed training course on the use of models in environmental regulatory decision-making for U.S. EPA Region 1.

2000-2002 **Teaching Assistant**, School of Resource and Environmental Management, Simon Fraser University: 1) Applied Ecology and Sustainable Environments (undergraduate); 2) Simulation Modelling in Natural Resource Management (graduate); 3) Applied Environmental Toxicology and Management of Contaminants (graduate)

Ph.D. committees: Eun-Joo Park (2013-), Yong-Mei Shen (2011-), Iny Jhun (2012-2013), Matthieu Trudeau (2011-2013).

Ongoing Supervision:

Postdocs (4): Xianming Zhang (2013-); Yanxu Zhang (2013-); Amina Schartup (2012-); Anne Soerensen (2011-)

Doctoral students (6): Elizabeth Corbitt (2010-); Helen Amos (2010-); Miling Li (2011-); Hannah Horowitz (2011-); Ryan Calder (2012-); Clifton Dassuncao (2013-)

Masters students (3): Xindi Hu (2012-); Fangli Gang (2012-)

Alumni:

Postdocs (2): Asif Qureshi (2011-2013), Assistant Professor, IIT Hyderabad, India; Jenny Fisher (2011-2012), Postdoctoral Fellow, University of Wollongong, Australia.

Masters students (3): Dev Saha (2011-2012), Medical student, University of Texas; Wei Nui (2011-2013); Clifton Dassuncao (2011-2013), Doctoral candidate, Harvard.

ACADEMIC & PROFESSIONAL HONORS

2013 “Excellence in Reviewing Award” from journal *Biogeochemistry*

2012 Smith Family Foundation Award for Excellence in Biomedical Research

2010 U.S. EPA Level II Scientific & Technological Achievement (STAA) Award

2010 “Outstanding Reviewer” citation by Editorial Board of *Estuaries and Coasts*

2008 U.S. EPA Highest Level (Level I) Scientific & Technological Achievement (STAA) Award

2005 U.S. EPA National Honor Award, Gold Medal for Exceptional Service

2003	Dean's Convocation Medal (top academic award), Simon Fraser University
2002	Society of Environmental Toxicology & Chemistry best student paper presentation award
2001	Department of Fisheries and Oceans Canada, Supplement to NSERC Scholarship
1998-2002	Natural Sciences and Engineering Research Council of Canada (NSERC), National Postgraduate Scholarships (PGS A and PGS B)
1999	Gulf of Maine Council on the Marine Environment Research Fellowship
1998	Mountain Equipment Co-op Environment Fund Award
1997-2001	Simon Fraser University Graduate Scholarships
1995	Royal Canadian Geographic Society Undergraduate Research Award
1993	McGill University, Greville Smith Scholarship (top-entrance scholarship)
1993	Canada Scholarship, Industry and Technology Canada

PROFESSIONAL ACTIVITIES

Professional Service

2013-	GEOS-Chem Model International Steering Committee (Co-chair: Hg & POPs working group).
2013-	Scientific Steering Committee, 12 th International Conference on Mercury as a Global Pollutant, Jeju, Korea, June 14-19, 2015.
2013-	International Planning Committee (IPC), 17 th International Conference on Heavy Metals in the Environment, Guiyang, China, September 22-26, 2014.
2011-	Planning Team, UNECE/LRTAP Hemispheric Transport of Air Pollutants (HTAP), Impacts on Health and Ecosystems
2009-	Science Council, Biodiversity Research Institute, Gorham, ME
2011-2013	Scientific Steering Committee, 11 th International Conference on Mercury as a Global Pollutant, Edinburgh, Scotland, 28 July – 2 August 2013
2009-2012	Steering Committee, Consortium on Mercury in the Marine Environment (C-MERC)
2011-2012	International Planning Committee, 16 th International Conference on Heavy Metals in the Environment, Rome, Italy, 22-27 September 2012
2006-2011	Conference Co-Host and Technical Co-Chair for the 10 th International Conference on Mercury as a Global Pollutant, Halifax, Nova Scotia, 24-29 July 2011
2009-2010	Chapter Lead Author for Task Force on Hemispheric Transport of Air Pollution 2010 Assessment Report
2008-2010	International Joint Commission Fish Consumption Priority Workgroup
2008-2009	Steering Committee: Mercury Science and Policy Conference for the Northeast and Great Lakes Region, Chicago, Illinois, 2009
2007-2008	Organizing Committee for the 6 th National Water Quality Monitoring Conference, Atlantic City, New Jersey, May 18-22, 2008
2006-2007	Co-organizer of the Lake Ontario Contaminants Modeling and Monitoring Meeting, Grand Island, NY. March 27-28, 2007
2004-2006	Regional Planning Committee for the 8 th International Conference on Mercury as a Global Pollutant, Madison, Wisconsin, 6-11 August 2006
2005-2006	Co-organizer of the International Joint Commission Collaborative Meeting on Mercury Modeling in Freshwater Environments, Niagara Falls, NY, 19-20 January 2006
2003-2008	Nation-wide modeling seminar series coordinator for U.S. EPA's Regional Offices
2007-2008	Great Lakes Observing System Modeling Subsystem Team Member
2003-2008	Co-organizer of Northwest Water Quality Modelers

