

William "Ryan" Currier, Ph.D. | Curriculum Vitae

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Education

University of Washington <i>Doctor of Philosophy in Civil Engineering, Hydrology and Hydrodynamics</i>	Seattle, WA 2019
University of Washington <i>Master of Science in Civil Engineering, Hydrology and Hydrodynamics</i>	Seattle, WA 2016
University of Colorado <i>Bachelor of Arts in Environmental Studies, and Ecology & Evolutionary Biology</i>	Boulder, CO 2013

Publications

First Author

- Currier, W. R.** and others, 2024. End-of-century changes in orographic precipitation with the Intermediate Complexity Atmospheric Research Model over the western United States. *J. Hydrometeor.* in review
- Currier, W. R.** and others, 2023. Vegetation representation influences projected streamflow changes in the Colorado River Basin. *J. Hydrometeor.* doi:[10.1175/JHM-D-22-0143.1](https://doi.org/10.1175/JHM-D-22-0143.1)
- Currier, W. R.** and others, 2022. The impact of forest-controlled snow variability on late-season streamflow varies by climatic region and forest structure. *Hydrological Processes* doi:[10.1002/hyp.14614](https://doi.org/10.1002/hyp.14614)
- Currier, W. R.** and others, 2019. Comparing aerial lidar observations with terrestrial lidar and snow-probe transects from NASA's 2017 SnowEx campaign. *Water Resour. Res.*, doi:[10.1029/2018WR024533](https://doi.org/10.1029/2018WR024533)
- Currier, W. R.** and J. D. Lundquist, 2018. Snow depth variability at the forest edge in multiple climates in the western United States. *Water Resour. Res.*, doi:[10.1029/2018WR022553](https://doi.org/10.1029/2018WR022553)
- Currier, W. R.**, T. Thorson, and J. D. Lundquist, 2017. Independent evaluation of frozen precipitation from WRF and PRISM in the Olympic Mountains, WA, USA. *J. Hydrometeor.* doi:[10.1175/JHM-D-17-0026.1](https://doi.org/10.1175/JHM-D-17-0026.1)

Co-Author

- Breen, C., **W. R. Currier**, C. Vuyovich, Z. Miao, L. R. Prugh, 2024. Snow depth extraction from time-lapse imagery using a keypoint deep learning model *Water Resour. Res.*, in press
- Bytheway, J.L., **W. R. Currier**, M. Hughes, K. Mahoney, R. Cifelli, 2023. Evaluation of wintertime precipitation estimates and forecasts in the mountains of Colorado *J. Hydrometeor.* doi:[10.1175/JHM-D-23-0158.1](https://doi.org/10.1175/JHM-D-23-0158.1)
- de Boer, G. and others, 2023. Supporting advancement in weather and water prediction in the upper Colorado River Basin: The SPLASH campaign *Bulletin of the American Meteorological Society* doi:[10.1175/BAMS-D-22-0147.1](https://doi.org/10.1175/BAMS-D-22-0147.1)
- Lumbrazo, C., A. Bennet, **W. R. Currier**, B. Nijssen, J. D. Lundquist, 2022. Evaluating Multiple Canopy-Snow Unloading Parameterizations in SUMMA with Time-Lapse Photography Characterized by Citizen Scientists. *Water Resour. Res.*, doi:[10.1029/2021WR030852](https://doi.org/10.1029/2021WR030852)
- Sthapit, E., and others, 2022. Evaluation of Snow and Streamflows Using Noah-MP and WRF-Hydro Models in Aroostook River Basin, Maine. *Water* doi:[10.3390/w14142145](https://doi.org/10.3390/w14142145)
- Mazzotti, G., **W. R. Currier**, J. Deems, J. Pflug, J. D. Lundquist, and T. Jonas, 2019. Revisiting snow cover variability within forest stands: insights from airborne LiDAR data to inform modelling strategies. *Water Resour. Res.*, doi:[10.1029/2019WR024898](https://doi.org/10.1029/2019WR024898)
- Lundquist, J. D., C. Chickadel, N. Cristea, **W. R. Currier**, B. Henn, E. Keenan, and J. Dozier, 2018. Separating snow and forest temperatures with thermal infrared remote sensing. *Remote Sens. Environ.*, doi:[10.1016/j.rse.2018.03.001](https://doi.org/10.1016/j.rse.2018.03.001)
- Cao, Q., T. H. Painter, **W.R. Currier**, J. D. Lundquist, and D. P. Lettenmaier, 2017. Estimation of precipitation over the OLYMPLEX Domain during Winter 2015/16, *J. Hydrometeor.* doi:[10.1175/JHM-D-17-0076.1](https://doi.org/10.1175/JHM-D-17-0076.1)

Reports

- Gutmann, E., R. McCrary, **W.R. Currier**, K. Brooks, and N. Templeton, 2024. The Influence of Downscaling on Climate Projections, [WUCA Publication](#)

McCrary, R., **W.R. Currier**, E. Gutmann, K. Brooks, and N. Templeton, 2023. Improving the Vegetation Representation in Hydrologic Models Alters Hydroclimate Projections, [WUCA Publication](#)

Datasets

Currier, W. R., and E. D. Gutmann 2024: [En-GARD Downscaled Climate Data over the Colorado River Basin](#). Research Data Archive at the National Center for Atmospheric Research, Computational and Information Systems Laboratory.

