

Dr. Daniel Scott Miller Runfola

Department of Applied Science
Data Science Program
William & Mary

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Current Position

2017 - present Assistant Professor, Department of Applied Science, Data Science Program, William & Mary

Academic History

Postdoctoral Fellowship	2014	National Center for Atmospheric Research, CU:Boulder
Ph.D., Geography	2012	Clark University Graduate School of Geography
Masters, Geography	2011	Clark University Graduate School of Geography
Bachelors, Geography	2008	Georgia State University Department of Geosciences

Research Grants - Principal Investigator

- Commonwealth Cyber Initiative, *Deep Learning with Satellite Data: Capabilities and Susceptibility to Data Poisoning Techniques*. 2021-2022. Total: \$109,675.
- Bill and Melinda Gates Foundation, *Coalition to Advance Progress on Administrative Boundaries in Africa*. 2020-2022. Total: \$298,365.
- Commonwealth Cyber Initiative, *Data Poisoning & Satellite Reconnaissance: Bridging Application and Education*. 2020-2021. Total: \$125,000.
- Bill and Melinda Gates Foundation, *Georeferencing Healthcare Boundaries in Data Sparse African Nations*. 2020-2021. Total: \$69,229.
- Cloudera Foundation (**Gift with named Principal Investigator*), *GeoQuery*. 2019 - 2021. Total: \$1,152,000.
- Jeffress Trust Awards Program in Interdisciplinary Research, The Medical Foundation, *Evaluating the Impact of International Aid on Ecological Processes by Integrating Computational and Experimental Methods*. 2018-2020. Total: \$100,000.
- United States Agency for International Development, Operations Innovations, *Neural-network Based Approaches to Spatial Estimation of State Fragility*. 2018-2020. Total: \$499,592. Subcontract for approx ~\$79,822 to Development Gateway.
- Green Climate Fund, *Developing Geospatial Information Systems for Evaluations*. 2018-2019. Total: \$100,294.
- United States Agency for International Development, Bureau for Food Security, *Developing satellite-based poverty and agricultural yield estimates for multiple African and Asian countries*. 2017 - 2019. Total: \$1,746,352. Subcontract for approx. ~\$1,518,000 to Stanford University.
- Global Environment Facility. 2018. *Geospatial Impact Evaluation in the Context of GEF Projects - On-site*. \$27,093.
- Commonwealth Center for Energy and the Environment. 2017 - 2018. *Working Group on the Impact of International Aid on the Environment*. Total \$10,000.
- Global Environment Facility. 2016 - 2017. *Spatially Heterogeneous Impacts of GEF projects*. Total \$162,241.
- World Bank Independent Evaluation Group. 2015 - 2017. *Value for Money Approach for Projects Impacting Tropical Forests*. Total \$49,626.

Research Grants - Other Roles

- Co-PI. United States Department of Homeland Security, *Modeling Push-and-Pull factors in Cross-Border Migration with Deep Learning*. 2020-2022. Total: \$249,973
- Co-PI. Millenium Challenge Corporation, *High-Frequency Monitoring Data of Land Use Changes*. 2018 - 2020. Total: \$403,599.
- Co-I. International Growth Center. 2016 - 2017. *The Socio-Economic Impacts of Natural Resource Concessions in Liberia*. Total: \$93,170. Subcontract for approx ~\$15,000 to University of Texas (PI: Jonas Bunte).

Peer-Reviewed Academic Publications (* indicates senior author in cases of last-authorship; † indicates W&M student)

