

# Richard P Fiorella

Department of Geology and Geophysics, University of Utah  
455 Frederick A Sutton Building, 115 S 1460 E, Salt Lake City, UT 84112  
email: [rich.fiorella@utah.edu](mailto:rich.fiorella@utah.edu) | phone: (385)-202-3760  
[richfiorella.org](http://richfiorella.org) | ORCID: 0000-0002-0824-4777  
[Publons profile](#) | Google Scholar: <https://goo.gl/74aKqF>

## EDUCATION

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- 2016 Ph.D., Geology, **University of Michigan**  
*Thesis Advisor: Christopher J. Poulsen*
- 2012 M.S., Earth and Environmental Sciences, **University of Michigan**
- 2009 B.S., Chemistry, **University of Pittsburgh**  
B.A., Environmental Studies, **University of Pittsburgh**

## PROFESSIONAL POSITIONS

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- 2019- Faculty Affiliate, Global Change and Sustainability Center, **University of Utah**
- 2019- Research Assistant Professor, Geology and Geophysics, **University of Utah**
- 2018-2019 Postdoctoral Scholar, Biology, **University of Utah**  
*Postdoctoral Advisors: James Ehleringer, William R.L. Anderegg*
- 2016-2018 Postdoctoral Scholar, Geology and Geophysics, **University of Utah**  
*Postdoctoral Advisor: Gabriel J. Bowen*

## PUBLICATIONS

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### Peer-Reviewed Journals

- In review/ [22] Follstad Shah, J. J., Bares, R., Bowen, B.B., Bowen, G.J., Bowling, D.R.,  
in revision Eiriksson, D.P., Fasoli, B., **Fiorella, R.P.**, Hallar, A.G., Horel, J.D., Hinners,  
S.J., Jacques, A.A., Jamison, L.R., Lin, J.C., Mendoza, D.L., Mitchell, L.E.,  
Pataki, D.E., Skiles, S.M., Smith, R.M., Wolf, M.A., and Brooks, P.D. The  
Wasatch Environmental Observatory: A mountain-to-urban research  
network in the semi-arid Western US. *Hydrological Processes*.
- [21] Aron, P.G., Poulsen, C.J., **Fiorella, R.P.**, Levin, N.E., Acosta, R.P., Yanites,  
B.J., and Cassel, E.J. Spatiotemporal variability of stable water isotopes in  
central Andean precipitation. *Journal of Geophysical Research:  
Atmospheres*.
- [20] Finkenbiner, C.E., Good, S.P., Allen, S.T., **Fiorella, R.P.**, and Bowen, G.J.  
A Statistical Method for the Temporal Downscaling of Geochemical Tracer  
Datasets. *Journal of Hydrometeorology*.

