Curriculum Vitae

Richard Karsten
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Academic Qualifications

Education

1992–1998	**Ph.D.** in Applied Mathematics, August 1998 University of Alberta **Thesis:** Nonlinear effects in two-layer, frontal-geostrophic models of surface ocean fronts **Advisor:** Dr. Gordon E. Swaters
1987–1992	**B.Math.** Honours Applied Mathematics with Physics Electives, May 1992 Graduated With Distinction, Dean's Honour List, Co-operative Program University of Waterloo

Awards and Scholarships

1998–2000	NSERC Post-doctoral Research Fellowship, Massachusetts Institute of Technology
1996–1998	Izaak Walton Killam Memorial Scholarship, University of Alberta
1996	Andrew Stewart Memorial Graduate Prize, University of Alberta
1994–1996	NSERC Post Graduate Scholarship B, University of Alberta
1992–1994	NSERC Post Graduate Scholarship A, University of Alberta
1992–1996	Walter H. Johns Fellowship, University of Alberta
1994	Eoin L. Whitney Scholarship, University of Alberta
1993	Pundit R.D. Sharma Memorial Graduate Award in Mathematics, University of Alberta
1992–1998	Graduate Assistantship, University of Alberta
1987–1992	Rene Descartes Fellowship, University of Waterloo

Employment History

2004–present	Associate Professor Department of Mathematics and Statistics Acadia University
2002–2008	Adjunct Professor Department of Oceanography Dalhousie University
2001–2004	Assistant Professor Department of Mathematics and Statistics Acadia University
2000–2001	Scientific Researcher Department of Earth, Atmospheric, and Planetary Sciences Massachusetts Institute of Technology
2000 Summer	Lecturer Department of Mathematics Massachusetts Institute of Technology

1998–2000	NSERC Postdoctoral Fellow Department of Earth, Atmospheric, and Planetary Sciences Massachusetts Institute of Technology
1992–1998	Graduate Teaching/Research Assistant Department of Mathematical Sciences University of Alberta
1987–1992	Teaching Assistant Faculty of Mathematics University of Waterloo

Performance as a Teacher

Courses Taught

Acadia University:

Winter 2013:	Math 2023 X2	Introduction to Differential Equations
	Math 4773 X2	Fluid Dynamics
Fall 2012:	Math 2723 X1	Introduction to Differential Equations
	Math 3413 X1	Numerical Methods
	Math 3713 X1	Ordinary Differential Equations
Winter 2012:	Math 1023 B2	Introductory Calculus II
	Math 1332 B2	Matrix Algebra
	MAth 1513 X2	Truth in Numbers(team taught)
Winter 2011:	Math 1023 B2	Introductory Calculus II
	MAth 1513 X2	Truth in Numbers (team taught)
	Math 2023 X2	Introduction to Differential Equations
	Math 4773 X2	Fluid Dynamics
	Math 5843 X2	Computational Fluid Dynamics
Fall 2010:	Math 2723 X1	Introduction to Differential Equations
	Math 3413 X1	Numerical Methods
Winter 2010:	Math 2023 X2	Introduction to Differential Equations
	Math 5743 X0	Demographic Models
Fall 2009:	Math 1013 A1	Introductory Calculus I
	Math 2723 X1	Introduction to Differential Equations
	Math 3713 X1	Ordinary Differential Equations
Winter 2009:	Math 4023 X2	Fluid Dynamics
	Math 4753 X2	Partial Differential Equations
	Math 5753 X2	Partial Differential Equations
Fall 2008:	Math 2013 X1	Calculus of Several Variables
	Math 2723 X1	Introduction to Differential Equations
	Math 3713 X1	Ordinary Differential Equations
	Math 5733 X0	Mathemtical Models of Biological Populations
Winter 2007:	Math 2753 X2	Multivariate Calculus for Applied Science
	Math 4753 X2	Partial Differential Equations
Fall 2006:	Math 2013 X1	Calculus of Several Variables
	Math 3713 X1	Ordinary Differential Equations
Winter 2006:	Math 2753 X2	Multivariate Calculus for Applied Science
	Math 4023 X2	Fluid Mechanics

Fall 2005:	Math 1013 B2	Introductory Calculus I
	Math 2013 X1	Calculus of Several Variables
Winter 2005:	Math 2753 X2	Multivariate Calculus for Applied Science
Fall 2004:	Math 1013 B2	Introductory Calculus I
	Math 2013 X1	Calculus of Several Variables
	Math 2723 X1	Introduction to Differential Equations
Winter 2004:	Math 1023 B2	Introductory Calculus II
	Math 1020 B2	Calculus II Studio
Fall 2003:	Math 1010 B1	Calculus I Studio
	Math 2723 X1	Introduction to Differential Equations
	Math 3713 X1	Ordinary Differential Equations I
Winter 2003:	Math 1023 B2	Introductory Calculus II
	Math 1020 B2	Calculus II Studio
	Math 4023 X2	Fluid Mechanics
Fall 2002:	Math 1013 B1	Introductory Calculus I
	Math 1010 B1	Calculus I Studio
	Math 2723 X1	Introduction to Differential Equations
	Math 3713 X1	Ordinary Differential Equations I
Winter 2002:	Math 1023 B2	Introductory Calculus II
	Math 1020 G2	Calculus II Studio
	Math 3743 X2	Partial Differential Equations
Fall 2001:	Math 1013 G1	Introductory Calculus I
	Math 2413 X1	Introduction to Numerical Analysis
	Math 3713 X1	Ordinary Differential Equations I

Massachusetts Institute of Technology:

Summer 2000:	Math 18.086	Mathematical Methods for Engineers II

University of Alberta

Fall 1992:	Math 100	Calculus I Lab
Winter 1993:	Math 201	Differential Equations Lab
Fall 1993:	Math 201	Differential Equations Lab
Winter 1994:	Math 201	Differential Equations Lab
Fall 1994:	Math 201	Differential Equations Lab (2 Sections)
Fall 1995:	Math 201	Differential Equations Lab (2 Sections)
Fall 1996:	Math 201	Differential Equations Lab
Winter 1997:	Math 201	Differential Equations Lab
Fall 1997:	Math 209	Calculus III Lab

Winter 1998: Math 209 Calculus III Lab

Other Teaching Related Activities

- **S**tudent Supervision:
  - *Thesis Supervision:*
    1. Jueun Kim, 2002, Honours Mathematics
    2. Kyle Morgan, in progress, Honours Mathematics
    3. Angela Mackenzie, 2004, Honours Mathematics
    4. Matt Corkum, 2006, Honours Physics
    5. Ryan Lukeman, 2005, MSc. Mathematics, Dalhousie
    6. Josh Gould, 2007, MSc. Mathematics
    7. Megan Lickley, 2009, Honours Mathematics
    8. Amber Corkum, 2011, Honours Mathematics
    9. Amanda Swan, 2011, Honours Mathematics
    10. Angela Vogels, 2011, MSc. Mathematics
    11. Mitchell O'Flaherty-Sproul, 2013, MSc. Mathematics
    12. Jude McConnell, 2013, Honours Mathematics
    13. Jeff Franklin, in progress, MSc. Mathematics
    14. Aidan Bharath, in progress, Honours Physics
  - *Summer Research Supervision:*
    1. Aidan Bharath, 2013
    2. Robie Hennigar, 2013
    3. Jude McConnell 2012
    4. Amber Corkum 2010 (NSERC USRA)
    5. Amanda Swan 2010 (NSERC USRA)
    6. Michael Deveau 2009, 2010
    7. Mariella Nalepa 2009
    8. Mitchell O'Flaherty-Sproul 2009–2012
    9. Justine McMillan 2007, 2008 (NSERC USRA)
    10. Megan Lickley 2007, 2008 (NSERC USRA, HSRA)
    11. Josh Gould, 2006
    12. Matt Corkum, 2005, 2006 (Summer Research Assistant)
    13. Kyle Morgan, 2003 (NSERC USRA)
    14. Angela Mackenzie, 2003 (NSERC USRA)
    15. Jueun Kim, 2002
    16. Fang Zhe, 2002
- Awarded Acadia Student Union Teaching Award, 2004, Acadia University
- Awarded Graduate Student Teaching Award, 1996, University of Alberta
- Organized Summer Institute on the Bay of Fundy and Tidal Energy for Nova Scotia Teachers, July 2012

- Organizer: Acadia Undergraduate Mathematics Competition
- Organized student involvement in the First MITACS Atlantic Interchange and acted as Poster Competition Judge, March 2003
- Organized student involvement in the Bluenose Numerical Analysis Day, 2002-2005, 2009-2011
- Chaired MSc. Defence at Acadia, (2005, 2006, 2007, 2009, 2013), Acting Head for MSc Defence (2005)
- PhD external examiner: Vasily Korabel, Dept of Physics, MUN, Oct. 2005; Paul Spence, Dept of Earth and Ocean Sciences, UVic, May 2009.
- MSc internal examiner: Mark Franey, Acadia, Aug. 2010; Jing Ding, Acadia, July 2012.
- MSc external examiner: Dept. of Mathematics, Trent, Dec. 2006; Jielin Zhu, Dept. of Mathematics, Trent University, July 2009. Siva Prasad, Memorial University, July 2013.
- Honours Thesis Reader: WeiWei Wang, 2010, Jason Newport, 2002, Honours Mathematics
- Marker for the Maritime Mathematics Competition

Scholarly Activity

Papers Published in Refereed Journals

Note: the authors are listed in the order that indicates their the contribution to the paper, except for the first two papers where the authors are listed in alphabetical order.

1. M. Deveau, R. Karsten, and H. Teismann, "The modellers' encounter with ecological theory. Or, what is this thing called 'growth rate'?", submitted to *Oikos* August 2013.

2. R. Karsten, H. Teismann, and A. Vogels, 2013, "Reproductive value, sensitivity, and non-linearity. Population-management heuristics derived from classical demography", *Theoretical Population Biology*, **85**, 20–25. (`http://dx.doi.org/10.1016/j.tpb.2013.01.002`)

3. J.M. Hardman, W. Werf, S. Blatt, J.L. Franklin, R. Karsten and H. Teismann, 2013, "Simulating effects of environmental factors on biological control of Tetranychus urticae by Typhlodromus pyri in apple orchards" *Experimental and Applied Acarology*,1–23.

4. R. Karsten, A. Swan, and J. Culina, 2013, "Assessment of arrays of in-stream tidal turbines in the Bay of Fundy." *Phil. Trans. R. Soc. A* **3**71: 20120189. (`http://dx.doi.org/10.1098/rsta.2012.0189`)

5. P. Ranjan, R. Haynes, and R. Karsten, 2011, "Gaussian Process Models and Interpolators for Deterministic Computer Simulators," *Technometrics* **53**, 366–378.

6. Patrick F. Cummins, Richard H. Karsten, Brian K. Arbic, 2010, "The Semi-Diurnal Tide in Hudson Strait as a Resonant Channel Oscillation," *Atmosphere Ocean* , **48**, 163–176.

7. Teismann H, Karsten R, Hammond R, Hardman J and Franklin J, 2009; "On the Possibility of Counter-Productive Intervention: The Population Mean for Blowflies Models Can Be an Increasing Function of the Death Rate," *Journal of Biological Systems*, **4**7, 739–757.

8. B. K. Arbic, Karsten R. H. and Garrett, C, 2009: "On Tidal Resonance in the Global Ocean and the Back-Effect of Coastal Tides upon Open-Ocean Tides," *Atmosphere Ocean*, **4**7, 239–266.

