PAUL D. BROOKS

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##### *EDUCATION*

1991 - 1995 University of Colorado, Boulder, CO;

Degree Conferred: Ph.D. Biogeochemistry, 1995

1990 - 1991 University of Colorado, Boulder, CO;

Degree Conferred: M.B.S. Riparian Eco-Hydrology, 1991

##### *EMPLOYMENT and APPOINTMENTS*

2017 – Present Director, Interdisciplinary Graduate Program in Hydrology and Water Resources, University of Utah

2014 - Present Professor, Department of Geology and Geophysics, University of Utah, Salt Lake City, UT

2015 – 2017 Director, Utah Experimental Program to Stimulate Competitive Research (EPSCoR)

2000 - Present Faculty Affiliate, Institute of Arctic and Alpine Research, University of Colorado, Boulder

2000 – 2014 Assistant/ Associate/ Full Professor, Department of Hydrology and Water Resources, University of Arizona, Tucson, AZ

2009 – 2013 Director, Center for Sustainability of semi-Arid Hydrology and Riparian Areas (SAHRA), University of Arizona, Tucson, AZ

2000 - 2014 Faculty Associate, Institute for the Environment University of Arizona, Tucson

2008 Visiting Fellow, TIIMES and BEACHON Programs, National Center for Atmospheric Research, Boulder, CO

1998 - 1999 Research Assistant Professor, Institute of Arctic and Alpine Research, University of Colorado, Boulder CO

1996 - 1997 National Research Council Research Associate, U.S. Geological Survey – Water Resources Division, Boulder, CO

1991 - 1995 Research Assistant, Institute of Arctic and Alpine Research, Teaching Assistant, Environmental, Population, and Organismal Biology; University of Colorado, Boulder, CO

1987 - 1990 Research Associate, Center for Biomedical, Toxicological, and Hazardous Waste Research, Florida State University, Tallahassee, FL and Boulder, CO

1986 Microbiologist/ Chemist, Institute for Applied Microbiology, Oak Ridge National Lab, Oak Ridge TN

***RECENT AWARDS***

2021 Elected as Fellow of the American Geophysical Union

2021 American Federation of Mineralogical Societies Excellence in Mentoring

***SERVICE***

**Synergistic Activities:**

* Director, Hydrology 2030, AGU
* Great Salt Lake Strike Team (2022-2024)
* Founding Director, Interdisciplinary Graduate Program in Hydrology and Water Resources, University of Utah (2017-present)
* Board of Directors, Wasatch Environmental Observatory (2019 – present)
* Plenary Session Lead, Gordon Research Conference on Catchment Science, (2017)
* Utah State EPSCoR Director: Integrating research and educational strengths focused on water resources and air quality across research intensive and primarily undergraduate institutions
* Convener for 1 to 4 sessions each year at American Geophysical Union (AGU) annual meeting
* AGU – Multiple Technical Committee (2002 – present)
* Consortium of Universities for the Advancement of Hydrological Science (CUAHSI) – Multiple Roles on Committees and Institute representative (2004 – present)

**Editorial:**

* *Water Resources Research*, Associate Editor
* *AGU Cryosphere Journal*, Subject Editor (Snow)
* *The History of Snow Survey and Water Supply Forecasting,* USDA NRCS
* *Wetland Ecology: Principles and Conservation,* Cambridge University Press
* *Snow Ecology****, an interdisciplinary examination of snow-covered ecosystems,*** Cambridge University Press
* *Snow and Climate: Physical Processes, Surface Energy Exchange and Modeling,* Cambridge University Press
* *Ecohydrology*: A journal proposal to Wiley and Sons, Ltd

**Program reviews and panels:**

* CSU – ESS/ NREL Warner College of Natural Resources (2022-2023)
* NSF – PREEVENTS Panel (multiple years)
* DOE – SBR and TES review panels and reverse site visits (multiple years)
* NSF – Hydrology Panel (multiple years)
* NSF – Science and Technology Program
* NSF - WATERS Network Design and Program Office (multiple years)
* NSF – OPP Arctic Natural Sciences (multiple years)
* U.S. Forest Service (multiple years)
* U.S. Geological Survey (multiple years)
* Arizona Technology Research Infrastructure Fund (TRIF) (multiple years)
* Hydrologic Observatory workshop and standing committee, CUAHSI (multiple years)
* CUAHSI Audit Committee (multiple years)

**Proposal reviews:** (6-10 ad hoc per year, and regular panels)

National Science Foundation (EAR, DEB, OPP, OIA), U.S. Department of Agriculture, National Park Service, U.S. Department of Energy, National Aeronautics and Space Administration, US Environmental Protection Agency, NWO – Netherlands Organization for Scientific Research, Los Alamos National Laboratory; State of Arizona; State of Wisconsin; State of New Mexico; Kearney Foundation, CA; State of Wisconsin; NSERC, Canada

**Manuscript Reviews**: (10 - 12 per year)

Arctic, Antarctic, and Alpine Research, Biogeochemistry, Climatic Change, Ecology, Ecological Applications, Ecohydrology, Ecology, Ecological Applications, Ecosphere, Ecosystems, Eastern Snow Conference, Environmental Monitoring and Assessment, Geochimica et Cosmichimica Acta, Geochemistry, Geoderma, Geography Compass, Geophysical Research Letters, Global Biogeochemical Cycles, Global Change Biology, Hydrobiologia, Hydrology and Earth System Science (HESS), Hydrologic Processes, Hydrometeorology, International Association of Hydrological Sciences, Journal of the American Water Resources Association, Journal of Environmental Quality, Journal of Geophysical Research, Journal of Hydrology, Journal of Hydrometeorology, Journal of the North American Benthological Society, Nature, Oecologia, PNAS, Royal Society of Biology Letters, Soil Science Society of America, Water Resources Research

**Reviews for Promotion and Tenure**:

Colorado State University, Cornell University, Boise State University, University of California, University of Colorado, Washington State University, SLU-Swedish Agricultural University, University of Montana, Montana State University, University of Washington, University of Idaho, Purdue University, Rutgers University

### Stakeholder and Community Engagement: (last five years)

* Great Salt Lake Strike Team
* Friends of Alta Board Member
* Water Supply and Climate Vulnerability, Weber Basin Water Conservancy District
* Water Supply and Forest Management, Ashley National Forest
* Science Advisory Board, Carpe Diem Network and Healthy Headwaters
* Water Supply and Climate Vulnerability Assessment, Salt Lake City Public Utilities
* Water Supply and Water Quality, The Mountain Accord, Wasatch Range Utah
* Water Supply, Salt River Project, Phoenix, AZ
* Hydrology and Hydrochemistry, Valles Caldera National Preserve and Trust, USFS
* Docent training on snowmelt-derived water supply, NHMU
* Community Science Presentations/ Science Cafes, ~2 per year
* Media: NPR, KUER, Salt Lake Tribune, New York Times, KSL, Fox 13, Washington Post, Austrian Public Television, HCN, among others

