*CURRICULUM VITAE*

# SPRUCE W. SCHOENEMANN, PH.D.

PROFESSOR
Environmental Sciences Department
The University of Montana Western

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## *SUMMARY OF QUALIFICATIONS*

- Strong professional and personal interest in Environmental, Geological and Climatological Sciences
- 15-years experience of climate-related scientific research; applying analytical tools and implementing research methods
- Experienced in teaching and designing inclusive and engaging curriculum for undergraduate students
- Extensive teaching experience in academic and outdoor/experiential education settings
- Skilled in organizing and facilitating field research and course field trips
- Strong commitment to developing students' critical reasoning skills and interdisciplinary approaches to problem-solving

## *EDUCATION*

**Ph.D. Earth & Space Sciences, University of Washington** **Mar 2015**
- Climatology, Ice Core Paleoclimate Reconstructions, and Stable Isotope Geochemistry

***Certificate**:* Graduate Certificate in Climate Science, Program on Climate Change **Jun 2014**

Related Coursework: Paleoclimatology and Proxies, Isotope Geochemistry, The Global Carbon Cycle, Ice and Climate, Climate Dynamics, Objective Statistical Analysis, Principles of Glaciology, and Energy, Science, and Technology

**B.A. in Geology and Environmental Studies, Whitman College** **May 2003**
*Awarded Dr. Albert Ripley Leeds Prize in Geology (2003)*

**Sea Education Association (SEA), Boston University** **Sep – Dec 2001**
*Nautical Science and Oceanography semester aboard*
*SSV Schooner Westward*

## *RESEARCH INTERESTS*

- Understanding the variability and dynamics of past and present climate change, thereby informing our projections of future climate change
- Paleoclimate reconstructions from proxy records including ice cores, sediment cores, tree-rings, glacier deposits, and other environmental recorders
- Utilize geochemical tracers, such as water isotopes, to investigate spatial and temporal changes in the Earth's hydrological cycle, including polar and alpine regions, local precipitation and snowpack, and lake systems.

## *TEACHING INTERESTS*

- Undergraduate and graduate environmental science and climate courses; including Environmental Geochemistry, Intro to Environmental Geology, Intro to Earth's Climate System, Glacial Geology and Ice Sheets, Paleoclimate and Proxies, Carbon Cycle and Climate, and others.
- Commitment to developing science curriculum that promotes transferable skills including: scientific inquiry, data analysis and interpretation, problem-solving, comprehend long-term implications, critical reading and effective writing
- Advising graduate and undergraduate research projects and coordinating capstone seminars

## *TEACHING & RESEARCH EXPERIENCE*

*Professor*
**The University of Montana Western** **Dillon, MT** **Aug 2023 – present**
**Environmental Sciences Dept.**

- Taught lower & upper division courses including: Weather & Climate, Carbon Cycle and Climate, Intro to Environmental Geology, Geology of the American West, Intro to General Chemistry, Environmental Geochemistry, Rocks, Minerals and Resources, Sustainable Natural Resource Management, Water in the West: Science and Society, Glacial Geology of MT and PolarPASS Greenland Climate Change.
- Courses are developed for Experience One (known as X1) where students take one course at a time for 3.5 weeks.
- Classes provide authentic practice in the discipline, including hands-on, experiential, and project-based research with an emphasis on transferable job skills.
- 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.

*Lecturer (sabbatical appointment)*
Applied Polar Science & Climate Change (200 & 300 level)
**University of Vermont** **Burlington, VT** **Spring 2023**
**Rubenstein School of Env. & Natural Resources**

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

*Associate Professor*
**The University of Montana Western** **Dillon, MT** **Aug 2019 – Aug 2023**
**Environmental Sciences Dept.**

- See Professor at University of Montana Western description from above.

*Assistant Professor*
**The University of Montana Western** **Dillon, MT** **Aug 2016 – Aug 2019**
**Environmental Sciences Dept.**

- See Professor at University of Montana Western description from above. *Note*: in addition to my 3 years as Assistant Professor I had 2 years of prior lectureship experience credited toward my promotion to Associate Professor rank.

