

Jacob S. Diamond

<https://jakediamond.science>

<https://orcid.org/0000-0002-5392-5707>

RESEARCH INTERESTS

Environmental data science to support public policy. Watershed science and ecohydrology. Ecosystem ecology and biogeochemistry. Model-data fusion across scales.

EDUCATION

Ph.D. [Ecohydrology], Virginia Tech May 2019

M.S. [Ecohydrology], University of Florida May 2013

Concentration in Hydrologic Science

Certificate in Wetland Science

B.S.E. [Environmental Engineering], University of Florida May 2011

APPOINTMENTS

Sole proprietor and CEO December 2022 – Present

Jake Diamond LLC, Virginia, USA

- Data analysis of forestry data in New Zealand (\$150k)

Research Fellow February 2023 – Present

University of Venice Ca' Foscari

- Developing model of carbon dioxide fluxes from river networks

Research Engineer June 2019 – January 2023

INRAe with additional appointments at CNRS and University of Tours, Lyon, France

- Co-led and managed team coordination of 3 research projects spanning 3 departments and 15 people
- Obtained external funding for research projects on river hypoxia (200k€) and carbon cycling (30k€)
- Developed neural net and random forest models to predict river oxygen and temperature regimes
- Developed workflow for classifying riverine autotrophs with Landsat satellite data
- Mentored 3 graduate students and conducted regional and international scientific outreach
- Led 7 lead-author publications of peer-reviewed research in top subject-area journals

Graduate Research Assistant August 2015 – May 2019

Virginia Tech, Blacksburg, VA

- Obtained independent funding for research to support conservation and ecosystem management
- Developed open-science, novel classification tools for wetland microtopography
- Led graduate student workshops on open and reproducible data science in R
- Led grad./undergrad. team to 1st place NYU Policy Case Competition for Climate Change

- Led 6 lead-author publications of peer-reviewed research in top subject-area journals

Water Resources Specialist

August 2013 – August 2015

SWCA Environmental Consultants, Salt Lake City, UT

- Won 4 external contracts (\$200k) and managed 2 projects for state & local governments
- Conducted hydro-bio-geo-chemical, geomorphic, and risk-based analyses of rivers, lakes, and wetlands
- Developed, published, and presented to stakeholders: EPA-based Implementation Plans, Total Maximum Daily Loads, Environmental Assessments, and Environmental Impact Statements

Wetland Field Technician

June 2013 – August 2013

Utah Department of Environmental Quality, Salt Lake City, UT

- Developed novel, standardized wetland ecological index sampling routine for state-wide use
- Quantified large wetland ecosystem services using in-situ nutrient uptake experiments

Graduate Teaching Assistant

August 2011 – May 2013

University of Florida, Gainesville, FL

- Conducted independent research and programmed novel statistical analyses for
- Designed web scraping tool and reproducible workflow in R to mine water quality data from US databases

Research Assistant, Ecohydrology Laboratory

August 2009 – May 2011

University of Florida, Gainesville, FL

- Led 10-person team to 1st Place National Water Env. Fed. Design Competition (\$2,500)
- Managed laboratory water chemistry and soil analyses for isotopes and nutrients
- Led field campaigns for groups of 2-5 in difficult terrain and conditions

