

# CURRICULUM VITAE

## ROBERTA C. HAMME

School of Earth and Ocean Sciences  
University of Victoria  
P.O. Box 3065 STN CSC  
Victoria, BC V8W 3V6  
CANADA

Tel: (250) 686-4140  
Fax: (250) 721-6200  
rhamme@uvic.ca  
<http://web.uvic.ca/~rhamme/>  
Immigration Status: US Citizen

### Major fields of scholarly interest

- Gases as tracers of oceanic physical and biological processes
- Ocean carbon cycle and uptake of anthropogenic carbon dioxide
- Water mass formation processes
- Rates of marine organic carbon production and export
- Oceanic nitrogen cycle
- Air-sea gas exchange
- Development of high precision gas analysis methods

### Education

- Ph.D.** 2003, Chemical Oceanography, University of Washington, Seattle, WA.  
*"Applications of neon, nitrogen, argon and oxygen to chemical, physical and biological cycles in the ocean"* Advisor: Steven Emerson
- M.Sc.** 1996, Chemical Oceanography, University of Washington, Seattle, WA.  
*"Barium geochemistry of corals from the Great Barrier Reef"* Advisors: Glen Shen, Russ McDuff
- B.A.** 1993, Chemistry (summa cum laude) Pomona College, Claremont, CA

### Employment

- 2006-present *Assistant Professor*  
School of Earth and Ocean Sciences, University of Victoria, Victoria, BC, Canada.
- 2003-2006 *Postdoctoral Scholar* with Ralph Keeling.  
Scripps Institution of Oceanography, UCSD, La Jolla, CA, USA
- 1996-1998 *Analytical Chemist*  
Scott Semiconductor Gases, Fremont, CA, USA

### Publications (underlined = student directly supervised)

- Hamme, R.C.**, N. Cassar, V.P. Lance, R.D. Vaillancourt, M.L. Bender, P.G. Strutton, T.S. Moore, M.D. DeGrandpre, C.L. Sabine, D.T. Ho, and B.R. Hargreaves (2011) Dissolved O<sub>2</sub>/Ar and other methods reveal rapid changes in productivity during a Lagrangian experiment in the Southern Ocean, *J. Geophys. Res.*, submitted.
- Moore, T.S., M.D. DeGrandpre, C.L. Sabine, C.J. Zappa, W.R. McGillis, **R.C. Hamme**, R.A. Feely, and W.M. Drennan (2011) Sea surface pCO<sub>2</sub> and O<sub>2</sub> in the Southern Ocean during the austral fall, 2008, *J. Geophys. Res.*, revision submitted.
- Ho, D.T., C.L. Sabine, D. Hebert, D.S. Ullman, R. Wanninkhof, **R.C. Hamme**, P.G. Strutton, B. Hales, J.B. Edson, and B.R. Hargreaves (2010) Southern Ocean Gas Exchange Experiment: Setting the stage, *J. Geophys. Res.*, in press.
- Ito, T., **R.C. Hamme**, and S. Emerson (2011) Temporal and spatial variability of noble gas tracers in the North Pacific, *J. Geophys. Res.*, 116, C08039, doi:10.1029/2010JC006828..
- Nicholson, D., S. Emerson, S. Khatiwala, **R.C. Hamme** (2011) An inverse approach to estimate bubble-mediated air-sea gas flux from inert gas measurements. *Proceedings of the 6th International Symposium on Gas Transfer at Water Surfaces*, Kyoto University Press, 223-237.

