

Colin R. Meyer

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Education

- 2013–2017 **PhD in Applied Mathematics**
Advised by Professor James R. Rice
School of Engineering and Applied Sciences
Harvard University
- 2012–2013 **MASt in Applied Mathematics**
Part III of the Mathematical Tripos
University of Cambridge
- 2008–2012 **BS in Civil and Environmental Engineering**
University of California, Berkeley
With High Honors

Research Interests

Fluid dynamics; snow and ice mechanics; glaciology; icy satellites; applied mathematics

Appointments

- 2019–now **Dartmouth College**, Thayer School of Engineering, Assistant Professor of Arctic Engineering

Professional Experience

- 2017–2019 **University of Oregon** *Postdoctoral scholar*
Research on how glacier sliding responds to the freezing of subglacial sediments.
Reference: Professor Alan Rempel, rempel@uoregon.edu
- 2013–2017 **Harvard University** *Graduate research assistant*
Research on the thermodynamics and hydrology of ice stream shear margins.
Reference: Professor Jim Rice, rice@seas.harvard.edu
- 2016 **Woods Hole Oceanographic Institute** *Geophysical fluid dynamics fellowship*
Lectures on swimming and biolocomotion. Research on meltwater flow in firn.
Reference: Professor Ian Hewitt, hewitt@maths.ox.ac.uk
- 2014 **University of Alaska, Fairbanks** *McCarthy glaciology summer school*
Field experience on Kennicott glacier. Research on lumped subglacial hydrology models.
Reference: Professor Ed Bueler, elbueler@alaska.edu
- 2012–2013 **University of Cambridge** *Research assistant*
Lab experiments on the scaling of the transition to turbulence in stratified shear flow.
Reference: Professor Paul Linden, p.f.linden@damtp.cam.ac.uk
- 2012 **Sea Engineering, Inc.** *Environmental engineer (intern)*
Hydro-acoustic monitoring and sound attenuation modeling for fish protection
Reference: Mr Ken Israel, kisrael@integral-corp.com
- 2011–2012 **McGill University** *Research trainee*
Wind tunnel turbulence data comparison to predictions for passive scalar statistics.
Reference: Professor Laurent Mydlarski, laurent.mydlarski@mcgill.ca

2010–2012 **University of California, Berkeley** *Research assistant*
Turbulence tank construction and experiments to determine particle rotation using PIV.
Reference: Professor Evan Variano, variano@ce.berkeley.edu

Scholarships, Honors & Awards

2017 David Crighton Fellow to the University of Cambridge
2013–2016 National Science Foundation Graduate Research Fellowship
2013–2015 Harvard Certificate of Distinction in Teaching
2012–2013 Winston Churchill Scholarship to the University of Cambridge
2012 Clement T. Wiskocil Award, UC Berkeley Civil & Environmental Engineering Honor
2011 Chevron Environmental Engineering Scholarship
2011 Travel Grant, American Physical Society Division Fluid Dynamics
2009 APWA Civil Engineering Scholarship
2008–2012 Robert C. Byrd Scholarship

Teaching Experience

Spring 2020 Dartmouth ENGS 150 (graduate fluid mechanics, Instructor)
Winter 2020 Dartmouth ENGS 34 (undergraduate fluid mechanics, Instructor)
Spring 2018 Oregon GEOL 462/562 (environmental geomechanics, Co-Instructor with Prof A Rempel)
Spring 2016 Harvard ES 123 (undergraduate fluid mechanics, TA, Prof S Rubinstein)
Fall 2015 Harvard AM 104 (undergraduate complex analysis, TA, Dr N Upadhyaya)
Spring 2015 Harvard AM 105 (undergraduate differential equations, TA, Prof M P Brenner)
Fall 2014 Harvard ES 220 (graduate fluid dynamics, TA, Prof J R Rice)
Spring 2014 Harvard EPS 162 (undergraduate hydrology, TA, Prof J R Rice)
Fall 2013 Harvard ES 220 (graduate fluid dynamics, TA, Prof L Mahadevan)

Academic Service

Reviewer

Cold Regions Science and Technology. The Cryosphere. Fluid Dynamics Research. Journal of Fluid Mechanics. Geophysical Research Letters. Journal of Geophysical Research. Journal of Glaciology. International Journal of Solids and Structures. Nature Communications. Nature Geoscience. NASA SSW. NSF ANS. Polar Science. Proceedings of the Royal Society A. Water Resources Research.