1. *Brewer, E.†, Lin, J.†, Runfola, D. Accepted 2022. Susceptibility & defense of satellite image-trained convolutional networks to backdoor attacks. **Information Sciences**. <https://doi.org/10.1016/j.ins.2022.05.004>
2. Runfola, D., Baier, H.†, Mills, L.†, Naughton-Rockwell, M.†, Stefanidis, A. Accepted 2022. Deep Learning Fusion of Satellite and Social Information to Estimate Human Migratory Flows. **Transactions in GIS**.
3. *Karim, B.†, Runfola, D. 2021. Toponym-assisted map georeferencing: Evaluating the use of toponyms for the digitization of map collections. **PLoS One**. <https://doi.org/10.1371/journal.pone.0260039>
4. Runfola, D., Stefanidis, A., Baier, H.†, 2021. Using Satellite Data and Deep Learning to Estimate Educational Outcomes in Data Sparse Environments. **Remote Sensing Letters** 13(1). <https://doi.org/10.1080/2150704X.2021.1987575>
5. *Brewer, E.†, Kemper, P., Lin, J.†, Hennin, J.†, and Runfola, D. 2021. Predicting Road Quality using High Resolution Satellite Imagery: A Transfer Learning Approach. **PLoS One**. <https://doi.org/10.1371/journal.pone.0253370>
6. *Goodman, S.†, BenYishay, A., Runfola, D. 2020. A Convolutional Neural Network Approach to Predict Non Permissive Environments from Moderate Resolution Imagery. **Transactions in GIS**. <https://doi.org/10.1111/tgis.12661>
7. Runfola D., Anderson A†, Baier H†, Crittenden M†, Dowker E†, Fuhrig S†, et al.† (2020) geoBoundaries: A global database of political administrative boundaries. **PLoS ONE** 15(4): e0231866. <https://doi.org/10.1371/journal.pone.0231866>
8. Runfola, D.; Batra, G.; Anand, A.; Way, A.†; Goodman, S.† 2020. Exploring the Socioeconomic Co-benefits of Global Environment Facility Projects in Uganda Using a Quasi-Experimental Geospatial Interpolation (QGI) Approach. **Sustainability**, 12, 3225. <https://doi.org/10.3390/su12083225>
9. *Goodman, S.†, BenYishay, A., Lv, Z.†, Runfola, D., 2019. GeoQuery: Integrating HPC systems and public web-based geospatial data tools. **Computers and Geosciences**. <https://doi.org/10.1016/j.cageo.2018.10.009>
10. *Marty, R.†, Goodman, S.†, LeFew, M.†, Dolan, C., BenYishay, A., Runfola, D. 2019. Assessing the Causal Impact of Chinese Aid on Vegetative Land Cover in Burundi and Rwanda Under Conditions of Spatial Imprecision. **Development Engineering**. <https://doi.org/10.1016/j.deveng.2018.11.001>
11. Buchanan, G., Parks, B., Donald, P., O'Donnel, B., Runfola, D., Swaddle, J., Tracewski, L., Butchart, S. 2018. The Local Impacts of World Bank Development Projects Near Sites of Conservation Significance. **Journal of Environment and Development**. <https://doi.org/10.1177/1070496518785943>
12. Bunte, J., Desai, H.†, Gbala, K., Parks, B., Runfola, D.M., 2018. Natural resource sector FDI, government policy, and economic growth: Quasi-experimental evidence from Liberia. **World Development**. Volume 107. pg 151-162. <https://doi.org/10.1016/j.worlddev.2018.02.034>.
13. Hughes, S., Cormier, B., Runfola, D.M., 2018. Issue Proximity and Policy Response in Local Governments. **Review of Policy Research**. <https://doi.org/10.1111/ropr.12285>
14. BenYishay, A., Heuser, S., Runfola, D.M., Trichler, R. 2017. Indigenous land rights and deforestation: Evidence from the Brazilian Amazon. **Journal of Environmental Economics and Management**. <https://doi.org/10.1016/j.jeem.2017.07.008>
15. Runfola, D., Ariel BenYishay, Jeffery Tanner, Graeme Buchanan, Jyoteshwar Nagol, Matthias Leu, Seth Goodman†, Rachel Trichler and Robert Marty†. 2017. A Top-Down Approach to Estimating Spatially Heterogeneous Impacts of Development Aid on Vegetative Carbon Sequestration. **Sustainability** 9(3), 409. doi:10.3390/su9030409. <https://doi.org/10.3390/su9030409>.
16. Runfola, D.M., Samuel Ratick, Julie Blue, Eia Axnia Machado, Nupur Hiremath, Nick Giner, Kathleen White (USACE), Jeffrey Arnold (USACE), 2017. "A Multi-Criteria Geographic Information Systems Approach for the Measurement of Vulnerability to Climate Change." **Mitigation and Adaptation Strategies for Global Change**. <https://doi.org/10.1007/s11027-015-9674-8>
17. Marty, R.†, Dolan, C., Leu, M., Runfola, D. 2017. Taking the Health Aid Debate to the Sub-National Level: The Impact and Allocation of Foreign Health Aid in Malawi. **BMJ Global Health**. DOI: 10.1136/bmjgh-2016-000129.
18. Nawrotzki, R. J., Runfola, D. M., Hunter, L. M., and Riosmena, F. 2016. Domestic and international climate migration from rural Mexico. **Human Ecology** 44(6), 687-699. DOI: 10.1007/s10745-016-9859-0
19. Leyk, S., Runfola, D.M., Riosmena, F., Hunter, L. and Nawrotzki, R., "Internal and International Mobility as Adaptation to Climatic Variability in Contemporary Mexico: Evidence from the Integration of Census and Satellite Data." 2016. **Population, Space and Place**. 23(6), e2047
20. Runfola, D.M., Napier, A., 2016. "Migration, climate, and international aid: examining evidence of satellite, aid, and micro-census data." **Migration and Development**. 5.2 (2016): 275-292.
21. Kevin Robert Gurney, Paty Romero-Lankao, Karen C. Seto, Lucy R. Hutyra, Riley Duren, Christopher Kennedy, Nancy