- Nicholson, D., S. Emerson, N. Caillon, J. Jouzel, and **R.C. Hamme** (2010) Constraining ventilation during deep-water formation using deep-ocean measurements of the dissolved gas ratios  $^{40}\text{Ar}/^{36}\text{Ar}$ ,  $\text{N}_2/\text{Ar}$  and  $\text{Kr}/\text{Ar}$ , *J. Geophys. Res.*, 115(C11), C11015, doi:10.1029/2010JC006152.
- Manning, C., **R.C. Hamme**, and A. Bourbonnais (2010) Impact of deep-water renewal events on fixed nitrogen loss from seasonally-anoxic Saanich Inlet, *Mar. Chem.*, 122 (1-4), p. 1-10, doi: 10.1016/j.marchem.2010.08.002.
- Hamme, R.C.**, P.W. Webley, W.R. Crawford, F.A. Whitney, M.D. DeGrandpre, S.R. Emerson, C.C. Eriksen, K.E. Giesbrecht, J.F.R. Gower, M.T. Kavanaugh, M.A. Peña, C.L. Sabine, S.D. Batten, L.A. Coogan, D.S. Grundle, and D. Lockwood (2010) Volcanic ash fuels anomalous plankton bloom in subarctic northeast Pacific, *Geophys. Res. Lett.*, 37, L19604, doi:10.1029/2010GL044629.
- Juranek, L.W., **R.C. Hamme**, J. Kaiser, R. Wanninkhof, and P.D. Quay (2010) Evidence of  $\text{O}_2$  consumption in underway seawater lines: Implications for air-sea  $\text{O}_2$  and  $\text{CO}_2$  fluxes, *Geophys. Res. Lett.*, 37, L01601, doi:10.1029/2009GL040423.
- Cassar, N., B.A. Barnett, M.L. Bender, J. Kaiser, **R.C. Hamme**, and B. Tilbrook (2009) Continuous high-frequency dissolved  $\text{O}_2/\text{Ar}$  measurements by Equilibrator Inlet Mass Spectrometry, *Anal. Chem.*, 81(5), p. 1855-1864.
- Hamme, R.C.**, and R.F. Keeling (2008) Ocean ventilation as a driver of interannual variability in atmospheric potential oxygen, *Tellus B*, 60(5), p. 706-717.
- Hamme, R.C.**, and J.P. Severinghaus (2007) Trace gas disequilibria during deep-water formation, *Deep Sea Res. I*, 54(6), p. 939-950.
- Ito, T., C. Deutsch, S. Emerson and **R.C. Hamme** (2007) The impact of diapycnal mixing on the saturation state of argon in the subtropical North Pacific. *Geophys. Res. Lett.*, 34(9), L09602, doi:10.1029/2006GL029209.
- Hamme, R.C.**, and S.R. Emerson (2006) Constraining bubble dynamics and mixing with dissolved gases: Implications for productivity measurements by oxygen mass balance, *J. Mar. Res.*, 64(1), p. 73-95.
- Hamme, R.C.**, and S.R. Emerson (2004) The solubility of neon, nitrogen and argon in distilled water and seawater. *Deep-Sea Res. I*, 51(11), p. 1517-1528.
- Hamme, R.C.**, and S.R. Emerson (2004) Measurement of dissolved neon by isotope dilution using a quadrupole mass spectrometer. *Mar. Chem.*, 91(1-4), p. 53-64.
- Hamme, R.C.**, and S.R. Emerson (2002) Mechanisms controlling the global oceanic distribution of the inert gases argon, nitrogen and neon. *Geophys. Res. Lett.*, 29(23), 2120, doi:10.1029/2002GL015273.

## Research Grants and Contracts

- The marine dissolved  $\text{N}_2/\text{Ar}$  ratio: A tracer for deep ocean denitrification? (2010) U.S. National Science Foundation Chemical Oceanography subcontract to R Hamme (S Emerson lead PI)
- A membrane inlet mass spectrometer for dissolved gas analysis in natural waters (2007) Canada Natural Sciences and Engineering Research Council Research Tools and Instruments Grant to P Tortell lead PI.
- Geochemical laboratory for the high precision analysis of dissolved gases (2007) Canadian Foundation for Innovation and British Columbia Knowledge Development Fund to R Hamme.
- Gaseous tracers of deep-water formation, mixing and ocean productivity (2006) Canada Natural Sciences and Engineering Research Council Discovery Grant to R Hamme.
- Measuring diapycnal mixing in the upper ocean thermocline using noble gas supersaturation (2006) U.S. National Science Foundation Chemical Oceanography subcontract to R Hamme (S Emerson lead PI)

