Mark Halverson

4305 Prince Albert St.
Vancouver, BC, V5V 4J8
778.772.3929
mhalvers@eos.ubc.ca
Department Profile

Education

Aug 2009	Ph.D Physical Oceanography, **University of British Columbia**, Vancouver, BC Dissertation: *Multi-timescale analysis of the salinity and algal biomass of the Fraser River plume from repeated ferry transects* Advisor: Prof. Rich Pawlowicz
May 2002	MSc Astronomy, **University of Wisconsin**, Madison, WI
May 2000	BSc *Summa cum laude* Physics,**Univ. of Minnesota**, Minneapolis, MN BSc *Summa cum laude* Astronomy
Sep 1997	Manufacturing Engineering Major, **University of Wisconsin-Stout**, Menomonie, WI

Research Experience

Jan 2013 - Present | Research Associate / Postdoctoral Fellow
Department of Earth and Ocean Sciences, University of British Columbia

My research at UBC in the Department of Earth, Ocean, and Atmospheric Sciences Department is focused on understanding the coastal oceanography of British Columbia. In particular, I am interested in combining HF radar velocity measurements with ship-of-opportunity observations and satellite imagery to learn more about how the Fraser River in the Strait of Georgia responds to forcing. The research is part of the Marine Environmental Observation Prediction and Response Network (MEOPAR) I also have a project with the Hakai Research Network which makes use of a multi-year hydrographic time series to study the circulation on the central coast of British Columbia.

May 2013 - Dec 2014 | Hydrological Applications Specialist
Meteorological Service of Canada, Environment Canada

At Environment Canada I undertook a project in collaboration with Sean Fleming to explore how graph theory can be used to study the hydrology of British Columbia, with a particular emphasis on streamflow network design. The results developed during this work can be used by Environment Canada to assess how well the current network performs, and to develop an optimal sampling strategy to ensure that the full complexity of the British Columbia hydrology is captured.

Aug 2010 - Dec 2012 | Visiting Scholar
Department of Earth and Ocean Sciences, University of British Columbia

Much of the research I did for the PWSSC was written up and completed while I was based at UBC as a visiting scholar.

Jan 2009 - Dec 2012 | Research Oceanographer
Prince William Sound Science Center, Cordova, AK

I was responsible for conducting basic physical oceanographic research in Prince William Sound (PWS). Much of this project was centered on obtaining and analyzing baseline measurements of the hydrographic conditions and the exchange of water between PWS and the Gulf of Alaska. I conducted all aspects of the research, including instrument maintenance, mooring design, field work, analysis, and publication. Finally, I organized the hydrographic and drifting buoy sampling efforts of a large, multi-PI model validation field experiment in PWS (link).

Jan 2003 - Aug 2009 | Research Assistant

Department of Earth and Ocean Sciences, University of British Columbia

My thesis work was to investigate the effects of river, wind, and tidal forcing on two basic river plume characteristics: surface area and salinity. I used those results along with chlorophyll-a fluorescence and nitrate data to understand how the Fraser plume mitigates phytoplankton biomass in time and space. My approach was based entirely on observations, most of which were taken from instrumented ferries which traverse the plume, and also from hydrography and MODIS imagery. The work was done under the supervision of Profs. Rich Pawlowicz, Susan Allen, and Evgeny Pakhomova.

Sep 2001 - May 2002 | Research Assistant

Department of Astronomy, University of Wisconsin, Madison, WI

I worked on two different projects in theoretical and observational astronomy. The first project was to examine a time series of Hubble Space Telescope images of the Crab Nebula under the advisement of Profs. Jay Gallagher (U of Wisconsin) and Jeff Hester (U of Arizona St.). During my final semester, I worked on a model to calculate the line emission profiles from the disks of rotating stars with Prof. Joe Cassinelli.

Sep 1999 - May 2000 | Undergraduate Researcher

Department of Astronomy, University of Minnesota

For my undergraduate thesis, I examined Hubble Space Telescope images of supergiant stars. The work was supervised by Prof. Roberta Humphreys.