9. Richard H. Karsten, Justine M. McMillan, Megan J. Lickley, and Ronald D. Haynes, 2008: "Assessment of Tidal Current Energy in Minas Passage, Bay of Fundy." *Proceedings of the Institution of Mechanical Engineers, Part A: Journal of Power and Energy*, **2**22, 493–507.

10. Richard H. Karsten and John Marshall, 2002: "Constructing the residual circulation for the ACC from observations." *Journal of Physical Oceanography*, **32**, 3315–3327.

11. Richard H. Karsten and John Marshall, 2002: "Testing theories of the vertical stratification of the ACC against observations." *Dynamics of Atmospheres and Oceans*, **36**, 233–246.

12. Richard H. Karsten, Helen Jones and John Marshall, 2002: "The role of eddy transfer in setting the stratification and transport of a circumpolar current." *Journal of Physical Oceanography*, **32**, 39–54.

13. John Marshall, Helen Jones, Richard H. Karsten and Richard Wardle, 2002: "Can eddies set ocean stratification?" *Journal of Physical Oceanography*, **32**, 26–38.

14. Richard H. Karsten and Gordon E. Swaters, 2000: "Nonlinear effects in two-layer, large-amplitude, geostrophic dynamics. Part 1: The strong- case." *Journal of Fluid Mechanics*, **412**, 125–160.

15. Richard H. Karsten and Gordon E. Swaters, 2000: "Nonlinear effects in two-layer, large-amplitude, geostrophic dynamics. Part 2: The weak- case." *Journal of Fluid Mechanics*, **412**, 161–196.

16. Richard H. Karsten and Gordon E. Swaters, 1999: "A unified asymptotic derivation of two-layer, frontal-geostrophic models including planetary sphericity and variable topography." *Physics of Fluids*, **11**, 2583-2597.

17. Richard H. Karsten and Gordon E. Swaters, 1996: "Nonlinear stability of baroclinic fronts in a channel with variable topography." *Studies in Applied Mathematics*, **96**, 183–199.

18. Richard H. Karsten and Gordon E. Swaters, 1996: "A note on the stability theory of buoyancy-driven ocean currents over a sloping bottom." *Zeitschrift für Angewandte Mathematik und Physik*, **47**, 28–38.

19. Richard H. Karsten, Gordon E. Swaters and Richard E. Thomson, 1995: "Stability characteristics of deep water replacement in the Strait of Georgia." *Journal of Physical Oceanography*, **25**, 2391–2403.

Refereed Conference Proceedings

1. T. Kutney, R. Karsten, and B. Polagye, "Priorities for Reducing Tidal Energy Resource Uncertainty: Clearing the bar for Project Financing" accepted for publication in the Proceedings of the 10th European Wave and Tidal Energy Conference, 2–5 September, 2013, Aalborg, Denmark. (10 pages)

2. **J. McMillan**, A. Hay, R. Karsten, G. Trowse, D. Schillinger, and **M. OFlaherty-Sproul**, "Comprehensive Tidal Energy Resource Assessment in the lower Bay of Fundy, Canada" accepted for publication in the Proceedings of the 10th European Wave and Tidal Energy Conference, 2–5 September, 2013, Aalborg, Denmark. (10 pages)

3. **J. Culina** and R. Karsten, "Comparison of Different Resolution Models and Observed Current Proles in the Bay of Fundy, Canada Using Turbine-Relevant Metrics" Proceedings of the 9th European Wave and Tidal Energy Conference, 5–9 September, 2011, Southampton, U.K. (9 pages)
`http://www.see.ed.ac.uk/~shs/EWTEC%202011%20full/papers/94.pdf`

4. R. Karsten, **A. Swan**, and **J. Culina**, "Assessment of Arrays of In-stream Tidal Turbines in the Bay of Fundy", Proceedings of the 9th European Wave and Tidal Energy Conference, 5–9 September, 2011, Southampton, U.K. (10 pages)
`http://www.see.ed.ac.uk/~shs/EWTEC%202011%20full/papers/280.pdf`

5. Richard H. Karsten, 2011, "An Assessment of the Potential of Tidal Power from Minas Passage, Bay of Fundy, Using Three-Dimensional Models," Proceedings of ASME 2011 30th International Conference on Ocean, Offshore and Arctic Engineering, June 19–24, 2011, Rotterdam, Netherlands. (8 pages)
`http://proceedings.asmedigitalcollection.asme.org/proceeding.aspx?articleid=1624900`

Conference Proceedings

1. R. Karsten, M. O'Flaherty-Sproul, J. McMillan, J. Culina, G. Trowse, and A. Hay, "Analysis of Tidal Turbine Arrays in Digby Gut and Petit Passage, Nova Scotia" Proceedings of the 4th International Conference on Ocean Energy, 17 October 2012, Dublin, Ireland. (6 pages)
`http://www.icoe2012dublin.com/ICOE_2012/downloads/papers/day2/2.6%20Site%20Investigation/Richard%20Karsten%20-%20Acadia%20University.pdf`

2. J. Culina and R. Karsten, 2012 "Sensitivity of water speeds to sea-bed roughness distribution in Minas Passage, Bay of Fundy", Proceedings of the 4th International Conference on Ocean Energy, 17 October 2012, Dublin, Ireland. (5 pages)
http://www.icoe2012dublin.com/ICOE_2012/downloads/papers/day2/POSTER%20SESSION%202/Joel%20Culina,%20Acadia%20University.pdf

3. R. H. Karsten, J. M. McMillan, M. J. Lickley, and R. D. Haynes, 2009: "A Review of a Recent Assessment of Tidal Current Energy in Minas Passage, Bay of Fundy." in **R**esource Development and its Implications in the Bay of Fundy and Gulf of Maine, proceedings of the 8th BoFEP Bay of Fundy Science Workshop. 15–22.
http://www.bofep.org/PDFfiles/BoFEP8thproceedings.pdf

4. Richard Karsten, 2003: "The role of eddy fluxes in the dynamics of the Antarctic Circumpolar Current. AMS's 14th Conference on Atmospheric and Oceanic Fluid Dynamics Extended Abstracts," 191–192.