## Students Advised

- M.Sc.: Karina Giesbrecht (July 2010)
- M.Sc. co-supervised: Alejandra Lara-Espinosa (on-going)
- Undergraduate research projects: Cara Manning (NSERC USRA summer 2008, Honours thesis April 2010)
- Undergraduate lab assistants: Rebeccah McLean (2009-2010), Courtney Dean (2008-2009)

## Teaching Experience

- 2007-11      Chemical Oceanography (EOS 312)  
University of Victoria, School of Earth and Ocean Sciences  
Designed and taught summer class in Ocean Sciences Minor, open to science majors. Block plan format, extensive cooperative learning, class project leads from planning and sampling Saanich Inlet, through lab analysis, to poster presentation of results. (10-20 students)
- 2006-09      Understanding the World's Oceans (EOS 350) co-taught with John Dower  
University of Victoria, School of Earth and Ocean Sciences  
Taught physical and chemical oceanography portion of lecture class open to any student at the university, focusing on scientific literacy about the ocean. (~60 students)
- 2009          Oceans and Atmosphere (EOS/GEOG 110) co-taught with Kim Juniper  
University of Victoria, School of Earth and Ocean Sciences  
Taught physical and chemical oceanography and atmospheric science portion of large lecture class aimed at first-year undergraduates. (~250 students)
- 2006          Isotopes in Earth and Ocean Sciences (EOS 430) co-taught with Abigail Barker  
University of Victoria, School of Earth and Ocean Sciences  
Taught stable isotope portion of class aimed at senior undergraduate earth science majors.
- 2005-09      *Guest lecturer:* Research Frontiers in Earth and Ocean Science (EOS 525), Advanced Isotope Geochemistry (SIO)
- 2004          Biogeochemistry of the Coastal Margin co-taught with Tim Lueker.  
Scripps Institution of Oceanography, Marine Chemistry and Geochemistry  
Paper discussion class for undergraduates, graduate students, and faculty.
- 2004          North Pacific Nutrient Transport: Questions and Controversies co-taught with Ralph Keeling.  
Scripps Institution of Oceanography, Marine Chemistry and Geochemistry  
Paper discussion class for graduate students and faculty.
- 2003          *Teaching assistant:* Greenhouse Gases and the Global Carbon Cycle with Steven Emerson, Lyatt Jaegle, and Virginia Armbrust.  
University of Washington, Program on Climate Change  
Assisted with constructing and grading problem sets for graduate level, carbon cycle modeling class, taught MatLab to students
- 1998          *Teaching assistant:* Marine Chemistry with Steven Emerson and John Hedges.  
University of Washington, Chemical Oceanography  
Assisted in development of cooperative learning sessions for graduate level class, facilitated weekly discussions of papers, minor lecturing
- 1995          *Teaching assistant:* Ocean Circulation with Paul Quay.  
University of Washington, School of Oceanography  
Constructed and graded problem sets for undergraduate level class, minor lecturing

## Service Activities

- Convener – Gases as Tracers of Oceanic Processes, AGU Ocean Sciences meeting 2010  
Co-convener – Air-Sea Gas Exchange, AGU Fall meeting 2008  
Convener – Gases as Tracers of Oceanic Processes, AGU Fall meeting 2006  
Convener – Gaseous Tracers of Oceanic Physical and Biogeochemical Processes, AGU Fall meeting 2004

- UVic SEOS Honours Advisor (2008-2010, 2011- )  
UVic SEOS Co-op Advisor (2011- )  
Founded *Publish Before We Perish* writing group for UVic Science Faculty  
UVic SEOS Undergraduate Committee (2007-2010, 2011- )  
UVic SEOS Seminar Organizer (2009 Spring term)  
UVic SEOS Graduate Committee (2006-2007)  
Organized Worldwide University Network (WUN) videoconference seminar series at Scripps (2004-2006)