**Departmental and University Committees**: (Last five years)

* Director, Hydrology and Water Resources Certificate Program (2017 – Present)
* Chair and member, Merit Review Committee (2018 – Present)
* Chair, Graduate Affairs (2017 – 2021)
* Graduate School Advisory Council (2019-2021)
* Director, Wasatch Environmental Observatory (2018 – Present)
* Departmental Executive Committee (2017 – 2021)
* EARTH Core Facility (2017 – Present)
* University Utah Water Center (2017 – Present)
* Curriculum Revision Committee (2014-2017)
* CMES Naming Committee (2016 – 2017)
* CMES Facilities Committee (2016 – 2017)
* Graduate Affairs (2014 – 2016)
* Co-Chair, G&G Seminar Series (2015-16, 2019-20, 2022-23)
* Retention, Promotion, and Tenure (2014 – 2019)

##### *PUBLICATIONS*

**Peer Reviewed Journal Articles – In Review and Revision**

Wolf, M. A., Jamison, L.R., Strong, S., Brooks, P.D. (In Revision) Periodic Variability in Groundwater Storage in Headwater Streams of the Upper Colorado River: Implications for Runoff Efficiency, *Journal of the American Water Resources Association*

Bosworth, L., Smith, R.M., Culbertson, A., Jamison, L.R., Burnett, P., Brooks, P.D. (In Revision) Streamflow and Groundwater Response to Stream Restoration using Beaver Dam Analogs, *Rivers*

**Peer Reviewed Journal Articles – Published and In Press**

Wolf, M., Jamison, L.R., Solomon, D.K., Strong, S., Brooks, P.D. (2023) Multi-year Climatic Controls on Groundwater Storage in Seasonally Snow-Covered Headwater Catchments, *Water Resources Research* 59 (6), e2022WR033394

Stone, L., Strong, C., Bai, H., Reichler, T., McCabe, G., Brooks, P.D. (2023) Atlantic-Pacific influence on Western US hydroclimate and water resources, *npj Climate and Atmospheric Science* 6(1):139 DOI:10.1038/s41612-023-00471-7

Webb, R., Litvak, M., Brooks, P.D. (2023) The Role of Terrain-Mediated Hydroclimate in Vegetation Recovery after Wildfire, *Environmental Research Letters* 18 (6), 064036

# Hasan, M.M., Strong, S., Brooks, P.D., Burian, S., Barber, M.E.(2023) Quantifying Climate Change Impacts on Low Flows of Small High Mountain Watersheds, *Journal of Hydrology, Regional Studies* 40(2023) 101463

Tyler, S., Kent, J., Anderson, S.P., Brooks, P.D., Packman, A., Uijlenhoet, R., Western, A., Zeng, X. (2023) Reflections and Thoughts on the Future of Science from AGU Hydrology Section Fellows, *Perspectives of Earth and Space Scientists* 4(1) e2023CN000206

Hwang, K., Harpold, A.A., Tague, C., Lowman, L., Boisrame, G.F.S., Lininger, K.B., Sullivan, P.L., Manning, A., Graup, L., Litvak, M., Lewis, G., Miller, K., Brooks, P.D., Barnard, H.R. (2023) Seeing the disturbed forest for the trees: Remote sensing is underutilized to quantify critical zone response to unprecedented disturbance, *Earth’s Future* 11.8 (2023): e2022EF003314

Gordon, B.L., Brooks, P.D., Krogh, S.A., Boisrame, G.F.S., Carroll, R.W.H., McNamara, J.P., and Harpold, A.A. **(**2022**)** A data-driven review to understand streamflow risk to climate induced changes in seasonal snow dynamics, *Environmental Research Letters Environ. Res. Lett.* 17 (5), 053004

Hale, C.A., Carling, C.T., Nelson, S.T., Fernandez, D.P., Brooks, P.D., Rey, K.A., Tingey, D.G., Packer, B.N., and Aanderud, Z.T., (2022) Strontium Isotope Dynamics Reveal Streamflow Contributions from Shallow Flow Paths During Snowmelt in a Montane Watershed, Provo River, Utah, USA, *Hydrological Processes* 36(1), e14458 https://doi.org/10.1002/hyp.14458

Brooks, P. D., Gelderloos, A., Wolf, M. A., Jamison, L. R., Strong, C., Solomon, D. K., et al. (2021). Groundwater- mediated memory of past climate controls water yield in snowmelt- dominated catchments. *Water Resources Research*, *57*, e2021WR030605. https:// doi.org/10.1029/2021WR030605

Follstad Shah, J.J., Bares, R., Bowen, B.B., Bowen, G.J., Bowling, D.R., Eiriksson, D.P., Fasoli, B., Fiorella, R.P., Hallar, A.G., Hinners, S.J., Horel, J.D., Jacques, A.A., Jamison, L.R., Lin, J. C., Mendoza, D.L., Mitchell, L.E., Pataki, D.E., Skiles, S.M., Smith, R.M., … Brooks, P.D. (2021). The Wasatch Environmental Observatory: A mountain to urban research network in the semi-arid western US. *Hydrological Processes*, 35(9),  <https://doi.org/10.1002/hyp.14352>

Tai, X., Venturas, M.D., Mackay, D.S.,  Brooks, P.D., and  Flanagan, L.B.(2021) Lateral subsurface flow modulates forest mortality risk to future climate and elevated CO2

Environ. Res. Lett. 16 084015

Johnson, R.C., Wolf, M.A., Jamison, L. Burian, S. Oroza, C.A., Brooks, P.D.; Strong, C., Stewart, J. and Kirkham, T. (2021) Drought in the West: Embedded Water Demand Stationarity Compromises System Vulnerability Analysis, Open Water Journal: Vol. 7 : Iss. 1 , Article 6.

