

Clark Gordon Richards, PhD

Woods Hole Oceanographic Institution
266 Woods Hole Rd. MS# 21
Woods Hole, MA 02543-1050 USA
phone: 508-289-3972 cell: 508-524-5385
crichards@whoi.edu
clark.richards@gmail.com

Education:

- 2012 PhD, Physical Oceanography, Dalhousie University, Halifax NS Canada. *Energetics of shoaling internal waves and turbulence in the St. Lawrence Estuary*. Supervised by Dr. Dan Kelley.
- 2005 MSc, Physical Oceanography, Department of Physics and Physical Oceanography, Memorial University of Newfoundland, St. John's NL Canada. *Wind-forced exchange in Bonne Bay, Newfoundland*. Supervised by Dr. Brad de Young.
- 2002 BSc (Honours), Physics, University of New Brunswick, Fredericton NB Canada. *Cavity Ringdown Laser Absorption Spectroscopy of a Radio Frequency Discharge*. Supervised by Dr. Allan Adam.

Positions Held:

- 2012-2014 Postdoctoral Investigator; Woods Hole Oceanographic Institution, Woods Hole, MA. Advisor: Dr. Fiamma Straneo, Physical Oceanography Department. Current work at WHOI involves two aspects of physical oceanography in high latitudes: water mass transformation as a component of the meridional overturning circulation in the Nordic Seas, and ice-ocean interactions of glaciers in Greenland.
- 2005 Research Assistant, Department of Physics and Physical Oceanography, Memorial University of Newfoundland, St. John's NL.
- 2003 Laboratory Technician, Department of Physics, UNB.

Publications:

Refereed:

- 2014 Bourgault, D., Morsilli, M., Richards, C., Neumeier, U., and Kelley, D. *Sediment resuspension and nepheloid layers induced by long internal solitary waves shoaling orthogonally on uniform slopes*. Continental Shelf Research. 72, 21–33. DOI:10.1016/j.csr.2013.10.019
- 2013 Richards, C., Bourgault, D., Galbraith, P., Hay, A., and Kelley, D. *Measurements of shoaling internal waves and turbulence in an estuary*. Journal of Geophysical Research, Oceans. 118 (1), 273–286. DOI: 10.1029/2012JC008154
- 2007 Bourgault, D., and Richards, C., *A laboratory experiment on internal solitary waves*. American Journal of Physics, Vol. 75 No. 7, 2007.

Submitted, under revision, and in preparation:

- In prep.* Richards, C., and Straneo, F.: *Air-sea interaction and watermass transformation in the Lofoten Basin*. (To be submitted to the Journal of Physical Oceanography).
- In prep.* Richards, C., and Kelley, D.: *A novel technique for measuring nonlinear internal-wave energy flux*. (To be submitted to the Journal of Atmospheric and Oceanic Technology).
- In prep.* Richards, C., and Straneo, F.: *Detection and characterization of iceberg calving from a tidewater glacier using submerged pressure sensors*. (To be submitted to the Annals of Glaciology).
- In prep.* Richards, C., and de Young, B.: *Wind-forced flow over a sill in Bonne Bay, Newfoundland*. (To be submitted to Atmosphere-Ocean).

Non-refereed:

- 2013 Richards, C., *A stirring story: turbulence and mixing caused by shoaling internal waves*. Current Tides; Dalhousie Oceanography Research Magazine, Volume 1.

Grants/Proposals:

- 2013 *Collaborative Research: Detecting Glacier Calving Events From Ocean Waves and Underwater Acoustics*. Richards, C., F. Straneo, P. Dahl, and D. Farrell. Submitted Dec. 2013 to NSF PLR division. *In review*.

Academic Awards:

- 2013 CMOS Tertia M.C. Hughes Memorial Graduate Student Prize
- 2008-2010 Killam Scholarship, Dalhousie University
- 2009-2010 Faculty of Graduate Studies Scholarship, Dalhousie University

2011 Best overall talk, CDOGS conference
 2010 Best PhD talk, CDOGS conference
 2008-2009 President's Award, Dalhousie University
 2008-2009 Faculty of Graduate Studies Scholarship, Dalhousie University
 2007-2008 Faculty of Graduate Studies Scholarship, Dalhousie University
 2005-2007 NSERC PGS (Post Graduate Scholarship) D2
 2007 Kathy Ellis Memorial Book Prize, Department of Oceanography, Dalhousie University
 2005 Fellow of the School of Graduate Studies, Memorial University
 2003-2005 NSERC PGS A
 2003-2005 Dean's Excellence Award, Memorial University
 2002 NSERC USRA (Undergraduate Student Research Award), University of New Brunswick
 2001-2002 Dr. A. Wilmer Duff Memorial Prize in Physics, University of New Brunswick
 2001-2002 Dr. Theodore Weiner Scholarship, University of New Brunswick
 2000-2001 University of New Brunswick Fredericton Scholarship
 2000 NSERC USRA, University of New Brunswick
 1999-2000 C. W. Argue Prize, University of New Brunswick
 1999-2000 N. Myles Brown Scholarship, University of New Brunswick
 1999 NSERC USRA, University of New Brunswick
 1998-1999 Awards Office Bursary, University of New Brunswick
 1997-1998 Sir George E. Foster Scholarship, University of New Brunswick