PUBLISHED JOURNAL ARTICLES

*indicates mentee

Citations = 209; h-index = 10; i10-index = 10

1. **Diamond, J.S.**, L. Valette, R. Recoura-Massaquant, A. Charnaud, G. Pinay, J. Zarnetske, and F. Moatar. (2023) Hypoxia is common in temperate headwaters and driven by hydrological extremes. *Ecological Indicators*, 147. doi: 10.1016/j.ecolind.2023.109987
2. **Diamond, J.S.**, G. Pinay, S. Bernal, M.J. Cohen, D. Lewis, A. Lupon, J. Zarnetske, and F. Moatar. Light and hydrologic connectivity drive dissolved oxygen synchrony in stream networks. *LEO*. doi: 10.1002/lno.12271
3. Seyedhashemi, H.*, J. Vidal, **J.S. Diamond**, D. ThiÃry, C. MontÃil, FrÃdÃric Hendrickx, A. Maire, and F. Moatar. (2022). Regional, multi-decadal analysis reveals that stream temperatures increase faster than air temperature. *Hydrol. Earth Sys. Sci.*, 26(9), 2583-2603. doi:10.5194/hess-26-2583-2022
4. Beaufort, A., **J.S. Diamond**, et al. (2022). Spatial extrapolation of stream thermal peaks using heterogeneous time series. *Hydrol. Earth Sys. Sci.*, 26(13), 3477-3495.

doi:10.5194/hess-26-3477-2022

5. **Diamond, J.S.**, S. Bernal, A. Boukra, M.J. Cohen, D. Lewis, M. Masson, F. Moatar, and G. Pinay. (2021). Stream network variation in dissolved oxygen: metabolism proxies and biogeochemical controls *Ecological Indicators* 131. doi: 10.1016/j.ecolind.2021.108233
6. Ledford, S.H., **J.S. Diamond**, and L. Toran. (2021). Large spatiotemporal variability in metabolic regimes for an urban stream draining four wastewater treatment plants with implications for dissolved oxygen monitoring. *PLoS ONE* 16(8). e0256292. doi: 10.1371/journal.pone.0256292
7. **Diamond, J.S.**, F. Moatar, M.J. Cohen, A. Poirel, C. Martinet, A. Maire, and G. Pinay. (2021). Metabolic regime shifts and ecosystem state changes are decoupled in a large river. *Limnology and Oceanography*. doi: 10.1002/lno.11789
8. **Diamond, J.S.**, J. Epstein, M.J. Cohen, D.L. McLaughlin, J. Duberstein, Y. Hsueh, and R. Keim. (2021). A little relief: Autogenesis and ecological functions of wetland microtopography. *Wiley Interdisciplinary Reviews: Water*, 8(1) e1493. doi: 10.1002/wat2.1493
9. Ciancolo, T., **J.S. Diamond**, D.L. McLaughlin, R.A. Slesak, A. D'Amato, and B. Palik. (2020). Hydrologic variability in black ash wetlands: implications for vulnerability to emerald ash borer. *Hydrological Processes*. doi: 10.1002/hyp.14014
10. Seyedhashemi, H.*, F. Moatar, J. Vidal, **J.S. Diamond**, A. Beaufort, A. Chandesris, and L. Valette. (2020). Thermal signatures identify the influence of dams and ponds on stream temperature at the regional scale. *Science of the Total Environment*. doi: 10.1016/j.scitotenv.2020.142667
11. **Diamond, J.S.**, D.L. McLaughlin, R.A. Slesak, and A. Stovall. (2020). Microtopography is a fundamental organizing structure in black ash wetlands. *Biogeosciences* 17(4), 901–915. doi: 10.5194/bg-17-901-2020.
12. **Diamond, J.S.**, D.L. McLaughlin, R.A. Slesak, and A. Stovall. (2019). Pattern and structure of microtopography implies autogenic origins in forested wetlands. *Hydrol. Earth Syst. Sci.*, 23, 5069–5088, doi: 10.5194/hess-23-5069-2019.
13. Chandesris, A., K. Van Looy, **J.S. Diamond**, and Y. Souchon. (2019). Small dams alter thermal regimes of downstream water. *Hydrol. Earth Syst. Sci.*, 23, 4509–4525, doi: 10.5194/hess-23-4509-2019.
14. Stovall, A., **J.S. Diamond**, D.L. McLaughlin, and H. Shugart. (2019). Quantifying Wetland Microtopography with Terrestrial Laser Scanning. *Remote Sensing of Environment*, 232, 111271. doi: 10.1016/j.rse.2019.111271.
15. McLaughlin D.L., **J.S. Diamond**, C. Quintero, and M.J. Cohen. (2019). Wetland connectivity thresholds and flow dynamics from stage measurements. *Water Resources Research* doi: 10.1029/2018WR024652.
16. **Diamond, J.S.** and M.J. Cohen. (2018). Complex patterns of catchment solute-discharge relationships for coastal plain rivers. *Hydrological Processes*, 32(3), 388–401. doi: 10.1002/hyp.11424.