## Outreach Activities

- 2010 Press coverage for Volcanic ash fuels anomalous plankton bloom paper  
Radio Interviews: CBC Quirks and Quarks, Victoria CFAX 1020 Talk Radio, Seattle WA KUOW-NPR, Dillingham AK KDLG-NPR  
Print Interviews: ScienceNOW, The Globe and Mail, Nature News, Discovery News, Our Amazing Planet, Forskning.no (Norway), Science et Vie (France), UVic Science Matters
- 2009 Workshop Leader: STEM Aboriginal Youth Tours, University of Victoria  
Led laboratory workshops for First Nations high school students to increase their exposure to and interest in science
- 2008-2009 Laboratory Intro/Tours: Opening of Wright Bldg. 2008, Donors Dinner 2009, Earth Science Articulation Meeting 2009, University of Victoria  
Gave brief introductions to work and equipment in Gas Tracers Lab for donors, colleagues, media, and public
- 1995-2005 Workshop Leader: Expanding your Horizons University of California, San Diego; Shoreline and Bellevue Community Colleges  
Led laboratory workshops for high school girls to increase their exposure to and interest in science

## Field Experience

- Jul 2007-2011 Saanich Inlet: EOS 312 student cruises  
Oct, Dec 2008; Feb 2009 Saanich Inlet: Dissolved gas sample collection  
Feb-Apr 2008 Southern Ocean Gas Exchange Experiment: Gas sample collection, monitoring of surface water by mass spectrometry, O<sub>2</sub> analysis  
May 2007 Labrador Sea: Inert gas sample collection  
Jul 2001 Bermuda Atlantic Time-series Study #154: Gas sample collection and O<sub>2</sub> analysis  
Sept 1993; Aug 1999; Hawaii Ocean Time-series # 49, 107, 117-118, 121-122, and 125- 127: Gas sample collection and O<sub>2</sub> analysis  
Aug 2000-Jun 2001 Kyodo North Pacific Ocean Time-series (KNOT) MR00-K01: Gas sample collection and O<sub>2</sub> analysis; video recording of whitecap coverage  
Jan-Feb 2000 Puget Sound student cruise: Test of whitecap video recording equipment  
Nov 1999 Australia/Papua New Guinea: Coral sample and trace metal estuarine water collection  
Feb 1995 Puget Sound student cruise: Winkler O<sub>2</sub> titration training for undergraduate students  
Apr 1994 North Pacific student cruise: Sediment core collection; alkalinity analysis  
Jul 1992

## Presentations at Professional Conferences

- CMOS Congress (June 2011) Victoria, BC. Talk: *Estimating marine nutrient loss from dissolved N<sub>2</sub>/Ar measurements* **Hamme RC**, Emerson SR
- AGU Ocean Sciences (February, 2010) Portland, OR. **Invited talk:** *Natural volcanic iron fertilization of the Subarctic North Pacific* **Hamme RC**, Batten S, Coogan LA, Crawford WR, Dohan KB, Emerson SR, Eriksen CC, Giesbrecht KE, Gower JFR, Kavanaugh MT, Lockwood D, Sabine CL, Webley P, Whitney F  
Poster: *Net community production from O<sub>2</sub>/Ar measurements in the Subarctic North Pacific* Giesbrecht KE, **Hamme RC**  
Poster: *Nitrous Oxide Production and Consumption in an Anoxic, Brackish Coastal Pond* Manning CC, Casciotti KL, Frame CH, **Hamme RC**  
Talk: *Noble gas supersaturations as tracers of diapycnal mixing in the ventilated thermocline of the North Pacific Ocean* Emerson SR, **Hamme RC**, Ito T  
Talk: *Modeling spatial and temporal variability of noble gas tracers in the North Pacific* Ito T, **Hamme RC**, Covert P, Emerson SR
- PICES Annual Meeting (October 2009) Jeju, Korea. Talk: *Natural volcanic iron fertilization of the Subarctic North Pacific* **Hamme RC**, Batten S, Crawford W, Dohan K, Emerson S, Giesbrecht K, Gower J,