Presentations/Posters:

2014 Richards, C., and F. Straneo: *Transformation of Atlantic Water in the Lofoten Basin from 2 years of moored data*. Presentation given at the American Geophysical Union Ocean Sciences Meeting, Honolulu, HI, 2014.
 2014 D. Kelley, C. Richards, D. Bourgault, P. Galbraith, and A. Hay: *Energy fluxes and turbulence caused by shoaling nonlinear internal waves in the St Lawrence Estuary*. Presentation given at the American Geophysical Union Ocean Sciences Meeting, Honolulu, HI, 2014.
 2013 F. Straneo, S. B. Das, H. Singh, A. Plueddemann, C. Richards, K. D. Mankoff, and L. A. Stevens: *Observations of a subglacial discharge plume at the edge of a Greenland tidewater glacier*. Poster presented at the American Geophysical Union Fall Meeting, San Francisco, CA, 2013.
 2013 Richards, C., and F. Straneo: *If a glacier calves into the ocean, and no one is around to see it, does it make a splash?*. Presentation given at the Woods Hole Oceanographic Institution Postdoc Symposium, October 2013.
 2013 Richards, C., and D. Kelley: *Energetics of shoaling internal waves and turbulence in the St. Lawrence Estuary*. Poster given at the Gordon Research Conference on Coastal Ocean Circulation, June 2013.
 2013 Richards, C., and F. Straneo: *Timing and characterization of glacier calving events from surface waves*. Poster given at the Greenland ice-sheet-ocean interactions (GRISO) workshop, June 2013.
 2012 Richards, C.: *Energetics of shoaling internal waves and turbulence in an estuary*. Presentation given at the Woods Hole Oceanographic Institution Postdoc Symposium, October 2012.
 2012 Richards, C., and D. Kelley: *An internal beach experiment: turbulence and internal waves in the St Lawrence Estuary*. Presentation given at the Woods Hole Oceanographic Institution physical oceanography seminar series, February 2012.
 2011 Richards, C., and D. Kelley: *Turbulence and internal waves in the St Lawrence Estuary*. Presentation given at the 5th Warnemünde Turbulence Days on turbulence and mixing in estuaries and coastal seas, Isle of Vilm, Germany, September 2011.
 2011 Richards, C., and D. Kelley: *Internal waves and dissipation in the St Lawrence Estuary*. Presentation given to POMSS (Physical Oceanography and Meteorology Seminar Series), Department of Oceanography, Dalhousie University, May 2011.
 2011 Richards, C., and D. Kelley: *Turbulence measurements on an internal beach*. Presentation given at C-DOGS 2011 (Conference of Dalhousie Oceanography Graduate Students), Halifax NS, March 2011.
 2010 Richards, C., D. Bourgault, P. Galbraith, A. Hay, and D. Kelley: *Measuring internal wave energy flux in a partially mixed estuary*. Poster presented at the Cargèse international school on topographic internal waves in the atmosphere and ocean, Corsica, France, November 2010.
 2010 Richards, C., D. Bourgault, P. Galbraith, A. Hay, and D. Kelley: *Measuring internal wave energy flux in a partially mixed estuary*. Poster presented at the CMOS 2010 Congress in Ottawa ON, June 2010.
 2010 Richards, C., and D. Kelley: *A relaxation technique for computing nonlinear internal-wave streamfunctions*. Presentation given at C-DOGS 2010, Halifax NS, March 2010.
 2010 Richards, C., D. Bourgault, P. Galbraith, A. Hay, and D. Kelley: *Internal wave generation and energy fluxes in a partially mixed estuary*. Poster presented at the February 2010 Ocean Sciences Meeting, Portland OR.
 2009 Bourgault, D., M.D. Blokhina, P.S. Galbraith, A.E. Hay, D.C. Janes, D.E. Kelley, R. Mirshak, C. Richards, and G.J. Sutherland: *The St Lawrence Estuary Internal Wave Experiment*. Presentation given at the 4th Warnemünde Turbulence Days on internal waves and turbulence in coastal seas, Isle of Vilm, Germany, September 2009.