Grijseels, N.H., M. Buchert, P.D. Brooks, D.E. Pataki (2021) Using LiDAR to assess transitions in riparian vegetation structure along a rural-to-urban land use gradient in western North America, *Ecohydrology,* 2020;e2259 https://doi.org/10.1002/eco.2259

Christensen, L., H.R. Adams, X. Tai, H.R. Barnard, P.D. Brooks (2021) Increasing plant water stress and decreasing summer streamflow in response to a warmer and wetter climate in seasonally snow covered forests, *Ecohydrology* 2020;e2256. https://doi.org/10.1002/eco.2256

Tai, X, W.R. L. Anderegg, P.D. Blanken, S.P. Burns, L. Christensen, P.D. Brooks (2020) Hillslope hydrology influences the spatial and temporal patterns of remotely sensed ecosystem productivity, *Water Resources Research,* DOI: 10.1029/2020WR027630

Tai, X,. D.S. Mackay, B. Ewers, A. Parsekian, D. Beverly, H. Speckman, P.D. Brooks, W. Anderegg, (2019) Plant hydraulic stress explained tree mortality and tree size explained beetle attack in a mixed conifer forest, *JGR Biogeosciences* DOI 10.1029/2019JG005272

Follstad Shah, J., Y. Jameel, R. Smith, R. Gabor, P. D. Brooks, and S. Weintraub (2019) Altered hydrologic connectivity and spatio-temporal variability in water sources impact chemical and physical properties of a semi-arid arid urban river system, *JAWRA* DOI: 10.1111/1752-1688.12734

Fan, Y, M Clark, D M Lawrence, S Swenson, L E Band, S L Brantley, P D Brooks, W E Dietrich, A Flores, G Grant, J W Kirchner, D S Mackay, J J McDonnell, P C D Milly, P L Sullivan, C Tague, H Ajami, N Chaney, A Hartmann, P Hazenberg, J McNamara, J Pelletier, J Perket, E Rouholahnejad-Freund, T Wagener, X Zeng, E Beighley, J Buzan, M Huang, B Livneh, B P Mohanty, B Nijssen, M Safeeq, C Shen, W van Verseveld, J Volk, D Yamazaki (2019). Hillslope hydrology in global change research and Earth system modeling. *Water Resources Research*, 55. https://doi.org/10.1029/2018WR023903

Love, D.M., M. D. Venturas, J. S. Sperry, P. D. Brooks, J. L. Pettit, Y. Wang, W. R. L. Anderegg, X. Tai, and D. S. Mackay, (2018) Dependence of Utah Aspen Stands on a Subsurface Root Zone Subsidy: Implications for Climate Change Impacts, *Water Resources Research****,*** DOI: 10.1029/2018WR023468

Neilson, B.T., H. Tennant, T.L. Stout, M. Miller, R.S. Gabor, Y. Jameel, M. Millington, A. Gelderloos, G. Bowen, P. D. Brooks (2018) Stream centric methods for establishing groundwater contributions in karst mountain watersheds, *Water Resources Research,* <https://doi.org/10.1029/2018WR022664>

## Tai, X., D.S. Mackay, J.S. Sperry, P.D. Brooks, W.R.L. Anderegg, L.B. Flanagan, S.B. Rood, C. Hopkinson  (2018) Distributed Plant Hydraulic and Hydrological Modeling to Understand the Susceptibility of Riparian Woodland Trees to Drought‐Induced Mortality, *Water Resources Research,* <https://doi.org/10.1029/2018WR022801>

 Perdrial, J., Brooks, P.D., Swetnam, T., Lohse, K.A., Rasmussen, C., Litvak, C., Harpold, A.A., Zapata-Rios, X., Broxton, P., Mitra, B., Meixner, T., Condon, K., Huckle, D., Stielstra, C., Vázquez-Ortega, A., Lybrand, R., Holleran, M., Orem, C., Pelletier, J., Chorover, J. (2018) A net ecosystem carbon budget for snow-dominated, forested headwater catchments: linking water and carbon fluxes to critical zone carbon storage, *Biogeochemistry* 138: 225. https://doi.org/10.1007/s10533-018-0440-3

Harpold, A.A. and P.D. Brooks (2018) Humidity will determine snowpack response to climate change, *Proc Nat Acad Sci* doi:10.1073/pnas.1716789115

Gabor, R.S., S. J. Hall, D. Eiriksson, Y. Jameel, M. Millington, T. Stout, M. L. Barnes, A. Gelderloos, H. Tennant, G. J. Bowen, B. T. Neilson P.D. Brooks (2017) Persistent urban influence on surface water quality via impacted groundwater *Environ. Sci. Tech* DOI: 10.1021/acs.est.7b00271

Tenant, C. J., A.A. Harpold, K.A. Lohse, S.E. Godsey, B.T. Cosby, L. G. Larsen, P. D. Brooks, and R.W. Van Kirk (2017) Regional sensitivities of seasonal snow cover to elevation, aspect, and vegetation structure in western North America, *Water Resources Research* 53, Issue 8, 6908–6926, DOI: 10.1002/2016WR019374

Swetnam, T., P.D. Brooks, H.R. Barnard, A.A. Harpold, E. Gallo (2017) Revisiting environmental gradient ecology: how topography trumps climate in determining forest carbon reservoir size, *Ecosphere* 8 (4), e01797. 10.1002/ecs2.1797

McIntosh, J.C., Schuamberg, C., Perdrial, J., Harpold, A.A., Vázquez-Ortega, A., Rasmussen, C., Zapata-Rios, X., Brooks. P.D., Meixner, T., Pelletier, J., Derry, L., Chorover, J. (2017) Geochemical evolution of the Critical Zone across variable time scales informs concentration-discharge relationships: Jemez River Basin Critical Zone Observatory, *Water Resources Research* DOI: 10.1002/2016WR019712

Tai, Xiaonan, D. Scott Mackay, William R. L. Anderegg, John S. Sperry, Paul D. Brooks (2017) Incorporating plant hydraulics improves and topography mediates prediction of aspen mortality in southwestern USA, *New Phytologist,* DOI:10.1111/nph.14098

Weintraub, S.R. P. D. Brooks, and G.J. Bowen (2017) Interactive effects of vegetation type and topographic position on nitrogen availability and loss in a temperate montane ecosystem, *Ecosystems* DOI 10.1007/s10021-016-0094-8

Burns, M.A., H. R. Barnard, R.S. Gabor, D.M. McKnight, P.D. Brooks (2016) Dissolved Organic Matter Transport and Transformation Reflects Hillslope to Stream Connectivity during Snowmelt in a Semi-arid Catchment, *Water Resources Research* DOI: 10.1002/2015WR017878

Foster, L. Bearup, L., Molotch, N., Brooks, P.D., and Maxwell, R. (2016) Energy Budget Changes Impact Arid Mountain Hydrology More Than Snow-Rain Transitions, *Environ. Res. Lett*. 11 044015 doi:10.1088/1748-9326/11/4/044015