- Kavanaugh M, Lockwood D, Sabine C, Whitney F. Talk given by W Crawford  
International Carbon Dioxide Conference 8 (September, 2009) Jena, Germany. Poster: *Seasonal ocean heat fluxes and short-term variability from semi-continuous atmospheric Ar/N<sub>2</sub> measurements* **Hamme RC**, Blaine T, Keeling R, Paplawsky W
- CO2 Experts Meeting 15 (September, 2009) Jena, Germany. Talk: *Refinement of atmospheric Ar/N<sub>2</sub> techniques: Implications for O<sub>2</sub>/N<sub>2</sub> measurement* **Hamme RC**, Blaine T, Keeling RF, Paplawsky W, Rafelski L
- Gordon Research Conference on Chemical Oceanography (August, 2009) Tilton, NH. Poster: *Widespread High-Productivity Event Observed in the Northeast Pacific, August 2008* **Hamme RC**, Batten S, Crawford W, Dohan K, Emerson S, Giesbrecht K, Gower J, Kavanaugh M, Lockwood D, Sabine C, Whitney F
- GLOBEC Open Science Meeting (June, 2009) Victoria, BC Talk: *Widespread High-Productivity Event Observed in the Northeast Pacific, August 2008* **Hamme RC**, Batten S, Crawford W, Dohan K, Giesbrecht K, Gower J, Kavanaugh M, Lockwood D, Sabine C, Whitney F
- AGU Fall Meeting (December, 2008) San Francisco, CA. Poster: *Low Net Community Production from Oxygen/Argon Mass Balance during the Southern Ocean Gas Exchange Experiment* **Hamme RC**, Cassar N  
Talk: *Ocean ventilation as a driver of interannual variability in atmospheric potential oxygen* Keeling RF, **Hamme RC** (presenter).  
Poster: *Biological Productivity from an Oxygen Mass Balance in the subarctic North Pacific* Giesbrecht K, **Hamme RC**  
Poster: *Denitrification and Oxygen Cycling in Saanich Inlet* Manning CC, **Hamme RC**, Bourbonnais A
- Gordon Research Conference on Chemical Oceanography (August, 2007) Tilton, NH.  
**Invited talk:** *Studying water mass formation using noble gases (and an ignoble one)* **Hamme RC**
- AGU Fall Meeting (December, 2006) San Francisco, CA. Talk: *Explaining observed variability in the interhemispheric gradient of atmospheric potential oxygen* **Hamme RC**, Keeling RF, Paplawsky WJ
- Line-P Symposium (July 2006) Victoria, BC. Poster: *Measuring productivity and air-sea gas exchange with dissolved gases at the Hawaii Ocean Time-series* **Hamme RC**, Emerson SR
- AGU Ocean Sciences (February 2006) Honolulu, HI. Poster: *A simple convection model demonstrates the importance of rapid cooling and bubbles in setting the concentration of gases in the deep ocean* **Hamme RC**, Severinghaus JP  
Poster: *Noble gases, air-sea gas exchange and diapycnal mixing in the subtropical North Pacific* Stump C, Ito T, Deutsch C, Emerson SR, **Hamme RC**
- Comer Abrupt Climate Change Roundtable (October, 2005) Palisades, NY. Poster: *Interannual variability in Atmospheric Potential Oxygen from the Scripps atmospheric oxygen flask sampling network* **Hamme RC**, Keeling RF, Paplawsky WJ
- Seventh International Carbon Dioxide Conference (ICDC7) (September, 2005) Broomfield, CO. Poster: *Interannual variability in Atmospheric Potential Oxygen from the Scripps atmospheric oxygen flask sampling network* **Hamme RC**, Keeling RF, Paplawsky WJ  
Talk: *Global oceanic and land carbon sinks from the Scripps atmospheric oxygen flask sampling network* Keeling, RF, Manning AC, **Hamme RC**, Paplawski WJ
- Gordon Research Conference on Chemical Oceanography (August, 2005) Tilton, NH. Poster: *Interannual variability in Atmospheric Potential Oxygen from the Scripps atmospheric oxygen flask sampling network.* **Hamme RC**, Keeling RF, Paplawsky WJ
- Ocean Carbon and Climate Change (August, 2005) Woods Hole, MA. Poster: *Interannual variability in Atmospheric Potential Oxygen from the Scripps atmospheric oxygen flask sampling network* **Hamme RC**, Keeling RF, Paplawsky WJ
- AGU Fall Meeting (December, 2004) San Francisco, CA. Poster: *Dissolved argon, krypton and xenon demonstrate the importance of rapid cooling in causing gas undersaturations in the deep ocean* **Hamme RC**, Severinghaus JP, Emerson SR, Keeling RF  
Poster: *Argon isotopes in seawater: Fractionation during air-water exchange and the  $\delta^{40}\text{Ar}$  of seawater* Emerson SR, Caillon N, **Hamme RC**, Severinghaus JP
- Comer Abrupt Climate Change Fellows Conference (April 2004) Palisades, NY. Poster: *Development of a new continuous atmospheric oxygen analysis method* **Hamme RC**, Keeling RF
- AGU Ocean Sciences (January 2004) Portland, OR. Talk: *Air-sea gas flux from bubbles constrained by Ne and N<sub>2</sub>/Ar measurements at station ALOHA* **Hamme RC**, Emerson SR
- Gordon Research Conference on Chemical Oceanography (August, 2003) Tilton, NH. Poster: *Upper ocean*