- 2007-2008 Invited Panelist for International Joint Commission Nearshore Priority Expert Consultations
- 2006-2008 U.S. EPA Region 1 Regional Science Council
- 2006-2008 Workgroup on U.S. EPA Guidance Document for Calculating National Bioaccumulation Factors
- 2006-2008 Workgroup on U.S. EPA Methylmercury Fish Tissue Residue Implementation Guidance
- 2003-2008 Lead Author and workgroup coordinator for U.S. EPA Guidance on Regulatory Environmental Modeling
- 2005 U.S. EPA Reconsideration of the Clean Air Mercury Rule Workgroup and Author
- 2004-2005 U.S. EPA Clean Air Mercury Rule Regulatory Impact Assessment Workgroup and Author
- 2003-2004 U.S. EPA Office of Water Mercury in Marine Life Workgroup

Special Session Organizer

- 2013 11th International Conference on Mercury as Global Pollutant, Edinburgh, Scotland, 28 July – 2 August, 2013
- 2012 American Meteorological Society, First Conference on Atmospheric Biogeosciences, 29 May – 1 June, 2012
- 2010 Society of Environmental Toxicology & Chemistry, Annual Meeting, Portland OR, November 7-11, 2010
- 2009 American Geophysical Union, Fall Meeting, San Francisco CA, December 14-18, 2009
- 2009 9th International Conference on Hg as a Global Pollutant, Guiyang, China, June 7-12, 2009
- 2008 6th National Water Quality Monitoring Conference, Atlantic City, New Jersey, May 18-22, 2008
- 2006 8th International Conference on Hg as a Global Pollutant, Madison, WI, August 6-11, 2006

University Affiliations and Professional Societies

- 2011-present Co-leader, Harvard Atmospheric Chemistry Modeling Group
- 2010-present Faculty Associate, Harvard University Center for the Environment (HUCE)
- 2009-present Member, Harvard Center for Risk Analysis (HCRA)
- 2007-present Member, American Geophysical Union (AGU)
- 2001-present Member, Society of Environmental Toxicology and Chemistry (SETAC)

Peer Review

Peer-reviewer for >25 different journals:

Analytical Chemistry; Applied Geochemistry; Atmospheric Chemistry and Physics; Biogeochemistry; Chemical Reviews; Chemosphere; Ecology and Evolution; Environmental Practice; Environmental Pollution; Environmental Research; Environmental Science & Technology; Environmental Toxicology & Chemistry; Estuaries and Coasts, *Geochimica et Cosmochimica Acta*; Geophysical Research Letters; Global Biogeochemical Cycles; Handbook of Environmental Chemistry; International Journal of Environmental and Analytical Chemistry; Journal of Geophysical Research-Biogeosciences; Marine Chemistry; Marine Environmental Research; Nature Geoscience; Nature Climate Change; Proceedings of the National Academy of Science (PNAS); Science; Science of the Total Environment; Water, Air and Soil Pollution.

Guest Editor: *Environmental Research*, Volume 119, Pages 1-142 (November 2012): Mercury in Marine Ecosystems: Sources to Seafood Consumers

Grant Reviews:

- 2013 U.S. National Science Foundation Panel Reviewer, Office of Polar Programs
- 2012 Natural Sciences and Engineering Research Council of Canada (NSERC) Discovery Program
- 2012 Agence Nationale de la Recherche (ANR), France
- 2012 U.S. National Science Foundation

- 2010 Swiss National Science Foundation
 2009-2013 Canadian Northern Contaminants Program
 2009 New Hampshire Sea Grant, Virginia Sea Grant
 2008 Minnesota Sea Grant
 2007 Natural Sciences and Engineering Research Council of Canada (NSERC) Strategic Grants Program

Review of International Assessment Reports:

- 2012 Canadian Assessment of Mercury in the Marine Environment, Environment Canada
 2010 Arctic Monitoring and Assessment Report, Arctic Monitoring and Assessment Program
 2009 UNEP Mercury Fate and Transport Partnership Assessment Report

Consulting

- 2013 Reviewer, Penobscot Bay scientific panel report on impacts of a chlor-alkali plant on estuarine water quality and mercury bioaccumulation.
 2011 Nunatsiavut Government, Expert review of potential impacts of hydroelectric power development on the Lower Churchill River in Labrador, Canada on methylmercury dynamics and risks to Inuit health.
 2011 Panelist for blueprint review of research and monitoring priorities for the Northern Contaminants Program, Indian and Northern Affairs Canada.