Jun 1999 - Aug 1999 | Undergraduate Researcher

Department of Physics, University of Minnesota

I was involved in a summer research program for undergraduate students, funded by the National Science Foundation (Research Experience of Undergraduates - REU). I worked for Prof. C.C. Huang in measuring the surface tension of thin smectic films.

Teaching Experience

Jan - Apr 2015 | Co-instructor

Department of Earth and Ocean Sciences, University of British Columbia

EOSC 473/573 Oceanographic Methods

· My responsibilities were to develop and give lectures, and to guide advanced undergraduate and graduate students while they develop and execute their field projects.

EOSC 373 Introductory Oceanography: Climate and Ecosystems

· Developed and presented lectures, wrote and administered exams/homework, met with students out of class

May - Jun 2007 | Co-instructor

Department of Earth and Ocean Sciences, University of British Columbia

EOSC 314 The Ocean Environment

· I taught the physical oceanography portion of this course. My responsibilities were to develop and present lectures, to write and mark exams and homework, and to meet with students during out of class office hours.

Jan 2003-Aug 2009 | Teaching Assistant

Department of Earth and Ocean Sciences, University of British Columbia

EOSC 473/573 Methods in Oceanography
· In this course I assisted with student's field projects, and I assessed student oral and written presentations.
ATSC 405 Cloud physics
· I wrote a `MATLAB` tutorial.
EOSC 211 Computer Methods in Earth Sciences
· My job was to supervise students as they worked through labs dealing with geophysical data analysis techniques. I also held regular office hours where I worked with students individually.
EOSC 478 Introduction to Fisheries Science
· I marked term papers and assessed student oral presentations.
EOSC 371 Introduction to Physical and Chemical Oceanography
· Most of my responsibility while assisting with this course was to help students individually during office hours.
EOSC 112 Fluid Earth
· My teaching duties were to supervise undergraduate hands-on labs and hold office hours.
EOSC 114 Catastrophic Earth
· My teaching experience with this course has varied, but the most important skill I acquired came from conducting labs.
EOSC 314 Ocean Environment
· I held office hours and marked assignments, term papers, and exams.
EOSC 315 Ocean Ecosystem
· I marked assignments and exams.

Sep-Dec 2002 | Faculty Assistant
Department of Astronomy, University of Wisconsin, Madison, WI
The Evolving Universe
· I conducted discussion sections six times weekly. Most of the teaching was lecture style, and I also met with students during regular office hours.
Hands on the Universe
· I conducted computer-based labs and marked papers.

Sep 2000 - May 2001 | Teaching Assistant
Department of Astronomy, University of Wisconsin, Madison, WI
The Evolving Universe
· I conducted discussion sections six times weekly. Most of the teaching was lecture style.
· I also held regular office hours.

Publications

[1] M. J. Halverson, R. Pawlowicz, and C. Chavanne, "Dependence of 25 MHz HF radar working range on near-surface conductivity, sea state, and tides," *Journal of Atmospheric and Oceanic Technology*, July 2016. in review.

[2] M. Halverson and R. Pawlowicz, "Tide, wind, and river forcing of the surface currents in the Fraser River plume," *Atmosphere-Ocean*, vol. 54, no. 2, pp. 131–152, 2016.

[3] M. J. Halverson and S. W. Fleming, "Complex network theory, streamflow, and hydrometric monitoring system design," *Hydrology and Earth System Sciences*, vol. 19, no. 7, pp. 3301–3318, 2015.

[4] M. J. Halverson, "Atmospheric and tidal forcing of the exchange between Prince William Sound and the Gulf of Alaska," *Dynamics of Atmospheres and Oceans*, vol. 65, pp. 86 – 106, 2014.

[5] M. J. Halverson, J. C. Ohlmann, M. A. Johnson, and W. S. Pegau, "Disruption of a cyclonic eddy circulation by wind stress in Prince William Sound, Alaska," *Cont. Shelf. Res.*, vol. 63, Supplement, no. 0, pp. S13 – S25, 2013. Coastal Ocean Observing System: Retrospective Reanalysis and Real-Time Forecasting.

[6] M. J. Halverson, C. Bélanger, and S. M. Gay III, "Seasonal transport through the straits connecting Prince William Sound to the Gulf of Alaska," *Cont. Shelf Res.*, vol. 63, Supplement, no. 0, pp. S63 – S78, 2013. Coastal Ocean Observing System: Retrospective Reanalysis and Real-Time Forecasting.