*cycles of oxygen and inert gases at station ALOHA* **Hamme RC**, Emerson SR  
 Surface Ocean Lower Atmosphere Study (SOLAS) summer school (July, 2003) Cargese, France. Poster & talk:  
*Upper ocean cycles of oxygen and inert gases at station ALOHA* **Hamme RC**, Emerson SR  
 AGU Fall Meeting (December, 2002) San Francisco, CA. Talk: *The effect of air/sea exchange and mixing on  
 organic carbon export calculated from an oxygen mass balance* **Hamme RC**, Emerson SR  
 Dissertations in Chemical Oceanography (DISCO) XVII (May 2002) Honolulu, HI. Talk: *Mass balance of  
 gases in the ocean: organic carbon production and deep-water formation processes* **Hamme RC**  
 AGU Ocean Sciences (February 2002) Honolulu, HI. Talk: *Control of inert gas saturations in the deep ocean by  
 surface gas exchange processes* **Hamme RC**, Emerson SR  
 Gordon Research Conference on Chemical Oceanography (August, 2001) Tilton, NH. Poster: *Geochemistry of  
 inert gases in the ocean* **Hamme RC**, Emerson SR  
 Gas Transfer at Water Surfaces IV (June 2000) Miami, FL. Poster: *Explaining gas undersaturations in deep  
 water and at their source in high latitudes* **Hamme RC**, Emerson SR