- B. Grimm, James R. Ehleringer, Peter Marcotullio, Sarah Hughes, Stephanie Pincetl, Mikhail V. Chester, Daniel M. Runfola, Johannes J. Feddema, Joshua Sperling. 2015. "Climate change: Track urban emissions on a human scale." 2015. **Nature** (Comment). 525, 179-181. doi:10.1038/525179a
22. Nawrotzki, R. J., Hunter, L. M., Runfola, D. M., Riosmena, F. (2015). Climate change as migration driver from rural and urban Mexico. **Environmental Research Letters** 10(11), 114023. DOI: 10.1088/1748-9326/10/11/114023.
 23. Nawrotzki, R. J., Riosmena, F., Hunter, L. M., Runfola, D. M. (2015). Undocumented migration in response to climate change. **International Journal of Population Studies** 1(1), 60-74. DOI: 10.18063/IJPS.2015.01.004.
 24. Nawrotzki, R. J., Riosmena, F., Hunter, L. M., & Runfola, D. M., 2015. Amplification or suppression: Social networks and the climate change – migration association in rural Mexico. **Global Environmental Change** 35, 463-474. DOI: 10.1016/j.gloenvcha.2015.09.002
 25. Runfola, D.M., Romero-Lankao, P., Leiwen, J., Hunter, L., Nawrotzki, R., and Sanchez, L., 2015. "The Influence of Migration on Exposure to Extreme Weather Events: A Case Study in Mexico." 2015, **Society and Natural Resources**. <https://doi.org/10.1080/08941920.2015.1076918>
 26. Runfola, D.M., Hughes, S., 2014. "What makes green cities unique? Examining the economic and political characteristics of grey and green cities." **Land**, 3(1), 131-147; doi:10.3390/land3010131.
 27. Marcotullio, Peter J., Sara Hughes, Andrea Sarzynski, Stephanie Pincetl, Landy Sanchez Peña, Patricia Romero-Lankao, Daniel Runfola, and Karen C. Seto, 2014. "Urbanization and the carbon cycle: Contributions from social science." **Earth's Future** (2) 596-514. <https://doi.org/10.1002/2014EF000257>
 28. Giner, N.M., Polsky, C., Pontius, Jr., R.G., Runfola, D.M., Ratick, S., 2014. "Creating spatially-explicit lawn maps without classifying remotely-sensed imagery: The case of suburban Boston, Massachusetts, USA." **Cities and the Environment (CATE)**, 7(1), 10.
 29. Patricia Romero-Lankao, Kevin Gurney, Karen Seto, Mikhail Chester, Riley M. Duren, Sara Hughes, Lucy R. Hutyra, Peter Marcotullio, Larry Baker, Nancy B. Grimm, Chris Kennedy, Elisabeth Larson, Stephanie Pincetl, Dan Runfola, Landy Sanchez, Gyami Shrestha, Johannes Feddema, Andrea Sarzynski, Joshua Sperling, and Eleanor Stokes, 2014. "A critical knowledge pathway to low-carbon, sustainable futures: integrated understanding of urbanization, urban areas and carbon." **Earth's Future** 2(10) pp. 515-532.
 30. Runfola, D.M., Pontius Jr., R.G., 2013. "Quantifying the temporal instability of land change transitions." **International Journal of GIS**, 27(9), 1696-1716.
 31. Runfola, D.M., Polsky, C., Nicolson, C., Giner, N., Pontius Jr., R.G., Krahe, J., Decatur, A., 2013. "A Growing Concern? Examining the Influence of Lawn Size on Residential Water Use in Suburban Boston, MA, USA" **Landscape and Urban Planning**, 119, 112-123.
 32. Runfola, D.M., Hamill, T., Pontius, R.G., Rogan, J., Polsky, C., Albert, D., Ratick, S., 2014. "Using Fine Resolution Orthoimagery and Spatial Interpolation to Rapidly Map Turf Grass in Suburban Massachusetts." **International Journal of Geospatial and Environmental Research**. 1:4. <https://dc.uwm.edu/ijger/vol1/iss1/4>.
 33. Giner, N.M., Polsky, C., Pontius Jr., R.G., and Runfola, D.M., 2013. "Understanding the determinants of lawn landscapes: A fine-resolution spatial statistical analysis in suburban Boston, Massachusetts, USA." **Landscape and Urban Planning**, 111, 25-33.
 34. Islam, N., Kitazawar, D., Runfola, D.M., Giner, N., 2012. "Urban Lakes in a Developing Nation: Drivers, States, and Impacts of Water Quality and Quantity in Dhaka, Bangladesh." **Lakes & Reservoirs: Research and Management**. 17(4): 253-263.
 35. Gao, Y., Marpu, P., Niemeyer, I., Runfola, D.M., Giner, N., Hamill, T., Pontius, G.R. Jr., 2011. "Object-based classification with features extracted by a semi-automatic feature extraction algorithm - SEaTH." **Geocarto International**, 26 (3).
 36. Rogan, J., Bumbarger, N., Kulakowski, D., Christman, Z., Runfola, D.M., Blanchard, S., 2011. "Improving forest type discrimination with mixed lifeform classes using fuzzy classification thresholds informed by field observations." **Canadian Journal of Remote Sensing**, 36 (6).
 37. Griffin, S., Rogan, J., Runfola, D.M., 2011. "Application of Spectral and Environmental Variables to Map the Kissimmee Prairie Ecosystem using Classification Trees." **GIScience & Remote Sensing**, 48(3).
 38. Fortier, J., Rogan, J., Woodcock, C., Runfola, D.M., 2011. "Utilizing temporally invariant calibration sites to classify multiple dates of satellite imagery." **Photogrammetric Engineering & Remote Sensing**, 77 (2): p.181.
 39. Runfola, D.M., and Katherine B. Hankins. 2010. "Urban dereliction as environmental injustice." **ACME: An International Journal for Critical Geographies** 9(3): 345-367

Peer-Reviewed Book Chapters & Conference Proceedings

1. Runfola, D.M., 2022. *Computational Geography*. In: Geographic Information Science & Technology Body of Knowledge. Eds: John Wilson. **University Consortium for Geographic Information Science**.
<https://gistbok.ucgis.org/bok-topics/computational-geography>
2. Hollander, J., Polsky, C., Zinder, CD., Runfola, D., 2018. Shrinking Suburbs in a Time of Crisis. In: **The Routledge Companion to the Suburbs**, Hanlon, B., Vincino, T., eds. Routledge: Abingdon, Oxfordshire.
3. Zhao J.†, Runfola D.M., Kemper P. 2017. Quantifying Heterogeneous Causal Treatment Effects in World Bank Development Finance Projects. **Machine Learning and Knowledge Discovery in Databases. ECML PKDD 2017**.
<http://ecmlpkdd2017.ijs.si/papers/paperID507.pdf>
4. Zhao, J.†, Runfola, D., Kemper, P. 2017. Simulation Study in Quantifying Heterogeneous Causal Effects. **WSC Proceedings, IEEE**. Available online at: <https://ieeexplore.ieee.org/abstract/document/8247991>.
5. Runfola, D.M., Goodman, S.†, BenYishay, A., Nagol, J., Baatra, G., Tanner, J., Anand, A., Zhao, J.†, Kemper, P. 2017. Casual Tree Determination of the Heterogeneous Impacts of International Programs to Mitigate Deforestation. **Geocomputation**. Available online at: <http://www.geocomputation.org/2017/papers/27.pdf>
6. Runfola, D.M. (Contributing Author), 2014. **Intergovernmental Panel on Climate Change (IPCC) Assessment Report 5**, Working Group 2 - Chapter 26. North America.
https://www.ipcc.ch/site/assets/uploads/2018/02/WGIIAR5-Chap26_FINAL.pdf
7. Runfola, D.M., Polsky, C., Giner, N., Pontius Jr., R.G., Nicolson, C., 2013. "Future Suburban Development and the Environmental Implications of Lawns: A Case Study in New England, USA" In: **Modeling of Land-Use and Ecological Dynamics: Cities and Nature**, D. Czamanski, I. Benenson, and D. Malkinson, eds. Springer: New York. pp. 119-141.