- [19] Carlo, A.D., Sterling, R.A., Mao, J., **Fiorella, R.P.**, Fortney, J.C., Unützer, J., and Wong, E.S. Characteristics of Veterans with Depressive Disorders Eligible for Mental Health Community Care Benefits through the Veterans Choice Program. *Health Services Research*.
- 2021 [18] **Fiorella, R.P.**, Good, S.P., Allen, S.T., Guo, J.S., Noone, D.C., Anderegg, W.R.L., Florian, C.R., Luo, H., Pingintha-Durden, N., and Bowen, G.J. (accepted). Macroscale Patterns in Calibrated NEON Atmospheric Carbon Isotope Observations. *Journal of Geophysical Research – Biogeosciences*. doi: [10.1029/2020JG005862](https://doi.org/10.1029/2020JG005862)
- [17] Kannenberg, S.A., **Fiorella, R.P.**, Anderegg, W.R.L., Monson, R.K., and Ehleringer, J.R. Seasonal and diurnal trends in progressive isotope enrichment along needles in two pine species. *Plant, Cell, and Environment*, v. 44(1), p. 143-155. doi: [10.1111/pce.13915](https://doi.org/10.1111/pce.13915)
- 2020 [16] Aron, P.G., Poulsen, C.J., **Fiorella, R.P.**, Matheny, A.M., and Veverica, T.J. An Isotopic Approach to Quantify Transpiration in a Mixed Deciduous Forest. *Ecohydrology*, v. 13(6). doi: [10.1002/eco.2229](https://doi.org/10.1002/eco.2229)
- 2019 [15] Putman, A.L., **Fiorella, R.P.**, Cai, Z., and Bowen, G.J. A Global Perspective on Local Meteoric Water Lines: Metanalytic Insight into Fundamental Controls and Practical Constraints. *Water Resources Research*, v. 55(8). doi: [10.1029/2019WR025181](https://doi.org/10.1029/2019WR025181)
- [14] Aron, P.G., Poulsen, C.J., **Fiorella, R.P.**, and Matheny, A.M. Forest Canopy Water Cycling in Northern Michigan Revealed Through Stable Water Isotopes. *Journal of Geophysical Research – Biogeosciences*, v. 124(10). doi: [10.1029/2019JG005118](https://doi.org/10.1029/2019JG005118)
- [13] **Fiorella, R.P.**, West, J.B., and Bowen, G.J. Biased estimates of the isotope ratios of steady-state evaporation from the assumption of equilibrium between vapor and precipitation. *Hydrological Processes*, v. 33, p. 2576-2590. doi: [10.1002/hyp.13531](https://doi.org/10.1002/hyp.13531)
- [12] **Fiorella, R.P.**, Bares, R., Lin, J.C., and Bowen, G.J. Wintertime decoupling of urban valley and rural ridge water vapor revealed through stable water isotopes. *Atmospheric Environment*, v. 213, p. 337-348. doi: [10.1016/j.atmosenv.2019.06.022](https://doi.org/10.1016/j.atmosenv.2019.06.022)
- [11] Bowen, G.J., Cai, Z., **Fiorella, R.P.**, Putman, A.L., Isotopes in the Water Cycle: Regional- to Global-Scale Patterns and Applications. *Annual Reviews in Earth and Planetary Sciences*, v. 47, p. 453-479. doi: [10.1146/annurev-earth-053018-060220](https://doi.org/10.1146/annurev-earth-053018-060220)
- 2018 [10] Jameel, Y., Brewer, S., **Fiorella, R.P.**, Tipple, B.J., Terry, S., and Bowen, G.J., Isotopic reconnaissance of urban water supply system dynamics. *Hydrology and Earth System Science*, v. 22, p. 6109-6125. doi: [10.5194/hess-22-6109-2018](https://doi.org/10.5194/hess-22-6109-2018)
- [9] **Fiorella, R.P.**, Poulsen, C.J., and Matheny A.M., Seasonal patterns of water cycling in a deep, continental mountain valley inferred from stable water vapor isotopes. *Journal of Geophysical Research—Atmospheres*, v. 123(14), p. 7271-7291, doi: [10.1029/2017JD028093](https://doi.org/10.1029/2017JD028093)

- [8] **Fiorella, R.P.**, Bares, R., Lin, J.C., Ehleringer, J.R., and Bowen, G.J., Detection and variability of combustion-derived vapor in an urban basin. *Atmospheric Chemistry and Physics*, 18(12), p. 8529-8547. doi: [10.5194/acp-18-8529-2018](https://doi.org/10.5194/acp-18-8529-2018)
- 2017 [7] **Fiorella, R.P.** and Sheldon, N.D., Equable end Mesoproterozoic climate in the absence of high CO<sub>2</sub>. *Geology*, v. 45(3), p. 231-234. doi: [10.1130/G38682.1](https://doi.org/10.1130/G38682.1)
- [6] Skinner, C.B., Poulsen, C.J., Chadwick, R., Diffenbaugh, N.S., and **Fiorella, R.P.**, The role of plant CO<sub>2</sub> physiological forcing in shaping future daily-scale precipitation. *Journal of Climate*, v. 30(7), p. 2319-2340. doi: [10.1175/JCLI-D-16-0603.1](https://doi.org/10.1175/JCLI-D-16-0603.1)
- 2016 [5] Matheny, A.M., **Fiorella, R.P.**, Bohrer, G., Poulsen, C.J., Morin, T.H., Wunderlich, A., Vogel, C.S., and Curtis, P.S., Contrasting strategies of hydraulic control in two co-dominant temperate tree species. *Ecohydrology*, e1815, doi: [10.1002/eco.1815](https://doi.org/10.1002/eco.1815)
- 2015 [4] **Fiorella, R.P.**, Poulsen, C.J., Pillco Zolá, R.S., Jeffery, M.L., and Ehlers, T.A., Modern and long-term evaporation of central Andes surface waters suggests paleo archives underestimate Neogene elevations. *Earth and Planetary Science Letters*, 432, p. 59-72. doi: [10.1016/j.epsl.2015.09.045](https://doi.org/10.1016/j.epsl.2015.09.045).
- [3] **Fiorella, R.P.**, Poulsen, C.J., Pillco Zolá, R.S., Barnes, J.B., Tabor, C.R. and Ehlers, T.A., Spatiotemporal variability of modern precipitation δ<sup>18</sup>O in the Central Andes and Implications for Paleoclimate and Paleoelevation Estimates. *Journal of Geophysical Research-Atmospheres*, 120(10), p. 4630-4656. doi: [10.1002/2014JD022893](https://doi.org/10.1002/2014JD022893)
- 2013 [2] **Fiorella, R.P.** and Poulsen, C.J. Dehumidification over tropical continents reduces climate sensitivity and inhibits snowball Earth initiation. *Journal of Climate*, 26, p. 9677-9695. doi: [10.1175/JCLI-D-12-00820.1](https://doi.org/10.1175/JCLI-D-12-00820.1)
- 2009 [1] An, J., **Fiorella, R.P.**, Geib, S.J., and Rosi, N.L. Synthesis, structure, assembly and modulation of the CO<sub>2</sub> adsorption properties of a zinc-adeninate macrocycle. *Journal of the American Chemical Society*, 131(24), p. 8401-8403, doi: [10.1021/ja901869m](https://doi.org/10.1021/ja901869m).