Conferences

2015–2017 *American Physical Society Division of Fluid Dynamics — Geophysical Fluid Dynamics: Cryosphere session organizer and chair (2015, 2016)*
2017–2019 *American Geophysical Union Fall Meeting — Hydrology of Mountain Glaciers and Ice Sheets session organizer (with K. Poinar, C. Dow, S. Moustafa, K. Schild)*

Mentoring

2019–now Jacob Buffo (Dartmouth postdoc)
2020–now Brita Horlings (Dartmouth graduate student)
2018–now Pierce Hunter (Oregon masters student)

Publications

Journal articles

Submitted

2019 1. Lizz Ultee, **Colin R. Meyer**, and Brent M. Minchew. Tensile strength of glacial ice deduced from observations of the 2015 Eastern Skaftá Cauldron collapse, Vatnajökull ice cap, Iceland. *J. Glac.*

- 2019 2. Baptiste Vandecrux and 22 others, including **Colin R. Meyer**. The meltwater Retention Model Intercomparison Project (RetMIP): Evaluation of nine firn models at four weather station sites on the Greenland ice sheet. *Cryosphere Discuss.*, doi: 10.5194/tc-2019-331
- 2020 3. Brent M. Minchew and **Colin R. Meyer**. Dilation of subglacial sediment governs incipient surge motion in glaciers with deformable beds. *Proc. R. Soc. London A*
- 2020 4. Meghana Ranganathan, Brent M. Minchew, **Colin R. Meyer**, and Hilmar Gudmundsson. A new approach to inferring basal drag and ice rheology in ice streams, with applications to West Antarctic ice streams. *J. Glac.*

Published

- 2020 20. **Colin R. Meyer**, Kaitlin M. Keegan, Ian Baker, and Robert L. Hawley. A model for French-press experiments of dry snow compaction. *accepted at Cryosphere*, doi: 10.5194/tc-2019-253
- 2020 19. Adam J. O. Butler, **Colin R. Meyer**, Jerome A. Neufeld. Deformation of an elastic beam on a winkler foundation. *J. Appl. Mech.* 87(5): 051010. doi: 10.1115/1.4046197
- 2019 18. **Colin R. Meyer**, Alexander A. Robel, and Alan W. Rempel. Frozen fringe explains sediment freeze-on during Heinrich events. *Earth Planet. Sci. Lett.* 524. doi: 10.1016/j.epsl.2019.115725
- 2019 17. Bradley Lipovsky, **Colin R. Meyer**, Lucas K. Zoet, et al. Glacier sliding, seismicity, and sediment entrainment. *Ann. Glac.* 60(79):182-192. doi: 10.1017/aog.2019.24
- 2019 16. Alan W. Rempel and **Colin R. Meyer**. Premelting increases the rate of regelation by an order of magnitude. *J. Glac.* 65(251):518–521. doi: 10.1017/jog.2019.33
- 2019 15. Brent M. Minchew, **Colin R. Meyer**, Samuel S. Pegler, et al. Comment on “Friction at the bed does not control fast glacier flow.” *Science*, 363(6427). doi: 10.1126/science.aau6055
- 2018 14. **Colin R. Meyer**, L. Mydlarski, and L. Danaila. Statistics of incremental averages of passive scalar fluctuations. *Phys. Rev. Fluids*, 3(9). doi: 10.1103/PhysRevFluids.3.094603
- 2018 13. **Colin R. Meyer**, Anthony S. Downey, and Alan W. Rempel. Freeze-on limits bed strength beneath sliding glaciers *Nat. Comms.* 9. doi: 10.1038/s41467-018-05716-1
- 2018 12. **Colin R. Meyer**, Alissar Yehya, Brent M. Minchew, and James R. Rice. A model for the downstream evolution of temperate ice and subglacial hydrology along ice stream shear margins. *J. Geophys. Res.* 123:1682–1698. doi: 10.1029/2018JF004669
- 2018 11. **Colin R. Meyer** and Brent M. Minchew. Temperate ice in the shear margins of the Antarctic Ice Sheet: Controlling processes and preliminary locations. *Earth Planet. Sci. Lett.* 498:17–26. doi: 10.1016/j.epsl.2018.06.028
- 2018 10. Brent M. Minchew, **Colin R. Meyer**, Alexander A. Robel, Hilmar Gudmundsson, and Mark Simons. Processes controlling the downstream evolution of ice rheology in glacier shear margins: Case study on Rutford Ice Stream, West Antarctica. *J. Glaciol.* 64(246):583-594. doi: 10.1017/jog.2018.47
- 2017 9. **Colin R. Meyer** and Ian Hewitt. A continuum model for meltwater flow through compacting snow. *Cryosphere*, 11:2799-2813, doi: 10.5194/tc-11-2799-2017
- 2017 8. **Colin R. Meyer** and Timothy T. Creyts. Formation of ice eddies in subglacial mountain valleys. *J. Geophys. Res.* 122(9):1574–1588. doi: 10.1002/2017JF004329
- 2017 7. Navid Zolfaghari, **Colin R. Meyer**, and Andrew P. Bungler. Blade-shaped (PKN) hydraulic fracture driven by a turbulent fluid in an impermeable rock. *J. Eng. Mech.* doi: 10.1061/(ASCE)EM.1943-7889.0001350
- 2017 6. **Colin R. Meyer**, John W. Hutchinson, and James R. Rice. The path-independent M integral implies the creep closure of englacial and subglacial channels. *J. Appl. Mech.* 84(1), 011006:1-9. doi: 10.1115/1.4034828
- 2016 5. **Colin R. Meyer**, Matheus C. Fernandes, Timothy T. Creyts, and James R. Rice. Effects of ice deformation on Röthlisberger channels and implications for transitions in subglacial hydrology. *J. Glaciol.* 62(234):750–762. doi: 10.1017/jog.2016.65
- 2016 4. Douglas J. Brinkerhoff, **Colin R. Meyer**, Ed Bueler, Martin Truffer, and Timothy Bartholomaeus. Inversion of a glacier hydrology model. *Ann. Glaciol.* 57(72):1–12. doi: 10.1017/aog.2016.3