PUBLICATIONS (STUDENTS/POSTDOCS MENTORED ARE UNDERLINED)

JOURNALS (PEER-REVIEWED)

37. H.M. Horowitz, D.J. Jacob, H.M. Amos, D.G. Streets, **E.M. Sunderland**. 2014. Historical mercury releases from commercial products: Global environmental implications. *Environmental Science and Technology*. Submitted.
36. M. Li, L.S. Sherman, J.D. Blum, P. Grandjean, B. Mikkelsen, P. Weihe, **E.M. Sunderland***, J.P. Shine*. 2014. Assessing sources of human mercury exposure using mercury stable isotopes. *Environmental Science and Technology*. Submitted. *Co-senior authors.
35. M.B. Trudeau, **E.M. Sunderland**, D.L. Jindrich, J.T. Dennerlein. 2014. A data-driven design evaluation tool for handheld device soft keyboards. *PLoS ONE*. In review.
34. J.A. Fisher, D.J. Jacob, A.L. Soerensen, H.M. Amos, E.S. Corbitt, D.G. Streets, Q. Wang, R.M. Yantosca, **E.M. Sunderland**. 2013. Factors driving mercury variability in the Arctic atmosphere and ocean over the past 30-years. *Global Biogeochemical Cycles*. 27(4) : 1226-1235.
33. D.P. Krabbenhoft **E.M. Sunderland**. 2013. Global change and mercury. *Science*. 341 (6153), 1457-1458.
32. N. Pirrone, W. Aas, S. Cinnirella, R. Ebinghaus, I. M. Hedgecock, J. Pacyna, F. Sprovieri, **E.M. Sunderland**. 2013. Toward the next generation of air quality monitoring: Mercury. *Atmospheric Environment*. 80: 599-612.
31. A.L. Soerensen, R.P. Mason, P.H. Balcom, **E.M. Sunderland**. 2013. Drivers of surface ocean mercury concentrations and air-sea exchange in the West Atlantic Ocean. *Environmental Science and Technology*. 47(14), 7757-7765.
30. H.M. Amos, D.J. Jacob, D.G. Streets, **E.M. Sunderland**. 2013. Legacy impacts of all-time anthropogenic emissions on the global mercury cycle. *Global Biogeochemical Cycles*. 27, 410-421.
29. **E.M. Sunderland** and N.E. Selin. 2013. Future trends in environmental mercury concentrations:

- Implications for prevention strategies. *Environmental Health*. 12:2, doi:10.1186/1476-069X-12-2.
28. A.L. Soerensen, D.J. Jacob, D. Streets, M. Witt, R. Ebinghaus, R.P. Mason, M. Andersson, **E.M. Sunderland**. 2012. Multi-decadal decline of mercury in the North Atlantic atmosphere explained by changing subsurface seawater concentrations. *Geophysical Research Letters*. 39, L21810.
 27. R. Harris, C. Pollman, C., Landing, W., Axelrad, D., Morey, S.L., Dukhovskoy, D., Evans, D., D. Rumbold, D. Adams, **E.M. Sunderland**. 2012. Mercury in the Gulf of Mexico: Sources to receptors. *Environmental Research*, 119, 42-52.
 26. C.Y. Chen, C.T. Driscoll, K.F. Lambert, R.P. Mason, L.R. Rardin, N. Serrell, **E.M. Sunderland**. Marine mercury fate: From sources to seafood consumers. *Environmental Research*, 119, 1-2.
 25. C.T. Driscoll, C.Y. Chen, C.R. Hammerschmidt, R.P. Mason, C.C. Gilmour, **E.M. Sunderland**, B. Greenfield, K. Buckman, C.H. Lamborg, 2012. Nutrient supply and mercury dynamics in marine ecosystems: A conceptual model. *Environmental Research*, 119, 118-131.
 24. R.P. Mason, W.F. Fitzgerald, C. Lamborg, C. Hammerschmidt, A. Choi, A.L. Soerensen, **E.M. Sunderland**. 2012. Mercury biogeochemical cycling in the ocean and policy implications. *Environmental Research*. 119, 101-117.
 23. **E.M. Sunderland**, N. Burgess, A. Amirbahman, G. Harding, E. Kamai, M. Karagas, S. Jones, J. Dalziel, X. Shi, C.Y. Chen. 2012. Mercury sources and fate in the Gulf of Maine. *Environmental Research*. 119, 27-41.
 22. J.A. Fisher, D.J. Jacob, A.L. Soerensen, H.M. Amos, A. Steffen, **E.M. Sunderland**. 2012. Riverine source of Arctic Ocean mercury inferred from atmospheric observations. *Nature Geoscience*, 5: 499-504.
 21. E. Oken, A. Choi, M. Karagas, R. Schoeny, K. Marien, C. Rheinberger, **E. Sunderland**, S. Korrick. 2012. Which fish should I eat? Challenges to developing clear, unified fish consumption advice. *Environmental Health Perspectives*. 120: 790-798.
 20. H. M. Amos, D. J. Jacob, C. D. Holmes, J. A. Fisher, Q. Wang, R. M Yantosca, E. S. Corbitt, E. Galarneau, A. P. Rutter, M. S. Gustin, A. Steffen, J. J. Schauer, J. A. Graydon, V. L. St. Louis, R. W. Talbot, E. S. Edgerton, **E. M. Sunderland**. 2012. Gas-particle partitioning of atmospheric Hg(II) and its effect on global mercury deposition. *Atmospheric Chemistry and Physics*, 12, 591-603.
 19. D.G. Streets, M.K. Devane, Z. Lu, T.C. Bond., **E.M. Sunderland**, D.J. Jacob. 2011. All-time releases of mercury to the atmosphere from human activities. *Environmental Science and Technology*, 45(24), 10485-10491.
 18. E.S. Corbitt, D.J. Jacob, C.D. Holmes, D.G. Streets, **E.M. Sunderland**. 2011. Global source-receptor relationships for mercury deposition under present-day and 2050 emissions scenarios. *Environmental Science & Technology*, 45(24), 10477-10484.
 17. K.R. Mahaffey, **E.M. Sunderland**, H.M. Chan, A.L. Choi, P. Grandjean, K. Marien, E. Oken, M. Sakamoto, R. Schoeny, P. Weihe, C.-H. Yan, A. Yasutake. 2011. Balancing benefits of n-3 polyunsaturated fatty acids and the risk of methylmercury exposure from fish consumption. *Nutrition Reviews*. 69(9): 493-508.
 16. A.L. Soerensen, **E.M. Sunderland**, C.D. Holmes, D.J. Jacob, B. Yantosca, S.A. Strode, H. Skov, J. Christensen, R.P. Mason. 2010. An improved global simulation of mercury air-sea exchange: High concentrations in the North Atlantic. *Environmental Science & Technology*. 44(22): 8574-8580.
 15. **E.M. Sunderland**, J. Dalziel, A. Heyes, B.A. Branfireun, D.P. Krabbenhoft, F.A.P.C. Gobas. 2010. Response of a macrotidal estuary to changes in anthropogenic mercury loading between 1850 and 2000. *Environmental Science & Technology*. 44(5): 1698-1704.
 14. N.V. Smith-Downey, **E.M. Sunderland**, D.J. Jacob. 2010. Anthropogenic impacts on global storage and emissions of mercury from terrestrial soils: Insights from a new global model. *Journal of Geophysical*

Research - Biogeosciences. 115, G03008.