*Postdoctoral Research Associate*
**University of Washington, Earth & Space Sciences** **Seattle, WA** **Feb 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.

*Lecturer*
The Earth System and Climate, ESS 201
**University of Washington, Earth & Space Sciences** **Seattle, WA** **Spring Qtr. 2015**

- 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

*Graduate Research Assistant*
**University of Washington, Earth & Space Sciences** **Seattle, WA** **2009 – 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 $\delta^{17}$O isotopes into isotope-enabled General Circulation Model, and in Intermediate Complexity Isotope-Models for interpretation of $^{17}O_{excess}$ sensitivity to climate conditions.
- Developed sample preparation line and Isotope Ratio Mass Spectrometer methods for high precision measurement of $\delta^{17}$O and $\delta^{18}$O isotopes of $O_2$.

*Visiting Lecturer*
Environmental Studies 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

*Graduate Student Representative*
**Program on Climate Change, University of Washington** **Seattle, WA** **2011 – 2012**

- Represented graduate student perspectives, curricular needs, and feedback/suggestions on PCC Advisory Committee
- Provided regular feedback to graduate students on PCC state of affairs, student opportunities for fellowships, and upcoming PCC-related events

*Teaching Assistant*
The Earth System and Climate, ESS 201
**University of Washington, Earth & Space Sciences** **Seattle, WA** **Winter Qtr. 2011, 2013**

- Assisted in the overall course planning and assessment design
- Presented course material during faculty absence
- Facilitated lab sections and discussions, and labs

*Science Fellow*
**Eagle Rock School and Professional Development Center** **Estes Park, CO** **Sep 2006 – Aug 2007**

- One-year residential teaching fellowship position at the Eagle Rock School and Professional Development Center
- Developed interdisciplinary science curriculum and assessments for diverse learning styles
- Instructed or co-instructed courses on geology, region specific environmental and social studies, river ecology, climate change, and physics
- Provided positive role modeling and developed mentoring relationships with students to help them foster their academic and personal growth

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## *FIELD EXPERIENCE*

*Field Lecturer-Geology and Geological Engineering*
**South Dakota School of Mines & Technology** **Dillon, MT** **Jun 2023**
Black Hills Natural Sciences Field Station

- Presented curriculum on glacial geology, geomorphology, paleoclimate, and Quaternary geology of Montana
- Taught field sampling methods for cosmogenic exposure dating of glacial moraines
- Taught field-mapping of quaternary and surficial deposits
- Led data-analysis of regional cosmogenic exposure ages using the ICE-D Alpine data repository

*Field & Lab Technician*
**University of Washington** **Kangerlussuaq, Greenland** **Aug – Sep 2012**

- Gathered water samples for performing a suite of geochemistry and sedimentological analysis
- Filter waters for sediment grain size & distribution, Sulfates, Particulate Organic Carbon, and Dissolved Organic Carbon
- Utilized a spectrophotometer for measurements of Fe(II), Fe(tot), and DOC absorbance
- Responsibilities included site maintenance of data loggers, checking rain gauges, calculating stream discharge, and measuring pH, Ec, and DO

*Field Technician*
**University of Washington** **Mt Waddington, B.C** **Jun – Jul 2010**

- Assisted with assembly, set up & operation of drilling tower, winch, and core barrel
- Responsibilities included recovering the ice core, logging the core, and packing for shipment

*Ice Core Handler and Science Technician*
**University of New Hampshire** **WAIS Divide, Antarctica** **Nov 2008 – Jan 2009**
**Science Coordination Office**

- Responsibilities included removing the drilling fluid from the core, measuring the length, quality, and electrical properties of the core, packing the core for shipment, and assisting the drillers with quality control

## *TEACHING: EXPERIENTIAL & OUTDOOR ED.*

*Instructor*
**Outward Bound Wilderness, HIOBS** **Wheeler Bay, ME** **May – Aug 2006**

