

Christopher “Max” Stevens

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EDUCATION

University of Washington, PhD, Department of Earth and Space Sciences, July 2018.

Dissertation: *Investigations of physical processes in polar firn through modeling and field measurements.*

Advisor: Edwin D. Waddington

Colorado College, B.A., Mathematics and Physics, *Cum Laude*, May 2005.

PROFESSIONAL EXPERIENCE

Physical Scientist	2021 - present
United States Geological Survey, Northern Rocky Mountain Science Center	
Assistant Research Scientist	2020 - present
University of Maryland, Earth System Science Interdisciplinary Center Cryosphere Lab, NASA Goddard Space Flight Center	
Postdoctoral scholar	2018 – 2020
University of Washington, Department of Earth and Space Sciences	
Graduate Research Associate	2010 – 2018
University of Washington, Earth and Space Sciences,	
Fellow	2010 – 2011
University of Washington Program on Climate Change	

PEER-REVIEWED PUBLICATIONS

1. Kahle, E. C., Steig, E. J., Jones, T. R., Fudge, T. J., Koutnik, M. R., Morris, V. A., Vaughn, B. H., Schauer, A. J., **Stevens, C. M.**, Conway, H., Waddington, E. D., Buizert, C., Epifanio, J. and White, J. W. C.: Reconstruction of Temperature, Accumulation Rate, and Layer Thinning From an Ice Core at South Pole, Using a Statistical Inverse Method, *J. Geophys. Res. Atmos.*, 126(13), doi:10.1029/2020JD033300, 2021.
2. Horlings, A. N., Christianson, K., Holschuh, N., **Stevens, C. M.** and Waddington, E. D.: Effect of horizontal divergence on estimates of firn-air content, *J. Glaciol.*, 67(262), 287–296, doi:10.1017/jog.2020.105, 2021.
3. Verjans, V., Leeson, A. A., McMillan, M., **Stevens, C. M.**, van Wessem, J. M., van de Berg, W. J., van den Broeke, M. R., Kittel, C., Amory, C., Fettweis, X., Hansen, N., Boberg, F. and Mottram, R.: Uncertainty in East Antarctic Firn Thickness Constrained Using a Model Ensemble Approach, *Geophys. Res. Lett.*, 48(7), 1–11, doi:10.1029/2020GL092060, 2021.
4. Gkinis, V., Holme, C., Kahle, E. C., **Stevens, M. C.**, Steig, E. J. and Vinther, B. M.:

- Numerical experiments on firn isotope diffusion with the Community Firn Model, *J. Glaciol.*, 67(263), 450–472, doi:10.1017/jog.2021.1, 2021.
5. **Stevens, C. M.**, Verjans, V., Lundin, J. M. D., Kahle, E. C., Horlings, A. N., Horlings, B. I., and Waddington, E. D.: The Community Firn Model (CFM) v1.0, *Geosci. Model Dev.*, 13, 4355–4377, <https://doi.org/10.5194/gmd-13-4355-2020>, 2020.
 6. Hawley, R. L., Neumann, T. A., **Stevens, C. M.**, Brunt, K. M., and Sutterly, T. C.: Greenland Ice Sheet elevation change: Direct observation of process and attribution at Summit, *Geophysical Research Letters*, 47, <https://doi.org/10.1029/2020GL088864>, 2020.
 7. Horlings, A., Christianson, K., Holschuh, N., **Stevens, C.M.**, and Waddington, E.: Effect of horizontal divergence on estimates of firn-air content. *Journal of Glaciology*, 1-10. doi:10.1017/jog.2020.105, 2020.
 8. Verjans, V., Leeson, A. A., Nemeth, C., **Stevens, C. M.**, Kuipers Munneke, P., Noël, B., and van Wessem, J. M.: Bayesian calibration of firn densification models, *The Cryosphere*, 14, 3017–3032, <https://doi.org/10.5194/tc-14-3017-2020>, 2020.
 9. Vandecrux, B., Mottram, R., Langen, P. L., Fausto, R. S., Olesen, M., **Stevens, C. M.**, Verjans, V., Leeson, A., Ligtenberg, S., Kuipers Munneke, P., Marchenko, S., van Pelt, W., Meyer, C., Simonsen, S. B., Heilig, A., Samimi, S., Machguth, H., MacFerrin, M., Niwano, M., Miller, O., Voss, C. I., and Box, J. E.: The firn meltwater Retention Model Intercomparison Project (RetMIP): Evaluation of nine firn models at four weather station sites on the Greenland ice sheet, *The Cryosphere*, <https://doi.org/10.5194/tc-2019-331>, 2020.
 10. Hughes, A. G., Jones, T. R., Vinther, B. M., Gkinis, V., **Stevens, C. M.**, Morris, V., Vaughn, B. H., Holme, C., Markle, B. R., and White, J. W. C.: High-frequency climate variability in the Holocene from a coastal-dome ice core in east-central Greenland, *Clim. Past*, 16, 1369–1386, <https://doi.org/10.5194/cp-16-1369-2020>, 2020.
 11. Vandecrux, B., Fausto, R. S., Van As, D., Colgan, W., Langen, P. L., Haubner, K., Ingeman-Nielsen, T., Heilig, A., **Stevens, C. M.**, Macferrin, M., Niwano, M., Steffen, K. and Box, J. E.: Firn cold content evolution at nine sites on the Greenland ice sheet between 1998 and 2017, *J. Glaciol.*, 1–12, doi:10.1017/jog.2020.30, 2020.
 12. Heilig, A., Eisen, O., Schneebeli, M., Macferrin, M., **Stevens, C. M.**, Vandecrux, B. and Steffen, K.: Relating regional and point measurements of accumulation in southwest Greenland, *Cryosphere*, 14(1), 385–402, doi:10.5194/tc-14-385-2020, 2020.
 13. Fudge, T.J., A. Lilien, D., Koutnik, M., Conway, H., **Stevens, C.M.**, Waddington,

