

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

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## Education

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

- 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 OLYMPEX 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)

## Work Experience

<b>Research Hydrologist</b> <i>NOAA Physical Sciences Laboratory</i>	<b>Boulder, CO</b> 2020–Present
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<b>Postdoctoral Fellow</b> <i>National Center for Atmospheric Research</i>	<b>Boulder, CO</b> 2020
<b>Graduate Research Assistant</b> <i>Mountain Hydrology Research Group</i>	<b>Seattle, WA</b> 2014–2019
<b>Institute for Snow &amp; Avalanche Research (SLF)</b> <i>Visiting Fellow</i>	<b>Davos, Switzerland</b> 2018
<b>Institute of Arctic and Alpine Research (INSTAAR)</b> <i>Lab Technician</i>	<b>Boulder, CO</b> 2013

## Fellowships and Awards

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<b>NASA Earth and Space Science Fellowship</b> Improving snow water equivalent modeling in forests using remote sensing at multiple spatial scales.	<b>2016–2019</b>
<b>Ronald and Mary Nece Endowed Fellowship</b> Awarded annually to the top Ph.D. students in the hydrology and hydrodynamics program, based on their Ph.D. dissertation, scholarship, and academic performance.	<b>2019</b>
<b>Award Winning Student Presentation</b> AMS Annual Meeting: 28th Conference on Weather Analysis and Forecasting	<b>2018</b> <i>Seattle, WA</i>

## Skills and Competences

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### 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

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### 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

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**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

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**NOAA'S SPLASH**

*Snow depth and temperature/RH monitoring*

**Gothic, Colorado**

*2021-2022*

<b>Switzerland Field Work</b> <i>Coincident GPR, snow depth, and snow pit observations in forest stands.</i>	<b>Davos, Switzerland</b> 2018
<b>NASA's SnowEx</b> <i>Set up time-lapse cameras and collected terrestrial lidar scans, snow depth, and snow pit obs.</i>	<b>Grand Mesa, CO</b> 2017
<b>NASA's OLYMPEX</b> <i>Led students and set up a snow/meteorological observational network within remote locations.</i>	<b>Olympic National Park, WA</b> 2014–2016
<b>Infrared Remote Sensing</b> <i>Thermal infrared camera observations coincident with airborne and satellite overpasses.</i>	<b>Yosemite National Park, CA</b> 2016
<b>Easton Glacier Field Survey</b> <i>Semi-annual UAV SfM survey of the terminating mountain glacier.</i>	<b>Mount Baker, WA</b> 2017–2018
<b>Energy Balance Towers</b> <i>Maintained/analyzed eddy covariance and meteorological instruments/observations. Snoqualmie Pass in Washington, Five Ameriflux Towers in the Front Range of Colorado.</i>	<b>Colorado &amp; Washington</b> 2013–2015

## Volunteer Experience

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### Reviewer

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

### Professional

<b>A high school module for rain-on-snow flooding</b> <i>Presented at: UW Program on Climate Change &amp; CUHASI Virtual Poster Session.</i> High school module contains a <a href="#">YouTube video</a> on rain-on-snow-flooding	<b>Seattle, WA</b> 2015
<b>CUHASI Snow Measurement Field School Teaching Assistant</b> Field sampling strategies/techniques based on scientific objectives, time, and financial constraints.	<b>Fraser, CO</b> 2018
<b>UW Freshwater Initiative Steering Committee Member</b> 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.	<b>Seattle, WA</b> 2017–Present
<b>USGS National Research Program</b> 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.	<b>Lakewood, CO</b> 2013–2014

### Educational

<b>NOAA CIRES Mentoring</b> Work life balance, grant writing, career development, networking.	<b>Boulder, CO</b> 2022
<b>NOAA Hollings and Lapenta Scholar Mentor</b> Help students formulate research hypotheses, test them, write code, present their research, analyze hydrologic models, and conduct observations in the field.	<b>Boulder, CO</b> 2021,2023
<b>Mary Gates Fellowship Mentor</b> Help students formulate research hypotheses and write research proposals, test them, write code, present their research, run hydrologic models, and collect quality observations.	<b>Seattle, WA</b> 2015–2018
<b>Univeristy of Washington Engineering Discovery Days</b> Taught K-12 students about infrared radiation and using it to prediction mountain runoff	<b>Seattle, WA</b> 2015–2019
<b>American Meteorological Society Weatherfest</b> Taught K-12 students how to convert from snow depth to snow water equivalent	<b>Seattle, WA</b> 2017

## Professional Memberships

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