- Led 22 & 16-day Ocean Bound Expeditions to Bermuda and Nova Scotia respectively and one 8-day Pulling Boat course
- Responsibilities included pre-program preparation, program coordination and planning
- Taught core values, seamanship, nautical and maritime science, all in an expeditionary-based learning model
- Encouraged and developed teamwork, compassion, service, and physical fitness

*Crew Leader*
**Student Conservation Association** **Naches, WA & Seward, AK** **Jun 2004, Jul 2005**

- Led 4-week backcountry trail crew of high school age volunteers in conservation service projects for US Park Service
- Duties included pre-program preparation, backcountry living instruction, group facilitation, risk management, environmental and experiential education, and trail maintenance project completion

*Program Coordinator & Instructor Deckhand*
**Guided Discoveries CIMI Tall Ship Expeditions** **Long Beach, CA** **Feb – May 2005**

- Organized and implemented 2, 3, and 5-day overnight trips
- Taught marine science, oceanography, marlinspike seamanship, navigation, and ship operations
- Rotated between program coordinator, instructor, and deckhand

## *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**

- Facilitated neighborhood climate action group meetings and coordinate among groups
- Assisted with marketing/outreach of all Climate Action Plan programs (ClimateSmart, Residential Energy Audit Program, Weatherization, Home Energy Makeover contest, and Transportation)

## *PEER-REVIEWED PUBLICATIONS*

[1] **Schoenemann, S. W.,** Bryant, M. M., Larson, W. B., Corbett, L. B., & Bierman, P. R. (2023). A cosmogenic $^{10}$Be 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

[2] **Schoenemann, S.W.,** M. Wolhowe, A. Maloney, R. Sletten, K. W. Huntington, A. J. Schauer, J. P. Sachs (2023), Prominent cooling of West Greenland during the 8.2 ka event based on multiple proxies from lake sediments, *Paleoceanography and Paleoclimatology*, In revision.

[3] Gold, A.U., Ward, E.G., Marsh, C., Moon, T., Khan, A., **Schoenemann, S.W**., Littrell, M. (2023) Measuring novice-expert sense of place for a far-away place: Implications for geoscience instruction, *PLOS One*. Accepted. Manuscript# PONE-D-22-27793

[4] Wang, J., Pang, H., Wu, S., **Schoenemann, S. W**., Uemura, R., Ekaykin, A., Werner, M., Cauquoin, A., Goursaud Oger, S., Rupper, S. & Hou, S. (2022). The Ant-Iso dataset: a compilation of Antarctic surface snow isotopic observations. *Earth System Science Data Discussions*, 1-23. In revision for new journal.

[5] **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.

[6] 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.

[7] Jones, T. R., J.W.C. White, E. J. Steig, B. H. Vaughn, V. Morris, V. Gkinis, B. R. Markle, **S. W. Schoenemann** (2017), Improved Methodologies for Continuous Flow Analysis of Stable Water Isotopes in Ice Cores, *Atmospheric Measurement Techniques*, 10, 617-632, doi:10.5194/amt-10-617-2017.

[8] **Schoenemann, S. W**. and E.J. Steig (2016), Seasonal and spatial variation of $^{17}O_{excess}$ and $d_{excess}$ in Antarctic precipitation: insights from an intermediate complexity isotope model, *J. Geophys. Res. Atmos.* 121, doi:10.1002/2016JD025117.

[9] 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.*

[10] Schauer, A. J., **S. W. Schoenemann**, and E. J. Steig (2016), Routine high-precision analysis of triple water-isotope ratios using cavity ring-down spectroscopy, *Rapid Communications in Mass Spectrometry*, 30, 2059-2069, doi:10.1002/rcm.7682.

