Mark S. Raleigh, Ph.D., P.E.

Assistant Professor

College of Earth, Ocean, and Atmospheric Sciences
Oregon State University, Corvallis, Oregon
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EDUCATION

Ph.D. (2013)	**Civil & Environmental Engineering**, University of Washington, Seattle, Washington. Thesis: *Quantification of Uncertainties in Snow Accumulation, Snowmelt, and Snow Disappearance Dates.* Advisor: Jessica Lundquist
M.S. (2009)	**Civil & Environmental Engineering**, University of Washington, Seattle, Washington. Thesis: *A Statistical Evaluation of a Snow Water Equivalent Reconstruction Method.* Advisor: Jessica Lundquist
B.S. (2005)	**Civil Engineering**, Magna Cum Laude, Gonzaga University, Spokane, Washington

ACADEMIC APPOINTMENTS AND PROFESSIONAL EXPERIENCE

Academic

2020-present	**Assistant Professor**, Geography Program, College of Earth, Ocean, and Atmospheric Sciences (CEOAS), Oregon State University
2017-2020	**Research Scientist I**, National Snow and Ice Data Center (NSIDC), Cooperative Institute for Research in Environmental Sciences (CIRES), University of Colorado
2015-2020	**Research Associate**, Department of Geological Sciences, University of Colorado
2015-2017	**Postdoctoral Visiting Fellow**, Cooperative Institute for Research in Environmental Sciences (CIRES), University of Colorado
2013-2015	**Postdoctoral Fellow**, Advanced Study Program, National Center for Atmospheric Research (NCAR)
2007-2013	**Graduate Research Assistant**, Department of Civil & Environmental Engineering, University of Washington

Professional Certifications, Licensure, and Consulting

2022-present	**FAA Remote Pilot** (drone) certification
2021-present	**Wilderness First Aid** certification
2021-present	**Owner and Principal Scientist**, Peak to Stream, LLC, Oregon
2019-2020	**Security Clearance**, United States Government
2014-present	**Registered Professional Engineer (P.E.)**, State of Colorado (0048909)
2005-2007	**Design Engineer**, Civil Infrastructure Group, Merrick & Company
2002-2004	**Civil Engineering Intern**, Civil Infrastructure Group, Merrick & Company

PUBLICATIONS

*** graduate student advisee*

In review/revision:

Stillinger, T., Rittger, K., **Raleigh, M.S.**, Michell, A., Davis, R.E., and E.H. Bair (submitted). Landsat, MODIS, and VIIRS snow cover mapping algorithm performance as validated by airborne lidar datasets. Submitted to *The Cryosphere*.

Meehan, T.G., Hojatimaleksha, A., Marshall, H.P., Deeb, E.J., O'Neel, S., McGrath, D., Webb, R.W., Bonnell, R., **Raleigh, M.S.**, Hiemstra, C., and K. Elder (in review). Spatially Distributed Snow Water Equivalent from Ground-based and Airborne Sensor Integration at Grand Mesa, Colorado, USA. Submitted to *Water Resources Research*.

Published:

26. Bonner**, H.M., Smyth**, E., **Raleigh, M.S.**, and E.E. Small (**2022**). A meteorology and snow dataset from adjacent forested and meadow sites at Crested Butte, CO, USA. *Water Resources Research*, 58, e2022WR033006.
25. Jaeger, D.M., Looze, A.M.C., **Raleigh, M.S.,** Miller, B.W., Friedman, J.M., and C.A. Wessman (**2022**). From flowering to foliage: Accelerometers track tree sway to provide high-resolution insights to tree phenology. *Agricultural and Forest Meteorology*, 318, 1-13.
24. Smyth**, E.J., **Raleigh, M.S.**, and E.E. Small (**2022**). Data assimilation of snow depth reduces model SWE error and parameter sensitivity in forests. *Water Resources Research*, 58, e2021WR030563.
23. Teich, M., Becker, K.M.L., **Raleigh, M.S.**, and J.A. Lutz (**2022**). Large-diameter trees affect snow duration in post-fire old-growth forests. *Ecohydrology*, e2414.
22. **Raleigh, M.S.,** Gutmann, E.D., Van Stan II, J.T., Burns, S.P., Blanken, P.D., and E.E. Small (**2022**). Challenges and capabilities in estimating snow mass intercepted in conifer canopies with tree sway monitoring. *Water Resources Research*, 58, e2021WR030972.
21. Bonner**, H. M., **Raleigh, M. S.**, & Small, E. E. (**2022**). Isolating forest process effects on modelled snowpack density and snow water equivalent. *Hydrological Processes*, 36(1), e14475.
20. Wrzesien, M.L., Kumar, S., Vuyovich, C., Gutmann, E.D., Kim, R.S., Forman, B.A., Durand, M., **Raleigh, M.S.**, Webb, R., and P. Houser (**2022**). Development of a "nature run" for observing system simulation experiments (OSSEs) for snow mission development. *Journal of Hydrometeorology*, 23, 351–375.
19. Webb, R.W., **Raleigh, M.S.**, McGrath, D., Molotch, N.P., Elder, K., Hiemstra, C., Brucker, L., and H.P. Marshall (**2020**). Within-stand boundary effects of snow water equivalent distribution in forested areas. *Water Resources Research*, 56(10), 1-17.
18. Smyth**, E. J., **Raleigh, M. S.**, & Small, E. E. (**2020**). Improving SWE Estimation With Data Assimilation: The Influence of Snow Depth Observation Timing and Uncertainty. *Water Resources Research*, 56(5), 1–17.
17. Rittger, K., **Raleigh, M. S.**, Dozier, J., Hill, A. F., Lutz, J. A., & Painter, T. H. (**2020**). Canopy Adjustment and Improved Cloud Detection for Remotely Sensed Snow Cover Mapping. *Water Resources Research*, 56(6), 1-20.
16. Ménard, C. B., Essery, R., Barr, A., Bartlett, P., Derry, J., Dumont, M., Fierz, C., Kim, H., Kontu, A., Lejeune, Y., Marks, D., Niwano, M., **Raleigh, M.S.**, Wang, L., and Wever, N. (**2019**),

Meteorological and evaluation datasets for snow modelling at ten reference sites: description of in situ and bias-corrected reanalysis data, *Earth Syst. Sci. Data.*, 11, 865–880.

15. Smyth**, E., **Raleigh, M.S.**, and E.E. Small (**2019**), Particle filter data assimilation of monthly snow depth observations improves estimation of snow density and SWE, *Water Resources Research*, 55.

14. Krinner, G., Derksen, C., Essery, R., Flanner, M., Hagemann, S., Clark, M., Hall, A., Rott, H., Brutel-Vuilmet, C., Kim, H., Ménard, C. B., Mudryk, L., Thackeray, C., Wang, L., Arduini, G., Balsamo, G., Bartlett, P., Boike, J., Boone, A., Chéruy, F., Colin, J., Cuntz, M., Dai, Y., Decharme, B., Derry, J., Ducharne, A., Dutra, E., Fang, X., Fierz, C., Ghattas, J., Gusev, Y., Haverd, V., Kontu, A., Lafaysse, M., Law, R., Lawrence, D., Li, W., Marke, T., Marks, D., Nasonova, O., Nitta, T., Niwano, M., Pomeroy, J., **Raleigh, M. S.,** Schaedler, G., Semenov, V., Smirnova, T., Stacke, T., Strasser, U., Svenson, S., Turkov, D., Wang, T., Wever, N., Yuan, H., and Zhou, W. (**2018**), ESM-SnowMIP: Assessing models and quantifying snow-related climate feedbacks, *Geosci. Model Dev.*, 11(12), 5027–5049.

13. **Raleigh, M.S.** & E.E. Small (**2017**), Snowpack density modeling is the primary source of uncertainty when mapping basin-wide SWE with lidar, *Geophysical Research Letters*, *44*.