- E.D., J. Steig, E., J. Schauer, A. and Holschuh, N.: Advection and non-climate impacts on the South Pole Ice Core, *Clim. Past*, 16(3), 819–832, doi:10.5194/cp-16-819-2020, 2020.
14. MacFerrin, M., Machguth, H., As, D. van, Charalampidis, C., **Stevens, C. M.**, Heilig, A., Vandecrux, B., Langen, P. L., Mottram, R., Fettweis, X., Broeke, M. R. van den, Pfeffer, W. T., Moussavi, M. S. and Abdalati, W.: Rapid expansion of Greenland’s low-permeability ice slabs, *Nature*, 573(7774), 403–407, doi:10.1038/s41586-019-1550-3, 2019.
 15. Vandecrux, B., MacFerrin, M., MacHguth, H., Colgan, W. T., Van As, D., Heilig, A., **Stevens, C.M.**, Charalampidis, C., Fausto, R. S., Morris, E. M., Mosley-Thompson, E., Koenig, L., Montgomery, L. N., Miège, C., Simonsen, S. B., Ingeman-Nielsen, T. and Box, J. E.: Firn data compilation reveals widespread decrease of firn air content in western Greenland, *Cryosphere*, 13(3), 845–859, doi:10.5194/tc-13-845-2019, 2019.
 16. Verjans, V., Leeson, A. A., **Stevens, C.M.**, MacFerrin, M., Noël, B. and Van Den Broeke, M. R.: Development of physically based liquid water schemes for Greenland firn-densification models, *Cryosphere*, 13(7), 1819–1842, doi:10.5194/tc-13-1819-2019, 2019.
 17. Lilien, D. A., Fudge, T. J., Koutnik, M. R., Conway, H., Osterberg, E. C., Ferris, D. G., Waddington, E. D. and **Stevens, C. M.**: Holocene Ice-Flow Speedup in the Vicinity of the South Pole, *Geophys. Res. Lett.*, 45(13), 6557–6565, doi:10.1029/2018GL078253, 2018.
 18. Sommers, A. N., Rajaram, H., Weber, E. P., Macferrin, M. J., Colgan, W. and **Stevens, C. M.**: Inferring firn permeability from pneumatic testing: A case study on the Greenland ice sheet, *Front. Earth Sci.*, 5, 20, doi:10.3389/feart.2017.00020, 2017.
 19. Lundin, J. M. D., **Stevens, C. M.**, Arthern, R., Buizert, C., Orsi, A., Ligtenberg, S. R. M., Simonsen, S. B., Cummings, E., Essery, R., Leahy, W., Harris, P., Helsen, M. M. and Waddington, E. D.: Firn Model Intercomparison Experiment (FirnMICE), *J. Glaciol.*, 63(239), 401–422, doi:10.1017/jog.2016.114, 2017.
 20. Shean, D. E., Christianson, K., Larson, K. M., Ligtenberg, S. R. M., Joughin, I. R., Smith, B. E., **Stevens, C.M.**, Bushuk, M. and Holland, D. M.: GPS-derived estimates of surface mass balance and ocean-induced basal melt for Pine Island Glacier ice shelf, Antarctica, *Cryosphere*, 11(6), 2655–2674, doi:10.5194/tc-11-2655-2017, 2017.