Biederman, J. A., Meixner, T., Harpold, A.A., Reed, D.E., Gutmann, E.D., Guan, J.A. and Brooks, P.D. (2016) Riparian zones attenuate nitrogen loss following bark beetle-induced lodgepole pine mortality, *J Geophys. Res. Biogeosci* 121, doi:10.1002/2015JG003284

Hall S., Weintraub S., Eiriksson D., Brooks P.D., Baker M., Bowen G., and Bowling, D. (2016) Stream nitrogen inputs reflect groundwater across a snowmelt-dominated montane to urban watershed, *Environ. Sci. Tech.*2016, *50* (3), pp 1137–1146 DOI: 10.1021/acs.est.5b04805

Field, J.P., D.D. Breshears, D.J. Law, L. López-Hoffman, P.D. Brooks, J. Chorover, J.D. Pelletier. (2016) Understanding ecosystem services from a geosciences perspective, Eos, 97, doi:10.1029/2016EO043591

Zapata-Rios X., C. Rasmussen, J. McIntosh, L. P.D. Brooks., P.A. Troch., J. Chorover (2016) Influence of climate variability on water partitioning and effective energy and mass transfer (EEMT) in a semi-arid critical zone, Hydrol. Earth Syst. Sci., 20, 1103-1115, doi:10.5194/hess-20-1103-2016, 2016.

Biederman, J.A., A.J. Somor, A.A. Harpold, E.D. Guttman, D.D. Breshears, P. A. Troch, D.J. Gochis, D.D. Breshears, P.A. Troch, R.Scott, A.J. Meddens, and P.D. Brooks. (2015) Tree die-off has little effect on streamflow in contrast to expected increases from historical studies, *Water Resources. Research* doi/10.1002/2015WR017401

Zapata-Rios X., P.D. Brooks, P.A. Troch, J. McIntosh., Q. Guo (2015), Influence of terrain aspect on water partitioning, vegetation structure and vegetation greening in high elevation catchments in northern New Mexico. *Ecohydrology* DOI:10.1002/eco.1674

Brooks P.D., J. Chorover, Y.F. Reinfelder, S.E., Godsey, R.M. Maxwell, J.P. McNamara, N.C. Tague (2015) Hydrological Partitioning in the Critical Zone: Recent Advances and Opportunities for Developing Transferrable Understanding of Water Cycle Dynamics, *Water Resources Research* 10.1002/2015WR017039

Zapata-Rios X., J. McIntosh., L. Rademacher., T. Meixner., P.D. Brooks., P.A. Troch., J. Chorover (2015), Climatic and landscape controls on water transit times and silicate mineral weathering in the critical zone. Water Resources Research; DOI:10.1002/2015WR017018

Gallo, E. L., T. Meixner, H. Aoubid, K. A. Lohse, and P. D. Brooks. (2015) Combined Impact of Catchment Size, Land Cover and Precipitation on Streamflow and Stream  Nitrogen: A Global Comparative Analysis *Global* *Biogeochemical Cycles* 29, 1109-1121 doi:10.1002/2015GB005154

Stielstra, C.M., K.A. Lohse, J. Chorover, J.C. McIntosh, M. Litvak, G. Baron-Gafford, H. Barnard, and P.D. Brooks (2015) Climatic and Landscape Influences on Soil Moisture are Primary Determinants of Soil Carbon Fluxes in Seasonally Snow-covered Forest Ecosystems, *Biogeochemistry* DOI 10.1007/s10533-015-0078-3

Berryman, E.M., Barnard, H.R., Adams, H.R., Burns, M.A., Gallo, E., Brooks, P.D. (2015) Complex terrain alters temperature and moisture limitations of forest soil respiration across a semi-arid to subalpine gradient, *JGR-Biogeosciences,* **DOI:**10.1002/2014JG002802

Pangle, L.A. S. B. DeLong, Nate Abramson, J. Adams, G. Barron-Gafford, D. D. Breshears, P.D. Brooks, J. Chorover,W. Dietrich, K. Dontsova, M. Durcik, J. Espeleta, T. Ferre, R. Ferriere, W. Henderson, E. Hunt, T. E. Huxman, D. Millar, B. Murphy, G. Y. Niu, M. Pavao-Zuckerman, J. D. Pelletier, C. Rasmussen, J. Ruiz, S. Saleska, M Schaap, M. Sibayan, P. A. Troch, M. Tuller, J. van Haren, X. Zeng(2015) The Landscape Evolution Observatory: large-scale controllable infrastructures to study coupled Earth-surface processes, *Geomorphology,* http://dx.doi.org/10.1016/j.geomorph.2015.01.020

Vázquez-Ortega, A., J. Perdrial, A. Harpold, X. Zapata-Ríos, C. Rasmussen, J. McIntosh, M. Schaap, J. D. Pelletier, P. D. Brooks, and M. K. Amistadi (2015), Rare earth elements as reactive tracers of biogeochemical weathering in forested rhyolitic terrain, *Chemical Geology*, *391*, 19-32.

Harpold, Adrian A.,Noah P. Molotch, Keith N. Musselman, Roger C. Bales, Peter B. Kirchner, Marcy Litvak, and Paul D. Brooks (2015) Soil Moisture Response to Snowmelt Timing in Mixed-Conifer Subalpine Forests, *Hydrological Processes* 29 (12)2782-2798DOI: 10.1002/hyp. 10400

Broxton, P., A. Harpold, J. Biederman, P. Troch, N. Molotch, P.D. Brooks, (2015) Quantifying the Effects of Vegetation Structure on Snow Accumulation and Ablation in Mixed-Conifer Forests, *Ecohydrology* DOI: 10.1002/eco. 1565

Field, J.P. David D. Breshears, Darin J. Law, Laura López-Hoffman, Paul D. Brooks, Jon Chorover, Greg A. Barron-Gafford, Rachel E. Gallery, Marcy E. Litvak, Rebecca Lybrand, Jennifer McIntosh, Thomas Meixner, Guo-Yue Niu, Shirley A. Papuga, Jon D. Pelletier, Craig. R. Rasmussen, and Peter A. Troch (2014) A perspective on areas of emphasis for critical zone services, *Vadose Zone Journal* DOI: 10.2136/vzj2014.10.0142

Biederman, J. A., A.A. Harpold, D.J. Gochis, B.E. Ewers, D. E. Reed, S.A. Papuga, and P. D. Brooks (2014) Increased evaporation following widespread forest mortality limits streamflow response, *Water Resources Research 50:7 5395-5409* DOI: 10.1002/2013WR014994