12. Cristea, N.C., Breckheimer, I., **Raleigh, M.S.**, HilleRisLambers, J., & J.D. Lundquist (**2017**), An evaluation of terrain-based downscaling of fractional snow covered area datasets based on lidar-derived snow data and orthoimagery, *Water Resources Research*, *53*.

11. **Raleigh, M.S.**, Livneh, B., Lapo, K., & J.D. Lundquist (**2016**), How does availability of meteorological forcing data impact physically-based snowpack simulations?, *Journal of Hydrometeorology*, *17*, 99-120.

10. **Raleigh, M.S.**, Lundquist, J.D., & M.P. Clark (**2015**), Exploring the impact of forcing error characteristics on physically based snow simulations within a global sensitivity analysis framework, *Hydrology and Earth Systems Sciences, 19*, 3153-3179.

9. Lapo, K., Hinkelman, L., **Raleigh, M.S.**, & J.D. Lundquist (**2015**), Impact of errors in the surface radiation balance on simulations of snow water equivalent and snow surface temperature, *Water Resources Research, 51*.

8. Dickerson-Lange, S.E., Lutz., J.A., Martin, K.A., **Raleigh, M.S.,** Gersonde, R., & J.D. Lundquist (**2015**), Evaluating observational methods to quantify snow duration under diverse forest canopies, *Water Resources Research, 51*.

7. Landry, C.C., K.A. Buck, **M.S. Raleigh**, & M.P. Clark (**2014**), Mountain system monitoring at Senator Beck Basin, San Juan Mountains, Colorado: A new integrative data source to develop and evaluate models of snow and hydrologic processes, *Water Resources Research*, *50*.

6. **Raleigh, M.S.**, C.C. Landry, M. Hayashi, W.L. Quinton, & J.D. Lundquist (**2013**), Approximating snow surface temperature from standard temperature and humidity data: New possibilities for snow model and remote sensing evaluation, *Water Resources Research*, *49*.

5. **Raleigh, M.S.**, Rittger, K., Moore, C.E., Henn, B., Lutz, J.A., & J.D. Lundquist (**2013**), Ground-based testing of MODIS fractional snow cover in subalpine meadows and forests of the Sierra Nevada, *Remote Sensing of Environment*, *128*, 44-57.

4. Henn, B., **Raleigh, M.S.**, Fisher, A., & J.D. Lundquist (**2013**), A comparison of methods for filling gaps in hourly near-surface air temperature data, *Journal of Hydrometeorology*, 14, 929-945.

3. Ford, K.R., Ettinger, A.K., Lundquist, J.D., **Raleigh, M.S.**, & J. Hille Ris Lambers (**2013**), Spatial heterogeneity in ecologically important climate variables at coarse and fine scales in a high-snow mountain landscape, *PLoS ONE*, *8*(6): e65008.

2. Slater, A.G., Barrett, A.P., Clark, M.P., Lundquist, J.D., & **M.S. Raleigh** (**2013**), Uncertainty in seasonal snow reconstruction: relative impacts of model forcing and image availability, *Advances in Water Resources*, 55, 165-177.

1. **Raleigh, M.S.** & J.D. Lundquist (**2012**), Comparing and combining SWE estimates from the SNOW-17 model using PRISM and SWE reconstruction, *Water Resources Research*, *48*, W01506.

Scientific Reports and Other Products

1. Durand, M., Gatebe, C., Kim, E., Molotch, N., Painter, T. H., **Raleigh, M.S.**, Sandells, M., and C. Vuyovich (**2018**). NASA SnowEx Science Plan: Assessing Approaches for Measuring Water in Earth's Seasonal Snow, version 1.7.

Datasets

5. Breen, C. M., C. Lumbrazo, C. Hiemstra, C. Vuyovich, **M. S. Raleigh**, and H.P. Marshall (**2022**). SnowEx20 Grand Mesa Time-Lapse Imagery (SNEX20_TLI), Version 1. Boulder, Colorado USA. NASA National Snow and Ice Data Center Distributed Active Archive Center. doi: https://nsidc.org/data/SNEX20_TLI.