## Other publications

- 2021 [1] Bowen, G.J. and **Fiorella, R.P.** Water emissions put a damper on the coal-to-gas transition. *Proceedings of the National Academy of Sciences*.

## GRANTS AND FUNDING

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### *Funded proposals*

- 2020 National Science Foundation, Atmospheric and Geospace Science – Climate and Large-Scale Dynamics, Collaborative Research: Testing controls on source, sink, and lifetime of atmospheric water with numerical tags and stable isotope ratios. **PI: Richard P. Fiorella**, U of Utah, Co-PIs: John C.

- Lin, U of Utah, Nicholas Siler, Oregon State University (\$756,921 total, \$310,960 to U of Utah).
- 2018 National Science Foundation EF-MSB, Collaborative Research: Leveraging NEON to Build a Predictive Cross-scale Theory of Ecosystem Transpiration (RPF contributed as a co-author), National Science Foundation, PI: Gabriel J. Bowen, University of Utah; Co-PIs: William R. L. Anderegg, University of Utah; Christopher Still, Stephen Good, David Noone, Oregon State University. (\$1,809,000 total, \$875,624 to U of Utah)
- 2015 Graduate Student Research Fellowship, University of Michigan Biological Station, \$1500
- 2013 Geological Society of America Graduate Student Research Grant, \$2500  
Scott Turner Award, University of Michigan Department of Earth and Environmental Sciences, \$2400
- 2012 Rackham Graduate School Graduate Student Research Grant, University of Michigan, \$3000  
Scott Turner Award, University of Michigan Department of Earth and Environmental Sciences, \$2400
- 2011 Rackham International Research Award, University of Michigan, \$4500  
Scott Turner Award, University Michigan Department of Earth and Environmental Sciences, \$2400  
Rackham Graduate School Graduate Student Research Grant, University of Michigan, \$1500  
NSF Graduate Research Fellowship, ~\$130,000

## INVITED TALKS

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- 2020 Department of Marine, Atmosphere, and Earth Sciences, North Carolina State University, Raleigh, NC (virtual)
- 2018 DeFord Lecture, University of Texas at Austin Jackson School of Geosciences, Austin, TX
- 2012 Altiplano Hydrology Conference, Oruro, Bolivia

## AWARDS AND HONORS

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- 2017 John Dorr Graduate Achievement Award, Department of Earth and Environmental Sciences, University of Michigan, Ann Arbor, MI
- 2013 Outstanding Student Research Award, Geological Society of America
- 2011 National Science Foundation Graduate Research Fellow
- 2010 BP Geosciences Fellowship

## TEACHING EXPERIENCE

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### University of Utah

2016-2019 Isotopes in Spatial Ecology and Biogeochemistry (SPATIAL Summer Short Course)

### University of Michigan

2013 Fossil and Sustainable Energy: Options and Consequences, Camp Davis Rocky Mountain Field Station; Jackson, WY (field course)