17. **Diamond, J.S.**, D.L. McLaughlin, R.A. Slesak, A.W. D'Amato, and B.J. Palik. (2018). Forested *versus* herbaceous wetlands: Can management mitigate ecohydrologic regime shifts from invasive emerald ash borer? *Journal of Environmental Management*, 222(15), 436–446. doi: 10.1016/j.jenvman.2018.05.082.

MANUSCRIPTS SUBMITTED FOR PUBLICATION OR IN PREPARATION

1. **Diamond, J.S.** and E. Bertuzzo. River carbon model accounting for calcification and carbon concentrating mechanisms. *In prep for E&T*
2. **Diamond, J.S.**, A. Nguyen, G. Abril, and F. Moatar. Trophic regime control on carbon dioxide fluxes in a large river. *In prep for L&O Letters*
3. Nguyen, A., **J.S. Diamond**, G. Abril, and F. Moatar. Long term trends in carbon dioxide emissions in a large river. *In prep for Global Change Biology*
4. Cohen, M.J., M. Gooseff, **J.S. Diamond**, P.H. Decker, L.H. Devito, and R.T. Hensley. Oxygen Signals and Metabolism in Spatially Heterogeneous Rivers. *In prep for Geophysical Research Letters*
5. **Diamond, J.S.**, M.R. Ross, J. Gardner, F. Moatar, M.J. Cohen, and G. Pinay. Directional autotrophic regime shifts in a large river. *In prep.*
6. Song, C., J. Zarnetske, **J.S. Diamond**, and F. Moatar. Watershed controls on dissolved organic carbon transport. *In prep.*
7. **Diamond, J.S.**, D.L. McLaughlin, R.A. Slesak, J.H. Kim, K. Schafer, B. Ebel, M. Forrest, and K. McGuire. Ecohydrological effects and resilience to forest pests. *In prep. for Frontiers in Ecology and the Environment*

SKILLS

- Data analysis and visualization
- Geospatial and multivariate statistics
- Time series analysis and forecasting with uncertainty propagation
- Complex systems analysis (e.g., causality, convergent cross mapping)
- Machine learning (ANN, RF, multi-model, clustering)
- Outlier detection
- Environmental systems monitoring and associated in-situ and laboratory methods
- Surface and groundwater hydrology
- Terrestrial laser scanning
- Out-of-box hydrology and biogeochemistry models (e.g., HYDRUS, QUAL2k)
- Model development for 1-,2-,3D hydrology and biogeochemistry (Stochastic and deterministic)
- Environmental systems modeling
- Project management
- Grant and proposal preparation
- Public outreach and presentation
- Study design and implementation
- Leadership and networking
- Functional programming in R and Python
- Google Earth Engine
- French: B2

RESEARCH GRANTS

Total granted = \$245,000 (230,000€)

1. Project "RHpoxie" (200,000€) – developed for the Loire-Bretagne and Rhone-Med.-Corse Water Agencies. PI: Florentina Moatar
2. Project "METACALC" (30,000€) – developed for the Electricity of France (EDF). PI: Florentina Moatar