[11] **WAIS Divide Project Members** (2015), Precise interpolar phasing of abrupt climate change during the last ice age, *Nature*, 520, 661−665, doi:10.1038/nature14401. *Contributed to editing manuscript and interpretation of isotope/$CH_4$ records.*

[12] **Schoenemann, S. W.**, E. J. Steig, Q. Ding, B. R. Markle, and A. J. Schauer (2014), Triple water-isotopologue record from WAIS Divide, Antarctica: controls on glacial-interglacial changes in $^{17}O$-excess of precipitation, *J. Geophys. Res. Atmos.,* 119, 8741–8763.

[13] Steig, E. J., V. Gkinis, A. J. Schauer, **S. W. Schoenemann**, K. Samek, J. Hoffnagle, K. J. Dennis, and S. M. Tan (2014), Calibrated high-precision $^{17}O_{excess}$ measurements using laser-current tuned cavity ring-down spectroscopy, *Atmospheric Measurement Techniques*, 6, 10191–10229.

[14] **Schoenemann, S. W.**, A. J. Schauer, and E. J. Steig (2013), Measurement of SLAP2 and GISP $\delta^{17}O$ and proposed VSMOW-SLAP normalization for $\delta^{17}O$ and $^{17}O_{excess}$, *Rapid Communications in Mass Spectrometry*, 582–590, doi:10.1002/rcm.6486.

[15] **WAIS Divide Project Members** (2013), Onset of deglacial warming in West Antarctica driven by local orbital forcing, *Nature*, 500, 440-444, doi:10.1038/nature12376. *Contributed to writing manuscript, GCM-enabled isotope modeling, and interpretation of isotope records and GCM results.*

[16] Steig, E. J. et al. (2013), Recent climate and ice-sheet changes in West Antarctica compared with the past 2,000 years, *Nature Geoscience*, 6, 372–375.

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## *INVITED DEPARTMENTAL COLLOQUIA*

Idaho State University **Idaho Falls, ID** **Nov 29, 2017**
**Schoenemann, S.** A. Steele, R. Sletten, A. Maloney, J. Sachs, A. Schauer
*Reconstructing Holocene Climate based on Alkenones and Isotopes from West Greenland Lake Sediments*

Montana Tech Public Lecture Series **Butte, MT** **Sep 14, 2017**
**Schoenemann, S.** A. Steele, R. Sletten, A. Maloney, J. Sachs, A. Schauer
*Reconstructing Holocene Climate based on Alkenones and Isotopes from West Greenland Lake Sediments: Temperature or Effective Moisture as a Driver?*

USGS NOROCK EcoLunch Seminar Series **Bozeman, MT** **Feb 16, 2017**
**Schoenemann, S.** T. Porter, D. Froese, and L. Davies
*A full Holocene Record of Water Isotopes from Syngenetic Pore Ice in central Yukon Territory*

RoughCut Series at Montana Institute on Ecosystems **Bozeman, MT** **Feb 15, 2017**
**Schoenemann, S.** A. Steele, R. Sletten, A. Maloney, J. Sachs, A. Schauer
*Reconstruction of Holocene Climate from Greenland Lake Sediment Cores: A Pilot Study*

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## *PRESENTATIONS*

American Geophysical Union – Fall Meeting **Chicago, IL** **Dec 12-16, 2022**
**Spruce W. Schoenemann**, **S.** 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*.

Kori L. Mooney, **Spruce W. Schoenemann**
*5,000-year lake carbonate and tree-ring based snowpack reconstructions reveal long-term trends in southwest MT hydroclimate*

Geological Society of America – Fall Meeting **Portland, OR** **Oct 10-13, 2021**
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*.

Will B. Larson, Mana M. Bryant, **Spruce W. Schoenemann**, Lee B. Corbett, Paul R. Bierman
*Glacial mapping in the arid Pioneer Mountains, Montana: assessing paleo-ELAs during the Last Glacial Maximum*

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.

MtnClim– Fall Meeting **Gothic, CO** **Sep 11-14, 2018**
**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. Presenter G. Pederson.

CANQUA– Annual Meeting **Ottawa, Canada** **Aug 7-11, 2018**
Porter, T, **S. Schoenemann**, L. Davies, S. Bandara, D. Froese
*A full Holocene summer temperature reconstruction from precipitation isotopes in syngenetic permafrost in central Yukon (eastern Beringia).* Presenter T. Porter.