2011 Introductory Geology, Camp Davis Rocky Mountain Field Station; Jackson, WY (field course)

Global Change 2: The Sustainability Challenge (Ann Arbor campus)

### University of Pittsburgh

2010 General Chemistry (as post-graduate, 3 laboratory and 4 recitation sections)

2009 Honors Organic Chemistry Laboratory (as an undergraduate)

2008 General Chemistry (as an undergraduate)

## ADVISING

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### Undergraduate Students Advised

Hayley Lind (2019-2020) – 2 UROP awards

Sierra Hymas (2019-2020) – 1 UROP award

## RESEARCH COMPUTING AWARDS

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2020 “Testing controls on the source, sink, and lifetime of atmospheric water with numerical tags and water isotope ratios,” NCAR CISL Large Allocation (October, 13.4 million core hours, Cheyenne supercomputer)

2016 “Equable Mesoproterozoic Climate in the Absence of High Greenhouse Gas Concentrations,” NCAR CISL Small Allocation (June, 200,000 core hours, Yellowstone supercomputer)

2014 Supplement to “Equable surface conditions in the absence of high atmospheric CO<sub>2</sub> levels in the Mesoproterozoic?”, NCAR CISL Large Allocation (October, 318,000 core hours, Yellowstone supercomputer)  
“Equable surface conditions in the absence of high atmospheric CO<sub>2</sub> levels in the Mesoproterozoic?”, NCAR CISL Large Allocation (April, 297,000 core hours, Yellowstone supercomputer)

## CONFERENCE ABSTRACTS

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2020 [29] Guo, J., Allen, S.T., **Fiorella, R.P.**, Still, C.J., Anderegg, W.R.L., and Bowen, G.J. Vertical partitioning of root distributions correlated with ecophysiological characteristics: Initial results from NEON megapit data. Poster presentation, *American Geophysical Union Fall Meeting, virtual*. December 1-17.

- [28] **Fiorella, R.P.**, Guo, J.S., Good, S.P., Allen, S.T., Anderegg, W.R.L., Finkenbiner, C., Hawkins, L.R., Noone, D., Still, C.J., Bowen, G.J. Calibration strategies for NEON carbon and water vapor isotope observations and cross-network patterns. Poster presentation, *Ecological Society of America Annual Meeting, virtual*. August 3-6.
- 2019 [27] **Fiorella, R.P.**, Kannenberg, S.A., Anderegg, W.R.L., Ehleringer, J.R., and Monson, R.K. A string-of-lakes in Ponderosa Pine needles: progressive leaf water and organic matter oxygen isotope enrichment and implications for tree-ring reconstructions. eLightning presentation, *American Geophysical Union Fall Meeting, San Francisco, CA*. December 9-13.
- [26] Allen, S.T., **Fiorella, R.P.**, Guo, J., Good, S.P., Noone, D.C., Anderegg, W.R.L., and Bowen, G.J. Canopy interception losses of rainfall in North American biomes. Oral presentation, *American Geophysical Union Fall Meeting, San Francisco, CA*. December 9-13.
- [25] **Fiorella, R.P.**, Allen, S.T., Guo, J., Anderegg, W.R.L., Good, S.P., Noone, D.C., Still, C.J., West, J.B., and Bowen, G.J. Evaluating the assumption of equilibrium between precipitation and vapor using data and models. Oral Presentation, *US CLIVAR Water Isotopes and Climate Workshop*. Boulder, CO. October 1-3.
- [24] Allen, S.T., **Fiorella, R.P.**, Guo, J., Good, S.P., Noone, D.C., Anderegg, W.R.L., and Bowen, G.J. Accounting for interception loss in evapotranspiration partitioning. Poster presentation, *US CLIVAR Water Isotopes and Climate Workshop*. Boulder, CO. October 1-3.
- [23] **Fiorella, R.P.**, Anderegg, W.R.L., Good, S.P., Noone, D.C., Still, C.J., and Bowen, G.J. Developing a continental-scale theory for predicting ecosystem transpiration with NEON flux tower measurements. PICO Presentation, European Geophysical Union Annual Assembly, Vienna, Austria. April 10-14.
- 2018 [22] **Fiorella, R.P.**, West, J.B., Putman, A.L., Cai, Z., and Bowen, G.J. Spatial patterns of bias during steady-state evaporation from the assumption of equilibrium between vapor and precipitation. Oral Presentation, American Geophysical Union Fall Meeting, Washington D.C. December 10-14.
- [21] Putman, A.L., **Fiorella, R.P.**, Cai, Z., and Bowen, G.J. A Global Perspective on Local Meteoric Water Lines: Metanalytic Insight into Fundamental Controls and Practical Constraints. Oral Presentation, American Geophysical Union Fall Meeting, Washington D.C. December 10-14.
- 2017 [20] **Fiorella, R.P.**, Bares, R., Lin, J.C., Strong, C., Bowen, G.J. Variability in the combustion-derived fraction of urban humidity during Salt Lake City winter estimated from stable water vapor isotopes and its relationship to atmospheric stability and inversion structure. Poster, American Geophysical Union Fall Meeting, New Orleans, LA, December 11-15.
- [19] Jameel, Y., Brewer S., **Fiorella, R.P.**, Tipple, B.J., Bowen, G.J., Terry, S. Estimates of water source contributions in a dynamic urban water supply system inferred via a Bayesian stable isotope mixing model. Poster, American Geophysical Union Fall Meeting, New Orleans, LA, December 11-15.