Computer Software, Datasets and Reports († indicates with William and Mary student co-author)

1. Batra, G., Anand, A., Goodman, S.†, Runfola, D., 2019. Value for Money Analysis of GEF Interventions in Support of Sustainable Forest Management. GEF/ME/C.56/Inf.02 .
<https://www.thegef.org/council-meeting-documents/value-money-analysis-gef-interventions-support-sustainable-forest>
2. Goodman, S.†, BenYishay, A., Runfola, D., 2017. GeoQuery: Dynamic High Performance Computation for the Retrieval of Arbitrary Spatial Data. Summary Available online at <http://www.geoquery.org/>. DOI: 10.13140/RG.2.2.28363.59686
3. Marty, R.†, Goodman, S.†, LeFev, M.†, BenYishay, A., Runfola, D. 2016. GeoSIMEX: A R Package for Estimating Parameters in Linear Models incorporating Spatial Imprecision. <https://github.com/itpir/geoSIMEX>
4. Runfola, D., Lv, Miranda†, BenYishay, A., 2017. GeoMatch: A R Package for Propensity-Score Matching in Conditions of Intervention Spillover. <https://github.com/itpir/geoMatch>
5. Goodman, S.†, Runfola, D.M. (2019), Global Carbon Dioxide Concentration: 2015-2018.
<http://geolab.wm.edu/data>.
6. Batra, G., Anand, A., Goodman, S.†, BenYishay, A., Nyoteshwar, J., Runfola, D., 2017. A Value for Money Analysis of GEF Interventions in Land Degradation and Biodiversity,
<http://www.gefio.org/evaluations/value-money-analysis-gef-interventions-land-degradation-and-biodiversity>
7. Polsky, C., Pontius, R., Giner, N., Decatur, A., Runfola, D.M., and Rakshit, R., Plum Island Ecosystems LTER Landcover, 2013. **Marine Biological Laboratory**. Available Online:
<http://pie-liter.ecosystems.mbl.edu/content/holmes-land-cover>
8. Polsky, C., Pontius, R., Giner, N., Decatur, A., Runfola, D.M., and Rakshit, R., "HERO Object-based lawn mapping exploration of suburbia: rationale, methods and results for the **NSF Plum Island Ecosystems Long-term Ecological Research Site**."

Teaching

Undergraduate Courses Designed and Taught at William & Mary

1. Breaking Intuition: How Data is Changing Our World (DATA 100 [COLL 100])
2. Reasoning Under Uncertainty (DATA 146, renamed to Introduction to Data Science)
3. Applied Machine Learning (DATA 310)
4. Data Driven Decisionmaking (DATA 201/301 [COLL 200])
5. Neural Networks & Deep Learning (DATA 442)

Undergraduate Courses Taught at William & Mary

1. Agent Based Modeling (DATA 444)
2. Spatial Data Discovery (DATA 431)
3. Human Development & Data Science (DATA 150)

Graduate Courses Prepared and taught at William & Mary

1. Computational Geography I and II (APSC 691/692)
2. Applied Machine Learning (APSC 691)

Courses taught at other institutions:

1. *Decision Methods for Environmental Management and Policy (GEOG 261), Clark University*

Formal Training

1. Seminar in College Teaching, *Worcester State University* (Fall 2011)
2. Workshop on Undergraduate Mentoring, *Clark University* (Summer 2010)

Student Advising at William and Mary

Undergraduate

- Major advisor (67) (*includes self-designed majors before formalization of Data Science degree).
Ali Citiana, Caitlin Bryant, John Cone, Justin Cross, Emma Dubin, Sasan Faraj, Dominic Fornatora, Caroline Freshcorn, Ninnjin Gankhuleg, Victor Green, Rebecca Gurysh, Jordan Landrum, Jason Lin, Emilio Luz-Ricca, Zoe Metzger, Joseph O'Brien, Holitiana Raparoelina, Alexandra Raposo, Griffith Ruck, Anne Seekford, Mary Sharpe, Suditi Shyamsunder, Lydia Troup, Samuel Updike, Olivia Wachob, Bryce Whitney, Kevin Williams, Namgyu Woo, Heather Baier, Phillip Barto, Ishan Deb, David Grice, Peter H'Doubler, Ethan Harrison, Lauren Hobbs, Katherine Katz, Hyun-Jik Lee, John Napoli, Rachel Oberman, Prakrit Shukla, John Svoboda, Jonathan Tandaw, Catherine de Luca, Mollie Gaines, Lauren Hobbs, Noah Kim, Emma Lather, Hyun-Jik Lee, Graham Melville, Elizabeth Rosen, Campbell Scheuerman, Mallika Suri, Daniel Tay, Jennifer Traver, Audrey Way, Hemasree Yeluru, Rebecca Youngerman, Luke Hogg, Roger Clanton, Keagan DeLong, Anna Glass, Cole Granger, Samuel Joyner, Jing Li, Renee Ritchey, Jeremy Swack, Annamarie Warnke
- Pre-Major (First Year) Advising (19)
Ishan Deb, Andrew McGrady, Zack H'Doubler, John Svoboda, P. Govindaraj, Dominic Fornatora, Ryan Lingo, Emma Dubin, Kathryn Balint, Maya Shyamsundar, Gwen Galleher, Eric Downey, Weijun Wang, Srikar Vadgantam, Charles Hu, Brianna Howell, Jahnvi Murthy, Charles Hu, Annmarie Warnke
- Undergraduate Honors Thesis & Monroe Scholars Reports
 - Primary Advisor for Honors Thesis (8)
 - Sean Murphy, Data Science Honors Thesis. 2022. Evaluating the Efficacy of Convolutional Neural Networks to Detect Floating Plastic Debris.
 - John Hennin, Data Science Honors Thesis. 2022. The Pandemic From Above: Estimating COVID-19 Cases Using Deep Learning and Satellite Imagery.
 - Maeve Naughtonn-Rockwell, Data Science Honors Thesis. 2022. Using Deep Learning with Satellite Imagery to Estimate Global Deforestation Rates.
 - Matthew Crittenden, Data Science Honors Thesis. 2021. SCOPE: Building and Testing an Integrated Manual-Automated Event Extraction Tool for Online Text-Based Media Sources.
 - Heather Baier, Data Science Honors Thesis. 2020. Learning about Learning with Deep Learning: Satellite Estimates of School Test Scores.
 - Rebecca Youngerman, Data Science Honors Thesis. 2019. A Data-Driven Approach to Quantifying Perceptions of Drivers in Kenyan Health Care Quality.
 - Mollie Gaines, Data Science Honors Thesis. 2019. Calculating a Drought Vulnerability Index for South Africa based on Social and Biophysical Characteristics.
 - Ethan Harrison, Economics Honors Thesis. 2020. Modeling Movement: A machine-learning approach to track migration routes after displacement.
 - Primary Advisor - Monroe Scholars and Other Works
 - Monica Alicea, Monroe Scholarship. 2021. Estimating Metrics of Relevance by Integrating Search and News Media with Deep Learning.