[7] M. J. Halverson and R. Pawlowicz, "High-resolution observations of chlorophyll-a biomass from an instru-

mented ferry: Influence of the Fraser River plume from 2003 to 2006," *Cont. Shelf Res.*, vol. 59, pp. 52–64, May 2013.

[8] D. L. Musgrave, M. J. Halverson, and W. S. Pegau, "Seasonal surface circulation, temperature, and salinity in Prince William Sound, Alaska," *Cont Shelf Res*, vol. 53, no. 0, pp. 20–29, 2013.

[9] J. D. Farrara, Y. Chao, Z. Li, X. Wang, X. Jin, H. Zhang, P. Li, Q. Vu, P. Q. Olsson, G. C. Schoch, M. Halverson, M. A. Moline, C. Ohlmann, M. Johnson, J. C. McWilliams, and F. A. Colas, "A data-assimilative ocean forecasting system for the Prince William sound and an evaluation of its performance during sound Predictions 2009," *Continental Shelf Research*, vol. 63, Supplement, pp. S193 – S208, 2013. Coastal Ocean Observing System: Retrospective Reanalysis and Real-Time Forecasting.

[10] M. J. Halverson and R. Pawlowicz, "Entrainment and flushing time in the Fraser River estuary and plume from a steady salt balance analysis," *J. Geophys. Res.*, vol. 116, 2011.

[11] M. J. Halverson and R. Pawlowicz, "Estuarine forcing of a river plume by river flow and tides," *J. Geophys. Res.*, vol. 113, 2008.

[12] R. Pawlowicz, O. Riche, and M. Halverson, "The circulation and residence time of the Strait of Georgia using a simple mixing-box approach," *Atmos. Ocean*, vol. 45, no. 4, pp. 173–193, 2007.

[13] J. J. Hester, K. Mori, D. Burrows, J. S. Gallagher, J. R. Graham, M. Halverson, A. Kader, F. C. Michel, and P. Scowen, "Hubble space telescope and chandra monitoring of the crab synchrotron nebula," *The Astrophysical Journal Letters*, vol. 577, no. 1, p. L49, 2002.

Invited talks

- Halverson, M., Atmospheric and tidal exchange between Prince William Sound and the Gulf of Alaska. 2013 Gordon Research Seminar on Coastal Ocean Circulation: Biddeport, ME, May 11, 2013.

Refereed Conference Proceedings

- Lee, R., M. Halverson, and R. Pawlowicz. An assessment by instrumented ferry routes of plume-bloom dynamics in the Strait of Georgia, British Columbia, Canada. *Coasts and Ports Australasian Conference*, Adelaide, South Australia, September 22, 2005.

Presentations

- Halverson, M., Pawlowicz, R., Di Costanzo, R., Rehm, E., and Devred, E. *Satellite based study of wind and river forcing of the Fraser River plume.* CMOS 50$^{\text{th}}$ Annual Congress: Fredericton, NB, Canada, May 31, 2016.
- Halverson, M. and R. Pawlowicz. *Dependence of working range on near-surface conductivity, sea state, and tides for a 25 MHz CODAR SeaSonde.* CMOS 50$^{\text{th}}$ Annual Congress: Fredericton, NB, Canada, May 31, 2016.
- Halverson, M., Pawlowicz, R., Di Costanzo, R., Rehm, E., and Devred, E. *Satellite based study of wind and river forcing of the Fraser River plume.* 2016 Salish Sea Ecosystem Conference: Vancouver, BC, Apr 15, 2016.
- Halverson, M. and R. Pawlowicz. *Effects of mudflats and stratification on surface tidal currents near the outflow of the Fraser River, British Columbia.* 2016 Ocean Sciences Meeting: New Orleans, LA, Feb 25, 2016.
- Halverson, M. and R. Pawlowicz, *Performance and range evaluation of the Ocean Networks Canada Strait of Georgia 25 MHz CODAR array.* 2015 Radiowave Oceanography Workshop: Woods Hole, MA, Nov 4 - 5, 2015.
- Halverson, M. and R. Pawlowicz. *Drifter-based validation of the Ocean Networks Canada Strait of Georgia CODAR array.* CMOS 49$^{\text{th}}$ Annual Congress: Whistler, BC, Canada, June 4, 2015.
- Halverson, M. and R. Pawlowicz. *What have 20 months of HF radar surface currents told us about the Fraser River plume?.* CMOS 48$^{\text{th}}$ Annual Congress: Rimouski, QC, Canada, June 2, 2014.