American Geophysical Union – Fall Meeting **New Orleans, LA** **Dec 11-14, 2017**
**Schoenemann, S.** A. Steele, R. Sletten, A. Maloney, J. Sachs, A. Schauer
*Reconstructing Holocene Climate based on Alkenones and Isotopes from West Greenland Lake Sediments: Temperature or Effective Moisture as a Driver?*- Invited Talk & Poster #243964

Geological Society of America – Fall Meeting **Seattle, WA** **Oct 22-25, 2017**
**Schoenemann, S.** A. Steele, R. Sletten, A. Maloney, J. Sachs, A. Schauer
*Reconstructing Holocene Climate based on Alkenones and Isotopes from West Greenland Lake Sediments: Temperature or Effective Moisture as a Driver?* Poster. Presenter R. Sletten

International Partnership in Ice Coring Sciences **Hobart, Tasmania** **Mar 7-11, 2016**
**Schoenemann, S.**, and E. Steig
*On the seasonality of $^{17}O$-excess in Antarctic precipitation: insights from an intermediate complexity isotope model and high-resolution firn-core data.* Poster. Presenter E. Steig

American Geophysical Union – Fall Meeting **San Francisco, CA** **Dec 14-18, 2015**
**Schoenemann, S.** and E. Steig
*Seasonal and spatial variation of $^{17}O$-excess and $d_{excess}$ in Antarctic precipitation: Insights from an intermediate complexity isotope model, Abstract PP78843*

WAIS Divide Ice Core Project– Science Meeting **La Jolla, CA** **Sept 22-23, 2015**
*Seasonal and spatial variation of $^{17}O$-excess and $d_{excess}$ in Antarctic precipitation: Insights from an intermediate complexity isotope model and high-resolution seasonal data*

American Geophysical Union– Fall Meeting **San Francisco, CA** **Dec 15-19, 2014**
*UWHS Climate Science: Uniting University Scientists and High School Teachers in the Development and Implementation of a Dual-Credit STEM-Focused Curriculum-Poster ED23A-0742*

American Geophysical Union– Fall Meeting **San Francisco, CA** **Dec 9-13, 2013**
**Schoenemann, S.**, E. Steig, Q. Ding, A. Schauer,
*Sea Ice Control of $^{17}O_{excess}$ in Antarctic Precipitation, Abstract PP41D-08*

International Partnership in Ice Coring Sciences **Presqu'ile de Giens, France** **Oct, 2012**
**Schoenemann, S.**, E. Steig, Q. Ding, A. Schauer,
*Glacial-Interglacial Change of 17Oexcess at WAIS Divide and other Antarctic Cores.* Poster

6th Graduate Climate Conference– Session Chair **Packwood Forest, WA** **Oct 26, 2012**
*An Introduction and Background to our Favorite Climate Recorder: Paleo Cryosphere!*

Colorado College– Visiting Lecturer Interview **Colorado College, CO** **Oct 15, 2012**
*What do Ice Cores and Water Isotopes tell us about Past Antarctic Climate?*

European Geosciences Union– General Assembly **Vienna, Austria** **Apr 26, 2012**
**Schoenemann, S.**, E. Steig, Q. Ding, A. Schauer,
*Ice Core Measurements and GCM Simulation of the Spatial Distribution and Glacial-Interglacial Change of 17O-excess in Antarctica, Abstract EGU2012-1029*

American Geophysical Union– Fall Meeting **San Francisco, CA** **Dec 5-8, 2011**
**Schoenemann, S.**, E. Steig, Q. Ding, A. Schauer,
*Measurement and GCM Simulation of the Spatial Distribution and Glacial-Interglacial Change of $^{17}O$-excess in Antarctica.*

Northwest Glaciologist – Science Meeting **Portland, OR** **Oct 19, 2011**
*Measurement of the Spatial Distribution and Glacial-Interglacial Change of $^{17}O$-excess in West Antarctica.*