## Institutional Seminars

University of Victoria: Royal Society Fellows luncheon (Jan 2011) Victoria, BC. *Volcanic ash fuelled a massive  
 plankton bloom, but did it lead to record salmon returns?* with Tim Parsons.  
 University of Maryland: Horn Point Laboratory (April 2010) Cambridge, MD. *Dissolved gases as tracers of  
 water mass formation and transformation.*  
 Universität Hamburg: Institut für Geophysik (March 2010) Hamburg, Germany. *The ocean response to a  
 volcanic iron fertilization event in the subarctic North Pacific AND Dissolved gases as tracers of  
 water-mass formation and transformation.*  
 Institute of Ocean Sciences (October 2009) Sidney, BC. *Did natural iron fertilization by volcanic ash cause the  
 August 2008 bloom event in the Subarctic North Pacific?*  
 Oregon State University: College of Oceanic and Atmospheric Sciences, Biogeochemistry (April 2009)  
 Corvallis, OR. *Signatures of ocean ventilation in atmospheric oxygen.*  
 University of Washington: Chemical Oceanography (March 2009) Seattle, WA. *Signatures of ocean ventilation  
 in atmospheric oxygen.*  
 Institute of Ocean Sciences (March 2009) Sidney, BC. *Signatures of ocean ventilation in atmospheric oxygen.*  
 University of Victoria: Topics in Atmospheres and Oceans (March 2009) Victoria, BC. *Signatures of ocean  
 ventilation in atmospheric oxygen.*  
 University of Hawaii Manoa: Department of Oceanography (January 2009) Honolulu, HI. *Dissolved gases as  
 tracers of water mass formation and transformation.*  
 University of Victoria: School of Earth and Ocean Sciences Fireside Chat (January 2009) Victoria, BC. *An  
 oceanographer ponders atmospheric gases: Tales from three years in the Keeling lab.*  
 University of Miami Rosenstiel School of Marine and Atmospheric Science: Marine Chemistry & Atmospheric  
 Chemistry (Dec 2007) Miami, FL. *Studying water mass formation using noble gases (and an ignoble  
 one).*  
 University of British Columbia: Earth and Ocean Sciences (Nov 2007) Vancouver, BC. *Studying water mass  
 formation using noble gases (and an ignoble one).*  
 University of Victoria: Biogeochemistry Group (May 2007) Victoria, BC. *What can atmospheric oxygen tell us  
 about ocean ventilation?*  
 Lamont-Doherty Earth Observatory (June 2005) Palisades, NY. *Dissolved gases: Tracers of deep-water  
 formation and the carbon pumps.*  
 University of Victoria: School of Earth and Ocean Sciences (June 2005) Victoria, BC. *Inert gases: Tracers of  
 deep-water formation and mixing.*  
 Scripps Institution of Oceanography: Physical Oceanography Research Division (May 2005) La Jolla, CA.  
*Tracer studies of deep-water formation and mixing.*  
 Worldwide Universities Network Videoconference Seminar (April 2005) multiple US and European locations.  
*The marine chemistry of gases: Tracers of physical and biological processes.* Joint with Steve Emerson

University of Rhode Island (March 2005) Narragansett, RI. *The effect of bubble dynamics and mixing on gases in the ocean: Implications for productivity measurements near Hawaii.*

Woods Hole Oceanographic Institution: Marine Chemistry and Geochemistry (February 2005) Woods Hole, MA. *The effect of bubble dynamics and mixing on gases in the ocean: Implications for productivity measurements near Hawaii.*

California Institute of Technology: Environmental Science and Engineering (October 2004) Pasadena, CA. *The effect of bubble dynamics and mixing on gases in the ocean: Implications for productivity measurements near Hawaii.*

Scripps Institution of Oceanography: Geosciences, Marine Chemistry, and Geochemistry (April 2004) La Jolla, CA. *The effect of bubble dynamics and mixing on dissolved gases: Implications for productivity measurements near Hawaii.*

Princeton University (April 2004) Princeton, NJ. *The effect of bubble dynamics and mixing on dissolved gases.*

University of Victoria: School of Earth and Ocean Sciences (March 2004) Victoria, BC. *The effect of bubble dynamics and mixing on dissolved gases.*

Oregon State University: Biogeochemical Oceanography (October 2003) Corvallis, OR. *Upper ocean cycles of oxygen and inert gases in the subtropical Pacific.*

Massachusetts Institute of Technology: Earth, Atmospheric and Planetary Sciences (April 2003) Boston, MA. *Inert gases as tracers of upper ocean processes.*

Pomona College: Chemistry (November 2002) Claremont, CA. *Using dissolved gases to measure ocean productivity: Implications for climate change.*

Scripps Institution of Oceanography (November 2002) La Jolla, CA. *Inert gases as tracers of upper ocean processes.*

Princeton University: Environmental Geosciences (September 2002) Princeton, NJ. *Inert gases as tracers of upper ocean processes.*

Woods Hole Oceanographic Institution: Marine Chemistry and Geochemistry (September 2002) Woods Hole, MA. *Inert gases as tracers of upper ocean processes.*

Lamont-Doherty Earth Observatory (September 2002) Palisades, NY. *Inert gases as tracers of upper ocean processes.*