AWARDS AND HONORS

Total awarded = \$215,550

| | |
|--|---------------------|
| Joint Aquatic Sciences Meeting Early Career Grant (\$750) | May 2022 |
| Elected as 2019 Gordon Research Seminar Chair | June 2017 |
| A.B. Massey Outstanding Doctoral Award | April 2019 |
| ICTAS Doctoral Scholar Experiential Learning Grant (\$500) | October 2017 |
| São Paulo School of Advanced Science on Climate Change (\$4,000) | July 2017 |
| William R. Walker Fellowship Award (\$2,300) | July 2017 |
| 1st Place in Category, 2nd Overall NYU Policy Case Competition, <i>Team Leader</i> | April 2017 |
| William J. Dann Fellowship (\$12,000) | August 2015 |
| Virginia Tech ICTAS Doctoral Scholar Award (\$160,000) | August 2015 |
| Virginia Tech Cunningham Doctoral Scholar Award | <i>not accepted</i> |
| Outstanding Presentation at the American Geophysical Union Conference | December 2012 |
| 1st Place National Water Env. Fed. Design Competition, <i>Team Leader</i> | December 2011 |
| Graduate Assistantship to Master's Program at UF (\$32,000) | August 2011 |
| Gareth Kerr Environmental Engineering Memorial Scholarship (\$1,000) | May 2010 |
| Charles Poekert Environmental Engineering Alumni Scholarship (\$500) | May 2009 |
| UF-HHMI GATOR Undergraduate Research Program (\$2,500) | May 2008 |

PROFESSIONAL ORGANIZATIONS

| | |
|--|-----------------------|
| European Geophysical Union | May 2020–Present |
| Society for Freshwater Science | May 2018–Present |
| Association for the Sciences of Limnology and Oceanography | February 2018–Present |
| American Association for the Advancement of Science | January 2016–Present |
| Society of Wetland Scientists | June 2012–Present |
| American Geophysical Union | June 2012–Present |

CONFERENCE PRESENTATIONS

| | |
|--|--------------|
| <i>[invited] ASLO – Controls on and typologies of internal carbon dioxide processes in a large carbonate river</i> | May 2023 |
| Joint Aquatic Sciences Meeting – <i>Spatial patterns of light and hydrological connectivity control dissolved oxygen synchrony across fluvial networks</i> | May 2022 |
| First OZCAR TERENO International Conference – <i>Three years of stream network hourly dissolved oxygen: scaling, hot spots, hot moments, and synchrony</i> | October 2021 |

| | |
|---|---------------|
| EGU Spring Meeting – <i>Metabolic regime shifts and ecosystem state changes are decoupled in a large river</i> | May 2021 |
| SFS Annual Meeting – <i>Metabolic regime shifts and ecosystem state changes are decoupled in a large river</i> | May 2021 |
| CUAHSI Master Class: Advanced Techniques in Watershed Science – <i>Synchronous surface water connectivity implies landscape scale mass export</i> | January 2019 |
| AGU Fall Meeting – <i>Small changes create big differences: A study on the importance of microtopography in wetlands</i> | December 2018 |
| SFS Annual Meeting – <i>Self-organized microtopography in black ash wetlands is driven by hydrology</i> | May 2018 |
| AGU Fall Meeting– <i>Wetland microtopographic structure and function revealed with terrestrial laser scanning</i> | December 2017 |
| Workshop on the Future of Ash Forests – <i>Six year effects of simulated EAB mortality and harvesting on black ash ecohydrology</i> | July 2017 |
| São Paulo School of Advanced Science on Climate Change – <i>Emerald ash borer simulation reveals ecohydrologic feedbacks in black ash wetlands</i> | July 2017 |
| Gordon Research Conference: Catchment Science – <i>Emerald ash borer simulation reveals ecohydrologic feedbacks in black ash wetlands</i> | June 2017 |
| ICTAS Doctoral Scholar Poster Session – <i>The black ash tree is a foundational species and ecosystem engineer</i> | April 2017 |
| AGU Fall Meeting – <i>Emerald Ash Borer Threat Reveals Ecohydrologic Feedbacks in Northern U.S. Black Ash Wetlands</i> | December 2016 |
| SWS Annual Meeting – <i>Vegetation controls hydrology in northern black ash wetlands</i> | May 2015 |
| AGU Fall Meeting – <i>Concentration-discharge relationships for variably sized streams in Florida: Patterns and drivers in long-term catchment studies</i> | December 2012 |
| Southeastern Ecology and Evolution Conference – <i>Use of $\delta^{15}N$ to Trace Sources of Nutrient Enrichment on Tree Islands in the Everglades, Fl</i> | May 2009 |