13. N.E. Selin, **E.M. Sunderland**, C.D. Knightes, and R.P. Mason. 2010. Sources of mercury exposure for U.S. seafood consumers: Implications for policy. *Environmental Health Perspectives*. 118(1): 137-143.
12. **E.M. Sunderland**, D.P. Krabbenhoft, J.M. Moreau, S. Strode, W.M. Landing. 2009. Mercury sources, distribution and bioavailability in the North Pacific Ocean: Insights from data and models. *Global Biogeochemical Cycles*. 23, GB2010.
11. C.D. Knightes, **E.M. Sunderland**, M. Craig Barber, J.J. Johnston, R.B. Ambrose Jr. 2009. Application of ecosystem scale fate and bioaccumulation models to predict fish mercury response times to changes in atmospheric deposition. *Environmental Toxicology and Chemistry*. 29(4): 881-893.
10. **E.M. Sunderland**, M. Cohen, N.E. Selin, G.L. Chmura. 2008. Reconciling models and measurements to assess trends in atmospheric mercury deposition. *Environmental Pollution*. 156, 526-535.
9. N.E. Selin, D.J. Jacob, R.M. Yantosca, L. Jaegle, S. Strode, **E.M. Sunderland**. 2008. Land-ocean-atmosphere cycling in a global 3-D model for atmospheric mercury: pre-industrial and present-day biogeochemical budgets, and anthropogenic enhancement factors for deposition. *Global Biogeochemical Cycles*. Vol. 22, GB2011.
8. **E.M. Sunderland** and R.P. Mason. 2007. Human impacts on open ocean mercury concentrations. *Global Biogeochemical Cycles*. Vol. 21, GB4022.
7. **E.M. Sunderland**. 2007. Mercury exposure from domestic and imported estuarine and marine fish and shellfish in U.S. seafood markets. *Environmental Health Perspectives*. 115: 235-242.
6. **E.M. Sunderland**, F.A.P.C. Gobas, A. Heyes, B. Branfireun. 2006. Environmental controls on the speciation and distribution of mercury in coastal sediments. *Marine Chemistry*. 102: 111-123.
5. Heyes, R.P. Mason, E-H. Kim, and **E. Sunderland**. 2006. Mercury methylation in estuaries. *Marine Chemistry*. 102: 134-147.
4. **E.M. Sunderland**, F.A.P.C. Gobas, A. Heyes, B. Branfireun, A. Bayer, R. Cranston, and M. Parsons. 2004. Speciation and bioavailability of mercury in well-mixed estuarine sediments. *Marine Chemistry*. 90: 91-105.
3. G.L. Chmura, L.L. Helmer, C.B. Beecher, and **E.M. Sunderland**. 2001. Historical rates of salt marsh accretion in the outer Bay of Fundy. *Canadian Journal of Earth Sciences*. 31: 1081-1092.
2. **E.M. Sunderland** and G.L. Chmura. 2000. An inventory of historical mercury emissions in Maritime Canada: Implications for present and future contamination. *The Science of the Total Environment*. 256(1): 39-57.
1. **E.M. Sunderland** and G.L. Chmura. 2000. The history of mercury emissions from fuel combustion in Maritime Canada. *Environmental Pollution*. 110(2): 297-306.

BOOK CHAPTERS

3. **E.M. Sunderland** and M. Tumpney. 2013. "Mercury in Foods." In: M. Rose, A. Fernandes. Persistent Organic Pollutants and Toxic Metals in Foods. Woodhead Publishing Series in Food Science, Technology and Nutrition No. 247. FERA, UK, pp. 392-413. ISBN-13: 978 0 85709 245 8.
2. A. Qureshi, M. MacLeod, **E. Sunderland**, and Hungerbühler, K. 2012. "Exchange of mercury between the oceans and atmosphere." In: G. Liu, Y. Cai, N. O'Driscoll. Environmental Chemistry and Toxicology of Mercury. John Wiley & Sons, Inc. Hoboken, New Jersey, USA, pp. 389-422. ISBN 978-0-470-57872-8.
1. **E.M. Sunderland**, C.D. Knightes, K. von Stackelberg, and N. Stiber. 2010. "Environmental Fate and Bioaccumulation Modeling at EPA: Application to Environmental Decision Making." In: G. Hanrahan (Ed.), Modelling of Pollutants in Complex Environmental Systems, Vol. II, ILM, UK, pp. 3-42.

REPORTS

8. Chen, C.Y., C.T. Driscoll, K.F. Lambert, R.P. Mason, L. Rardin, C.V. Schmitt, N.S. Serrell, and E.M. Sunderland. 2012. Sources to Seafood: Mercury Pollution in the Marine Environment. Hanover, NH: Toxic Metals Superfund Research Program, Dartmouth College.
7. International Joint Commission (Workgroup Contributor), 2011. Risks and Benefits of Fish Consumption. Great Lakes Water Quality Agreement 2009-2011 Priority Cycle Report. International Joint Commission, Windsor, Ontario. ISBN: 978-1-927336-0308.
6. Hedgecock, N. Pirrone, A. Dastoor, L. Levin, C-J. Lin, R.P. Mason, E. Sunderland, O. Travnikov. 2010. Chapter 6: Summary. In: Hemispheric Transport of Air Pollution 2010, Part B: Mercury. N. Pirrone and T. Keating (Eds.) Air Pollution Studies No. 18. United Nations Economic Commission for Europe. United Nations, New York and Geneva.
5. E.M. Sunderland, E. Corbitt, D. Cossa, D. Evers, H. Friedli, D. Krabbenhoft, L. Levin, N. Pirrone, G. Rice. 2010. Impacts of Intercontinental Mercury Pollution on Human and Ecological Health. In: Hemispheric Transport of Air Pollution 2010, Part B: Mercury. N. Pirrone and T. Keating (Eds.) Air Pollution Studies No. 18. United Nations Economic Commission for Europe. United Nations, New York and Geneva.
4. U.S. EPA. 2009. *Final EPA Guidance on the Development, Evaluation and Application of Environmental Models*. (Principal authors: N. Gaber, P. Pascual, N. Stiber, E. Sunderland). EPA/100/K-09/003, EPA Council for Regulatory Environmental Modeling, Washington D.C, March 2009.
3. International Joint Commission. 2006. Contributing author to chapter: Development of a Multi-compartment Mercury Model for Lake Ontario: Tracking Mercury from Sources, Deposition and Dispersion to Fish and Accumulation in Humans. In: *Priorities 2003-2005. Priorities and Progress Under the Great Lakes Water Quality Agreement*. Chapter 2: 37-69.
2. U.S. EPA. 2005. Lead author for chapter: “*Ecosystem Scale Modeling for Mercury Benefits Assessment*.” Chapter 3, Regulatory Impact Analysis of the Clean Air Mercury Rule, Final Report. EPA-452/R-05-003, Office of Air Quality Planning and Standards, Research Triangle Park, NC.
1. EPA Council for Regulatory Environmental Modeling. 2003. *Interim EPA Guidance for the Development, Evaluation and Application of Regulatory Environmental Models*. (Principal authors: P. Pascual, N. Stiber, E. Sunderland). Washington DC.