- Kate Munkacsy, Monroe Scholarship. 2020. Convolutional Neural Network-based Identification of Illicit Mining Activity.
 - Rachel Oberman, Monroe Scholarship. 2018. Implementing a R and Python-based Pipeline for Causal Analytics with Causal Trees.
- Reader for Honors Thesis (5)
 - Caroline Morin, International Relations. 2022. Showing Off and Going Out: China's Vanity Project Phenomenon.
 - Daniel Quiroga, Computer Science Honors Thesis. 2021. On Designing a Digital Marketplace for Bartering Course Registration.
 - Campbell Scheuerman, Government Honors Thesis. 2020. Measuring Anti-Vaxx Sentiment in Social Media.
 - Chengli Huang, Math Honors Thesis. 2018. A Mathematical Study of Competition and Adoption of Two Consumer Products.
 - Isabel Marcovici, Psychological Sciences Honors Thesis. 2018. Police Officers and Personality Characteristics.
- Undergraduate Research Group Members
 - Spring 2022 (67) - Olivia Hettinger, Sidonie Horn, Sean Murphy, Hadley Day, Lydia Troup, Dominic Fornatora, Michael Roth, Dorian Miller, Kristina Pupkiewicz, Tara McLaughlin, Russell (Russ) Biddle, Renee Ritchey, Amanda Reed, Selwyn Heminway, Shaun Mathew, Victor Gedeck, Jing Li, Laura Mills, Caroline Edwards, Elias Wolman, Olivia Wachob, Jane Siwek, Joe O'Brien, Naomi Levin, John Hennin, Niraj Patel, Maeve Naughton-Rockwell, Asha Silva, Michael Getaneh, Becca Gurysh, Kaitlyn Crowley, Grace Morales, Fatima Pate, Courtney Maynard, Annamarie Warnke, Jason Lin, Calvin Bertoncini, Kerry Wang, Jacob Somer, Linda Ma, Robert West, Michael Foster, Joseph S. Lee, Jeremy Swack, Minkyong Song, Megan Sierzega, Dev Saxena, Isabella Wu, Caroline Morin, Erin Horrigan, Remington Fritz, Garrison Goetsch, Cole Spiller, Kaitlyn Wilson, Aliia Woodworth, Sophie Pittaluga, Zoe Roberts, Yasha Barth, Sebastian (Zak) Zeldon, Charles Pritz, Catherine Cable, Anna Glass, Carolina Rivera, Charlie Altman, Daniella Marx, Lena Zheng, Laina Lomont
 - Fall 2021 (67) - Olivia Hettinger, Sidonie Horn, Sean Murphy, Hadley Day, Lydia Troup, Dominic Fornatora, Natalie Spage, Michael Roth, Dorian Miller, Carolina Rivera, Kristina Pupkiewicz, Tara McLaughlin, Russell (Russ) Biddle, Renee Ritchey, Charlie Altman, Amanda Reed, Hannah Williams, Mikayla Williams, Selwyn Heminway, Shaun Mathew, here, Laura Mills, Caroline Edwards, Elias Wolman, Olivia Wachob, Jane Siwek, Joe O'Brien, Naomi Levin, John Hennin, Fatima Pate, Niraj Patel, Maeve Naughton-Rockwell, Jeremy Swack, Asha Silva, Michael Getaneh, Becca Gurysh, Kaitlyn Crowley, Grace Morales, Jason Lin, Tina (Jiaying) Chen, Calvin Bertoncini, Kerry Wang, Jacob Somer, Langston Lee, Linda Ma, Robert West, Michael Foster, Joseph S. Lee, Landon Clime, Michael Carter, Isabella DiFulvio, Minkyong Song, William Weston, Caroline Morin, Erin Horrigan, Remington Fritz, Garrison Goetsch, Cole Spiller, Yiwen Sun(Wendy), Kaitlyn Wilson, Aliia Woodworth, Sophie Pittaluga, Zoe Roberts, Yasha Barth, Sebastian (Zak) Zeldon, Charles Pritz, Catherine Cable, Anna Glass
 - Spring 2021 (75) - Olivia Hettinger, Elizabeth (Lulu) Dawes, Sydney Fuhrig, Sylvia Shea, Andrew Peck, Hannah Slevin, Maddy Mulder, Sidonie Horn, Sean Muphy, Hadley Day, Lydia Troup, Dominic Fornatora, Natalie Spage, Michael Roth, Joshua Habib, Dorian Miller, Carolina Rivera, Lindsey Rogers, Kristina Pupkiewicz, Isabel Schruer, Tara McLaughlin, Russell (Russ) Biddle, Renee Ritchey, Charlie Altman, Laura Opsahl-Ong, Antonia Farrell, Laura Mills, Caroline Edwards, Elias Wolman, Olivia Wachob, Jane Siwek, Joe O'Brien, Naomi Levin, Laura Kirk, Alison Reynolds, John Hennin, Suditi Shyamsunder, Sebastian (Zak) Zeldon, Fatima Pate, Niraj Patel, Maeve Naughton-Rockwell, Jeremy Swack, Yaw Ofori-Addae, Grace Lee, Jason Lin, Tina (Jiaying) Chen, Calvin Bertoncini, Kerry Wang, Jacob Somer, Langston Lee, Linda Ma, Robert West, Austin Anderson, Michael Foster, Joseph S. Lee, Matthew Crittenden, Monica Sandu, Monica Alicea, William Weston, Caroline Morin, Erin Horrigan, Remington Fritz, Garrison Goetsch, Cole Spiller, Amelia Grossman, Yiwen Sun(Wendy), Landon Clime, Asha Silva, Kaitlyn Wilson, Aliia Woodworth, Sophie Pittaluga, Gracie Kosco, Moses Alexander, Zoe Roberts, Yasha Barth
 - Fall 2020 (74) - Olivia Hettinger, Elizabeth (Lulu) Dawes, Sydney Fuhrig, Sylvia Shea, Austin Anderson, Andrew Peck, Hannah Slevin, Maddy Mulder, Sidonie Horn, Sean Muphy, Hadley Day, Lydia Troup, Dominick Fornatora, Natalie Spage, Michael Roth, Joshua Habib, Dorian Miller, Carolina Rivera, Isabel Schruer, Neel Simpson, Lindsey Rogers, Helena Buckman, Sam Updike, James Turner, Kristina Pupkiewicz, Laura Opsahl-Ong, Antonia Farrell, Laura Mills, Caroline Edwards, Elias Wolman, Olivia Wachob, Jane Siwek, Joe O'Brien, Naomi Levin, Laura Kirk, Alison Reynolds, John Hennin, Suditi Shyamsunder, Sebastian (Zak) Zeldon, Fatima Pate, Niraj Patel, Maeve Naughton-Rockwell, Yaw Ofori-Addae, Grace Lee, Nolan Ma, Jason Lin, Tina (Jiaying) Chen, James Yao, Calvin Bertoncini, Kerry Wang, Jacob Somer, Langston Lee, Linda Ma, Robert West, Matthew Crittenden, Celia Metzger, Kate Munkacsy, Monica Sandu, Emily Maison, Monica Alicea, William Weston, Caroline Morin, Erin Horrigan, Remington Fritz, Garrison Goetsch, Cole Spiller, Katerina Viyella, Amelia Grossman, Rachel Li, Yiwen Sun(Wendy), Landon Clime, Asha Silva, Kaitlyn Wilson, Tara McLaughlin
 - Spring 2020 (56) - Olivia Hettinger, Josh Panganiban, Sydney Fuhrig, Sylvia Shea, Austin Anderson, Elizabeth Dowker, Andrew Peck, Hannah Slevin, Maddy Mulder, Sidonie Horn, Emily Topness, Sean Muphy, Hadley Day, Lydia Troup,