WAIS Divide Ice Core Project– Science Meeting **La Jolla, CA** **Sept 27-30, 2011**
*Measurement of the Spatial Distribution and Glacial-Interglacial Change of $^{17}O$-excess in West Antarctica.*

Earth & Space Sciences Gala **University of Washington** **Mar 30, 2011**
*$^{17}O$-excess of $H_2O$ from a West Antarctic Ice Core: Method Development and Implementation of $\delta^{17}O$ into a Climate Model.*

Zegrahm Eco Expeditions **Seattle, WA** **Feb 4, 2011**
*Antarctic Climate Evidence: How We Know What We Know*

## *FUNDING, HONORS, AND AWARDS*

**Funded Grants**

C. Chupik, Y. Gavillot, **S. Schoenemann (collaborator)** and others, Dec 1, 2022- Jul, 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.

J. Sachs, R. Sletten, **S. Schoenemann (primary author)** (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**, 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 $^{17}O$-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.

S. W. Schoenemann (2014−2015), Reconstruction of Holocene temperatures from Greenland lake sediment cores using a novel method: Clumped Isotopes, Quaternary Research Center, University of Washington, $3300.

**Funded Fellowships**

S. W. Schoenemann (2018−2019), *Lake reconnaissance for identifying high-accumulation, carbonate-based sediment cores*, Montana Space Grant Consortium, NASA, $6800

S. W. Schoenemann (2013−2014), *Reconstruction of Holocene temperatures from Greenland lake sediment cores using a novel method: Clumped Isotopes*, Earth & Space Sciences Departmental Award, Pilot Study $2500

S. W. Schoenemann (Summer 2011), *From Water Isotopes to Temperature: Climate Reconstructions from Ice Cores*, NASA/UWHS Research Assistant Fellowship, NASA Global Climate Change Education/Program on Climate Change, ~$4250

**Other Awards**

- Misch Research Assistant Fellowship (1 quarter), Earth & Space Sciences Departmental Award, May, 2012
- Best Surface Processes, Oral Presentation, Earth & Space Science, Oct 26, 2010
- Top Scholar Research Assistantship
  Graduate School's Fund for Excellence and Innovation (GSFEI), University of Washington, Autumn, 2009

## *UNIVERSITY COURSES*

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|---|---|
| NR-ENSC295/395Applied Polar Science & Climate Change | **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** |
| GEO 374 Carbon Cycle and Climate | **Fall 2018, Spr. 20, 21** |
| HONR 194 Water in the West: Science & Society | **Fall 2018** |
| GEO 210 Weather and Climate | **Fall 17, Spr. 19, Fall 19, 20, 21** |
| 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 226 Rocks, Minerals & Resources | **Spr. 2017** |
| GEO 431 Environmental Geochemistry | **Spr. 2017, 18, 19, 20, 21** |
| GEO 226 Geology of the American West | **Fall 2016, Spr. 18, Fall 19, 20, 21, 23** |
| ESS 201 The Earth System and Climate (Univ. of Washington) | **Spr. 2015** |
| EV 128 Introduction to Global Climate Change (Colorado College) | **Fall 2011** |

## *PROFESSIONAL/DEPARTMENTAL SERVICE*

Paper Reviewer – *Journal of Quaternary Science, Climate Dynamics, EPSL*
*The Cryosphere, The Holocene, PNAS, JGR Atmosphere, Geophysical Research Letters* **2013–PRESENT**

**UMWestern Environmental Sciences Department:**

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|---|---|
| Faculty Development Fund Committee | **Fall 2023** |
| Environmental Geophysics Search Committee Member | **Spring 2020** |
| Strategic Enrollment Management Committee | **Fall 2019−2022** |
| Chemistry Search Committee Member | **Fall 2018-Spring 2019** |
| Honors Committee | **Fall 2018−Present** |
| Env. Sustainability Search Committee Member | **Spring 2018** |
| Environmental Sciences Department, Department Chair | **Fall 2017−Fall 2018** |
| Budget Committee | **Fall 2017−Fall 2018** |
| Collective Bargaining Committee | **Fall 2017−present** |
| University Court Committee | **Fall 2016−2022** |