SELECTED INVITED TALKS

46. 34th Annual Meeting of the Society of Environmental Toxicology and Chemistry, North America. Nashville, TN. Invited speaker. November 21, 2013.
45. 11th International Conference on Mercury as a Global Pollutant. Edinburgh, Scotland. Invited plenary speaker (presented for medical reasons by D.P. Krabbenhoft). August 1, 2013.
44. Graduate School of Oceanography, University of Rhode Island, RI. Invited seminar. April 26, 2013.
43. Dartmouth College Superfund Program, Hanover, NH. Invited seminar. October 16, 2012.
42. 16th International Conference on Heavy Metals in the Environment (ICHMET), Rome, Italy. Invited plenary speaker. September 24, 2012.
41. Mercury Science in the Great Lakes Workshop, Invited participant and speaker, Chicago, IL. May 30-31, 2012.
40. School of Marine and Atmospheric Sciences, Stony Brook University, NY. Invited seminar. February 3, 2012.
39. Gulf of Mexico Alliance Mercury Meeting, Gulf Breeze, FL. Invited presentation. October 18, 2011.
38. Interdisciplinary Seminar Series, Lafayette College, PA. Invited seminar. September 26, 2011.

37. Superfund Research Program, Harvard School of Public Health, Boston, MA. Invited seminar. March 7, 2011.
36. Gordon Research Conference – Environmental Sciences: Water, Holderness, NH. Invited speaker. June 20-25, 2010.
35. U.S. EPA Meeting on Global Mercury Emissions and U.S. Exposures, Washington, DC. Invited presentation. January 14, 2010.
34. Northeast and Great Lakes Region Mercury Science and Policy Conference, Chicago, IL. Invited presentation. November 17-18, 2009.
33. 10th National Forum on Contaminants in Fish, Portland, OR. Invited presentation. November 2-5, 2009.
32. 9th International Conference on Mercury as a Global Pollutant, Guiyang, China. Invited presentation at session hosted by the National Institute for Minamata Disease (NIMD). June 7-12, 2009.
31. UNECE/CLRTAP Task force on Hemispheric Transport of Air Pollution, St. Petersburg, Russia. Invited presentation. April 1-3, 2009.
30. Gulf of Mexico Mercury Workshop, Gulfport MS. Invited talk. December 2-4, 2008.
29. GEOSS Workshop XXII: Air Quality and Coastal Ecosystems, Boston MA. Invited talk. July 6, 2008.
28. 5th Annual Northwest Water Quality Modelers Meeting, Hood River OR. Invited talk. May 2-3, 2008.
27. Joint ASLO and AGU Ocean Sciences Meeting, Orlando, FL. March 2-7, 2008.
26. International Air Quality Advisory Board, Washington DC. April 15, 2008.
25. International Joint Commission Nearshore Priority Expert Consultation Part II, Dearborn MI. Invited panelist. March 12-13, 2008.
24. New England Tribal Council, Boston MA. Invited seminar. December 11, 2007.
23. US EPA Region 1, Regional Science Council Seminar Series, August 29, 2007.
22. New England Interstate Water Pollution Control Commission Fish Consumption Workgroup, Lowell MA. April 3, 2007.
21. Lake Ontario Contaminant Monitoring, Modeling and Research Workshop, Grand Island NY. March 27-28, 2007.
20. Harvard Center for Risk Analysis, Harvard School of Public Health, Boston MA. Invited seminar. March 5, 2007.
19. US EPA's Mercury Coordination Workgroup, Washington DC. Invited Presentation. February 28, 2007.
18. Dartmouth Toxic Metals Research Program and Sea Grant Sponsored Workshop, Durham NH. Invited panel speaker. November 15-16, 2006.
17. Marine Science Program, University of Connecticut, Groton CT. Invited seminar. October 13, 2006.
16. NOAA Great Lakes Environmental Research Laboratory, Ann Arbor MI. Invited seminar. September 14, 2006.
15. USGS/US EPA Roundtable on Mercury in the Environment, Washington DC. Invited talk. April 13, 2006.
14. US EPA Region 1 Regional Science Council Seminar Series, Boston MA. Invited seminar. March 1, 2006.
13. University of British Columbia, School of Occupational and Environmental Hygiene, Vancouver BC, Canada. Invited seminar. February 3, 2006.
12. US Army Corps of Engineers Committee on Water Quality, San Francisco CA. Invited talk. August 30, 2005.
11. Shared Air Summit sponsored by the Premier of Ontario, Toronto ON, Canada. Invited talk. June 20, 2005.
10. Biennial Meeting of the International Joint Commission, Two invited talks. Kingston ON, Canada. Two invited talks. June 9-11, 2005.