- Halverson, M. and R. Pawlowicz, *An empirical, bootstrapped assessment of CODAR data quality in the Strait of Georgia, British Columbia*. 2014 Radiowave Oceanography Workshop: Savannah, GA, May 11, 2014.
- Halverson, M. and R. Pawlowicz. *Impact of Wind, Tides, and River Flow on Circulation in the Fraser River Plume: The HF Radar Perspective*. 2014 Ocean Sciences Meeting: Honolulu, HI, Feb 28, 2014.
- Halverson, M. and R. Pawlowicz. *A new look at the Fraser River plume from HF radar and repeated ship-of-opportunity transects*. 2013 Gordon Research Conference on Coastal Ocean Circulation: Biddeport, ME, May 13, 2013.
- Halverson, M., *Recent circulation studies in Prince William Sound, a fjord-like system in the northern Gulf of Alaska*. 2012 Ocean Sciences Meeting: Salt Lake City, UT, Feb 16, 2012.
- Halverson, M., *Seasonal exchange between Prince William Sound and the Gulf of Alaska*. 2012 Alaska Marine Science Symposium: Anchorage, AK, Jan 17, 2012.
- Halverson, M., *Seasonal flow variability in the straits connecting Prince William Sound to the Gulf of Alaska*. CMOS 45$^{\text{th}}$ Annual Congress: Victoria, BC, Canada, June 8, 2011.
- Halverson, M., *Near-surface circulation in Prince William Sound*. 2011 Alaska Marine Science Symposium: Anchorage, AK, Jan 17, 2011.
- Halverson, M., and C. Ohlmann, *The evolution of a cyclonic gyre in Prince William Sound, AK*. 2010 Ocean Sciences Meeting: Portland, OR, Feb 22, 2010.
- Halverson, M., and C. Ohlmann, *Circulation in Prince William Sound during the Sound Predictions 2009 Field Program from hydrography and drifting buoys*. 2010 Alaska Marine Science Symposium: Anchorage, AK, Jan 18, 2010.
- Halverson, M., C. Ohlmann, S. Pegau, and A. Allen, *Upper water column circulation in Prince William Sound from drifting buoys*. Eastern Pacific Ocean Conference (EPOC): Sidney, BC, Sep 23, 2009.
- Halverson, M., and R. Pawlowicz, *Tides and salinity in the Fraser plume*. 2008 Ocean Sciences Meeting: Orlando, FL, March 5, 2008.
- Halverson, M., and R. Pawlowicz, *Wind and river discharge forcing of the Fraser River plume.* 2007 Student Physical Oceanography Retreat (STUPOR): Friday Harbor, WA, Jan 28, 2007.
- Halverson, M., and R. Pawlowicz, *The Fraser River plume's impact on the magnitude and spatial distribution of phytoplankton biomass.* 53$^{\text{rd}}$ Eastern Pacific Ocean Conference (EPOC): Government Camp, OR, Sept 28, 2006.
- Halverson, M., R. Pawlowicz, R. Lee, and S. Allen, *High resolution ferry-based observations of three consecutive spring blooms in the Strait of Georgia.* CMOS 39$^{\text{th}}$ Annual Congress: Vancouver, BC, Canada, May 31, 2005.
- Halverson, M., R. Lee, and R. Pawlowicz, *High resolution observations of the 2004 spring phytoplankton bloom in the Strait of Georgia*. 51$^{\text{st}}$ Eastern Pacific Ocean Conference (EPOC): Sidney, BC, Canada, October 23, 2004.
- Halverson, M., R. Lee, and R. Pawlowicz, *Assessing surface water properties and chlorophyll concentrations with ferry-based instruments*. AGU Ocean Sciences Meeting: Portland, OR, January 28, 2004.