5. R. Karsten and J. Marshall, 2001: "Testing theories of the Antarctic Circumpolar Current against observations. AMS's 13th Conference on Atmospheric and Oceanic Fluid Dynamics Extended Abstracts," 181–184.

6. Richard Karsten and Gordon E. Swaters, 1997: "Nonlinear destabilization of large-scale oceanic fronts. AMS's 11th Conference on Atmospheric and Oceanic Fluid Dynamics Extended Abstracts," 147–151.

7. R. Karsten and G. E. Swaters, 1995: "On the stability of two-layer geostrophic fronts on a beta plane. AMS's 10th Conference on Atmospheric and Oceanic Waves and Stability Preprints," 49–50.

Papers Published by Supervised Students

1. Justine M. McMillan and Megan J. Lickley (Sponsor: Richard Karsten and Ronald Haynes), 2008: "The Potential of Tidal Power from the Bay of Fundy." *SIAM Undergraduate Research Online*, **1**, Issue 1, http://www.siam.org/students/siuro/published.php.

Technical Reports

1. J. Wood, D. Tollit, A. Redden, P. Porskamp, J. Broome, L. Fogarty, C. Booth and R. Karsten, "Passive Acoustic Monitoring of Cetacean Activity Patterns and Movements in Minas Passage: Pre-Turbine Baseline Conditions (2011-2012)" prepared for Fundy Ocean Research Center for Energy and the Offshore Energy Research Association of Nova Scotia, 71 pages, submitted August 2013.

2. J. Culina and R. Karsten, "Observed and modelled tidal and turbulence flow at the FORCE tidal turbine berths, prepared for Fundy Ocean Research Centre for Energy, 23 pages, submitted July 2013.

3. Mitchell O-Flaherty-Sproul and Richard Karsten, "Southwest Nova Scotia Tidal Energy Resource Assessment Volume 2: Numerical Modelling of Digby Neck Tidal Currents", prepared for Offshore Energy Environmental Research Association of Nova Scotia, 42 pages, submitted June 2013. http://www.oera.ca/marine-renewable-energy/strategic-environmental-assessment/swn-resource-assessment/

4. R. Karsten, "Module 2: Measuring and Assessing the Tidal Resource, in The Community and Business Toolkit for Tidal Energy Development, 13 pages, completed April 2013. http://tidalenergy.acadiau.ca/tl_files/sites/tidalenergy/resources/Documents/Toolkit/module_2Sweb.pdf

5. V. Klaptocz, C. Crawford, C. Hiles, and R. Karsten, Acadia University, "Cross-Coupling Between Device-Level CFD and Oceanographic Models Applied to TISECs in Minas Passage and Petit Passage prepared for Offshore Energy Environmental Research Association of Nova Scotia, 127 pages, submitted February 2013. http://www.oera.ca/wp-content/uploads/2013/05/OERA-FinalReport-Rev1-_May14-2013_-Public-Release.pdf

6. R. Karsten, "Tidal Energy Resource Assessment Map for Nova Scotia," prepared for Offshore Energy Environmental Research Association of Nova Scotia, 41 pages, submitted April 2012. http://www.oera.ca/marine-renewable-energy/tidal-research-projects/other-tidal-research/tidal-energy-resource-assessment-map-for-nova-scotia

7. R. Karsten, D. Greenberg, M. Tarbotton, "Assessment of the Potential of Tidal Power from Minas Passage and Minas Basin" prepared for Offshore Energy Environmental Research Association of Nova Scotia, 65 pages, submitted November, 2011. http://www.oera.ca/marine-renewable-energy/tidal-research-projects/hydrodynamic-modeling/assessment-of-the-potential-of-tidal-power-from-minas-passage-and-minas-basin/

Conference Presentations

1. "Reducing the cost of in-stream tidal energy generation through comprehensive hydrodynamic site assessment." Marine Renewables Canada 2013 Annual Conference, Ottawa, November 21, 2013.

2. "Priorities for Reducing Tidal Energy Resource Uncertainty: Clearing the bar for Project Financing" 10th European Wave and Tidal Energy Conference, Aalborg, Denmark, September 2, 2013.

3. "Quantifying the Uncertainty in Predicting Tidal Power Resources", Statistical Society of Canada Annual Conference, 2013, Edmonton.

4. "Cross-Coupling Between Device-Level CFD and Oceanographic Models Applied to TISECs in Minas Passage and Petit Passage", Nova Scotia Tidal Energy Research Symposium and Forum, Wolfville, May 14, 2013.

5. "Analysis of Tidal Turbine Arrays in Digby Gut and Petit Passage, Nova Scotia," International Conference on Ocean Energy 2012, October 18, 2012, Dublin, Ireland.

6. Analysis of Tidal Turbine Arrays in the Digby Neck Passages June 27, 2012, Canadian Symposium for Fluid Dynamics, Toronto

7. "Tidal Energy Resource Assessment in the Bay of Fundy: Community and Commercial Projects," Nova Scotia Research &Development Forum, May 16, 2012,Halifax

8. "Assessing the In-Stream Power Potential of Tidal Currents in the Bay of Fundy," Korea Green Technology and Industry Exhibition 2011, November 9, 2011, Incheon, Korea.

9. "Putting tidal energy development in perspective," OREG 2011 Annual Conference: A Time to Lead, November 2, 2011, Montreal, QC.