- 2014 3. **Colin R. Meyer** and Paul Linden. Stratified shear flow: experiments in an inclined square duct. *J. Fluid Mech.* 753: 242–253. doi: 10.1017/jfm.2014.358
- 2013 2. **Colin R. Meyer**, Margaret L. Byron, and Evan A. Variano. Rotational diffusion of particles in turbulence. *Limnol. Oceanogr.: Fluids & Environ.* 3:89–102. doi: 10.1215/21573689-2326592
- 2012 1. Gabriele Bellani, Margaret L. Byron, Audric G. Collignon, **Colin R. Meyer** and Evan A. Variano. Shape effects on turbulent modulation by large nearly neutrally buoyant particles. *J. Fluid Mech.* 712:41–60. doi: 10.1017/jfm.2012.393

Invited talks

- 2019 University of Limerick Applied Mathematics, Colorado School of Mines Geophysical Engineering, Dartmouth College Applied Mathematics, University of Pennsylvania Earth Science
- 2018 University of Oregon Earth Science, UC Santa Cruz Earth Science, Dartmouth College Thayer Engineering, MIT Civil & Environmental Engineering, Oregon State Earth Science, University of Wisconsin–Madison Geoscience
- 2017 Oxford Applied Mathematics, Cambridge Applied Mathematics, British Antarctic Survey, University of Pittsburgh Civil & Environmental Engineering
- 2016 Princeton Geosciences, Woods Hole Oceanographic Institution Geology & Geophysics, University of New Hampshire Applied Mathematics
- 2013 University of California–Santa Cruz Applied Mathematics

Selected conference presentations

- 2018 **Colin R. Meyer**, Alan Rempel. Maximum sediment flux precedes peak ice discharge in Heinrich events. *AGU Fall Meeting*.
- 2018 **Colin R. Meyer**, Alan Rempel. An enthalpy method for subglacial frozen fringe. *IGS Buffalo*.
- 2017 **Colin R. Meyer**, Ian Hewitt, and Jerome Neufeld. Turbulent flow through channels in a viscously deforming matrix. *American Physical Society Division of Fluid Dynamics conference*.
- 2016 **Colin R. Meyer** and Ian Hewitt. Meltwater percolation and refreezing in compacting snow. *American Physical Society Division of Fluid Dynamics conference*.
- 2015 **Colin R. Meyer**, Timothy T. Creyts, and James R. Rice. Moffatt eddies at the base of ice sheets. *American Physical Society Division of Fluid Dynamics conference*.
- 2014 **Colin R. Meyer** and Paul Linden. Stratified shear flow in an inclined square duct. *American Physical Society Division of Fluid Dynamics conference*.
- 2013 **Colin R. Meyer** and Paul Linden. Transition to turbulence in stratified shear flow through an inclined square duct. *14th European Turbulence Conference*.
- 2011 **Colin R. Meyer** and L. Mydlarski. Statistics of incremental averages of passive scalar fluctuations. *American Physical Society Division of Fluid Dynamics conference*.