## *OUTREACH & SERVICE*

Coordinator – *Snowpack Fest* **Dillon, MT** **Jan 30-Feb 1, 2020**

Co-coordinator/Presenter – *Save the Snow! Climate Summit* **Dillon, MT** **Mar 15, 2019**
*Precipitation Isotope Ratios and Tree-Ring Based Snowpack Relationships to Inform Paleoclimate Reconstruction from Lake Sediment Cores*

Presenter – *Patagonia Outlet Store* **Dillon, MT** **Dec 7, 2018**
*Antarctica to Iceland – Secrets of the Ice: Climate Research in Antarctica*

Presenter – *Washington Science Teachers Association* **Shorecrest, WA** **Oct 24, 2015**
*Next Generation Science Standards and Climate Change in the High School Classroom*

Research Presenter – *Science Inside Out* **Seattle, WA** **Nov, 2013**
*College of the Environment*

Program on Climate Change, UW in High School **Seattle, WA** **2010–2015**
*Curriculum design and development for UW Atmos211*

Pacific Science Center **Seattle, WA** **2010–2012, 2015**
*Polar Science Weekend (annual event)*

H.M. Jackson High School **Mill Creek, WA** **Apr 11, 2012**

*Climate Expeditions: Adventures in Polar Research*
*Developed in concert with the Ice Drilling Program Office – Dartmouth, NH*

| | | |
|---|---|---|
| UW in High School, University of Washington | **Seattle, WA** | **Mar 10, 2012** |
| *Orbital Forcing of Climate, Interpreting Temperature Variations recorded in Ice Cores* | | |
| Bremerton High School | **Bremerton, WA** | **Feb 22, 2012** |
| *Climate Expeditions: Adventures in Polar Research* | | |
| Ingraham High School | **Northgate, WA** | **Jan 5, Feb 2, 2012** |
| *Antarctic Climate Evidence from Ice Cores* | | |
| National Science Teachers Association–Regional Meeting | **Seattle, WA** | **Dec 9, 2011** |
| *Climate Expeditions: Adventures in Polar Research* | | |

## *ACADEMIC PROFESSIONAL DEVELOPMENT*

| | | |
|---|---|---|
| CUAHSi Snow Field Measurement School-MSU | **Bozeman, MT** | **Jan 7-11, 2019** |
| Isotope Tracers in Catchment Hydrology – USASK Online webinar | **Saskatoon, Saskatchewan, CA** | **May 14-18, 2018** |
| National Association of Geoscience Teachers – UNM Earth Educators' Rendezvous/SERC | **Albuquerque, NM** | **Jul 17-21, 2017** |
| Sixth Graduate Climate Conference– UW | **Pack Forest, WA** | **Oct 26-28, 2012** |
| Program on Climate Change– Summer Institute **(***Topic: Hydrologic Cycle)* | **Friday Harbor, WA** | **Sep 2011** |
| Program on Climate Change– Summer Institute **(***Topic: Climate Feedbacks)* | **Friday Harbor, WA** | **Sep 2010** |
| Fourth Graduate Climate Conference – UW | **Pack Forest, WA** | **Oct 15-17, 2010** |
| Meeting the Global Energy and Climate Challenge– University of Colorado Boulder | **Boulder, CO** | **Aug 22-23, 2008** |
| Global Climate Change Summit – OSU | **Columbus, OH** | **Jan 2007** |

## *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, Digital Photography, Website Design

Software: MATLAB, R-Studio, QGIS, HYSPLIT-back trajectory modeling, Microsoft Office, Keynote, Adobe Illustrator, Agisoft Metashape DEM/Ortho maps.

Effective Communication, Organizational Skills, Teamwork, Interdisciplinary Collaboration, Community Outreach

## *REFERENCES*

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