4. **Raleigh, M. S.**, W. R. Currier, J. D. Lundquist, P. Houser, and C. Hiemstra (**2022**). SnowEx17 Time-Lapse Imagery, Version 1.. Boulder, Colorado USA. NASA National Snow and Ice Data Center Distributed Active Archive Center. doi: https://doi.org/10.5067/WYRNU50R9L5R.

3. **M.S. Raleigh** (**2021**), Multi-year measurements of tree motion from an accelerometer on a fir tree near Niwot Ridge, Colorado, https://doi.org/10.5281/zenodo.5149308.

2. **M.S. Raleigh** (**2021**), Multi-year measurements of tree motion from an accelerometer on a spruce tree near Niwot Ridge, Colorado, https://doi.org/10.5281/zenodo.5130616.

1. Small, E.E. and **M.S. Raleigh** (**2019**), NASA SnowEx 2016/2017, The GAGE Facility operated by UNAVCO, Inc., GPS/GNSS Observations Dataset, https://doi.org/10.7283/6QYA-CN57.

Conference Proceedings Papers

4. **Raleigh, M.S.,** & J.S. Deems (2018), Filling the holes in the space-time cube of snowpack evolution with lasers, cameras, computers, and snow shovels, 86th Western Snow Conference, Albuquerque, New Mexico.

3. **Raleigh, M.S.,** & J.S. Deems (2016), Investigating the response of an operational snowmelt model to unusual snow conditions and melt drivers, 84th Western Snow Conference, Seattle, Washington.

2. **Raleigh, M.S.,** & M.P. Clark (2014), Are temperature-index models appropriate for assessing climate change impacts on snowmelt? 82nd Western Snow Conference, Durango, Colorado.

1. **Raleigh, M.S.**, K. Rittger, & J.D. Lundquist (2011), What lies beneath? Comparing MODIS fractional snow covered area against ground-based observations under forest canopies and in meadows of the Sierra Nevada, 79th Western Snow Conference, Stateline, Nevada.

Scientific Writing and Editorials

2020-2022 Science Blogger, NSIDC/INSTAAR Snow Today, https://nsidc.org/snow-today
2011-2013 Columnist, PRISM Magazine, American Society for Engineering Education

GRANTS & FUNDING

Research Grants (as PI = $1.53 M, total = $3.05 M)

2022 **Principal Investigator**, Advancing the mapping of snow water equivalent with space ready remote sensing through snow model integration, NASA Terrestrial Hydrology Program (THP), **$466,796** (3 years, 2022-2025).

2022 **Co-Investigator**, Development of a Colorado-Wide Data Assimilation System to Provide Snow Water Equivalent Data and Water Supply Forecasts to Water Managers, NASA Applied Sciences Program: Water Resources, **$454,559** (3 years, 2022-2025).

2021 **Co-Investigator**, A 21st Century Collaborative Test Bed for Mountain Hydrology, NASA Terrestrial Hydrology Program (THP), Testbed scoping support (2 years, 2021-2023).

2020 **Co-Investigator**, Surface Atmosphere Integrated field Laboratory (SAIL), Department of Energy Atmospheric Radiation Measurement (ARM) Research Facility, Campaign and infrastructure support (2 years, 2021-2023).

2020 **Senior Personnel**, LTER: Long-Term Ecological Research at the H.J. Andrews Experimental Forest (LTER8), National Science Foundation (NSF), Collaborative research facility (6 years, 2020-2026).

2018 **Principal Investigator***, Improved process understanding of snow density and SWE across forested mountain landscapes from coordinated field observations and model analyses, NSF Hydrologic Sciences #1761441, **$531,033** (4 years, 2018-2022, N.C.E).

2018 **Co-Investigator**, Multiscale, process-based seasonal snowpack dynamics observations and modeling to support water and solute store and flux accounting in the LBNL Watershed Function SFA, Department of Energy, **$590,980** (3 years, 2018-2021).