Currier, W. R., E. D. Gutmann, B. Krut, T. Eidhammer, and R. McCrary 2024: [ICAR Downscaled Climate Data over the Western United States](#). Research Data Archive at the National Center for Atmospheric Research, Computational and Information Systems Laboratory.

Intrieri, J. M., D. L. Jackson, G. de Boer, J. Longenecker, M. M. Stachura and W. R. Currier 2023: NOAA PSL Level 3 Soil Probe Soil Moisture and Surface Temperature Data for SPLASH (v1.0). [Zenodo](#), [Dataset](#)

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 Archive Center.

Work Experience

Hydrologist

NOAA Physical Sciences Laboratory

Boulder, CO

2020–Present

Postdoctoral Fellow

National Center for Atmospheric Research

Boulder, CO

2020

Graduate Research Assistant

Mountain Hydrology Research Group

Seattle, WA

2014–2019

Institute for Snow & Avalanche Research (SLF)

Visiting Fellow

Davos, Switzerland

2018

Institute of Arctic and Alpine Research (INSTAAR)

Lab Technician

Boulder, CO

2013

Fellowships and Awards

NASA Earth and Space Science Fellowship

Improving snow water equivalent modeling in forests using remote sensing at multiple spatial scales.

2016–2019

Ronald and Mary Nece Endowed Fellowship

Awarded annually to the top Ph.D. students in the hydrology and hydrodynamics program, based on their Ph.D. dissertation, scholarship, and academic performance.

2019

Award Winning Student Presentation

AMS Annual Meeting: 28th Conference on Weather Analysis and Forecasting

2018

Seattle, WA

Skills and Competences

Computer Languages and Software

Proficient: Python, Matlab, C, Bash, HPC, GDAL, QGIS, ArcGIS, ENVI, $\text{\LaTeX}$

Familiar: Fortran, R

Geophysical Models

Proficient:

- Structure for Unifying Multiple Modeling Alternatives (SUMMA)
- Distributed Hydrologic Soil and Vegetation Model (DHSVM)
- Variable Infiltration Capacity (VIC) Model
- National Water Model/WRF-Hydro
- SnowModel/Micromet/SnowTran3D
- Intermediate Complexity Atmospheric Research (ICAR) Model
- Generalized Analog Regression Downscaling (GARD) Tool

Familiar:

- Weather Research and Forecasting (WRF) Model
- Snow Accumulation and Ablation Model (SNOW-17)
- Sacramento Soil Moisture Accounting Model (Sac-SMA)
- Long-Short Term Memory (LSTM), Random Forest
- NextGen Framework

Geophysical Data Collection and Surveying

- Stereo Based Imagery: *Ames Stereo Pipeline*, SfM: *Pix4d*, *DroneDeploy*
- GNSS: *Trimble and Emlid Software*, *RTKLib*
- Terrestrial Lidar Scanning: *Riegl RiSCAN Pro*, *CloudCompare*, *LAStools*, *PDAL*

Select Oral Presentations

Airborne Snow Observatory Workshop

2018. Lasers vs Lasers: A spatially explicit comparison between lidar datasets from NASA's 2017 SnowEx campaign.

American Geophysical Union Annual Meeting

2023. Examining future hydroclimate projections from statistically downscaled datasets and ICAR.

2022. Dynamically downscaled global climate models over the western United States.

2021. Modeling forest-controlled variability in a distributed watershed scale model.

2021. An updated vegetation dataset increases projected runoff changes in the Colorado River Basin.

2018. Lasers vs Lasers: A spatially explicit comparison between lidar datasets from NASA's 2017 SnowEx campaign.

2017. Snow depth variability at the forest edge in multiple climates in the western United States.

American Meteorological Society Annual Meeting

2024. What resolution snow model is needed for accurate streamflow timing and volume simulation?

2023. Dynamically downscaled global climate models over the western United States.

2022. An updated vegetation dataset increases projected runoff changes in the Colorado River Basin.

2017. An Independent Evaluation of the WRF model and PRISM in the Olympic Mountains, WA, USA for WY 2015 and 2016. *Student Award Recipient:* [Link to presentation](#).

Colorado River Symposium

2022. Using ICAR and En-GARD to understand future climate variability of the Colorado River Basin.

2021. Dynamically downscaled global climate models over the western United States.

International Conference on Alpine Meteorology

2023. Dynamically downscaled global climate models over the western United States using ICAR

Mountain Climate Conference

2018. Snow depth variability at the forest edge in multiple climates.

Northwest Weather Workshop, NOAA Regional Center

2017. An Independent Evaluation of the WRF model and PRISM in the Olympic Mountains, WA, USA for WY 2015 and 2016.

NOAA PSL Seminar

2021. Future Climate and Hydrologic Variability in the Colorado River Basin

Olympic National Park Perspective Series

2017. *Invited Speaker*, Fieldwork for Evaluating Precipitation Estimates.