- [18] **Fiorella, R.P.**, Hyland, E.G., and Sheldon, N.D. Reconciling Divergent Carbon Isotope Responses in Ocean and Terrestrial Proxy Records to Constrain Causal Mechanisms for the Early Eocene Climatic Optimum. Oral Presentation, Climate and Biotic Events of the Paleogene 2017; Alta, UT. September 3-7.
- [17] **Fiorella, R.P.**, Noone, D.C., Frank, J., Williams, D.G., Johnson, J.E., Bowen, G.J. Scaling point observations of water vapor isotope compositions to understand regional hydrologic cycling. Oral Presentation, Integrated Carbon and Water Ecological and Biogeochemical Synthesis, Stevenson, WA, February 27-28.
- 2016 [16] **Fiorella, R.P.**, Poulsen, C.J., Matheny, A.M., Sanchez, C.R., Fotis, A.T., Morin, T.H., Vogel, C.S., Gough, C.M., Aron, P., Bohrer, G. Forest Canopy Water Cycling Responses to an Intermediate Disturbance Revealed Through Stable Water Vapor Isotopes. Poster, American Geophysical Union Fall Meeting, San Francisco, CA. December 12-16.
- [15] Aron, P., Poulsen, C.J., and **Fiorella, R.P.** A direct measurement of the stable isotopes of transpired water vapor in a northern Michigan forest. Poster, American Geophysical Union Fall Meeting, San Francisco, CA. December 12-16.
- [14] Sheldon, N.D., **Fiorella, R.P.**, and Mitchell, R.L. O<sub>2</sub>, CH<sub>4</sub>, and Sustained Mesoproterozoic Climate Equability. Oral Presentation, American Geophysical Union Fall Meeting, San Francisco, CA. December 12-16.
- [13] Matheny, A.M., Bohrer, G., **Fiorella, R.P.**, and Mirfenderesgi, G. Plant hydraulic traits govern forest water use and growth. European Geophysical Union General Assembly, Vienna, Austria. April 17-22.
- 2015 [12] **Fiorella, R.P.**, Matheny, A.M., Poulsen, C.J., and Bohrer, G. Constraints on water cycling in a deep mountain valley from stable water isotope and sap flux measurements. Poster, American Geophysical Union, Fall Meeting, San Francisco, CA. December 14-18. Abstract PP11B-2220.
- [11] Matheny, A.M., Bohrer, G., **Fiorella, R.P.**, Mirfenderesgi, G. Proposed hydrodynamic model improves resolution of species-specific responses to drought and disturbance. Poster, American Geophysical Union, Fall Meeting, San Francisco, CA. December 14-18. Abstract B41E-0476.
- [10] Sheldon, N.D., **Fiorella, R.P.**, and Domagal-Goldman, S. A Terrestrial Perspective on Archean and Proterozoic Habitability on Earth. In Astrobiology Science Conference, Abstract #7546. Chicago, IL. June 15-19. LPI Contribution No. 1842, Lunar and Planetary Institute, Houston.
- 2014 [9] Poulsen, C.J., Feng, R., and **Fiorella, R.P.** The Role of Topography on Continental Water Cycling and Water Stable Isotope Compositions over Geological Time Scales. Oral Presentation, American Geophysical Union Fall Meeting, San Francisco, CA. December 15-19.
- [8] **Fiorella, R.P.**, Poulsen, C.J., Pillco Zolá, R.S., Jeffery, M.L., and Ehlers, T.A. Incorporating Evaporation Histories into Paleohydrology Reconstructions: An Andean Case-Study. Oral Presentation, Geological Society of America Annual Meeting, Vancouver, BC, Canada. October 19-22.