PUBLICATIONS IN REVIEW AND IN PREPARATION

1. **Stevens, C. M.**, Waddington, E.D., Conway, H., Lilien, D., Koutnik, M., and Fudge,

T.J.: Deriving a firn compaction model for South Pole based on strain measurements, in preparation for submission to Journal of Glaciology.

NON-PEER-REVIEWED PUBLICATIONS

1. **Stevens, C.M.**, Conway, H., Kennard, P., Rasmussen, L.A., and Koutnik, M.R. Glacier Retreat, Outburst Floods, and Kinematic Waves: Nisqually Glacier Changes Related to Climate. Report to the National Park Service. 2016.

PRODUCTS

Lead developer, *The Community Firn Model*, an open-source, modular firn model framework, doi:10.5281/zenodo.3585885.

SELECTED PRESENTATIONS

1. *Observations of Firn Compaction near South Pole Compared with Model Predictions*, Stevens, C.M., Lilien D.A., Conway, H., Waddington, E.D., Fudge, T.J., Koutnik, M.R., Medley B.. American Geophysical Union Fall Meeting, New Orleans, LA, December 16, 2021, talk
2. *Firn effects on ice core climate records*, Stevens, C.M., IARPC Glaciers and Sea Level Collaboration Team Meeting, Online, February 22, 2021, invited talk
3. *Measured and modeled firn compaction near the South Pole*, Stevens, C.M., Waddington, E.D., Conway, H., Lilien D.A., Koutnik, M.R., Fudge, T.J., Northwest Glaciologists’ Meeting, virtual meeting hosted by the University of Montana, October 14-16, 2020, talk
4. *Field observations of firn compaction rates*, Stevens, C.M., Waddington, E.D., MacFerrin M., Conway, H., Lilien D.A., Koutnik, M.R., Northwest Glaciologists’ Meeting, Corvallis, OR, October 4-5, 2019, talk
5. *Firn strain-rate observations compared with firn model predictions in Greenland*, Stevens, C.M., MacFerrin M., Waddington, E.D., Abdalati, W., EGU General Assembly, Vienna, April 12, 2019, talk
6. *Holocene ice flow, accumulation, and firn dynamics affecting SPICEcore*, Stevens, C.M., Lilien D.A., Fudge, T.J., Koutnik, M.R., Waddington, E.D., Conway, H., Hawley, R., Osterberg, E.C., Albert, M., South Pole Ice Core Science Meeting, Seattle, WA, September 11 – September 12, 2018, talk
7. *Challenges in modeling firn evolution in the percolation zone*, Stevens, C.M., MacFerrin, M. Waddington, E.D., Abdalati, W., IARPC Glaciers and Sea Level Collaboration Team Meeting, Online, October 27, 2017, talk

