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

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

2020 1. Brent Minchew and **Colin R. Meyer**. Dilation of subglacial sediment governs incipient surge motion in glaciers with deformable beds. *Proc. R. Soc. London A*

2019 2. Lizz Ultee, **Colin R. Meyer**, and Brent Minchew. Tensile strength of glacial ice deduced from observations of the 2015 Eastern Skaftá Cauldron collapse, Vatnajökull ice cap, Iceland. *J. Glac.*

2019 3. **Colin R. Meyer**, Kaitlin M. Keegan, Ian Baker, and Robert L. Hawley. A model for French-press experiments of dry snow compaction. *Cryosphere Discuss.*, doi: 10.5194/tc-2019-253

2019 4. 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

Published

2020 19. Adam J. O. Butler, **Colin R. Meyer**, Jerome A. Neufeld. Deformation of an elastic beam on a winkler foundation. *accepted at 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 C. 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 C. 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 C. 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 C. 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. Bunger. 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 Bartholomaus. 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.*. 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