

CURRICULUM VITAE (CONDENSED)

SPRUCE W. SCHOENEMANN, PHD

PROFESSOR

Environmental Sciences Department

The University of Montana Western

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SUMMARY

I am a scientist, environmentalist, and climate specialist with a passion for tackling climate change and accelerating progress. My research investigates changes in Earth's past to better understand the long-term context of human-driven changes and future impacts on our climate system. I have a background in geology, environmental studies, and climate science, with a strong personal interest in boldly addressing the climate crisis through education & community engagement, natural climate solutions, sustainable resource management, renewable energy, decarbonization, and building resilience. I am passionate about protecting our winters and wilderness while securing a livable climate for future generations.

- Significant experience in drafting grant proposals, abstracts, and publishing peer-reviewed articles
 - Experience in project management, overseeing budgets, multi-disciplinary collaboration, and leading fieldwork.
 - Extensive knowledge of resource management, sustainable design, renewable energy, and climate solutions
 - Excellent oral and graphical communication skills, experienced in external presentations, outreach, and engagement.
 - Skilled in using Microsoft Office, MATLAB, QGIS, R, Adobe Illustrator, Structure-in-Motion, and other software.
 - Detail-oriented, organized, reliable, versatile, collaborative, team player, problem solver, and motivated
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EDUCATION

PhD Earth & Space Sciences, University of Washington

Sep 2009 – Mar 2015

- Climatology, Ice Core Paleoclimate Reconstructions, and Stable Isotope Geochemistry

Certificate: Graduate Certificate in Climate Science, UW Program on Climate Change

Sep 2010 – Jun 2014

BA in Geology and Environmental Studies, Whitman College

Sep 1999 – May 2003

Awarded Dr. Albert Ripley Leeds Prize in Geology (2003)

RESEARCH & TEACHING EXPERIENCE

Assistant/Associate/Full Professor

The University of Montana Western

Dillon, MT

Aug 2016 – present

Environmental Sciences Dept.

- Developed numerous applied science courses focused on past, current, and future climate change, including its impacts on water & air quality, forests, soils, permafrost, snowpack, and oceans, and incorporated the most current climate adaption and resilience strategies to address the climate crisis. Select courses included: Weather & Climate, Carbon Cycle and Climate, Intro to Environmental Geology, Environmental Geochemistry, Sustainable Natural Resource Management, Water in the West: Science and Society, and PolarPASS Greenland Climate Change.
- Developed research program in paleolimnology of alpine lakes, combined with tree-ring records and regional water isotope systematics to reconstruct past winter hydroclimate in the Northern Rocky Mountains.
- Managed multiple NSF grants, including budget, timeline, personnel, field research, data analysis, interpretation, and synthesis. Deliverables included peer-reviewed publications, presentations, webinars, curriculum & websites.
- Director and coordinator of Save the Snow! Climate Summit and SnowPack Fest; community events that brought together scientists, stakeholders, and community groups to discuss strategies for climate action and resilience in rural Montana.
- Strong track record of communicating complex scientific concepts to broad audiences, including a TEDX talk titled "[What will the climate be like for our kids,](#)" where I discussed the increasing severity of climate change impacts on Montana and the Rockies, as well as regionally relevant solutions (see Selected Presentations).
- Established working relationships with external partners to address climate impacts, including the US Forest Service, Bureau of Land Management, NRCS, MT Tech, MSU, & USGS Northern Rockies Center.

Lecturer (sabbatical appointment)

University of Vermont

Burlington, VT

Jan-May 2023

Rubenstein School of Env. & Natural Resources

Applied Polar Science & Climate Change ENSC295/395

- Designed course curriculum, assessments, and climate data/GIS analysis exercises.
- Presented and facilitated course lectures, student-led discussions, group worksheets and activities.
- Developed immersive environments and virtual field trips to Greenland.