- 2009 Richards, C., and D. Kelley: *Internal Wave Generation in the St. Lawrence Estuary*. Presentation given at the CMOS 2009 Congress in Halifax NS, June 2009.
- 2009 Richards, C., and D. Kelley: *Swimming with Internal Waves: A summary of recent SLEIWEX fieldwork* Presentation given to POMSS, Department of Oceanography, Dalhousie Isle of Vilm, Germany, Dalhousie University, April 2009.
- 2009 Richards, C., and D. Kelley: *Internal wave generation in the St. Lawrence Estuary*. Presentation given at C-DOGS 2009, Halifax NS, March 2009.
- 2008 Galbraith, P., D. Bourgault, D. Kelley, A. Hay, M. Blokhina, D. Janes, R. Mirshak, and C. Richards: *The St Lawrence Estuary Internal Wave Experiment (SLEIWEX)*. Poster given at Colloque scientifique Parc marin du Saquenay-Saint-Laurent: 10 années de science au service de la conservation, Rivière-du-Loup.
- 2008 Richards, C., and D. Kelley: *Some questions about nonlinear internal wave groups*. Presentation given at C-DOGS 2008, Halifax NS, March 2008.
- 2008 Richards, C., and B. deYoung: *Sub-tidal exchange in Bonne Bay, Newfoundland*. Poster presented at the March 2008 Ocean Sciences Meeting, Orlando Florida.
- 2006 Richards, C., and D. Bourgault: *A laboratory experiment on internal solitary waves for senior undergraduate students*. Presentation given at C-DOGS 2006, Halifax NS, March 2006.
- 2006 Richards, C.: *Wind-forced exchange of Bonne Bay, Newfoundland*. Presentation given to POMSS (Physical Oceanography and Meteorology Seminar Series), Department of Oceanography, Dalhousie University.
- 2005 Bourgault, D., and C. Richards: *A proposed laboratory experiment for PHYS 3900 on internal solitary waves*. Presentation given to the Department of Physics and Physical Oceanography, Memorial University as part of the departmental seminar series.
- 2005 Richards, C., and B. de Young: *Tidal and sub-tidal current dynamics in Bonne Bay Newfoundland*. Presentation given at the CMOS 2005 Congress in Vancouver BC, June 2005.
- 2002 Adam, A.G., D.W. Tokaryk, and C.G. Richards: *Progress in cavity ringdown laser spectroscopy at the University of New Brunswick*. Poster presented at the 2002 CAP conference at Laval University.
- 2000 Adam, A.G., S. Hopkins, and C.G. Richards: *High resolution laser spectroscopy of HfF and TiBr*. Poster presented at the 16th Annual Symposium on Chemical Physics at the University of Waterloo, Nov. 2000.

Fieldwork Experience:

- July 2013 Saqaardleq fjord, West Greenland. Oceanographic sampling in a tidewater glacial fjord, towards understanding the dynamics of the interaction between the ocean and melting of the Greenland ice sheet. Fieldwork included sampling from helicopters (XCTD), sampling from small boats (CTD, ADCP, and echosounders), shore-based photogrammetry, sampling with remotely operated vehicles, and mooring deployment/recovery.
- June 2008 SLEIWEX (St. Lawrence Estuary Internal Wave Experiment) 2008. Major field program jointly funded by CFCAS and NSERC studying internal wave generation, propagation, and dissipation in the St. Lawrence Estuary. I was responsible for much of the fieldwork planning, instrument preparation, and on the fly daily decisions. I also created the official Cruise Plan and a field manual for all the other team members (11 people from 3 different institutions). The data from this fieldwork made up the bulk of my PhD thesis.
- May 2007 Bedford Institute of Oceanography Labrador Sea AR7W survey aboard the CCGS Hudson. Duties included drawing water samples from bottles and launching XBTs.
- 2003-2005 Graduate student assistant on field trips for an undergraduate “Introduction to Physical Oceanography” class, Memorial University. Activities included CTD profiling, bottle sampling, and ADCP data collection from a towed body.
- June 2004 Deployment of the Bonne Bay Marine Observatory (www.bonnebay.ca). Fieldwork in Bonne Bay also included several extended data acquisition cruises in the bay, using CTDs and ADCPs.