9. NOAA- US EPA Scientist-to-Scientist Meeting on Multi-Media Aspects of Environmental Pollution in Coastal and Marine Environments. Patuxent Research Refuge National Wildlife Center, Laurel MD. Invited talk. June 1-3, 2005.
8. Ontario Ministry of the Environment (Toronto and Dorset locations), ON, Canada. Two invited seminars. April 20-22, 2005.
7. US EPA's Scientific Advisory Board, Panel on Regulatory Environmental Modeling, Washington DC. Invited presentation. February 7-9, 2005.
6. International Air Quality Advisory Board of the International Joint Commission, Vancouver, BC. Invited presentation. January 26, 2005.
5. Woodrow Wilson International Center for Scholars, Washington DC. Invited presentation. June 20, 2004.
4. USGS/US EPA Mercury Roundtable on Tools for Modeling Fish Bioaccumulation and Potential Health Effects, Washington, DC. Invited talk. June 4, 2004.
3. Department of Fisheries and Oceans Canada, Bedford Institute of Oceanography, Halifax, Nova Scotia, Canada. Two invited seminars. January 13-15, 2004.
2. 4th International Conference on Air Quality: Mercury, Trace Elements and Particulate Matter, Arlington, VA. Invited talk. September 22-24, 2003.
1. US EPA Mercury in Marine Life Workgroup, Office of Water. Washington DC. Invited presentation. July 10, 2003

SELECTED MEDIA COVERAGE

- July 8, 2013 “Harvard Researchers warn of legacy mercury in the environment.”
http://www.sciencecodex.com/harvard_researchers_warn_of_legacy_mercury_in_the_environment-115324
<http://esciencenews.com/articles/2013/07/08/harvard.researchers.warn.legacy.mercury.environment>
<http://phys.org/news/2013-07-legacy-mercury-environment.html>
<http://www.redorbit.com/news/science/1112893244/mercury-fish-environment-legacy-levels-centuries-070913/>
- January 21, 2013 Refinery 29. “Why the whole world (literally!) is talking about mercury in fish.” N. Catanese:
<http://www.refinery29.com/mercury-facts>
- January 9, 2013 Boston Globe: “All of the earth now a mercury hotspot.” D.Z. Jackson:
<http://www.bostonglobe.com/opinion/2013/01/09/all-earth-now-mercury-hotspot/pOyPxr2EuGhV959OEbokuN/story.html>
- January 7, 2013 BioMedCentral: “Counting the costs of mercury pollution.”
<http://www.biomedcentral.com/presscenter/pressreleases/20130107>
- December 3, 2012 ScienceDaily: “Mercury releases contaminate ocean fish: New research important for discussion of international mercury.”
<http://www.sciencedaily.com/releases/2012/12/121203150008.htm>
- Nov. 28, 2012 The Canadian Press: “Inuit raise concerns about possible mercury contamination from Muskrat Falls.” S. Bailey:
<http://www.canada.com/business/all/Inuit+raise+concerns+about+possible+mercury+contamination+from/7621408/story.html>
- May 21, 2012 LiveScience: “Toxic mercury accumulates in Arctic.” LiveScience Staff:
<http://www.livescience.com/20479-toxic-mercury-accumulating-arctic.html>