10. "Assessment of Arrays of In-stream Tidal Turbines in the Bay of Fundy", (poster presentation) Proceedings of the 9th European Wave and Tidal Energy Conference, September 7th, 2011, Southampton, U.K.

11. "An Assessment of the Potential of Tidal Power from Minas Passage, Bay of Fundy, Using Three-Dimensional Models," Proceedings of ASME 2011 30th International Conference on Ocean, Offshore and Arctic Engineering, June 22, 2011, Rotterdam, Netherlands.

12. "Tidal Power in the Bay of Fundy," Renewable Energy Conference, April 20th, 2011, Halifax, NS.

13. "Assessment of tidal current energy in the Bay of Fundy," Canadian Symposium for Fluid Dynamics/CAIMS 2010, June 20, 2010, St. Johns NL.

14. "Assessment of the Potential of Tidal Power from Minas Passage and Minas Basin," NS Energy R&D Forum 2010, Halifax, NS, May 26, 2010.

15. "Assessment of Tidal Current Energy," Atlantic Geoscience Society, February 6, 2010, Wolfville, NS.

16. "Assessment of Tidal Current Energy," Conference on Clean Energy, November 12, 2009, Boston, MA.

17. "Assessment of Tidal Current Energy in the Minas Passage, Bay of Fundy," OREG 2009 Fall Symposium: Ocean Energy in Ottawa, October 28, 2009, Ottawa, ON.

18. "Modelling Tidal Power in the Minas Passage", APICS Mathematics, Statistics and Computer Science Joint Conference, October 2009, Halifax, NS.

19. "Assessment of Tidal Current Energy in the Minas Passage, Bay of Fundy," Energy Ocean, June 17, 2009, Rockport, ME.

20. "Assessment of Tidal Current Energy in the Minas Passage, Bay of Fundy," CMOS Annual Meeting, June 1, 2009, Halifax, NS.

21. "Assessment of Tidal Current Energy in the Minas Passage, Bay of Fundy," Resource Development and its Implications in the Bay of Fundy and Gulf of Maine, 8th BoFEP Bay of Fundy Science Workshop, May 27, 2009, Wolfville, NS.

22. "Assessment of Tidal Current Energy in the Minas Passage, Bay of Fundy," Canadian Symposium for Fluid Dynamics, Canada-France 2008, June 3, 2008, Montreal, QC.

23. "Assessment of Tidal Current Energy in the Minas Passage, Bay of Fundy," CMOS Annual Meeting, May 26, 2008, Kelowna, BC.

24. "The Dynamics of the Intermediate Water Formation off the Coast of Chile," Canadian Symposium for Fluid Dynamics, June 18, 2006, Toronto, ON.

25. "Observations of Antarctic Intermediate Water Formation in the Pacific," CMOS Annual Meeting, May 31, 2006, Toronto, ON.

26. "Changes in the Southern Ocean as observed by Argo Floats," CMOS Annual Meeting, May 31, 2006, Toronto, ON.

27. "Dynamics of the Antarctic Circumpolar Current in the Pacific," CMOS Annual Meeting, May 29, 2006, Toronto, ON.

28. "Numerical Models of the Geostrophic Turbulence of the Antarctic Circumpolar Current", CAIMS 2005, June 2005, Winnipeg, MB.

29. "Numerical Models of the Geostrophic Turbulence of the Antarctic Circumpolar Current," Bluenose Numerical Analysis Day, June 2005, Sydney, NS.

30. "The Nonlinear Dynamics of Antarctic Intermediate Water Formation," CGU-AGU Joint Annual meeting, May 2004. Montreal, PQ.

31. "The role of eddy fluxes in the dynamics of the Antarctic Circumpolar Current," First Joint Meeting of CAIMS and SIAM, June 2003, Montreal, PQ.

32. "The role of eddy fluxes in the dynamics of the Antarctic Circumpolar Current," 14th Conference on Atmospheric and Oceanic Fluid Dynamics, June 2003, San Antonio, TX.

33. "Simple Numerical Models of the Antarctic Circumpolar Current," Bluenose Numerical Analysis Day, June 2003, Halifax, NS.

34. "The role of eddy fluxes in the dynamics of the Antarctic Circumpolar Current," EGS - AGU - EUG Joint Assembly, April 2003, Nice, France.

35. "The mathematics of the Antarctic Circumpolar Current," CAIMS 2002, June 2002, Calgary, AB.

36. "Can the dynamics of the ACC explain why Antarctica is cooling?" CMOS 35th Congress, May 2002, Rimouski, PQ.

37. "Modelling the Antarctic Circumpolar Current," APICS Mathematics, Statistics and Computer Science Joint Conference, October 2001, Antigonish, NS.

38. "A Discussion of the Dynamics of the Antarctic Circumpolar Current," Waves Phenomena III, June 2001, Edmonton, AB.

39. "Testing Theories of the Antarctic Circumpolar Current Against Observations," 13th Conference on Atmospheric and Oceanic Fluid Dynamics, June 2001, Breckenridge, CO.

40. "A thermally and mechanically driven model of the circumpolar current," Math 2000, June 2000, Hamilton, ON.

41. "Can eddies set the depth of the thermocline?" CMOS 34th Congress, May 2000, Victoria, BC.

42. "A thermally and mechanically driven model of the ACC," Ocean Sciences 2000, January 2000, San Antonio, TX.

43. "Modelling ocean fronts with two-layer, frontal-geostrophic models," CMOS 32nd Congress, June 1998, Halifax, NS.

44. "Nonlinear destabilization of large-scale oceanic fronts," 11th Conference on Atmospheric and Oceanic Fluid Dynamics, June 1997, Tacoma, WA.

45. "Stability characteristics of deep water replacement in the Strait of Georgia," 18th annual meeting of CAMS, June 1997, Toronto, ON.

46. "Nonlinear stability of geostrophic ocean fronts," Newton Institute Euroconference on Ocean Dynamics, September 1996, Cambridge, U.K.