Postdoctoral Research Associate

University of Washington, Earth & Space Sciences

Seattle, WA

Jan 2015 – Aug 2016

- Investigation of Holocene climate of Antarctica and the Southern Hemisphere through high-resolution ice cores and sediment cores with an aim to understand the application of ^{17}O -excess as a sea ice proxy.
- Utilize back-trajectory modeling and isotope models for investigating connections between Arctic permafrost cores and moisture source regions during the Holocene period.

Graduate Research Assistant

University of Washington, Earth & Space Sciences

Seattle, WA

Sep 2009 – Dec 2014

- Studied past climate of Antarctica and the Southern Hemisphere through water isotopes preserved in ice cores with an aim to better understand the mechanisms responsible for the last deglacial transition.
- Implementation and inclusion of $\delta^{17}\text{O}$ isotopes into isotope-enabled General Circulation Model, and in Intermediate Complexity Isotope-Models for interpretation of $^{17}\text{O}_{\text{excess}}$ sensitivity to climate conditions.
- Developed sample preparation line and Isotope Ratio Mass Spectrometer methods for high-precision measurement of $\delta^{17}\text{O}$ and $\delta^{18}\text{O}$ isotopes of O_2 .

Lecturer

University of Washington, Earth & Space Sciences

Seattle, WA

Spring Qtr. 2015

The Earth System and Climate, ESS 201

- Designed overall course syllabus and assessment design.
- Developed a “flipped classroom” structure including course videos, readings, and online quizzes
- Presented and facilitated course lectures, student-led discussions, group worksheets, and activities.
- Developed and facilitated lab experiments, data analysis, demonstrations, and field trips.

Visiting Lecturer

Environmental Studies and Science Program

Colorado College

Colorado Springs, CO

Nov – Dec 2012

- Developed science curriculum and assessments for Intro to Global Climate Change course.
- Planned and facilitated daily class lectures, discussions, and labs.
- Organized field trip to National Ice Core Lab and INSTAAR Stable Isotope Lab

PROFESSIONAL EXPERIENCE

Climate Lecturer, Zodiac Driver, & Staff Photographer

Zegrahm Eco Expeditions

Seattle, WA

Jan – Feb 2011

Falklands, South Georgia, & Antarctic Peninsula

- Presented two lectures on Antarctic ice cores & climate change research.
- Responsibilities included passenger safety and risk management, eco tours both by Zodiac boat and on foot, daily photo journal, descriptions of flora and fauna, species identification, and local geology.

Community Outreach Coordinator

City of Boulder

Boulder, CO

Jun 2008 – Nov 2008

Office of Environmental Affairs (now Office of Sustainability, Climate Action, and Resilience)

- Spearheaded neighborhood climate action group meetings and improved public engagement.
- Developed marketing/outreach materials for all Climate Action Plan programs (ClimateSmart, Residential Energy Audit Program, Weatherization, Home Energy Makeover contest, and Transportation)

TECHNICAL & INTERPERSONAL SKILLS

University Teaching, Curriculum Design, Public Speaking & Presentations, Grant & Report Writing, Research Design, Data Analysis/Statistics, Modeling, Field Work, Laboratory development and design, Project Management, Digital Photography, Website Design and Graphics, FAA Drone Pilot's License
Software: MATLAB, R-Studio, ArcGIS/QGIS, HYSPLIT-back trajectory modeling, Microsoft Office, Keynote, Adobe Illustrator, Agisoft Metashape DEM/Ortho maps.
Effective Communication, Organizational Skills, Teamwork, Interdisciplinary Collaboration, Community Outreach