- [7] Hyland, E.G., **Fiorella, R.P.**, and Sheldon, N.D. Reexamining Causal Mechanisms for the Early Eocene Climatic Optimum. Oral Presentation, Geological Society of America Annual Meeting, Vancouver, BC, Canada. October 19-22.
- [6] Sheldon, N.D. and **Fiorella, R.P.** Mesoproterozoic Climate–Equability in the Absence of High CO<sub>2</sub>. Goldschmidt Conference, Sacramento, CA. June 8-13.
- 2013 [5] **Fiorella, R.P.** and Poulsen, C.J. Paleogeographic controls on climate sensitivity and feedback strength and their impacts on snowball Earth initiation. Poster, AGU Fall Meeting, San Francisco, CA.
- [4] Poulsen, C.J. and **Fiorella, R.P.** Climate sensitivity in the pre-Cenozoic World. STRATA, série 1, vol. 14. Pre-Cenozoic Climate Workshop, Toulouse, France, June 17-19.
- 2012 [3] **Fiorella, R.P.**, Poulsen, C.J., Ehlers, T.A., Jeffery, M.L., and Pillco Zolá, R.S. Exceptional isotopic variability in stream waters of the Central Andes: large scale or local controls? Oral presentation, 2012 AGU Fall Meeting, San Francisco, CA.
- [2] Link, P., Goldner, A., Whadcoat, S., and **Fiorella, R.P.** Variability of oceanic and terrestrial water vapor sources in the Amazon Basin: An investigation using TES satellite and MERRA reanalysis at varying temporal resolutions. AGU Chapman Conference on Remote Sensing of the Terrestrial Water Cycle, Kona, HI.
- 2011 [1] **Fiorella, R.P.**, Poulsen, C.J., Jablonowski, C., and Bitz, C.M. Resistance to Snowball Earth Initiation in the CAM3.1 Slab Ocean Model. Poster, AGU Fall Meeting, San Francisco, CA.

## PROFESSIONAL SERVICE

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Chair of the Atmospheric Isotopes Technical Working Group of the National Ecological Observatory Network (2020-)

Member of the Atmospheric Isotopes Technical Working Group of the National Ecological Observatory Network (2017-2020)

Peer Review:

Proposals/funding agencies: *National Science Foundation (2019, 2021), Graduate Women in Science National Fellowships Program (2018)*

Journals: *Journal of Hydrology (2015, 2019); Journal of Geophysical Research – Atmospheres (2016, 2018-2020); Geophysical Research Letters (2015, 2017, 2020); Water Resources Research (2017); Climate of the Past (2017); Journal of Climate (2017, 2018); Atmosphere (2018, 2019); PeerJ (2018); Journal of Hydrometeorology (2018-2020); Geology (2018, 2019); Hydrological Processes (2019, 2020), Scientific Reports (2019), Earth and Space Science (2020), Earth System Science Data (2020), Journal of Geophysical Research – Biogeosciences (2019, 2020), Oecologia (2020), PLOS ONE (2020), Water (2020)*



Session convener, American Geophysical Union Fall Meeting 2016

Outstanding Student Presentation Award Judge, American Geophysical Union Fall Meeting 2016-2019

### **OUTREACH AND COMMUNITY INVOLVEMENT**

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- 2019 ACCESS Capstone Debate Judge, University of Utah, Salt Lake City, UT
- 2016 Science Fair Judge, Eastwood Elementary School, Salt Lake City, UT
- 2014 Contributing Editor, Science in the Classroom, [www.scienceintheclassroom.org](http://www.scienceintheclassroom.org)
- 2013 University of Michigan Museums Identification Day, Ann Arbor, MI

### **PROFESSIONAL AFFILIATIONS**

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American Geophysical Union  
Geological Society of America  
American Association for the Advancement of Science