Water Utility Climate Alliance Webinar

2021. Future Climate and Hydrologic Variability in the Colorado River Basin

Western Snow Conference

2023. What resolution snow model is needed for accurate streamflow timing and volume simulation?

2022. The impact of forest-controlled snow variability on late-season streamflow

2019. Lasers vs Lasers: A spatially explicit comparison between lidar datasets from NASA's 2017 SnowEx campaign

2018. Classifying hillslope-scale snow depth variability in multiple climates from lidar.

2016. Measuring Snow in the Olympic Mountains.

Poster Presentations

American Geophysical Union Annual Meeting.....

2024. How Do Different Downscaling Methods Impact Hydrology in the Upper Colorado River Basin?

2024. When Snowpack and Streamflow Relationships Break Down: Unraveling this Mystery by Combining Hydrometeorological Datasets and Data-Driven Modeling.

2020. Using ICAR and En-GARD to understand future climate variability of the Colorado River Basin.

2019. How does forest-edge snow depth variability affect streamflow?

Eastern Snow Conference.....

2017. Detecting forest-snow interception from MODIS fSCA and ancillary fractional vegetation data.

NASA SnowEx Workshop.....

2017. Evaluating the accuracy of LiDAR in forested areas and understanding the snow depth variability with respect to the canopy.

Precipitation Measuring Mission Workshop.....

2017. An Independent Evaluation of Frozen Precipitation from WRF and PRISM in the Olympic Mountains

Field Experience

NOAA'S SPLASH

Snow depth and temperature/RH monitoring

Gothic, Colorado

2021-2022

Switzerland Field Work

Coincident GPR, snow depth, and snow pit observations in forest stands.

Davos, Switzerland

2018

NASA's SnowEx

Set up time-lapse cameras and collected terrestrial lidar scans, snow depth, and snow pit obs.

Grand Mesa, CO

2017

NASA's OLYMPEX

Led students and set up a snow/meteorological observational network within remote locations.

Olympic National Park, WA

2014-2016

Infrared Remote Sensing

Thermal infrared camera observations coincident with airborne and satellite overpasses.

Yosemite National Park, CA

2016

Easton Glacier Field Survey

Semi-annual UAV SfM survey of the terminating mountain glacier.

Mount Baker, WA

2017-2018

Energy Balance Towers

Maintained/analyzed eddy covariance and meteorological instruments/observations.

Colorado & Washington

2013-2015

Snoqualmie Pass in Washington, Five Ameriflux Towers in the Front Range of Colorado.

Volunteer Experience

Reviewer.....

- o Water Resources Research, The Cryosphere, Hydrologic Processes, Remote Sensing of the Environment, Earth and Space Science, Journal of Climate, USBR Proposals, Journal of Hydrology

Professional.....

Author, Southwest, National Climate Assessment

Evaluate a wide range of scientific and technical reports from diverse and authoritative sources to provide comprehensive analysis on the state of climate as well as the adaptation and mitigation to any changes in climate in the Southwest United States.

Boulder, CO

2024-Current

A high school module for rain-on-snow flooding

Presented at: UW Program on Climate Change & CUHASI Virtual Poster Session.

High school module contains a [YouTube video](#) on rain-on-snow-flooding

Seattle, WA

2015

CUHASI Snow Measurement Field School Teaching Assistant

Field sampling strategies/techniques based on scientific objectives, time, and financial constraints.

Fraser, CO

2018

UW Freshwater Initiative Steering Committee Member

Developed the Freshwater Dam Exploration Series that led a fieldtrip tour around Diablo Dam.
Organized a student discussion, and a faculty and professional about dams.

Seattle, WA*2017–Present***USGS National Research Program**

Retrieved and analyzed data from five different Eddy Covariance Towers to look at the biological and physical processes that control the generation, consumption, and exchange of greenhouse gases.

Lakewood, CO*2013–2014***Educational**

NOAA CIRES Mentoring

Work life balance, grant writing, career development, networking.

Boulder, CO*2022***NOAA Hollings and Lapenta Scholar Mentor**

Help students formulate research hypotheses, test them, write code, present their research, analyze hydrologic models, and conduct observations in the field.

Boulder, CO*2021,2023***Mary Gates Fellowship Mentor**

Help students formulate research hypotheses and write research proposals, test them, write code, present their research, run hydrologic models, and collect quality observations.

Seattle, WA*2015–2018***University of Washington Engineering Discovery Days**

Taught K-12 students about infrared radiation and using it to predict mountain runoff

Seattle, WA*2015–2019***American Meteorological Society Weatherfest**

Taught K-12 students how to convert from snow depth to snow water equivalent

Seattle, WA*2017***Professional Memberships**

- o American Geophysical Union, *Member since 2017*
- o American Meteorological Society, *Member since 2016*