2018 **Co-Investigator**, Improving subseasonal water supply prediction across the Western United States through assimilation of remotely sensed snow cover, snow albedo, and snow water equivalent in the NOAA National Water Model, NOAA JTTI, **$412,419** (2 years, 2018-2020).

2018 **Co-Investigator**, Satellite-based snow persistence maps for SNOTEL site characterization, Colorado Water Conservation Board, **$61,000** (1 year, 2018-2019).

2017 **Principal Investigator***, Improving in situ snowpack sampling strategies for constraining modeled density and SWE from Lidar-based snow depth across landscapes in SnowEx, NASA Terrestrial Hydrology Program, NNX17AL41G, **$528,408** (5 years, 2017-2022).

(*Switched roles from PI to Co-I in 2020 with transition to Oregon State University)

Fellowships, Awards, & Honors

2018 Runner-up, Best Conference Paper, 86th Western Snow Conference
2013 Editor's Citation for Excellence in Reviewing from the American Geophysical Union (WRR)
2013 Dean's Award, University of Washington College of Engineering, Community of Innovators
2012 Editor's Citation for Excellence in Reviewing from the American Geophysical Union (WRR)
2012 Hydro Research Foundation Fellowship (1 year)
2012 University of Washington Ronald E. Nece Fellowship
2012 U.S. Society on Dams Grand Scholarship
2012 CH2M Hill Engineers Without Borders (EWB) USA Scholarship
2011 Dr. James E. Church Memorial Award, Best Student Paper, 79th Western Snow Conference
2010 American Water Works Association – Ameron International Scholarship

2009 NASA Earth and Space Science Graduate Fellowship (3 years)
2008 American Water Resources Association Washington Section Scholarship
2007 University of Washington Valle Scholarship (1 year)

TEACHING, LECTURING, & EDUCATOR TRAINING

Assistant Professor, Oregon State University, (2020-present)
GEOG 423/523 Snow Hydrology (W22)
GEOG 380/480, 580 Remote Sensing: Principles and Applications (F20, F21, F22)

Instructor, University of Colorado, Boulder (2019)
GEOL 4725 Surface Hydrology Field Class

Instructor, University of Washington, Seattle (2012)
CEE 345 Hydraulic Engineering

Teaching Assistant / Grader, University of Washington, Seattle (2009-2012)
CEE 345 Hydraulic Engineering (1 academic term)
CEE 424 GIS for Civil Engineers (4 academic terms)

Guest Lectures
Remote Sensing of Snow, Terrestrial Hydrology, Snow Hydrology, Hydrological Modeling, Water Resources Seminars, Hydraulic Engineering, Open Channel Hydraulics

Educator Training
2021 Workshop for Early Career Geoscience Faculty

2016 Summer Teaching-as-Research Institute for Postdocs in Engineering, University of Colorado Boulder & Center for the Integration of Research, Teaching and Learning (CIRTL)

2014 An Introduction to Evidence-Based Undergraduate STEM Teaching, Center for the Integration of Research, Teaching and Learning (CIRTL)

ADVISING & MENTORSHIP

Graduate faculty member of (1) Geography, (2) Water Resources Graduate Program

Students Advised at Oregon State University

Ph.D. Students (2):	Bareera Mirza: 2026 (anticipated), Geography Hannah Steele: 2026 (anticipated),, Geography
M.S. Students (2):	Anna Jensen: 2022 (anticipated), Geography Hannah Steele: 2022, Geography
Undergraduate interns (9):	Isabella Ayala (S22), Kyle Strachan (S22), Parker Grimes (W22), Aziz Almohannadi (W22), Julia Wilson (W22-S22), Beatrix Kritzer (W22-S22), Lauren Ringrose, (W22-S22) Marilyn Hawkens, (W22-S22) Nicholas DuVernay (W21-S21)

Students Co-Advised at University of Colorado

Postdoctoral scholars (1):	Gabriela Collao-Barrios: 2019-present
Ph.D. Students (2):	Hannah Bonner: 2022, Geological Sciences Eric Smyth: 2022, Geological Sciences
M.S. Students (1):	Alexandra Michell: 2019, Geological Sciences