Selected conference posters

- 2019 **Colin R. Meyer**, Christian Schoof, Alan W. Rempel. An enthalpy method for subglacial frozen fringe. *AGU Fall Meeting*.
- 2017 **Colin R. Meyer**, Ian J. Hewitt. A continuum model for meltwater flow through compacting snow. *AGU Fall Meeting*.
- 2016 **Colin R. Meyer**, Bradley P. Lipovsky, and Matthew R. Siegfried. Inferring subglacial lake water pressure from a bending model of surface displacement observations. *AGU Fall Meeting*.
- 2015 **Colin R. Meyer**, and James R. Rice. The path-independent M Integral around Röthlisberger channels. *AGU Fall Meeting*.
- 2015 **Colin R. Meyer**, Matheus C. Fernandes, and James R. Rice. Adding antiplane shear to Röthlisberger channels. *IGS Cambridge*.
- 2014 **Colin R. Meyer**, Timothy T. Creyts, and James R. Rice. Formation of Ice Eddies in Mountain Valleys of East Antarctica. *AGU Fall Meeting*.
- 2013 **Colin R. Meyer**, Margaret L. Byron, and Evan A. Variano. Rotational diffusion of particles in turbulence. *Microenvironments conference*. Les Houches, France.
- 2011 Margaret L. Byron, **Colin R. Meyer**, Gabriele Bellani, and Evan A. Variano. Coupled Dynamics of Turbulent Water Flow and Non-Spherical Particles Through Novel Measurement Method. *AGU Fall Meeting*.

Book reviews

- 2019 **Colin R. Meyer**, Review of “Enceladus and the Icy Moons of Saturn,” edited by Paul M. Schenk, Roger N. Clark, Carly J. A. Howett, Anne J. Verbiscer, J. Hunter Waite, University of Arizona Press, 2018; *Pure Appl. Geophys.* doi: 10.1007/s00024-019-02314-0
- 2018 **Colin R. Meyer**, Review of “The Mechanics and Reliability of Films, Multilayers and Coatings,” by M. R. Begley and J. W. Hutchinson, Cambridge University Press, 2017; *Pure Appl. Geophys.* doi: 10.1007/s00024-018-1894-x
- 2018 **Colin R. Meyer**, Review of “Variational Formulation of Fluid and Geophysical Fluid Dynamics,” by G. Badin and F. Crisciani, Springer, 2018; *Pure Appl. Geophys.* doi: 10.1007/s00024-018-1895-9
- 2017 **Colin R. Meyer**, Review of “Singularities: Formation, Structure, and Propagation,” by J. Eggers and M. A. Fontelos, Cambridge University Press, 2015; *Pure Appl. Geophys.* doi: 10.1007/s00024-017-1701-0
- 2017 **Colin R. Meyer**, Review of “Multiphysics Modeling Using COMSOL 5 and MATLAB,” by Roger W. Pryor, Mercury Learning, 2016; *Pure Appl. Geophys.* doi: 10.1007/s00024-017-1594-y
- 2016 **Colin R. Meyer**, Review of “Flow, Deformation and Fracture,” by G. I. Barenblatt, Cambridge University Press, 2014; *Pure Appl. Geophys.* doi: 10.1007/s00024-016-1240-0
- 2016 **Colin R. Meyer**, Review of “Fluid Dynamics in Complex Fractured-Porous Systems,” edited by Boris Faybishenko, Sally M. Benson, and John E. Gale, John Wiley & Sons/American Geophysical Union, 2015; *Pure Appl. Geophys.* doi: 10.1007/s00024-016-1239-6
- 2015 **Colin R. Meyer**, Review of “Flow in Porous Rocks,” by Andrew W. Woods, Cambridge University Press, 2015; *Pure Appl. Geophys.* doi: 10.1007/s00024-015-1138-2
- 2015 **Colin R. Meyer**, Review of “Introduction to Geophysical Fluid Dynamics, Second Edition,” by Benoit Cushman-Roisin and Jean-Marie Beckers, Academic Press, 2011; *Pure Appl. Geophys.* doi: 10.1007/s00024-015-1091-0
- 2015 **Colin R. Meyer**, Review of “Granular Media,” by Bruno Andeotti, Yöel Forterre, and Olivier Pouliquen, Cambridge University Press, 2013; *Pure Appl. Geophys.* doi: 10.1007/s00024-015-1094-x
- 2015 **Colin R. Meyer**, Review of “Double-Diffusive Convection,” by Timour Radko, Cambridge University Press, 2013; *Pure Appl. Geophys.* doi: 10.1007/s00024-015-1089-7