Riha, K. G. Mikalski, E. Gallo. K. Lohse, T. Meixner, and P.D. Brooks (2014) High atmospheric nitrate inputs and nitrogen turnover in semi-arid urban catchments, *Ecosystems* 10.1007/s10021-014-9797-x

Harpold, A.A., Q. Guo, N. Molotch, P. D. Brooks, R. Bales, J.C. Fernandez-Diaz, K.N. Musselman, T.L. Swetnam, P. Kirchner, M. Meadows, J. Flanagan, and R. Lucas (2014) LiDAR-Derived Snowpack Datasets From Mixed Conifer Forests Across the Western U.S., Water Resources Research 03/2014; DOI:10.1002/2013WR013935

Harpold, A.A., Biederman, J. A., K. Condon, M. Merino, Y. Korgaondar, T. Nan, L. Sloat, M. Ross, and P.D. Brooks (2014) Changes in Snow Accumulation and Ablation Following the Las Conchas Forest Fire, New Mexico, USA *Ecohydrology* **7**, 440**–**452 *DOI: 10.1002/eco.1363*

Perdrial, J., J. McIntosh, A. Harpold, P.D. Brooks, X. Zapata-Rios, C. Porter, J. Ray, P. Troch, J. Chorover, (2013) Impact of winter climate change and catchment aspect on carbon dynamics in snow-dominated headwater streams, *Biogeochemistry,* DOI 10.1007/s10533-013-9929-y

Gallo, E. L., K. A. Lohse, P. D. Brooks, C. M. Ferlin and T. Meixner, (2013) Physical and biological controls on trace gas fluxes in semi-arid urban ephemeral waterways, *Biogeochemistry* DOI 10.1007/s10533-013-9927-0.

Sorooshian, A., Shingler, T., Harpold, A., Feagles, C. W., Meixner, T., and Brooks, P. D. (2013) Aerosol and precipitation chemistry in the southwestern United States: spatiotemporal trends and interrelationships, Atmos. Chem. Phys. Discuss., 13, 8615-8662, doi:10.5194/acpd-13-8615-2013

Pelletier, J.D., G. A. Barron-Gafford, D. D. Breshears, P. D. Brooks, J. Chorover, M. Durcik, C. J. Harman, T. E. Huxman, K. A. Lohse, R. Lybrand, T. Meixner, J. C. McIntosh, S. A. Papuga, C. Rasmussen, M. Schaap, T. L. Swetnam, and P. A. Troch (2013) Coevolution of vegetation, soils, and topography in the sky islands of southern Arizona, *Journal of Geophysical Research - Earth Surface 118(2) 741-758*

Gallo, E. L., Brooks, P. D., Lohse, K. A. and McLain, J. E. T. (2013), Land cover controls on summer discharge and runoff solution chemistry of semi-arid urban catchments. Journal of Hydrology, 485: 37–53. doi: [10.1016/j.jhydrol.2012.11.054](http://dx.doi.org.ezproxy1.library.arizona.edu/10.1016/j.jhydrol.2012.11.054),

Gallo, E. L., Brooks, P. D., Lohse, K. A. and McLain, J. E. T. (2013), Temporal patterns and controls on runoff magnitude and solution chemistry of urban catchments in the semiarid southwestern United States. *Hydrological Processes*. 27: 995–1010. doi: 10.1002/hyp.9199

Harpold, A.A., P.D. Brooks, S. Rajagopal, I. Heiduechel, A. Jardine, and C. Stielstra. (2012). Changes in Snowpack Accumulation and Ablation in the Intermountain West, *Water Resources Research* VOL. 48, W11501, doi:10.1029/2012WR011949

Gallo, E.L., Lohse, K.A., P. D. Brooks, J.E.T. McLain, J.McIntosh, and T. Meixner (2012) Influence of channel substrate type on storage and transport of urban storm runoff in an arid environment. *Journal of Hydrology*, 470–471 (2012) 98–110; http://dx.doi.org/10.1016/j.jhydrol.2012.08.047

Edburg, S.L. J.A. Hicke, P.D. Brooks, E.G. Pendall, B. E. Ewers, U. Norton, D. Gochis, and E. Gutmann, (2012) Cascading Impacts of Bark Beetle-Caused Tree Mortality to Coupled Biogeophysical and Biogeochemical Processes, *Frontiers in Ecology and Environment* doi:10.1890/110173

Biederman, J. A., Brooks, P. D., Harpold, A. A., Gutmann, E., Gochis, D. J., Reed, D. E., & Pendall, E. (2012). Multi-scale Observations of Snow Accumulation and Peak Snowpack Following Widespread, Insect-induced Lodgepole Pine Mortality. *Ecohydrology* 5 NOV 2012, DOI: 10.1002/eco.1342

Frisbee, M. D. F.M. Phillips, G.S. Weisman. P.D. Brooks. J.L. Wilson. A.R. Campbell, and F. Liu (2012) Unraveling the Mysteries of the Large Watershed Black Box: Implications for the Streamflow Response to Climate and Landscape Perturbations, *Geophysical Research Letters* 39, L01404, DOI:10.1029/2011GL050416

Chorover, J., P. Troch, P. Brooks, C. Rasmussen, J. Pelletier, J. McIntosh, K. Lohse, M. Schaap, D. Breshears, T. Meixner, S. Papuga, T. Huxman, A. Harpold and J. Perdrial. (2012) How water, carbon, and energy drive critical zone evolution: The Jemez–Santa Catalina Critical Zone Observatory. *Vadose Zone J.* **10**, 884-899 (Special Issue on Critical Zone Observatories)

Meixner, T., P.D. Brooks, J. Hogan, and C. Soto (2012) Carbon and nitrogen cycling in semi-arid rivers and streams, Geography Compass, 6/9 (2012): 546–559, 10.1111/j.1749-8198.2012.00510.x

Thompson, S.E., C.J. Harman R. Schumer, J.S. Wilson, N.B. Basu, P.D. Brooks, S.D. Donner, M.A. Hassan, A.I. Packman, P.S.C. Rao, P.A. Troch and M. Sivapalan (2011) Patterns, Puzzles and People: Implementing Hydrologic Synthesis, Hydrological Processes, DOI: 10.1002/hyp.8234

Brooks, P.D., P.A. Troch, M. Durcik, E. Gallo, and M. Schlegel (2011) Quantifying regional-scale ecosystem response to changes in precipitation: Not all rain is created equal, Water Resources Research, Water Resour. Res., 47, W00J08, doi:10.1029/2010WR009762