Undergraduate interns (8): Elizabeth Hebel, Eric Ruggles, Valerie Foley, Leah McCafferty, Edward Cruise, Jordan Kaschinske, John Drew Scherer, Noah McCorkel

Graduate Student Committee Membership (Oregon State University, unless noted otherwise)

Degree	Student Name	Graduate Program	Grad. Year
PhD (10)	Christina Aragon	Water Resources	
	Keira Johnson	Water Resources	
	Zachariah Butler	Biological & Ecological Engineering	
	Mohsen Taherkhani (GCR)	Civil Engineering	
	Tifong Chin (GCR)	Civil Engineering	
	Vipul Chitnis (GCR)	Civil Engineering	
	Yerel Morales	Civil Engineering (U. de Chile)	
	Ben Roberts-Pierel	Geography	2021
	Thomas Enzminger	Geological Sciences (U. Colorado)	2019
	Keith Jennings	Geography (U. Colorado)	2018
MS (7)	Ian Whidden	Water Resources	
	Nadia Cohen	Civil Engineering	
	Erica Kim	Environmental Science	
	Name Withheld	Environmental Science	
	Melinda Vickers	Geography	2022
	Oyin Ndiomu	Geography	2022
	Shane Ransbury	Fisheries and Wildlife	2022

SERVICE, OUTREACH, & LEADERSHIP

University Service

2022	Michael Freilich Scholarship Committee Member
2021-present	CEOAS Strategic Planning Taskforce Member
2021-present	Geography Graduate Committee Member (co-chair 2021-present)
2021-2022	Geospatial Analysis Tenure-Track Position Search Committee Member
2021-present	CEOAS Promotion and Tenure Committee, Observer
2021-2022	CEOAS Peer Review of Teaching Committee Member
2021-present	Water Resources Graduate Program Scholarship Committee Member
2021-present	OSU Graduate School Scholarship Committee Member
2021	Geography & Geospatial Science Instructor Position Search Committee Member
2012	Civil Engineering and Atmospheric Science Faculty Position Search Committee Member, University of Washington

Professional Service

2021-Present	Member, HJ Andrews Diversity, Equity, and Inclusion Committee
2018–Present	Member, National Snow and Ice Data Center User Working Group
2017–Present	Member, NASA SnowEx THP16 Science Team

Academic Journal Editing

2017–Present	Associate Editor, *Journal of Hydrometeorology*

Academic Journal Reviewing

Arctic, Antarctic, and Alpine Research; Cold Regions Science and Technology; Computers and Geosciences; Earth and Space Science; Frontiers of Earth Science; Geophysical Research Letters; Geoscientific Instrumentation, Methods and Data Systems; Geoscientific Model Development; Hydrological Processes; Hydrology; Hydrology and Earth Systems Science; Journal of the

American Water Resources Association; Journal of Applied Meteorology and Climatology; Journal of Atmospheric and Oceanic Technology; Journal of Hydrology; Journal of Hydrometeorology; Nature; Nature – Scientific Reports; Remote Sensing; Remote Sensing of Environment; Science Advances; The Cryosphere; Water Resources Research

Proposal Reviewing

National Aeronautics and Space Administration (NASA); National Science Foundation (NSF)

K-12 Outreach

2015–2019	Science Fair Judge, Colorado State Science and Engineering Fair
2016	Science Fair Judge, Colorado STEM Academy
2015	Guest Speaker, Weather and Climate Class, New Vista High School
2006-2007	Math and Science Tutor, Colorado Association of Black Professional Engineers and Scientists

Humanitarian and Environmental Outreach

2012	Watershed restoration volunteer, Duwamish Alive! (Seattle, WA)
2008	Design and implementation team, Engineers Without Borders Roadway Improvement Project (Acasio, Bolivia)

Leadership

2018–Present	Co-chair, NASA SnowEx Science Plan Working Group
2007–2013	American Water Resources Association, University of Washington chapter, President (2008-2009), Professional Liaison (2009-2010), Webmaster (2007-2013)
2008–2011	Engineers Without Borders, University of Washington chapter, President (2009-2011), Vice President (2008-2009)