Research Skills:

- instrument operation and data processing from: CTDs, ADCPs, echo sounders, and more.
- knowledge of advanced mathematical software and computer languages such as: R, Python, MATLAB, FORTRAN, C, and \LaTeX
- experience with numerical ocean modelling, including MITgcm and programming a custom two-layer model
- experience with software version control systems, including Git and SVN
- knowledge of advanced data analysis techniques, including: time series analysis, empirical orthogonal function analysis, harmonic analysis, and filtering
- experience with a variety of computer operating systems including: Linux/Unix, Apple OS X, and Windows
- knowledge of oceanographic laboratory techniques, including experiments on rotating platforms and laboratory generated internal waves

Teaching Experience:

- 2014 Participated in COSEE (Centers for Ocean Sciences Education Excellence) early career workshop, AGU Ocean Sciences meeting 2014.
- 2013 WHOI GFD days laboratory demonstrator.
- 1998-2012 Shad Valley Dalhousie University (2009-2012), Memorial University of Newfoundland (2004-2005), and University of New Brunswick (1998-2003). Leader and instructor for the Shad Valley high school science, technology and entrepreneurship program (www.shad.ca).
- 2009-2012 Faculty Member (Dalhousie University)
 - 2004-2005 Faculty Member (Memorial University of Newfoundland)
 - 2003 Faculty Member (University of New Brunswick)
 - 1998-2002 Program Assistant (University of New Brunswick)
- 1999-2011 Private physics tutor.
- 2006-2010 Assisted with various laboratory demonstrations for OCEA 5120, Introduction to Physical Oceanography.
- 2006-2007 Physics lab demonstrator, Dalhousie Integrated Science Program (DISP), Dalhousie University.
- 2007 Guest lecturer for Shad Valley Dalhousie 2007. Presented a lecture on ocean tides, as well as a laboratory seminar on geophysical fluid dynamics.
- 2005 Guest speaker for the Fall 2005 TOGA (Teaching Opportunities for Graduate Assistants) program, MUN.
- 2005 Guest lecturer for PHYS 6321 - Coastal Oceanography, MUN.
- 2005 Participant in the pilot TOGA program in the Department of Physics and Physical Oceanography, MUN. Focus was on professional development to help graduate TA's develop their skills as instructors.
- 2005 Marker for PHYS 1050, Department of Physics and Physical Oceanography, MUN.
- 2004-2005 Tutorial Assistant, Department of Physics and Physical Oceanography, MUN.
- 2004-2005 Physics help centre worker, Department of Physics and Physical Oceanography, MUN.
- 2004-2005 Marker, Department of Physics and Physical Oceanography, MUN.
- 2003-2004 Lab Demonstrator, Department of Physics and Physical Oceanography, MUN.
- 1999-2002 NSERC USRA Summer Research Assistant, Departments of Physics and Chemistry, UNB.
- 1999-2002 Student lab demonstrator, Department of Physics, UNB.

Courses taken:

Woods Hole Oceanographic Institution:

- 2013 12.757 - Climate change literacy

Dalhousie University:

- 2007 OCEA 5311 - Fluid Dynamics
OCEA 5223 - Ocean Waves
- 2006 OCEA 5120 - Introduction to Physical Oceanography
OCEA 5220 - Numerical Modeling of the Ocean and Atmosphere
OCEA 5222 - Estuary, Coast, and Shelf Dynamics
OCEA 5130 - Introduction to Chemical Oceanography
OCEA 5140 - Introduction to Biological Oceanography
OCEA 5210 - Time Series Analysis
OCEA 5221 - Ocean Dynamics

Memorial University:

- 2004 PHYS 6310 - Advanced Physical Oceanography
PHYS 6318 - Numerical Modeling in Oceanography
- 2003 PHYS 6323 - Stability Theory
ENVS 6001 - Earth and Ocean Systems

Society Memberships:

- 2006- Member of the American Geophysical Union (AGU).
- 2005- Member of the Canadian Meteorological and Oceanographic Society (CMOS).

Volunteering:

- 2010-2012 C-DOGS (Conference of Dalhousie Oceanography Graduate Students) website maintainer.
- 2008-2009 Dalhousie Oceanography Students Association (DOSA) president.
- 2007-2009 C-DOGS organizer.

2007-2011 Nova Scotia Nature Trust photographer and volunteer.
2006-2007 Dalhousie Oceanography department outreach committee.
2005 World Year of Physics oceanography demonstrator for displays in St. John's schools.
2004-2005 Judge at St. John's Regional Science Fair and Canada Wide Science fair.
2004 Judge at Canada Wide Science Fair in St. John's.
2000-2002 Venturer Advisor with 3rd and 7th Fredericton Venturer Company, Scouts Canada.
1999-2001 Peer Mentor, Faculty of Science, UNB.
1998 Photography Editor of the UNB student newspaper, The Brunswickan.
1997-1999 Staff Member of The Brunswickan.

Last Updated March 14, 2014