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

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Education

University of Washington — **Seattle, WA**
Doctor of Philosophy in Civil Engineering, Hydrology and Hydrodynamics — *2019*

University of Washington — **Seattle, WA**
Master of Science in Civil Engineering, Hydrology and Hydrodynamics — *2016*

University of Colorado — **Boulder, CO**
Bachelor of Arts in Environmental Studies, and Ecology & Evoluntinary Biology — *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

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

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

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

Currier, W. R., T. Thorson, and J. D. Lundquist, 2017. Independent evalution of frozen precipitation from WRF and PRISM in the Olympic Mountains, WA, USA. *J. Hydrometeor.* doi: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

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

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

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

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

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. Enviro.*, doi: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 OLYMPEX Domain during Winter 2015/16, *J. Hydrometeor.* doi: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

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

Work Experience

Research Hydrologist — **Boulder, CO**
NOAA Physical Sciences Laboratory — *2020–Present*

Postdoctoral Fellow — **Boulder, CO**
National Center for Atmospheric Research — *2020*

Graduate Research Assistant — **Seattle, WA**
Mountain Hydrology Research Group — *2014–2019*

Institute for Snow & Avalanche Research (SLF) — **Davos, Switzerland**
Visiting Fellow — *2018*

Institute of Arctic and Alpine Research (INSTAAR) — **Boulder, CO**
Lab Technician — *2013*

Fellowships and Awards

NASA Earth and Space Science Fellowship — **2016–2019**
Improving snow water equivalent modeling in forests using remote sensing at multiple spatial scales.

Ronald and Mary Nece Endowed Fellowship — **2019**
Awarded annually to the top Ph.D. students in the hydrology and hydrodynamics program, based on their Ph.D. dissertation, scholarship, and academic performance.

Award Winning Student Presentation — **2018**
AMS Annual Meeting: 28th Conference on Weather Analysis and Forecasting — *Seattle, WA*

Skills and Competences

Computer Languages and Software

Proficient: Python, Matlab, C, Bash, HPC, GDAL, QGIS, ArcGIS, ENVI, 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 Moisutre Accounting Model (Sac-SMA)
- Long-Short Term Memory (LSTM), Random Forest
- NextGen Framework

Geophysical Data Collection and Surverying

- Stereo Based Imagery: *Ames Stereo Pipeline*, SfM: *Pix4d, DroneDeploy*
- GNSS: *Trimble and Emlid Software, RTKLib*
- Terrestial 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

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 — **Gothic, Colorado**
Snow depth and temperature/RH monitoring — *2021-2022*

Switzerland Field Work — **Davos, Switzerland**
Coincident GPR, snow depth, and snow pit observations in forest stands. — *2018*

NASA's SnowEx — **Grand Mesa, CO**
Set up time-lapse cameras and collected terrestial lidar scans, snow depth, and snow pit obs. — *2017*

NASA's OLYMPEX — **Olympic National Park, WA**
Led students and set up a snow/meterological observational network within remote locations. — *2014–2016*

Infrared Remote Sensing — **Yosemite National Park, CA**
Thermal infrared camera observations coincident with airborne and satellite overpasses. — *2016*

Easton Glacier Field Survey — **Mount Baker, WA**
Semi-annual UAV SfM survey of the terminating mountain glacier. — *2017–2018*

Energy Balance Towers — **Colorado & Washington**
Maintained/analyzed eddy covaraince and meterological instruments/observations. — *2013–2015*
Snoqualmie Pass in Washington, Five Ameriflux Towers in the Front Range of Colorado.

Volunteer Experience

Reviewer

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

Professional

A high school module for rain-on-snow flooding — **Seattle, WA**
Presented at: UW Program on Climate Change & CUHASI Virtual Poster Session. — *2015*
High school module contains a YouTube video on rain-on-snow-flooding

CUHASI Snow Measurement Field School Teaching Assistant — **Fraser, CO**
Field sampling strategies/techniques based on scientific objectives, time, and financial constraints. — *2018*

UW Freshwater Initiative Steering Committee Member — **Seattle, WA**
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. — *2017–Present*

USGS National Research Program — **Lakewood, CO**
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. — *2013–2014*

Educational

NOAA CIRES Mentoring — **Boulder, CO**
Work life balance, grant writing, career development, networking. — *2022*

NOAA Hollings and Lapenta Scholar Mentor — **Boulder, CO**
Help students formulate research hypotheses, test them, write code, present their research, analyze hydrologic models, and conduct observations in the field. — *2021,2023*

Mary Gates Fellowship Mentor **Seattle, WA**
Help students formulate research hypotheses and write research proposals, test them, write code, present their research, run hydrologic models, and collect quality observations. *2015–2018*

Univeristy of Washington Engineering Discovery Days **Seattle, WA**
Taught K-12 students about infrared radiation and using it to prediction mountain runoff *2015–2019*

American Meterological Society Weatherfest **Seattle, WA**
Taught K-12 students how to convert from snow depth to snow water equivalent *2017*

Professional Memberships

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