Brooks, P.D., P. Groffman, P. Grogan, M. Oquist, and P.H. Templer (2011) Biogeochemistry of Seasonally Snow-Covered Soil, Geography Compass, DOI: 10.1111/j.1749-8198.2011.00420.x

Voepel, H., B. Ruddell, R. Schumer, P.A. Troch, P.D. Brooks, A. Neal, M. Durcik, and M. Sivapalan, (2011) Quantifying the role of climate and landscape characteristics on hydrologic partitioning and vegetation response, Water Resources Research, doi:10.1029/2010WR009944

Thompson, S., C. Harman, P.A. Troch, P.D. Brooks, M. Sivapalan (2011) Spatial Scale Dependence of Ecohydrologically Mediated Water Balance Partitioning: A Synthesis Framework for Catchment Ecohydrology, Water Resources Research, 7, W00J03,doi:10.1029/2010WR009998

Bates, B.L., J.C. McIntosh, K.A. Lohse, and P.D. Brooks (2011) Influence of groundwater flowpaths, nutrients, and redox chemistry on the extent of microbial methanogenesis in coal beds: Powder River Basin, USA, Chemical Geology, [Volume 284, Issues 1-2](http://www.sciencedirect.com/science?_ob=PublicationURL&_tockey=%23TOC%235799%232011%23997159998%233098772%23FLA%23&_cdi=5799&_pubType=J&view=c&_auth=y&_acct=C000055186&_version=1&_urlVersion=0&_userid=9555371&md5=2e00b2f7d956fbc1188e55c60eee3686), 9 May 2011, Pages 45-61, clear[doi:10.1016/j.chemgeo.2011.02.004](http://dx.doi.org/10.1016/j.chemgeo.2011.02.004)

Neal, A.L., H. V. Gupta, S. A. Kurc, and P.D. Brooks, (2011) Flux Data Information Content and Gap Filling: A Case Study Using Artificial Neural Networks. Hydrol. Earth Syst. Sci., 15, 359-368, doi:10.5194 /hess-15-359-2011

Peters, N.E., J. K. Böhlke, P.D. Brooks, T.P. Burt, M.N. Gooseff, D.P. Hamilton, P.J. Mulholland, N.T. Roulet, J.Turner, (2011) Hydrology and Biogeochemical Linkages, In: Peter Wilderer (ed.) Treatise on Water Science, vol. 2, pp. 271– 304 Oxford: Academic Press.

Gustafson, J.R., P.D. Brooks, N.P. Molotch, and W. Veatch, (2010) Quantifying snow sublimation using natural tracer concentrations and isotopic fractionation in a forested catchment, Water Resour. Res., 46, W12511, doi:10.1029/2009WR009060

Rasmussen, C., P.A. Troch, J. Chorover, P.D. Brooks, T. Huxman, and J. Pelletier (2010) An Open System Energy-Based Approach for Predicting Critical Zone Structure and Function, Biogeochemistry 102:15-29, DOI: 10.1007/s10533-010-9476-8

Troch, P.A., G.F. Martinez, V.R.N. Pauwels, M. Durcik, M. Sivapalan, C. Harman, P.D. Brooks, H. Gupta, and T. Huxman (2009) Climate and vegetation water use efficiency at catchment scales

Hydrologic Processes 23:2409 – 2414 (2009) DOI: 10.1002/hyp.7358

Veatch, W., P.D. Brooks, J.R. Gustafson, and N. P. Molotch (2009) Quantifying the Effects of Forest Canopy Cover on Net Snow Accumulation at a Continental, Mid-Latitude Site, Ecohydrology, 2:115-128, DOI: 10.1002/eco.45

Molotch, N.P., P.D. Brooks, S.P. Burns, M. Litvak, R. K. Monson, J. R. McConnell, and K. Musselman (2009) Ecohydrological controls on snowmelt partitioning in mixed-conifer sub-alpine forests, Ecohydrology, 2:129-142, DOI: 10.1002/eco.48

Lohse, K.A., P.D. Brooks, J.C. McIntosh, T. Meixner, and T Huxman (2009) Interactions between biogeochemistry and hydrologic systems, Annual Review of Environment and Resources, 34:65-96, DOI: 10.1146/annurev.environ.33.031207.111141

Brooks, P.D. and E.R. Vivoni (2008) Mountain Ecohydrology: Quantifying the Role of Vegetation in the Water Balance of Montane Catchments, Ecohydrology 1:187-192 DOI: 10.1002/eco27

Lyon, S., P.A. Troch, P. Broxton, N.P. Molotch, and P.D. Brooks, (2008) Monitoring the timing of snow melt and the initiation of streamflow using a distributed network of temperature/light sensors, Ecohydrology 1:215-224 DOI: 10.1002/eco18

Rinehart, A.J., E.R. Vivoni and P.D. Brooks, (2008) Effects of Vegetation, Albedo and Radiation Sheltering on the Distribution of Snow in the Valles Caldera, New Mexico, Ecohydrology 1:253-270 DOI: 10.1002/eco26

Liu, F., R. Parmenter, P.D. Brooks, M.H. Conklin, R.C. Bales, (2008) Seasonal and interannual variation of streamflow pathways and biogeochemical implications in semiarid, forested catchments, Valles Caldera, New Mexico, Ecohydrology 1:239-252 DOI: 10.1002/eco22

Musselman, K., N. P. Molotch, andP. D. Brooks (2008) Quantifying the effects of forest vegetation on snow accumulation, ablation and potential meltwater inputs, Valles Caldera National Preserve, NM, USA, Hydrological Processes 22: 2767-2776 DOI:10.1002/hyp7050

Chung, G., K. Lansey, P. Blowers, P.D. Brooks, W. Ela, and S. Stewart, and P. Wilson, (2008), A General Water Supply Planning Model: Evaluation of Decentralized Treatment, Environmental Modeling and Software 23: 893-905 DOI: 10.1016/j.envsoft.2007.10.002

Brooks, P.D., J.A. Hogan, and T. Meixner, (2007) Water in the Desert: Introduction to the special feature on river and riparian biogeochemistry, Journal of Geophysical Research, 112, G03S05, DOI:10.1029/2007JG000556

Oelsner, G P., P D. Brooks, and J. F. Hogan, (2007) Quantifying Nitrogen Sources and Sinks within the middle Rio Grande, NM. Journal American Water Resources Association 43(4): 850-863

Brooks, P.D. and M.A. Lemon, (2007) Spatial Variability in Dissolved Organic Matter and Inorganic Nitrogen Concentrations in a Semi-arid Stream, San Pedro River, Arizona, Journal of Geophysical Research, 112, G03S05, DOI:10.1029/2006JG000262