8. Modeling Nisqually Glacier surface-elevation and length changes using a mass-balance record derived from reanalysis and weather-station data, Stevens, C.M., Conway, H., Koutnik, M., Rasmussen, A., Greenberg, H., Kennard P., GSA Annual Meeting, Seattle, WA, October 22, 2017, talk
9. *Comparison of Greenland firn compaction-rate and stratigraphy data to model predictions from the Community Firn Model*, Stevens, C.M., MacFerrin, M., Waddington, E., Abdalati, W., Vandecrux, B., Heilig, A., Northwest Glaciologists’ Meeting, Vancouver, Canada, October 13-14, 2017, talk
10. *Comparison of Greenland firn compaction-rate and stratigraphy data to model predictions from the Community Firn Model*, Stevens, C.M., MacFerrin, M., Waddington, E., Abdalati, W., Vandecrux, B., Heilig, A., Retain workshop on Modeling Meltwater in Snow and Firn: Processes, Validation, Intercomparison and Model uses of Optical Remotely Sensed Data, Copenhagen, Denmark, September 20, 2017, talk
11. *Model-predicted firn-property changes in West Antarctica using the Community Firn Model*, Stevens, C.M., Horlings, B.I., Horlings, A.N., Kahle, E., Christianson, K., MacFerrin, M., Waddington, E.D., WAIS Workshop, Coupeville, WA, October 8-11, 2017, poster
12. *Comparing measured and modeled firn compaction rates in Greenland*, Stevens, C.M., MacFerrin, M.J., Yoon, M., Vo, H., Waddington, E.D., Northwest Glaciologists Meeting, Seattle, WA, October 14 -15, 2016, poster
13. *Comparing measured and modeled firn compaction rates in Greenland*, Stevens, C.M., MacFerrin, M.J., Yoon, M., Vo, H., Waddington, E.D., American Geophysical Union Fall Meeting, San Francisco, CA, December 14-18, 2015, poster
14. Comparing firn-density models with the Community Firn Model and the role of field measurements in developing next-generation firn models, Stevens, C.M., MacFerrin, M.J., Vo, H., Yoon, M., Waddington, E.D., Northwest Glaciologists Meeting, Portland, OR, October 16, 2015, talk
15. Comparing firn-density models with the Community Firn Model and the role of field measurements in developing next-generation firn models, Stevens, C.M., MacFerrin, M.J., Vo, H., Yoon, M., Waddington, E.D., PIRE-ICEICS/MicroDICE Meeting, Grenoble, France, September 10, 2015, talk
16. *Effects of Climate Changes on Firn Properties and Gas Transport in Firn*, Stevens, C.M., Lundin, J., Vo, H., Yoon, M., Waddington, E.D., American Geophysical Union Fall Meeting, San Francisco, CA, December 15-19, 2014, poster
17. Developing a Community Model for Firn Evolution and Gas Transport in Firn and

- the Firn Model Inter-Comparison Experiment (FirnMICE), Stevens, C.M., Lundin, J., Yoon, M., Harris, P., Leahy, W., Waddington, E.D., Northwest Glaciologists Meeting, Fairbanks, AK, October 17, 2014, talk
18. *Updates on the PIRE-funded Community Firn Model and the Firn Model Inter-Comparison Experiment (FirnMICE)*, Stevens, C.M., Lundin, J., Vo, H., Yoon, M., Harris, P., Leahy, W., Waddington, E.D., PIRE-ICEICS Meeting, Helsingør, Denmark, August 27, 2014, talk
 19. *A Community Model for Transient Firn Evolution and Firn-Air Transport*, Stevens, C.M., Lundin, J., Leahy, W., Harris, P., Waddington, E., Northwest Glaciologists Meeting, Vancouver, B.C., October 18-19, 2013, talk
 20. *A Community Model for Transient Firn Evolution and Firn-Air Transport*, Stevens, C.M., Lundin, J., Leahy, W., Harris, P., Waddington, E., WAIS-Divide Meeting, La Jolla, CA, September 24-25, 2013, poster
 21. *Glacier Retreat, Outburst Floods, and Kinematic Waves - Nisqually Glacier Changes Related to Climate*, Stevens, C.M., Conway, H., Kennard, P., Nisqually Glacier Research Symposium, Ashford, WA, February 19, 2013, talk
 22. *A community model for transient evolution of firn density and firn air*, Stevens, C.M., Lundin, J., Leahy, W., Harris, P., Waddington, E., American Geophysical Union Fall Meeting, San Francisco, CA, December 3-7, 2012, poster
 23. *Firn modeling at UW: A community approach*, Stevens, C.M., Lundin, J., Waddington, E., Northwest Glaciologists Meeting, Seattle, WA, October 19-20, 2012, talk
 24. *Progress update on the development of the PIRE Community Firn-Air model*, Stevens, C.M., Lundin, J., Leahy, W., Harris, P., Waddington, E., PIRE-ICEICS Meeting, La Londe, France, September 2012, talk
 25. *Building a Community Gas Diffusion Model for Polar Firn*, Stevens, C.M., Waddington, E., Northwest Glaciologists Meeting, Portland, OR, October 14-15, 2011, talk