Professional Memberships

American Geophysical Union (AGU); American Meteorological Society (AMS); American Society for Engineering Education (ASEE); American Water Resources Association (AWRA); Engineers Without Borders (EWB); National Association of Geoscience Teachers (NAGT); Tau Beta Pi

CONFERENCE ACTIVITIES & PRESENTATIONS

Conference Organization and Volunteering

2021-Present	Committee Member, Western Snow Conference, N. Pacific Committee
2018–2021	Committee Member, Western Snow Conference, S. Continental Committee
2014–Present	OSPA Judge, AGU Fall Meeting
2013–Present	Session Co-convener/Chair, AGU Fall Meeting, Cryosphere and Hydrology
2012	Chair, Terrestrial Impacts Session, Graduate Climate Conference
2010	Planning Committee, Graduate Climate Conference (Pack Forest, WA)
2009	Planning Committee, AWRA National Conference (Seattle, WA)
2008	Planning Committee, EWB International Conference (Seattle, WA)

Invited Presentations

2022 **Raleigh, M.S.,** Impacts of the 2021 Western North America Heat Dome on Snowpack and Streamflow in the Pacific Northwest, OSU Water Resources Grad Program Symposium, May 18.

2021 **Raleigh, M.S.** et al., Snow in forest canopies: new insights from old ideas, CU Hydrologic Science Research Symposium, April 8.

Oral Presentations

2021 **Raleigh, M.S.**, E. Smyth, & E.E. Small, Mapping uncertainty in modeled snowpack density across climates and landscapes, American Geophysical Union Fall Meeting, December 13-17.

2020 **Raleigh, M.S.** et al., Quantifying canopy-intercepted snow mass from tree sway observations: a demonstration over six winters in a subalpine coniferous forest, American Geophysical Union Fall Meeting, December 1-17.

2019 **Raleigh, M.S.** et al., Field data reveal the opportunities and pitfalls of assimilating snow remote sensing for SWE, NASA SnowEx 2019 Workshop, September 16-19.

2018 **Raleigh, M.S.,** & E. Gutmann, What can tree sway tell us about snow interception?, MtnClim 2018, September 17-21.

2017 **Raleigh, M.S.**, & E.E. Small, What is the dominant source of uncertainty when mapping basin-wide SWE with airborne Lidar and a snow model? CU Hydrologic Science Research Symposium, April 7.

2017 **Raleigh, M.S.,** E. Smyth, & E.E. Small, Improving snow density estimation for mapping SWE with Lidar snow depth: assessment of uncertainty in modeled density and field sampling strategies in NASA SnowEx, American Geophysical Union Fall Meeting, December 11-15.

2015 **Raleigh, M.S.**, K. Lapo, D. Marks, A. Hedrick, G. Flerchinger, & M.P. Clark, Propagation of uncertainty in atmospheric longwave radiation to modeled snowpack and summer evapotranspiration at mountain research sites, International Conference on Alpine Meteorology, August 31 – September 4.

2014 Landry, C.C., K.A. Buck, **M.S. Raleigh**, & M.P. Clark, High elevation headwaters hydrology and snow monitoring at Senator Beck Basin, San Juan Mountains, Colorado, USA: a 7 year dataset, Mountain Observatories Global Fair and Workshop on Long-Term Observing Systems of Mountain Social-Ecological Systems, July 16-19.

2013 **Raleigh, M.S.,** C.C. Landry, M. Hayashi, W.L. Quinton, & J.D. Lundquist, Approximating snow surface temperature from standard temperature and humidity data: New possibilities for snow model and remote sensing evaluation, American Geophysical Union Fall Meeting, December 9-13.

2013 **Raleigh, M.S.,** & J.D. Lundquist, Modeling in the dark: how data scarcity and uncertainty impact snowmelt modeling, Davos Atmosphere and Cryosphere Assembly (DACA-13), July 8-12.