47. "Nonlinear stability of geostrophic ocean fronts," 16th annual meeting of CAMS, June 1996, Winnipeg, MN.

48. "On the baroclinic stability of ocean surface fronts," CMOS 29th Congress, June 1995, Kelowna, BC.

49. "On the baroclinic instability of cold-core coupled density fronts in a channel with variable bottom topography," International Conference on Nonlinear Dynamics and Pattern Formation in the Natural Environment, July 1994, Noordwijkerhout, Netherlands.

50. "Stability characteristics of deep-water replacement in the Strait of Georgia," CMOS 28th Congress, June 1994, Ottawa, ON.

Workshops Presentations

1. "Resource Assessment", Statement of Best Practices in Tidal Energy Development Workshop, June 19-20, 2012. Acadia University, Wolfville, NS.

2. "Tidal Power in the Bay of Fundy", Ocean Industry/University Workshop, June 2, 2011, Halifax, NS.

3. "Assessment of the Potential of Tidal Power from Minas Passage and Minas Basin," OEER/FORCE Tidal Energy Workshop, October 13, 2010, Wolfville, NS.

4. "Determining an Appropriate Model for Mites on Apple Trees," Atlantic Math Biology Workshop, June 6, 2010, Fredericton, NB,

5. "Assessment of the Potential of Tidal Power from Minas Passage and Minas Basin," Offshore Energy and Environmental Research Information Sharing Session, January 29, 2010, Dartmouth, NS.

6. "Flow past Tidal Turbines," Workshop on the Dynamics in Environmental and Geophysical Flows, June 27, 2009, Waterloo, ON.

7. "Models of In-stream Tidal Power in the Minas Passage," Invited Presenter at Workshop on Hydrodynamic Modeling in the Bay of Fundy, April 15, 2009, Dalhousie University, Halifax, NS.

Workshops Activities

1. Nova Scotia Tidal Energy Research Symposium and Forum, Wolfville, May 14, 2013 – Breakout Session Facilitator.

2. Panel Participants at Canadian Networking Breakfast at the 4th International Conference on Ocean Energy, October 18, 2012

3. Nova Scotia Research & Development Forum, May 16, 2012,Halifax – Panel on Knowledge Gaps, Growth, Priorities.

4. Fundy Tidal Energy Environmental Monitoring Tools and System January 12–13, 2011, Halifax NS – Breakout Session Facilitator.

5. Getting Power to Market, July 7-8, 2011, Halifax, NS.

6. Canada's Marine Renewable Energy Technology Roadmap Workshop 3, June 8–9, 2011,Vancouver, BC – Breakout Session Facilitator.

7. Canada's Marine Renewable Energy Technology Roadmap Workshop 2, March 29–30, 2011, Montreal QC – Breakout Session Facilitator.

8. Canada's Marine Renewable Energy Technology Roadmap Workshop 1, February 8, 2011, Halifax NS – Breakout Session Facilitator.

9. OEER/FORCE Tidal Energy Workshop, October 13, 2010, Wolfville, NS –Breakout Session Facilitator.

10. Bay of Fundy Tidal Energy Forum: Working Together for Sustainable Success, May 12-14, 2009, Annapolis Basin Conference Centre, Nova Scotia.

11. AARMS Workshop on Mathematical Modeling and Simulation, October 2006, Cape Breton University, Sydney NS.

12. Panel Discussion on "Climate Change: Global to Local," March 2005, Acadia University.

13. Southern Ocean Theory Workshop, July 2004, Alfred-Wegner Institute, Bremerhaven, Germany.

Invited Seminars

1. Mount Alison University, Sackville, NB, Sept. 27, 2013.

2. University of Maine, Orono, ME, Sept. 23, 2011.

3. Bedford Institute of Oceanography, Dartmouth, NS, 2010.

4. Memorial University of Newfoundland and Labrador, St John's, NF, 2008.

5. Acadia University Department of Biology Seminar, 2008.

6. Institute of Ocean Sciences, Sidney BC, 2007.

7. University of Alberta, Edmonton AB, 2007.

8. University of British Columbia Okanagan, Kelowna BC, 2007.

9. Trent University, Peterborough, ON, 2006.

10. Centre for Atmosphere and Ocean Science, Courant Institute of Mathematics, New York University , New York City, NY, USA, 2006.

11. Scripps Oceanographic Institution, La Jolla, CA, USA, 2005.

12. Memorial University of Newfoundland and Labrador, St John's, NF, 2005

13. Acadia University, Wolfville, NS, 2003.

14. Bedford Institute of Oceanography, Dartmouth, NS, 2002.

15. Dalhousie University, Halifax, NS, 2002.

16. Geophysical Fluid Dynamics Laboratory, Princeton, NJ, 2001.

17. Acadia University, Wolfville, NS, 2001.

18. Dalhousie University, Halifax, NS, 2001.

19. McGill University, Montreal, PQ, 2001.
20. Woods Hole Oceanographic Institution, Woods Hole, MA, 2000.
21. University of Rhode Island, Kingston, RI, 2000.
22. Massachusetts Institute of Technology, Cambridge, MA 1999.
23. University of Alberta, Edmonton AB, 1997.