FIELD EXPERIENCE

1. USGS Benchmark Glaciers Project, South Cascade Glacier, WA and Wolverine Glacier, AK
 - Spring 2021, Fall 2021
 - Installing/measuring mass balance stakes, drilling and logging firn cores
2. Collaborative Research: Characterization of upstream ice and firn dynamics affecting the South Pole Ice Core (SPICE) (3 field seasons)
 - December 2016 – January 2017; December 2017 – January 2018; December 2018

- January 2019
- Drilled and logged firn cores to 125 meters
- Installed firn-compaction instruments
- Surveyed stakes with geodetic GPS
- 3. Quantifying Firn Compaction and its Implications for Altimetry-based Mass Balance Estimates of the Greenland Ice Sheet (3 field seasons)
 - April – June 2015; April – May 2016; April – May 2017
 - 3-week snowmobile traverse and 2-week air-supported field campaigns
 - Drilled and logged firn cores, installed firn-compaction instruments
- 4. East Antarctic outlet glacier dynamics: investigations of Beardmore Glacier
 - December 2013 – January 2014
 - 5 weeks on the Beardmore Glacier in the Transantarctic Mountains, Antarctica
 - Assisted in collection of active seismic and radar data

TEACHING EXPERIENCE

Higher Education

Teaching Assistant, ESS 102: Space and Space Travel
 University of Washington Department of Earth and Space Sciences
 Winter and Spring Quarters 2012

- Taught lab sessions
- Graded assignments

High School

Physics and Math Faculty
 High-School High Scholar Program, Colorado Rocky Mountain School, Carbondale, CO
 Summer 2013

- Taught physics and calculus classes daily to high-school students from underprivileged backgrounds
- Planned curriculum and daily lessons
- Mentored teaching assistants

Teaching Fellow
 Colorado Rocky Mountain School, Carbondale, CO
 2009 - 2010

- Assisted teaching Algebra 2
- Supervised students in dormitories
- Led students in campus service work program
- Coached alpine ski team

Outdoor Leadership Education

Course Leader
 National Outdoor Leadership School (NOLS), Lander, WY
 2006 – 2014

- Led wilderness whitewater courses in Colorado, Utah, Idaho, the Yukon and India

- Instructed students in the areas of leadership, risk management, environmental studies, and sport specific skills
- Supervised and coached junior staff
- Planned and implemented curriculum specific to each course

AWARDS AND HONORS

Communication Fellow, February 2012 – December 2013

Pacific Science Center, Seattle, WA

- Took a course in effectively communicating science to the public
- Developed an outreach activity for Polar Science Weekend appropriate for all ages

Research Grant, 2011

American Alpine Club

- Monetary award to pursue avalanche research

Geophysics Graduate Student Research Award, 2011

University of Washington^[SEP]Department of Earth and Space Sciences

- Monetary award to pursue avalanche research

Program on Climate Change Fellow, 2010 – 2011 Academic Year

University of Washington Program on Climate Change

- Tuition and stipend paid for an academic year

“Top Scholar” Award, 2010

University of Washington^[SEP]Department of Earth and Space Sciences

Phi Beta Kappa, 2005

Colorado College

David and Karen Smith Cowperthwaite Award for Excellence in Physics, 2005

Colorado College

- Annual award for one graduating physics major

PROFESSIONAL, OUTREACH, AND SERVICE ACTIVITIES

Referee, *The Cryosphere*, *Journal of Geophysical Research Earth Surface*, *Geophysical Research Letters*, *Journal of Glaciology*, *Geophysical Model Development*

Member, American Geophysical Union, International Glaciological Society

Volunteer, Pacific Science Center Polar Science Weekend, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019

- Ran glaciology outreach exhibits
- Interacted with museum patrons ranging in age from young children to the elderly.

Organizer, Northwest Glaciologists Meeting, 2012, 2016

COMPUTER SKILLS

Fluent: Python, Matlab, git, bash, MS Office suite, Latex

Familiar: R, sql