2012 **Raleigh, M.S.**, & J.D. Lundquist, Different yet Similar: Studying Snow Cover Patterns in Wet and Dry Years Using Distributed Temperature Sensors in the Sierra Nevada, Yosemite Hydroclimate Meeting, October 11-12.

2010 **Raleigh, M.S.**, & J.D. Lundquist, An alternative approach to predicting snowfall across the Sierra Nevada, American Meteorological Society, 14th Conference on Mountain Meteorology, August 30 – September 3.

2009 **Raleigh, M.S.**, & J.D. Lundquist, Calculating snowmelt backwards – using the date of snowpack disappearance to determine how much snow fell over a season, 2009 Geological Society of America Meeting, October 18-21.

2009 **Raleigh, M.S.**, & J.D. Lundquist, Rain-on-snow events in a warmer world: hydrologic implications for the Sierra Nevada, Graduate Climate Conference, April 17-18.

<u>Poster Presentations</u>

2019 **Raleigh, M.S.**, G. Collao-Barrios, & J.S. Deems, Snowpack patterns in the East River, Colorado: Interannual Consistency and Associated Landscape Processes, American Geophysical Union Fall Meeting, December 9-13.

2018 **Raleigh, M.S.**, E. Smyth, & E.E. Small, Do snow models represent differences in snow density between forests and open areas for remote sensing of SWE?, American Geophysical Union Fall Meeting, December 10-14.

2016 **Raleigh, M.S.**, J.S. Deems, K. Rittger, & A. Pope, Shedding light on the hazy history of dust-on-snow in the Upper Colorado River Basin with snow measurements, modeling, and remote sensing, American Geophysical Union Fall Meeting, December 12-16.

2015 **Raleigh, M.S.**, K. Lapo, D. Marks, A. Hedrick, G. Flerchinger, & M.P. Clark, Cascading impacts of longwave radiation uncertainty on modeled snowmelt and summer evapotranspiration at mountain research sites, American Geophysical Union Fall Meeting, December 14-18.

2015 Fairfax, E., E. Small, C. Chew, **M.S. Raleigh**, & K. Larson, PBO H2O: Monitoring the terrestrial water cycle with reflected GPS signals recorded by the Plate Boundary Observatory Network, American Geophysical Union Fall Meeting, December 14-18.

2014 **Raleigh, M.S.**, Lundquist, J.D., & M.P. Clark, Which forcing data errors matter most when modeling seasonal snowpacks?, American Geophysical Union Fall Meeting, December 15-19.

2014 **Raleigh, M.S.**, Spatial and interannual variability of snow interception in forest canopies, CU Hydrologic Science Research Symposium, April 3-4.

2012 **Raleigh, M.S.**, Rittger, K., & J.D. Lundquist, Buried Treasure: Using distributed ground temperature sensors to test remote sensing of fractional snow cover, American Geophysical Union Fall Meeting, December 3-7.

2012 **Raleigh, M.S.**, Improving representation of high-elevation snowpack for summer water supply forecasting, United States Society on Dams, 2012 Annual Meeting and Conference, April 23 – 27.

2010 **Raleigh, M.S**. & J.D. Lundquist, Snowfall Accumulation in the Western United States: Comparing estimates from SWE reconstruction and PRISM, American Geophysical Union Fall Meeting, December 13-17.

2010 **Raleigh, M.S**. & J.D. Lundquist, A snow hydrologist's time machine: determining winter snow accumulation with springtime mass and energy exchanges at the snow-air interface, CUAHSI Biennial Colloquium, July 19-21.

2009 **Raleigh, M.S**. & J.D. Lundquist, Calculating snowmelt backwards – using the date of snowpack disappearance to determine how much snow fell over a season, American Geophysical Union Fall Meeting, December 14-18.

2008 **Raleigh, M.S.**, F.C. Lott, & J.D. Lundquist, Evaluation of Precipitation Scaling Using the Observed Snow Cover Disappearance Date, American Geophysical Union Fall Meeting, December 15-19.