Community Talks

1. "Turning High Tides into Green Energy: the Potential of Tidal Power in the Bay of Fundy," Meeting of Canadian Council of Deans of Science, Wolfville, June 24, 2013
2. "Reducing the cost of in-stream tidal energy generation through comprehensive hydrodynamic site assessment," Tidal Energy in Digby County 2013, Digby, May 4, 2013.
3. "Turning High Tides into Green Energy: The potential Tidal Power in the Bay of Fundy", Huggins Science Seminar, Wolfville, May 3, 2013.
4. "Assessment of the Potential of Tidal Power from Minas Passage and Minas Basin", OERA Joint Tidal Area Sub-Committee, April 10, 2012
5. "The Science of Tidal Power", Nova Scotia Association of Science Teachers Annual Meeting, October 28, 2011
6. "Resource Assessment", Coastal Community Forum, Acadia, August 17, 2011.
7. "Can changes in ocean circulation cause rapid climate change?" Acadia University International Baccalaureate Camp, Wolfville, August 11, 2011.
8. "Tidal Power in the Bay of Fundy',' Acadia Research Summit, Acadia University, March 24, 2011.
9. "The Science of Tidal Power", Nova Scotia Association of Science Teachers Annual Meeting, October 22, 2010
10. "Sustainable Tidal Energy Research and Development", Tidal Energy in Digby County, Westport, Nova Scotia, August 24, 2010.
11. "Harvesting Tidal Energy from the Bay of Fundy", Academy for the Environment and ACER Great Debate, Wolfville, March 31, 2010.
12. "Turning High Tides into Green Energy," Atlantic Undergraduate Physics and Astronomy Conference, Wolfville, February 7, 2010.
13. "Climate Modelling," Acadia University International Baccalaureate Camp, Wolfville, August 13, 2009.
14. "Turning High Tides into Green Energy", CMOS Teachers Day, Halifax, June 3, 2009.
15. "Turning High Tides into Green Energy", Huggins Science Seminar, Wolfville, May 7, 2009.
16. "Turning High Tides into Green Energy", Fieldwood Heritage Society Annual Dinner, Canning, April 25, 2009.

17. "Why are the tides in the Bay of Fundy so high?," Acadia Robotics Competition, November 29, 2008.

18. "Tidal Current Energy in the Bay of Fundy, Acadia Science Cafe, Wolfville, November 3, 2008.

19. "Ocean Current Switching: Can changes in ocean circulation cause rapid climate change?" Acadia University International Baccalaureate Camp, Wolfville, August 20, 2008.

20. "Ocean Current Switching: Can changes in ocean circulation cause rapid climate change?" Acadia University International Baccalaureate Camp, Wolfville, August 16, 2006.

21. "Ocean Motion: Understanding Ocean Circulation," Acadia Science Cafe, Wolfville March 6, 2006

22. "The Motion of the Ocean: Imaging Ocean Currents and Environmental Changes," Digital Dialogues: connecting in art and science. September 2003. Acadia University

Guest Lectures

- Assessment of Tidal Current Energy in the Bay of Fundy, Graduate course in policy/planning related issues in Marine Renewable Energy, taught by John Colton in Iceland, June 5, 2013
- Assessment of Tidal Current Energy in the Bay of Fundy, John Colton's class, Acadia University, October 6, 2011.
- Assessment of tidal current energy in the Bay of Fundy, Dr. Danika van Proosdij class in Bay of Fundy: Environments and Issues, Saint Mary's University , February 16, 2011.
- Acadia ASPC 2123X2 – Fluid Mechanics April 6th, 2010.
- Acadia IDST 1613- Perspectives on Climate Change, February 16, 2010

External Funding

- Natural Resources Canada ecoENERGY Innovation Initiative, $1,630,112, Reducing the cost of in-stream tidal energy generation through comprehensive hydrodynamic site assessment, Lead Proponent: Acadia University (R. Karsten), Project Partners: Clean Current Power Systems Inc., Dalhousie University, Dynamic Systems Analysis Ltd., Fundy Tidal Inc., and University of New Brunswick, Jan. 2013 – March 2016.
- Fundy Ocean Research Centre for Energy, Analysis of ADCP data and numerical simulations for FORCE test site, $21,000, R. Karsten and J. Culina, June, 2012– Jan. 2013.
- Offshore Energy Environment Research Association, Updated Resource Assessment of Tidal Energy for the Bay of Fundy, and Development of an Updated Map of Tidal Resource in the Area, $10,320, R. Karsten, March–December 2012.
- National Science and Engineering Research Council Engage Grant, $21,800, Richard Karsten and Design Systems Analysis, December 2011–May 2012.
- Offshore Energy Environment Research Association, Southwest Nova Scotia Tidal Energy Resource Assessment, $249,971, Alex Hay, Fundy Tidal Inc., Richard Karsten and Tim Webster, Nov. 2011–March. 2013.

- Offshore Energy Environment Research Association, Cross-coupling between device-level CFD and Oceanographic Models applied to multiple TISECs in Minas Passage, $149,860, Curran Crawford, Michael Tarbotton, Voytek Klaptocz, and Richard Karsten, Oct. 2011–Oct. 2012.
- ACEnet Research Fellowship, $40,000, Richard Karsten and Joel Culina, Sept 2010–Aug 2012.
- National Science and Engineering Research Council Engage Grant, $23,000, Richard Karsten and Fundy Tidal Inc., May 2010–Oct 2010.
- National Science and Engineering Research Council Interaction Grant, $2,920, May 2010.
- Offshore Energy Environment Research Association, Assessment of the Potential of Tidal Power from Minas Passage and Minas Basin, $160,800, Richard Karsten, David Greenberg, Michael Tarbotton, Jan 2010–Sept 2011.
- MITACS Internship for Rebecca Hammond, $15,000, supervisors Richard Karsten and Holger Teismann, 2008.
- AARMS Postdoctoral Research Fellowship for Rebecca Hammond, $33,500, supervisors Richard Karsten and Holger Teismann, 2007–2008.
- National Science and Engineering Research Council Research Tools and Instruments Grant, $50,638 with H. Chipman, R. Haynes, Y., Zhang, P. Taylor, 2007.
- Canadian Foundation for Climate and Atmospheric Sciences, GR-406 "Analysis of Argo Float data to examine Antarctic Intermediate Water Formation," Principal Investigator with Howard Freeland. A total of $164,750 over three years starting July 1, 2003.
- Daniel Langlois Foundation for art, science and technology, Institutional Grant, "Ideas in Residence/Creative Dislocations: Sense of Place and Digital Connections in the Rural Landscape," Collaborator, $23,700, May–September 2003.
- National Science and Engineering Research Council Research Grant, "The meridional overturning of the Southern Ocean," $20,000 per year for 5 years starting April 1, 2002.