Brooks, P.D., P.A. Haas, and A.K. Huth, (2007) Seasonal variability in the concentration and flux of organic matter and inorganic nitrogen in a semi-arid catchment, San Pedro River, Arizona, Journal of Geophysical Research, 112, G03S05, DOI:10.1029/2006JG000275

Meixner, T., A.K. Huth, P.D. Brooks, M.H. Conklin, N.B. Grimm, R.C. Bales, P.A. Haas, and J.R. Petti, (2007) Dissolved Organic Matter and Organic and Inorganic Nitrogen Concentrations During Monsoon Floods, San Pedro River, Arizona. Journal of Geophysical Research, 112, G03S05, DOI:10.1029/2006JG000266

Brooks, P.D, C.A. O’Reilly, S.A. Diamond, D.H. Campbell, R. Knapp, D. Bradford, P.S. Corn. B. Hossack, K. Tonnessen (2005) Spatial and Temporal Variability in the Amount and Source of Dissolved Organic Carbon: Implications for UV Exposure in Amphibian Habitats. Ecosystems 8:478-487

Diamond, S.A., P.C. Trenham, M.J. Adams, B. R. Hossack, R.A. Knapp, S.L. Stark, D. Bradford, P.S. Corn, K. Czarnowski, P.D. Brooks, D. Fagre, B. Breen, N. Detenback, K. Tonnessen (2005) Estimated Ultraviolet Radiation Doses in Wetlands in Six National Parks. Ecosystems 8:462-477

Brooks, P.D, D.M. McKnight, and K. Elder (2005) Carbon limitation of heterotrophic respiration under seasonal snowpacks: Implications for carbon balance in a changing climate, Global Change Biology **11** (12), 2266-2278

Brooks, P.D., D.M. McKnight, N.E. Driver and K.E. Bencala (2001) Annual Maxima in Zn concentrations during spring snowmelt, Environmental Geology 40:1447-1454.

Campbell, D.H., J.S. Baron, K.A. Tonnessen, P.D. Brooks, and P.F. Schuster (2000) Controls on nitrogen flux in two alpine/subalpine watersheds of the Front Range, Colorado, Water Resources Research 36:37-47

Brooks, P.D., D.M. McKnight and K.E. Bencala (1999) The relationship between over-winter soil heterotrophic activity and DOC export in high elevation catchments. Water Resources Research 35:1895-1902

Brooks, P.D., D.H. Campbell, K.A. Tonnessen and K. Heuer (1999) Natural variability in N export from headwater catchments: snow cover controls on ecosystem N retention. Hydrological Processes 13: 2191-2201, (Also Published as a chapter in *Snow Hydrology: The integration of physical, chemical, and biological systems.* J.Hardy, M. Albert, and P. Marsh, eds. John Wiley & Sons, Chichester, 374 pp)

Brooks P.D. and M.W. Williams (1999) Snowpack controls on nitrogen cycling and export in high elevation catchments, Hydrological Processes 13: 2177-2190, (Also Published as a chapter in *Snow Hydrology: The integration of physical, chemical, and biological systems.* J.Hardy, M. Albert, and P. Marsh, eds. John Wiley & Sons, Chichester, 374 pp)

Heuer, K., P. Brooks, and K. Tonnessen (1999) Nitrogen dynamics in paired high-elevation catchments during spring snowmelt, Rocky Mountains, CO. Hydrological Processes 13: 2203-2214, (Also Published as a chapter in *Snow Hydrology: The integration of physical, chemical, and biological systems.* J.Hardy, M. Albert, and P. Marsh, eds. John Wiley & Sons, Chichester, 374 pp)

West, A.E., P.D. Brooks, and S.K. Schmidt (1999) Landscape patterns of CH4 fluxes in an alpine tundra ecosystem, Biogeochemistry 45:243-250

Boyer, E.W., DM McKnight, KE Bencala, PD Brooks, MW Anthony, GW Zellweger, RE Harnish (1999) Streamflow and Water Quality Characteristics for the Upper Snake River and Deer Creek Catchments in Summit County, Colorado: Water Years 1980 to 1990. Occasional Paper No. 53, Institute of Arctic and Alpine Research, University of Colorado, 81 pp.

Walker, M.D., D.A. Walker, J.M. Welker, A.M. Arft, T. Bardsley, P.D. Brooks, J.T. Fahnestock, M.H. Jones, A.N. Parsons, T.R. Seastedt, and P.L. Turner (1999) Long-term experimental manipulations of winter snow regime and summer temperature. Hydrological Processes 13: 2315-2330, (Also Published as a chapter in *Snow Hydrology: The integration of physical, chemical, and biological systems.* J.Hardy, M. Albert, and P. Marsh, eds. John Wiley & Sons, Chichester, 374 pp)

Williams, M.W., P.D. Brooks, T. R. Seastedt (1998) Nitrogen and carbon soil dynamics in response to climate change in a high-elevation ecosystem in the Rocky Mountains, USA. Arctic and Alpine Research 30:26-30

Brooks, P.D., M.W. Williams, and S.K. Schmidt (1998) Soil inorganic N and microbial biomass dynamics before and during spring snowmelt, Biogeochemistry 43:1-15

Fahnestock J.T., M.H. Jones, P.D. Brooks and J.M. Welker (1998) Winter and early spring CO2 efflux from tundra communities of northern Alaska. Journal of Geophysical Research – Atmospheres, 103:29,023-29,027

Brooks, P.D., S.K. Schmidt, and M.W. Williams (1997) Winter production of CO2 and N2O from alpine tundra; environmental controls and relationship to inter-system C and N fluxes. Oecologia 110:403-413

Williams M.W., T.C. Davinroy, and P.D. Brooks (1997) Organic and inorganic nitrogen pools in talus fields and subtalus water, Green Lakes Valley, Colorado Front Range, Hydrologic Processes 11:1747-1760

Brooks, P.D., M.W. Williams, and S.K. Schmidt (1996) Microbial activity under alpine snowpacks, Niwot Ridge, CO Biogeochemistry, 32:93-113

Williams, M.W., P.D. Brooks, A.R. Mosier and K.A. Tonnessen (1996) Mineral N transformations in and under seasonal snow in a high-elevation catchment, Rocky Mountains, USA. Water Resources Research 32:3175-3185

**Peer Reviewed Chapters and Proceedings**

Brooks, P.D. and Lohse, K. A. (2009) Water quality in the San Pedro River. In: *Ecology and Conservation of the San Pedro River.* Stromberg, J. C. and Tellman, B., (eds) Tucson: University of Arizona Press.