Dominic Fornatora, Natalie Spage, John Napoli, Heather Baier, Laura Opsahl-Ong, Audrey Way, Antonia Farrell, Lara Maluf-Mas, Laura Mills, Caroline Edwards, Elias Wolman, Olivia Wachob, Jane Siwek, Joe O'Brien, Naomi Levin, Laura Kirk, Alison Reynolds, John Hennin, Nicolas LaGamma, Yaw Ofori-Addae, Grace Lee, Nolan Ma, Eric Nubbe, Jason Lin, Tina (Jiaying) Chen, Conor Sokolowsky, James Yao, Calvin Bertoncini, Matthew Crittenden, Greyson Pettus, Celia Metzger, Kate Munkacsy, Monica Sandu, Emily Maison, Monica Alicea, William Weston, Caroline Morin, Erin Horrigan, Remington Fritz, Maya Deutchman, Garrison Goetsch, Cole Spiller

- Fall 2019 (29) - Rachel Oberman, Josh Panganiban, Sydney Fuhrig, Sylvia Shea, Austin Anderson, Elizabeth Dowker, Andrew Peck, Hannah Slevin, John Napoli, Heather Baier, Laura Opsahl-Ong, Audrey Way, Antonia Farrell, Lara Maluf-Mas, Nicolas LaGamma, Yaw Ofori-Addae, Grace Lee, Nolan Ma, Eric Nubbe, Jason Lin, Matthew Crittenden, Greyson Pettus, Celia Metzger, Kate Munkacsy, Monica Sandu, Emily Maison, Monica Alicea, Victoria Haver, Olivia Hettinger
- Spring 2019 (24) - Rachel Oberman, Lauren Hobbs, Josh Panganiban, Grace Grimsley, Sydney Fuhrig, Rachel Layko, Sylvia Shea, Austin Anderson, Maddy Mulder, John Napoli, Heather Baier, Graham Melville, Laura Opsahl-Ong, Antonia Farrell, Lara Maluf-Mas, Jack Bowden, Nicolas LaGamma, Yaw Ofori-Addae, Grace Lee, Matthew Crittenden, Greyson Pettus, Celia Metzger, Nolan Ma, Kate Munkacsy, Ethan Harrison, Campbell Scheurman
- Fall 2018 (15) - Rachel Oberman, John Napoli, Lauren Hobbs, Heather Baier, Graham Melville, Josh Panganiban, Grace Grimsley, Sydney Fuhrig, Matthew Crittenden, Greyson Pettus, Rachel Laykos, Victor Ding, Audrey Way, Jack Bowden, Nicolas LaGamma, Mollie Gaines, Rebecca Youngerman
- 2017 - 2018 (18) - Oberman, R., Gaines, M., Ava Chafin, Allison Bowers, Grace Grimsley, Juliana Mitchell, Ryan Muro, Samantha Wooley, Samuel Patecell, Rebecca Youngerman, Heather Baier, Graham Melville, Josh Panganiban, Campbell Scheurman, John Napoli, Lauren Hobbs, Chengli Huang, Isabel Marcovici
- 2016 - 2017 (7) - Heather Baier, Evan King, Allison Bowers, Rebecca Youngerman, Oberman, R., LeFew, M., Seitz, L., Dempsey, H.
- 2015 - 2016 (5) - Dykstra, B., LeFew, M., Dempsey, H., Kovacevic, L., Ivan Echevarria
- 2014 - 2015 (7) - Teague, M., Ebert, C., Atan, J., Martin, S., Dempsey, H., Sevier, L., Marty, R.

