

Robert Zupko II

State College, Pennsylvania, United States

primary email: rzupko@mtu.edu

ORCID: [0000-0001-8757-483X](https://orcid.org/0000-0001-8757-483X)

Education

- 2019 **PHD in Computational Science and Engineering**
Michigan Technological University
- 2023 **MGIS in Geographic Information Systems**
Pennsylvania State University
- 2020 **MS in Environmental & Energy Policy**
Michigan Technological University
- 2014 **ALM in Information Technology**, concentration in Software Engineering
Harvard University
- 2008 **BS in Computer Science, Summa cum laude**
Rivier College (now Rivier University)

Professional Appointments

- 2022 - 2023 **Assistant Research Professor, Pennsylvania State University**
Boni Lab, Center for Infectious Disease Dynamics, Department of Biology
- 2019 - 2022 **Computational Scientist, Pennsylvania State University**
Boni Lab, Center for Infectious Disease Dynamics, Department of Biology

Publications

- 2025 Tran K.T., Nguyen T.D., Weissman D.B., Li E.Z., Mok S., Small-Saunders J.L., Bousema, T. **Zupko, R.J.**, Tran, T.N.A., Boni, M.F. Effects of recombination on multi-drug resistance evolution in *Plasmodium falciparum* malaria. *PLoS Computational Biology*. 21(8): e1013401, August 2025.
- 2024 **Zupko, R.J.**, Servadio, J.L., Nguyen, T.D., Tran, T.N.A., Tran, K.T., Somé, A.F., Boni, M.F., Role of Seasonal Importation and Genetic Drift on Selection for Drug Resistant Genotypes of *Plasmodium falciparum* in High Transmission Settings, *Royal Society Interface*. vol. 21: 20230619, March 2024.
- 2024 Zhewen, L., Nguyen, T.D., Tran, T.N.A., **Zupko, R.J.**, Boni, M.F., Assessing emergence risk of double-resistant and triple-resistant genotypes of *Plasmodium falciparum*, *Nature Communications* 15, 1390, February 2024.
- 2023 **Zupko, R.J.**, Nguyen, T.D., Ngabonziza, J.C.S., Kabera, M., Li, H., Tran, T.N.A., Tran, K.T., Uwimana, A., Boni, M.F., Potential policy interventions for slowing the spread of artemisinin-resistant *pfkelch* R561H mutations in Rwanda, *Nature Medicine*, vol. 29(11), pp. 2775–2784, September 2023.
- 2023 **Zupko, R.**, Kolapkar, S.S., Zinchik, S., Torrefied Plastic-Fiber Fuel Pellets as a Replacement for Fossil Fuels - A Case Study Life Cycle Assessment for Green Bay, Wisconsin, USA, *The International Journal of Life Cycle Assessment*, August 2023.
- 2023 **Zupko, R.**, Externalities as the Status Quo: Federal Application of Environmental Charges in the United States, *Environmental Policy and Governance*, vol. 33(1), pp. 78-89, February 2023. (ahead-of-print, May 2022)
- 2023 **Zupko, R.J.**, Nguyen, T.D., Wesolowski, A., Gerardin, J., Boni, M.F., National-Scale Simulation of Human Movement in a Spatially Coupled Individual-Based Model of Malaria in Burkina Faso, *Scientific Reports*, vol. 13, pp. 321, January 2023.