Fisk M.C., P.D. Brooks, S.K. Schmidt (2001) Nitrogen cycling, In: *Structure and Function in an Alpine Ecosystem*. Bowman W.D. and Seastedt T.R. eds. Pages 237-253 Oxford Press, New York, 338pp.

Schmidt S.K., A.E. West, P.D. Brooks, C.H. Jaeger, M.C. Fisk, and E.A. Holland (2001) Soil-Atmosphere gas exchange across an alpine tundra landscape, In: *Structure and Function in an Alpine Ecosystem*. Bowman W.D. and Seastedt T.R. eds. Pages 237-253 Oxford Press, New York, 338pp.

Brooks, P.D., D.H. Campbell, K.A. Tonnessen and K. Heuer (1999) Natural variability in N export from headwater catchments: snow cover controls on ecosystem N retention. In *Snow Hydrology: The integration of physical, chemical, and biological systems.* J.Hardy, M. Albert, and P. Marsh, eds. John Wiley & Sons, Chichester, 374 pp., (Also Published in Hydrological Processes, 13: 2191-2201)

Brooks P.D. and M.W. Williams (1999) Snowpack controls on nitrogen cycling and export in high elevation catchments, In *Snow Hydrology: The integration of physcial, chemical, and biological systems.* J.Hardy, M. Albert, and P. Marsh, eds. John Wiley & Sons, Chichester, 374 pp., (Also Published in Hydrological Processes, 13: 2177-2190)

Walker, M.D., D.A. Walker, J.M. Welker, A.M. Arft, T. Bardsley, P.D. Brooks, J.T. Fahnestock, M.H. Jones, A.N. Parsons, T.R. Seastedt, and P.L. Turner. (1999) Long-term experimental manipulations of winter snow regime and summer temperature, In *Snow Hydrology: The integration of physical, chemical, and biological systems.* J.Hardy, M. Albert, and P. Marsh, eds. John Wiley & Sons, Chichester, 374 pp., (Also Published in Hydrological Processes, 13: 2315-2330)

Heuer, K., P. Brooks, and K. Tonnessen (1999) Nitrogen dynamics in paired high-elevation catchments during spring snowmelt, Rocky Mountains, CO, In *Snow Hydrology: The integration of physical, chemical, and biological systems.* J.Hardy, M. Albert, and P. Marsh, eds. John Wiley & Sons, Chichester, 374 pp., (Also Published in Hydrological Processes, 13: 2203-2214)

Brooks, P.D., S.K. Schmidt, and M.W. Williams (1995) Snowpack Controls on Soil Nitrogen Dynamics in the Colorado Alpine, In*: Biogeochemistry of Snow-covered Catchments*, K. Tonnessen, M. Williams, and M. Tranter, eds., International Association of Hydrological Sciences Publication 228, Wallingford, UK. pp. 283-292.

Brooks, P.D., S.K. Schmidt, D.A. Walker, and M.W. Williams (1995) The effect of a snow fence on snow pack accumulation, soil temperature, and subnivean heterotrophic respiration in alpine soils. In*: Biogeochemistry of Snow-covered Catchments*, K. Tonnessen, M. Williams, and M. Tranter, eds., International Association of Hydrological Sciences Publication 228, Wallingford, UK. pp. 293-302.

Brooks, P.D., S.K. Schmidt, R.A. Sommerfeld, and R. Musselman (1993) Distribution and abundance of microbial biomass in waning Rocky Mountain Snowpacks. *Proceedings of the 50th Eastern Snow Conference*, 50:301-306.

**Other Publications**

##### Harpold, A., J A. Biederman, and P.D. Brooks (2013) Where did all that snow go? Compensating vapor losses following forest disturbance in the Rocky Mountains, *Mountain Views* 6(1):22

Brooks, P.D. (2013) Spatial distribution of stable water isotopes in alpine snow cover, Interactive comment, *HESS*

Brooks, P.D. (2009) Review: A History of Snow Survey and Water Supply Forecasting. *Journal American Water Resources Association*, DOI: 10.1111/j.1752-1688.2009.00349.x

Brooks, P.D. (1999) The effects of climate change on soil carbon and nitrogen cycling in high elevation systems. In: *Yearbook of Science and Technology*. McGraw-Hill, New York.

##### *PUBLIC PRESENTATIONS FOR GENERAL AUDIENCES*

I present 5-10 public educational presentations each year to community organizations, stakeholders, and interest groups

##### *INVITED SCHOLARLY PRESENTATIONS (last five years)*

June 2023, Hydrologic Partitioning in the Critical Zone (Revisited): Moving from Basic Research to Societal Application, CUAHSI Biennial Meeting, Tahoe, CA

June 2023, The future of hydrology education, a panel discussion, CUAHSI Biennial Meeting, Tahoe, CA

December 2022, Climate, Hydrologic, and Systems Modeling to Assess Water Supply Vulnerability to Climate Change, American Geophysical Union Fall meeting, Chicago IL

September 2022, Climate Change and Western Water Resources: Bridging Basic Science and Application, University of Wyoming, Laramie WY

September 2022, Climate Change and Western Water Resources: Bridging Basic Science and Application, Geology and Geophysics, University of Utah

July 2022, Reflections and Thoughts on the Future of Science, Frontiers in Hydrology, San Juan, PR

December 2021, Predicting snowmelt-derived water resources in a changing climate: Warming and multi-year droughts reduce runoff efficiency by depleting groundwater storage and slowing melt, American Geophysical Union Fall meeting, New Orleans, LA

December 2019, When DS Does Not Equal 0: A Multi-year Climate Signal, Mediated through Groundwater, Controls Hydrologic Response to Climate Change in Seasonally Snow-covered Mountain Headwaters, Fall Meeting of the American Geophysical Union

December 2018, Multi-disciplinary Insights in to the Effects of Vegetation Change on Hydrologic Partitioning, Fall Meeting of the American Geophysical Union

September 2018, Beyond lapse rates: Spatial heterogeneity in energy-water coupling in mountain environments, MountainClim, Crested Butte, CO

##### *CONTRIBUTED SCHOLARLY PRESENTATIONS*

Along with students and collaborators, I have contributed 6 to 20 presentations per year to the annual American Geophysical Union meeting (December), Ecological Society of America Meeting (August), Geological Society of America, the American Society of Limnology and Oceanography, the North American Benthological Society meeting, the Arizona Hydrological Society, the Universities Council on Water Resources, and several other regional meetings