GRANTS

- C. Chupik, Y. Gavillot, **S. Schoenemann (collaborator)** and others, Dec 1, 2022- Jul 1, 2024), Exploring void detection, and seismic hazards using acoustic sub-bottom profiling data, Bureau of Reclamation-Technical Service Center, \$118,854.
- T. Moon, A. Gold, A. Khan, **S. Schoenemann (co-PI)** (Aug 1, 2020-Jul 31, 2023), Collaborative Research: EHR-Polar DCL: Polar Space and Place: Using GIS and interactive environments to bring polar science to the classroom, National Science Foundation, Award# 2021275, 2021543, 2021503: \$299,963
- S. Schoenemann (PI)**, L. Corbett, P. Bierman (Sep 15, 2020-Aug 31, 2022), Collaborative Research: A place-based, student-led research project in the Pioneer Mountains, Montana: an investigation of very dry, alpine glaciation proximal to the Laurentide Ice Sheet, National Science Foundation, Award# 2018222, 2018059: \$135,046.
- S. Schoenemann (PI)**, J. Sachs, R. Sletten, (Jun 10, 2019-Jul 1, 2020), West Greenland Coastal Temperatures during the 8.2 ka Event derived from Alkenones, Quaternary Research Center-Univ of Washington, \$7,500.
- S. Schoenemann (PI)**, G. Pederson, D. McWethy, J. Martin (Jan 1, 2018-Dec 31, 2018), Precipitation Isotope Ratios and Tree-ring based Snowpack Relationships to inform Paleoclimate Reconstructions from Lake Sediment Cores, NASA Montana Space Grant Consortium, \$101,476.08.
- E. J. Steig, A. J. Schauer, **S. W. Schoenemann** (Oct 1, 2013-Jan 31, 2017), Development of a laser spectroscopy system for analysis of ¹⁷O-excess on ice cores, Grant Opportunities for Academic Liaison with Industry, Paleoclimate Program, Antarctic Instrumentation & Support, Antarctic Glaciology, Climate & Large-Scale Dynamics, \$357,627.00.
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SELECTED PEER-REVIEWED PUBLICATIONS

- [1] **Schoenemann, S.W.**, M. Wolhowe, A. Maloney, R. Sletten, K. W. Huntington, A. J. Schauer, J. P. Sachs (2024), Prominent cooling of West Greenland during the 8.2 ka event based on multiple proxies from lake sediments, *Paleoceanography and Paleoclimatology*, In revision.
- [2] **Schoenemann, S.W.**, M.M. Bryant, W.B. Larson, L. B. Corbett, P.R. Bierman (2023). A cosmogenic ¹⁰Be moraine chronology of arid, alpine Late Pleistocene glaciation in the Pioneer Mountains of Montana, USA. *Quaternary Science Reviews*, 317, 108283, 1-20. <https://doi.org/10.1016/j.quascirev.2023.108283>
- [3] Gold, A.U., E.G. Ward, C. Marsh, T. Moon, A. Khan, **S.W. Schoenemann**, M. Littrell. (2023) Measuring novice-expert sense of place for a far-away place: Implications for geoscience instruction, *PLOS One*. Manuscript# PONE-D-22-27793
- [4] **Schoenemann, S. W.**, J.T. Martin, G.T. Pederson, and D.B. McWethy (2020), 2,200-year tree-ring and lake-sediment based snowpack reconstruction for the northern Rocky Mountains highlights the historic magnitude of recent snow drought, *Quaternary Science Advances*, 2, 100013, 1-13, doi:10.1016/j.qsa.2020.100013.
- [5] Porter, T. J., **S.W. Schoenemann**, L.J. Davies, E.J. Steig, S. Bandara, D. Froese (2019), Recent summer warming in northwestern Canada exceeds the Holocene thermal maximum, *Nature Communications*, 10, 1-10, doi:10.1038/s41467-019-09622-y.
- [6] Markle, B. R., E.J. Steig, C. Buizert, **S.W. Schoenemann**, C.M. Bitz, T. Fudge, J.B. Pedro, Q. Ding, T. Jones, J.W.C. White, T. Sowers (2016), Atmospheric teleconnections between the tropics and high southern latitudes during abrupt climate change, *Nature Geoscience*, 10, 36-40. Contributed to key science concepts, editing manuscript and supplement, and reviewing figures.