Internal Funding

- Acadia University Academy Research Seed Grants, "Exploring the spread of Toxic Antifouling Compounds from Tidal Turbines in the Minas Passage," $5020, 2009.
- Acadia University Article 25.55 Research Award, "Environmental Impacts of Tidal Turbines in the Bay of Fundy," $2500, 2009.
- Acadia University Article 25.55 Research Award, "A Three Dimensional Assessment of Tidal Current Energy in Minas Passage," $2300, 2008.
- Acadia University Article 25.55 Research Award, "Examining the ACC using Ocean General Circulation Models," $1800, 2005.
- Acadia University Article 25.55 Research Award, "Antarctic Intermediate Water Formation," $2500, 2002.
- Teaching Innovation Fund/AITT, "LaTeX Resources for Mathematics and Science," with Dr. Jeff Hooper, $3000 + matching AITT funds, 2002.
- Acadia University Article 25.55 Research Award, "Modelling the Antarctic Circumpolar Current," $2500, 2001.

- Acadia University Start-up Funding, $10,000, 2001.

Research Supervision

- Mitchell O'Flaherty-Sproul, Research Assistant, 2013
- Robie Hennigar, Research Assistant, 2013
- Matthew von Bommel, Undergraduate, Winter 2012
- Joel Culina, Post Doctoral Fellow, 2010-2012
- Rebecca Hammond, AARMS Post Doctoral Fellow, 2007-2009
- Paul Barker, Post Doctoral Fellow, 2004-2006
- Matt Corkum, Research Assistant, 2006.
- Aaryn Tonita, Research Assistant, 2005.
- Murray Patterson, Research Assistant, 2004.

Other Research Activity

- Member of the Fundy Applied Sensor Technology Science Advisory Board, 2013 –present.
- Founding Member of the Acadia Tidal Energy Institute, 2011–present.
- Fundy Energy Research Network, Hydrodynamics and Geophysics Subcommittee co-chair, member of executive committe. 2011–present.
- Expert Member on Tidal Resource Assessment for International Electrotechnical Commission – PT62600-201, 2012–present.
- Member of the Canada's Mirror Committee on Power Performance of Tidal Turbines for International Electrotechnical Commission – PT62600-200, 2011–2012.
- Member of the Canada's Marine Renewable Energy Technology Roadmap Steering Committee, 2010-2011.
- Director of the Acadia Centre for Mathematical Modelling and Computation, 2004-2007.
- Co-organizer of the Acadia Symposium on Modelling and Computation held at Acadia, October 4th, 2004.
- Co-organizer of the 16th Canadian Symposium for Fluid Dynamics held in Halifax, June 13–15, 2004.
- Co-organizer of the Bluenose Numerical Analysis Day, 2004, 2009.
- Acted as referee for: *Journal of Physical Oceanography*, *Journal of Geophysical Research*, *Geophysical Research Letters*, *Journal of Marine Research*, *Ocean Dynamics*, *Science*, *Journal of Atmospheric and Oceanic Technology*, *Applied Mathematics and Computation*, *Atlantic Electronic Journal of Mathematics*, *Journal of Fluid Mechanics*, *Ocean Engineering*, *Estuaries and Coasts*, *Energies*, *Antarctic Science*, *Journal of Power and Energy*.
- Acted as a reviewer for NSERC Discovery Grants.
- Acted as a reviewer for CFI LOF Grant.
- Acted as a reviewer for the U.S. National Science Foundation .

Service Activities

Acadia Department of Mathematics and Statistics

- Co-ordinator of Department Graduate Program (2003–2007, 2009-2011)
- Departmental Review Committee (2004, 2006, 2008, 2010)
- Departmental Search/Hiring Committee (2003–2007, 2012, 2013)
- Department Committees, Curriculum (2004–2007), Recruiting (2004, 2005, 2012), Computer (2002–2005), Seminar (2003, 2004, 2010–2012), Problem Group (2012), Review (2010, 2011)
- Experience Acadia Days Presentation (2010, 2011)
- Acting Head of the Department of Mathematics and Statistics, numerous occasions

Acadia University

- Scholarships, Prizes and Awards Committee, Chair (2012-present)
- FPAS Research Funds Allocation Committee (2012)
- Departmental Review Committee: Physics (2006, 2008), Chemistry (2008), School of Engineering (2009, 2010)
- Internal reviewer for Program Review: School of Engineering (2009)
- Institutional Engagement Committee – Acadia Showcase (2009)
- Member of the Arthur Irving Academy of the Environment (2006-2012)
- Department Of Mathematics and Statistics Senate Representative (2006–2007, 2008–2009)
- Senate Graduate Coordinators Committee (2006–2007, 2009–2011)
- FPAS Bylaws Committee (2010-2011)
- Director of Acadia Centre for Mathematical Modelling and Computation (2004–2007)
- Faculty of Science representative on the Graduate Studies and Research Committee (2004–2006)
- University Honours Committee (2002–2005)
- Faculty Elections Officer (2002–2003)
- University Appeals Committee, Chair (2007)
- Environmental Science Steering Committee (2002–2003)
- Acadia University Club: Past President (2009–2010), Chair of the House Committee (2008–2009), President (2006–2007), Vice President (2005–2006), Secretary (2004–2005)
- Acadia University Faculty Association: Executive Committee Member at Large (2012-2013), Nominating Committee (2004)
- Adjudicator for NSERC PG Awards, NSERC USRA Awards, HSRAs (several years)