ScienceOmega.com: “Mercury rise flows from rivers.” K. Edgington:
<http://www.scienceomega.com/article/364/mercury-rise-flows-from-rivers>

Softpedia.com: “Mercury pollution found in the Arctic.” T. Vieru:
<http://news.softpedia.com/news/Mercury-Pollution-Found-in-the-Arctic-270712.shtml>

- August 2009 Environews, *Environmental Health Perspectives* “Ocean currents key to methylmercury in North Pacific Ocean.” C. Potera: <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2721888/>
- May 1, 2009 New York Times: “Study shows link between air pollution, contaminated seafood.” N. Straub: <http://www.nytimes.com/gwire/2009/05/01/01greenwire-study-shows-link-between-air-pollution-contami-19116.html>
- March 31, 2009 Nature News: “Ocean mercury on the increase: Rise may affect neurotoxin levels in fish.” N. Lubick: <http://www.nature.com/news/2009/090331/full/news.2009.218.html>.

RESEARCH SUPPORT

- 12/01/13-12/01/14 Gift to Harvard Office of Sponsored Research. “Immunotoxicity Risks Associated with Exposures to Perfluoroalkyl Substances (PFASs) in Marine Seafood.” PI.
- 5/15/13-12/31/13 Electric Power Research Institute, “Global 3-D Biogeochemical Modeling of the Impacts of Legacy and Riverine Mercury on Past and Future Atmospheric Deposition.” PI.
- 3/15/13-3/14/16 National Science Foundation, Chemical Oceanography: “Collaborative Research: Methylmercury Interactions with Marine Plankton.” Co-PI with Robert Mason (U.Conn.) and Nick Fisher (SUNY, Stony Brook).
- 3/1/13-2/28/16 Smith Family Foundation: “Sources, Trends and Effects of Immunotoxic Perfluorinated Compounds.” PI.
- 8/1/12-7/31/14 Nunatsiavut Government: “Methyl Mercury and Lake Melville.” PI.
- 8/1/12-7/31/15 National Science Foundation, Arctic Sciences: “Collaborative Research: Evaluating the Competing Impacts of Global Emissions Reductions and Climate Change on the Distribution and Retention of Selected POPs in the Arctic Ocean.” Co-PI with Rainer Lohmann (URI) and Noelle Selin (MIT).
- 5/1/12 -05/01/14 Electric Power Research Institute. “A Survey of High End Fish Consumers in the United States and Resulting Mercury Exposures.” PI.
- 11/22/11-11/21/12 Harvard School of Engineering and Applied Sciences Funding for Environment, Energy and Sustainability Research: “Global Source of Environmental Mercury from Disposal of Commercial Mercury Products.” Co-PI with D.J. Jacob (Harvard).
- 11/22/11-11/21/12 Harvard School of Engineering and Applied Sciences Funding for Environment, Energy and Sustainability Research: “Water Reuse for Irrigation in Rural Australia.” Co-PI with J. Briscoe (Harvard).
- 10/1/11-9/10/12 Electric Power Research Institute. “Pilot Investigation of the Impacts of Past, Present and Future Atmospheric Mercury Deposition on Distribution and Bioavailability of Oceanic Mercury.” PI.
- 9/1/11-8/31/14 National Science Foundation, Chemical Oceanography: “Collaborative Research: Interwoven Biogeochemical Cycles and Biotransformations of Mercury and Selenium

in the Upper Ocean. Co-PI with Carl Lamborg (WHOI) and William Fitzgerald (U.Conn.).

4/1/11-3/31/13 Harvard National Institute for Environmental Health Research Center Grant: “Predicting Cholera Outbreaks Using Global Climate Data.” Co-PI with C.O. Buckee (Harvard).

1/07/11-9/30/13 U.S. Environmental Protection Agency. “Global Mercury Emissions and U.S. Population Exposures.” PI.

12/22/10-12/22/11 Florida Department of Environmental Protection. “Pilot Analysis of Gulf of Mexico State Residents’ Methylmercury Exposures from Commercial and Locally Caught Fish.” PI.

8/15/10-7/31/13 National Science Foundation, Arctic Sciences: “Collaborative Research: Impacts of Recent Climate and Emissions Changes on Mercury Bioaccumulation in Arctic Marine Food-webs” Co-PI with D.J. Jacob (Harvard).

6/15/10-5/31/13 National Science Foundation, Atmospheric Chemistry Division: “Collaborative Research: Global 3-D Modeling of Atmospheric Mercury and its Coupling to the Ocean and Land: Impacts of Past and Future Anthropogenic Emissions.” Co-PI with D.J. Jacob (Harvard).