SELECTED PRESENTATIONS

- TEDx University of Montana Western **Dillon, MT** **Mar 23, 2024**
Spruce W. Schoenemann & 10-yr old daughter (Madrona Schoenemann)
[*What will the future climate be like for our kids?*](#)
- National Association of Geoscience Teachers- Webinar **Online** **Nov 17, 2023**
Spruce W. Schoenemann, E. Ward.
Hands-on with PolarPASS: Teaching with 360° Interactive Environments
- Montana Bureau of Mines & Geology **Butte, MT** **Nov 2, 2023**
Invited: Speaker Series: Quaternary Processes
Spruce W. Schoenemann, W. Larson, M. Bryant, L. Corbett, P. Bierman
Glacier chronologies of the Pioneer Mountains, MT derived from cosmogenic exposure dating
- American Geophysical Union – Fall Meeting **Chicago, IL** **Dec 12-16, 2022**
Spruce W. Schoenemann, Kori L. Mooney
4,400-year Reconstruction of Southwest Montana Hydroclimate using Tree-ring Snowpack Chronologies and Morrison Lake Sediment $\delta^{18}O$: Indications of past Snow Megadrought in the Northern Rockies. Poster # PP42B-06
- Alia L. Khan, **Spruce W. Schoenemann**, Twila A. Moon, Anne U. Gold, Emily Ward, Daniela Pennycook and Sophie Lei. *Engaging students in Polar Science: New undergraduate-level curriculum combines polar field data, 360-degree virtual experiences and GIS to transport students to Greenland.* Virtual Poster #ED55D-0187
- GSA Joint Rocky Mountain/Cordillera Section Meeting **Las Vegas, NV** **Mar 14-17, 2022**
Mana M. Bryant, Will B. Larson, **Spruce W. Schoenemann**, Lee B. Corbett, Paul R. Bierman
Investigating arid alpine Pleistocene glaciation in the Pioneer Mountains of Montana using cosmogenic 10-Beryllium.
- MT American Water Resources Assoc – Fall Meeting **Butte, MT (virtual)** **Oct 5-9, 2020**
Schoenemann, S. and L. Von Oesen
Lake Reconnaissance for Determining Potential Lake Cores with Carbonate for Retrieving Climate Records. Oral.
- American Geophysical Union – Fall Meeting **San Francisco, CA** **Dec 9-13, 2019**
Schoenemann, S. J. Nusbaumer, A. LeGrande, T. Porter
Ice Sheet-Moderated Changes in the Precipitation Isotope Climatology of NW Canada during the Late Deglacial. Poster #C21E-1494
- MT American Water Resources Assoc – Fall Meeting **Red Lodge, MT** **Oct 9-10, 2019**
Schoenemann, S. J. Martin, G. Pederson, D. McWethy
Precipitation Isotope Ratios and Tree-ring based Snowpack Relationships to inform Paleoclimate Reconstructions from Lake Sediment Cores. Poster.
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CLIMATE RELEVANT COURSES

- NR-ENSC295/395 Applied Polar Science & Climate Change (UVM) **Spr. 2023**
- ENSC 394B Polar Places and Spaces/NSF Greenland **Spr. 2022**
- ENSC 394 Glacial Geology of Montana **Spr. 2020, 22**
- HONR 193F Iceland & Climate Change: Geological, Ecological, & Sustainability Investigations **Spr. 2019, 24**
- GEO 374 Carbon Cycle and Climate **Fall 2018, Spr. 20, 21, 24**
- HONR 194 Water in the West: Science & Society **Fall 2018**
- GEO 210 Weather and Climate **Fall 17, Spr. 19, Fall 19, 20, 21,23**
- NRSM 441 Sustainable Natural Resource Management **Spr. 2018**
- GEO 103 Intro to Environmental Geology **Fall 2016, 17, 19, Spr. 21, 22**
- CHMY 121 Intro to General Chemistry **Fall 2016, 17, 18, 20, 21, 23 & Spr. 17, 20**
- GEO 431 Environmental Geochemistry **Spr. 2017, 18, 19, 20, 21**
- ESS 201 The Earth System and Climate (Univ. of Washington) **Spr. 2015**
- EV 128 Introduction to Global Climate Change (Colorado College) **Fall 2011**