Graduate

- Ph.D. Advising (*at William and Mary unless otherwise noted*)
 - Graduated Ph.D. Students - Primary Advisor
 - Dr. Seth Goodman (Applied Science, Computational Geography, Ph.D.). Ph.D. Advisor. Dissertation Title: Filling in the Gaps: Applications of Deep Learning, Satellite Imagery, and High Performance Computing for the Estimation and Distribution of Geospatial Data. 2017 - 2021.
 - Current Ph.D. Students - Primary Advisor
 - Lv, M. (Applied Science, Ph.D.). Ph.D. Advisor. Computer Vision and Land Cover Classification. Anticipated Graduation Year: 2024
 - Bahgat, K. (Applied Science, Ph.D.). Ph.D. Advisor. Global scope mapping and comparison of administrative boundaries. Anticipated Graduation Year: 2022
 - Brewer, E. (Applied Science, Ph.D.). Ph.D. Advisor. Convolutional Approaches to Satellite Imagery Analysis. Anticipated Graduation Year: 2022
 - Baier, H. (Applied Science, Ph.D.). Ph.D. Advisor. Deep Learning with Satellite Imagery to Predict Human Migratory Flows. Anticipated Graduation Year: 2025
 - Committee Member / Secondary Advisor
 - Kirn, S. (Applied Science, Ph.D.). Ph.D. Committee Member. Primary Advisor: Mark Hinders (APSC)
 - Rooney, M. (Applied Science, Ph.D.). Ph.D. Committee Member. Primary Advisor: Mark Hinders (APSC)
 - Spencer, S. (Applied Science, Ph.D.). Ph.D. Committee Member. Primary Advisor: Alfredo Pereira (ECON)
 - Weld, C. (Applied Science, Ph.D.). Ph.D. Committee Member. Primary Advisor: Larry Leemis (Math)
 - Sweigart, D. (Applied Science, Ph.D.). Ph.D. Committee Member. Primary Advisor: Rex Kincaid (Math)
 - Zaytseva, S. (Applied Science, Ph.D.). Ph.D. Committee Member. Primary Advisor: Leah Shaw (Math)
 - Zhao, J. (Computer Science, Ph.D.). Ph.D. Committee Member. Primary Advisor: Peter Kemper (CSCI). Quantifying Heterogeneous Causal Effects using Spatial Data and Causal Tree approaches.
 - Other (Dissertation Proposal Defense Committees, Academic Progress Committees):
Weld, C., Trujillo, V., Kallurkar, P., Borrus, D., Chaban, R., Maness, E., Naik, T., Simmons, E.

Extramural and Institutional (William & Mary) Service / Positions

Reviewer - Journals & Books: *Nature Sustainability, PLoS One, Land Degradation & Development, Climatic Change, Transactions in GIS, Environmental Research Communications, International Journal of GIS, Remote Sensing of Environment, Remote Sensing, Mitigation and Adaptation, Environmental Management, International Journal of Remote*

Reviewer - Grant Competitions: *National Science Foundation (Geography and Spatial Sciences), Department of Homeland Security (BTI Center of Excellence), United States Agency for International Development; Commonwealth Cyber Initiative (CCI)*

Other Extramural Service: AAG Session Organizer (GeoAI and Deep Learning Symposium: Spatial-Temporal Modeling and Data Mining), 2019; Applied Geography Specialty Group Awards Committee 2019; Geocomputation Session Organizer (Machine Learning & Spatial Techniques for Causal Inference), 2018; AAG Session Organizer (GeoAI Symposium: Spatial-Temporal Modeling and Data Mining pt. 2), 2020 [cancelled - Coronavirus].

Dataset Production & Maintenance: I am the founder and principal maintainer of the *geoBoundaries* global database of administrative layers, a collection of approximately 1 million geopolitical boundaries across the globe. The regularly-updated database is used by tens-of-thousands of users, including large multilaterals and NGOs, academics, and many other groups. You can learn more at www.geoboundaries.org.

Positions Held at the College of William and Mary

- **Assistant Professor, Department of Applied Science**, Data Science Program, William & Mary, 2017 - Present
- **Director of Technology, Data Science Program**, William & Mary, 2019 - Present
- **Director of Graduate Studies, Applied Science**, William & Mary, Fall 2020 - Present
- **Inaugural Director, Data Science Program**, William & Mary, 2017 - 2018
- **Geospatial Scientist, AidData**, William & Mary, 2014 - 2019

Extramural Positions Held

- **Academic Editor**, Editorial Board, Public Library of Science (PLOS) One, 2021- Present
- **Member (4 year term)**, NASA Socioeconomic Data and Applications center (SEDAC) User Working Group ([UWG](#))

Service at the College of William and Mary (Committees denoted with a *)

- University Committees
 - *Committee on Graduate Studies (COGS), William & Mary, Fall 2020 - Present
 - *Research Computing Advisory Committee, William & Mary, Fall 2021 - Present
 - *Information Technology Steering Committee, William & Mary, Fall 2019 - 2020
 - *Ad Hoc Committee for Engineering, Design, and Innovation, William & Mary, 2015-2016
- University General
 - *High Performance Computing Search Committee, William & Mary, 2020
 - William & Mary Day for Admitted Students, 2020, 2021, 2022
 - Admissions Office, William and Mary, Introduction to Data Science for Guides, Mentors, and TAs, Fall 2017.
 - First Year Advisor, 2017 - 2022
 - First Year Experience, William and Mary, Academic Life Presentation, Fall 2017
 - *Center for Geospatial Analysis Lecturer Search Committee, William and Mary - CGA, 2017
 - *Data Analyst Search Committee, William & Mary - AidData, 2016
 - *Geospatial Analyst Search Committee, William & Mary - AidData, 2016
 - *Geospatial Scientist Search Committee, William & Mary - AidData, 2015
 - *Center for Geospatial Analysis Director Search Committee, William & Mary, 2015
- Department of Applied Science
 - Director of Graduate Studies, Applied Science, William & Mary, Fall 2020 - Present
 - *Applied Science Admission and Recruiting Committee, William & Mary, 2017 - 2019
 - *Applied Science Academic Progress Committee, William & Mary, 2018 - 2019
 - *Applied Science Curriculum Committee, William & Mary, 2018 - 2019
- Data Science Program
 - *Data Science Visiting Assistant Professor Search Committee, William & Mary, Spring 2022

- *Data Science Faculty Search Committee, William & Mary, Spring 2022
- *Data Science Faculty Search Committee, William & Mary, Spring 2021
- *Data Science Lecturer Search Committee (Math), William & Mary, 2019.
- *Data Science Lecturer Search Committee, William & Mary - Applied Science, 2017
- Data Science Program Undergraduate Advisor, William & Mary, 2017 - Present
- Director of Technology, Data Science Program, William & Mary, 2019 - Present
- Inaugural Director, Data Science Program, William & Mary, 2017 - 2018