Mentoring

- I am on the supervisory committee of a MSc student in the Department of Earth, Ocean, and Atmospheric Sciences at UBC.
- I am mentoring a MSc level research assistant on a project to quality control and analyze a large collection of satellite imagery.
- When I worked at the Prince William Sound Science Center, I mentored two undergraduate students in the summer of 2009. My students helped to organized and conduct field work as part of a large multi-PI sampling effort.

Synergistic activities

- As a graduate student I coordinated a series of talks within Earth and Ocean Sciences (EOS) at UBC designed to help students and post-docs actively manage and plan their future careers. During these sessions an invited speaker (typically EOS scientists and professors) would present on topics ranging from networking skills and resume writing to interviewing for faculty jobs.
- I served as an external member on the Data Portal Requirements team, an Ocean Networks Canada committee which has been tasked with redesigning their data interface. I am currently a member of Met-Ocean, an Ocean Networks Canada group which is concerned with oceanographic monitoring and instrumentation on Canada's west coast
- I have reviewed manuscripts for *Continental Shelf Research*, the *Journal of Geophysical Research - Oceans*, and the *Journal of Physical Oceanography*
- Active member of the MEOPeers, a group of 80+ students, postdocs, and research associates in the MEOPAR Network Centers of Excellence. One example of the things I have done is to co-organize a day long professional development training event for all of the MEOPeers in western Canada.
- Volunteered on the 2015 CMOS Annual Congress Scientific Program Committee. Organized and convened a session on the use of HF radar for oceanographic applications in Canada at the same meeting.
- Co-founder of the Postdoc and RA Society within the Department of Earth, Ocean, and Atmospheric Sciences at the University of British Columbia. The purpose of this group is to increase postdoctoral and research associate representation within the department, and to host series of professional development events for grad students and postdocs in earth science.
- Member of the MEOPAR Research Management Committee
- Member of the Department of Earth, Ocean, and Atmospheric Sciences Computer & Web committee

Technical Skills

- Spatial and time series analysis, manuscript preparation, data processing
- Experience at sea with drifting buoys, acoustic releases, CTDs (including sensors for fluorescence, dissolved oxygen, and light transmission), ADCPs, an ISUS nitrate sensor, and Niskin bottles.
- Calibration and maintenance of flow-through oceanographic sensors.
- Development, deployment, and recovery of sub-surface moorings
- Lab experience filtering and analyzing water samples for chlorophyll-a, dissolved oxygen, and nutrients.
- Have participated in dozens of oceanographic cruises on a wide range of vessels
- Experience organizing research cruises, including field equipment preparation and sampling strategy.

Computer Skills

- Matlab: 12+ years of near-daily use.
- Experienced user of R, the statistical computing language
- Experience with oceanographic sensor interface software such as SEATERM, BBTalk, and WinADCP.
- Experience with version control software: Mercurial and Git
- LaTex, Microsoft Office, and SeaClearII (GPS software).
- Proficient in Linux, MacOSX, and Windows operating systems.

Awards and Honors

2008 Outstanding Student Talk Award - 2008 AGU Ocean Sciences Meeting
2000 University of Minnesota Dean's List
1999 University of Minnesota Dean's List
1999 National Science Foundation Research Experience for Undergraduates (NSF REU)
1998 University of Minnesota Dean's List
1997 University of Minnesota Dean's List
1996 Fulton and Edna Holtby Scholarship Recipient

Collaborators

- Allen, Susan (University of British Columbia)
- Bélanger, Claude (Institut national de la recherche scientifique)
- Campbell, Rob (Prince William Sound Science Center)
- Devred, Emmanuel (Université Laval)
- Fleming, Sean (Environment Canada)
- Gay, Shelton (Prince William Sound Science Center)
- Johnson, Mark (University of Alaska - Fairbanks)
- Ohlmann, Carter (University of California - Santa Barbara)
- Musgrave, Dave (Emeritus / University of Alaska)
- Pawlowicz, Rich (University of British Columbia)
- Pegau, Scott (Oil Spill Recovery Institute)
- Thompson, Keith (Dalhousie University)
- Wang, Xiaochun (UCLA/JPL)
- Winant, Clint (UCSD - Scripps)