SEMINARS AND TALKS

| | |
|---|----------------|
| <i>[invited]</i> Earth and Life Institute Seminar, UCLouvain – <i>Ecosystem regime shifts, stream metabolism, biogeochemical synchrony, and confluence behavior in river networks</i> | September 2022 |
| CASTOR development of a carbon budget for the Loire River basin, Universite d'Angers – <i>Carbon fluxes due to to biota in the Loire River</i> | November 2021 |

| | |
|---|---------------|
| LEHNA Lab, Universite de Lyon 1 – <i>Ecosystem regime shifts, stream metabolism, biogeochemical synchrony, and confluence behavior in river networks</i> | October 2021 |
| H2O'Lyon, Universite de Lyon 1– <i>Patterns, proxies, and mysteries of dissolved oxygen in river networks</i> | April 2021 |
| [invited] Environmental Engineering Seminar, Ecole Polytechnique Federale de Lausanne – <i>Dissolved oxygen provides insights into regime shifts and headwater network behavior</i> | February 2021 |
| [invited] Department of Integrative Biology Seminar, University of South Florida – <i>Dissolved oxygen, regime shifts, and scaling the metabolism of flowing waters</i> | November 2020 |
| Intermittent Rivers and Streams Workshop, Irstea Lyon – <i>River network metabolism in the Loire River Headwaters</i> | October 2019 |
| Cross-Boundaries Biogeochemistry Flash Talk – <i>Thresholds of connection</i> | November 2018 |
| Cross-Boundaries Biogeochemistry Flash Talk – <i>An ecology of mind</i> | April 2018 |
| Forest Resources and Environmental Conservation Spring Seminar – <i>Terrestrial laser scanning reveals wetland microtopographic structure and function</i> | March 2018 |
| Science on Tap Flash Talk – <i>Why do so many forested wetlands organize around a single primary producer?</i> | March 2017 |
| Cross-Boundaries Biogeochemistry Flash Talk – <i>What are the rules of life?</i> | March 2017 |
| Cross-Boundaries Biogeochemistry Flash Talk – <i>How do forested wetlands self-organize?</i> | November 2016 |
| Forest Resources and Environmental Conservation Spring Seminar – <i>How do Hydrologic Feedbacks Drive Ecosystem Structure and Process in Forested Wetlands?</i> | April 2016 |
| School of Natural Resources and Environment Spring Seminar – <i>Concentration-discharge relationships for streams and rivers in Florida: Patterns and drivers</i> | May 2013 |

OUTREACH AND SERVICE

| | |
|--|---------------|
| Session Organizer JASM 2022: Carbon fluxes across ecosystem interfaces | May 2022 |
| H2O'Lyon, Universite de Lyon Tutorial on dissolved oxygen measurement | April 2021 |
| [invited] University of South Florida Nitrogen S-STEM Roundtable | November 2020 |
| International School of Lyon Lesson on Environmental Assessments | May 2020 |
| Co-Chair Gordon Research Seminar on Catchment Science | June 2019 |
| R Data Wrangling and Graphics Workshop for Grad Students | October 2018 |
| Tazewell County 4-H Students Virginia Tech Visit | April 2018 |
| Southeastern Friends of the Pleistocene | February 2018 |
| Blacksburg High School Science Outreach | December 2017 |

William Fleming High School Science Outreach
President Department Graduate Student Association
Series Organizer Departmental Spring Seminar
Christiansburg Middle School Stormwater Day
Tazewell County 4-H Students Virginia Tech Visit

November 2017
August 2016–May 2017
November 2016–April 2017
April 2017
April 2017

PEER REVIEW

- Biogeosciences
- Ecology
- Frontiers in Water
- Geoderma
- Hydrological Processes
- Hydrology and Earth System Sciences
- JGR – Biogeosciences
- Journal of Hydrology
- Remote Sensing of the Environment
- Science of the Total Environment
- Water Resources Research
- Wetlands