Select Awards, Honors, Invited Lectures and Press Coverage

- Leveraging Geospatial Information to Understand the Efficacy of Climate Interventions, **United Nations Food and Agricultural Organization (FAO)**, Spring 2022.
- *Virginia Business*, 2022, [W&M emphasizes real-world skills in undergrad projects.](#)
- *Intel.gov Public Daily Brief*, 2021. Spotlight: [National Geospatial Intelligence Agency Tearline - China's Belt and Road Initiative in Ecuador.](#)
- *WYDAILY*, 2021. [Interests Converge as Data Science Program Grows.](#)
- *DHS CAO Spotlight*, 2021. [Undergraduate researcher creating visualizations to better understand migratory patterns.](#)
- *Earth-Eval*, 2020. [Evaluating the Impact of Environmental Interventions during a Global Quarantine.](#)
- *Measuring Adaptive Capacity from Space: Assessing Social Factors using Convolutional Neural Networks*, **University of North Carolina Wilmington**, Spring 2020.
- Arts & Sciences Faculty Award for Teaching Excellence. The College of William and Mary. 2019 (\$3,000).
- *William and Mary News*, 2019. "geoLab: Students use satellites & AI to make a better world."
<https://www.wm.edu/news/stories/2019/geolab-students-use-satellites-ai-to-make-a-better-world.php>
- *HPCwire*, 2019. "Thrill for Big Data, Scaling, Resilience and More."
<https://www.hpcwire.com/2018/11/19/whats-new-in-hpc-research-thrill-for-big-data-scaling-resilience-and-more/>
- *Geospatial Impact Evaluation*, **Norges Miljø-og Biovitenskapelige Universitet, Norway**, Spring 2018.
- *Brookings*, 2018. "A quiet revolution in impact evaluation at USAID."
<https://www.brookings.edu/blog/future-development/2018/10/08/a-quiet-revolution-in-impact-evaluation-at-usaid/>
- *Commonwealth Data Analytics in the Humanities Summit*, **Office of the Governor of Virginia**, Winter 2016.
- *The Washington Post*, Svrluga, S., 2015. "Here's how broke college students are helping Nepal recover from disaster."
<http://www.washingtonpost.com/news/grade-point/wp/2015/05/07/heres-how-broke-college-students-are-helping-nepal-recover-from-disaster/>
- *Williamsburg-Yorktown Daily*, Brickley, I., 2015. "W&M Students, AidData Crowdsource Maps for Nepal Relief Efforts."
- Presidential Management Fellow, Finalist, *Office of Budget and Management*, 2014.
- *Roundtable on International Climate Resilience Efforts*, **White House Office of Science and Technology Policy**, Winter 2014.
- *Casinos, Nukes and Statistics: Modernizing Aid Effectiveness*, *Frontiers in Development*, **U.S. Agency for International Development**, Summer 2014.
- *Resilience and Food Security in a Changing Climate*, US-Africa Leaders Summit, **National Academy of Sciences**, Summer 2014.
- *The Influence of Urban Migration on Exposure to Extreme Weather Events: Opportunities and Challenges in Mexico*. The Hamburg Conference: Actions for Climate Induced Migration, **Climate Services Center**, Hamburg, Germany, Summer 2013.
- Best Paper in Image Analysis and Interpretation, Photogrammetric Engineering and Remote Sensing (Boeing Award), *American Society for Photogrammetry and Remote Sensing*, 2012 (\$1000)
- NASA-MSU Professional Enhancement Award, 2012.
- HERO Fellowship Award, *Human-Environment Regional Observatory*, 2009-2012.
- Pruser Dissertation Award, *Clark University*, 2010.
- Global Land Project Fellow, *Advanced Institute in Ecosystem Services Valuation and Modeling*, 2010 (Travel to

Hokkaido University, Japan)

- Graduate Fellowship Program, *National Science Foundation, Honorable Mention*, 2010 (Terragrid Access)
- 1st Place, Glenda Laws Paper Competition, *Association of American Geographers Urban Geography Specialty Group*, 2008 (\$50)
- 1st place, Thomas Mettillie Student Achievement Award, *Urban and Regional Information Systems Association (Georgia Chapter)*, 2008 (\$500)
- Cartography Award, *Georgia State University Department of Geosciences*, 2008
- Outstanding Geography Senior Award, *National Council for Geographic Education*, 2008
- Dean's Scholarship Key, *Georgia State University*, Fall 2006, 2007
- Faculty Scholar, *Georgia State University*, 2005 – 2008
- College of Arts and Sciences Honor's Society Member, *Georgia State University*, 2004 – 2008
- Faculty Scholarship Award, *Georgia State University*, Spring 2006
- *Wired*, Putsch, C., 2014. "Dr. Watson - Man and Machine in the Fight Against Tuberculosis."
<https://www.wired.de/collection/latest/dr-watson-mensch-und-maschine-im-kampf-gegen-die-epidemie>
- *Daily Press*, Bozick, T., 2014. "Data -- including open government data -- could fuel innovation in Hampton Roads."
<http://www.dailypress.com/business/dp-nws-evg-open-data-20141227-story.html#page=1>
- *Boston Globe*, Hartnett, K., 2013. "Green lawns in Ipswich: Enjoy them while you can."
http://www.boston.com/bostonglobe/ideas/brainiac/2013/08/green_lawns_in.html
- *Urban Land Change Modeling: Using GEOMOD to Project Water Consumption & Suburban Drought in Metropolitan Boston, USA*. **Technion Institute**, Israel, Fall 2012.
- *USA Today*, Nasser, H.E., 2011. "Housing occupancy declines, but rentals up in some spots." http://www.usatoday.com/money/economy/housing/2011-07-26-ZIP-codes-home-occupancy-rentals-housing_n.htm
- *Lincoln Institute of Land Policy*, Hollander, J., Polsky, C., Zinder, D., **Runfola, D.M.**, 2011. "The New American Ghost Towns.", *Land Lines*, April: p. 2-7.
- *Land Change Modeling Methods: calibration, validation, extrapolation, and interpretation*. **Hokkaido University**, Japan, Summer 2010.
- *Ethics, Justice, and Human Rights Specialty Group Newsletter*, **Runfola, D.M.**, 2008, "It's Not Just Trash." April: p. 2-3.