- 2022 **Zupko, R.J.**, Nguyen, T.D., Somé, A.F., Tran, T.N., Gerardin, J., Dudas, P., Giang, D.D.H., Wesolowski, A., Ouédraogo, J.B., Boni, M.F., Long-term effects of increased adoption of artemisinin combination therapies in Burkina Faso, *PLoS Global Public Health*, vol. 2(2), pp. e0000111, February 2022.
- 2021 **Zupko, R.**, Application of Agent-Based Modeling and Life Cycle Sustainability Assessment to Evaluate Biorefinery Placement, *Biomass and Bioenergy*, vol. 144, pp. 105916, January 2021.
- 2020 **Zupko, R.**, Forest Ownership Patterns in the Western Upper Peninsula of Michigan, USA, *Journal of Forestry*, vol. 118(5), pp. 466-473, September 2020.
- 2020 **Zupko, R.**, Kamath, D., Coscarelli, E., Rouleau, M., Minakata, D., Agent-Based Model to Predict the Fate of the Degradation of Organic Compounds in the Aqueous-Phase UV/H₂O₂ Advanced Oxidation Process, *Process Safety and Environmental Protection*, vol. 136, pp. 49-55, April 2020.
- 2019 **Zupko, R.**, Life Cycle Assessment of the Production of Gasoline and Diesel from Forest Residues Using Integrated Hydrolysis and Hydroconversion, *The International Journal of Life Cycle Assessment*, vol. 24(10), pp. 1793-1804, October 2019.
- 2019 Rouleau, M., **Zupko, R.**, Agent-Based Modeling for Bioenergy Policy Analysis and Sustainability Assessment, *Landscape and Urban Planning*, vol. 188, pp. 54-63, August 2019.
- 2019 **Zupko, R.**, Rouleau, M., ForestSim: Spatially Explicit Agent-Based Modeling of Non-Industrial Forest Owner Policies, *SoftwareX*, vol. 9, pp. 117-125, January 2019.
- 2007 **Zupko, R.J.**, Introduction to IEEE standard 802.16: wireless broadband access. *Rivier Academic Journal*, vol. 3(1), pp. 1-11, Spring 2007.

Conference Proceedings

PAPERS

- 2021 **Zupko, R.**, Nguyễn, T., Boni, M., Simulating Human Movement in a National-Scale Individual-Based Model of Malaria in Burkina Faso, Social Simulation Conference 2021, Kraków, Poland (Online), September 20 - September 24, 2021.
- 2017 **Zupko, R.**, Fuzzy Decision Making in an Agent-Based Model of Non-Industrial Private Forest Owners, IEEE Symposium Series on Computational Intelligence, Honolulu, Hawai'i, November 27 - December 1, 2017.

ABSTRACTS

- 2023 **Zupko, R.**, Optimal drug policy coverage interventions for slowing the spread of *pfkelch* R561H artemisinin-resistance mutation in Rwanda, Pennsylvania Parasitology Conference (PParaCon), State College, Pennsylvania, July 21 - 22, 2023.
- 2023 **Zupko, R.**, Greatrex, H., Where are the malaria vectors? Identification and uncertainty associated with classification of mosquito's habitat using remote sensing, American Association of Geographers Annual Meeting 2023, Denver, Colorado, March 23 - 27, 2023 (presented virtually).
- 2022 **Zupko, R.**, Li, H., Nguyễn, T., Tran, T., Tran, K., Boni, M., Contrasting Drug Policy Interventions to Delay the Fixation of 561H Artemisinin Resistant *Plasmodium falciparum* in Rwanda, American Society of Tropical Medicine and Hygiene Annual Meeting, Seattle, Washington, October 30 - November 3, 2022.
- 2022 **Zupko, R.**, Role of seasonal importation and multiclonal infections on the selection for anti-malarial resistant genotypes of *Plasmodium falciparum* in high transmission settings, Malaria Modelers' Mini-Meeting, Bill & Melinda Gates Foundation, Seattle, Washington, October 29, 2022.
- 2021 **Zupko, R.**, Nguyễn, T., Tran, T., Somé, F., Ouédraogo, J.B., Boni, M., Projected progression of anti-malarial drug resistance in Burkina Faso using high resolution spatial modeling under drug policy and seasonal importation scenarios, Epidemics 8, Virtual Conference, November 30 - December 3, 2021.
- 2020 **Zupko, R.**, Tran, T., Nguyễn, T., Somé, F., Ouédraogo, J.B., Boni, M., Projected Development of

- Antimalarial Drug Resistance in Burkina Faso Using High Resolution Spatial Modeling, American Society of Tropical Medicine and Hygiene Annual Meeting, Virtual Conference, November 15-19, 2020.
- 2019 **Zupko, R.**, Agent Based Life Cycle Sustainability Assessment to Assess Regional Potential for Second Generation Biofuel Development, International Workshop on Putting Sustainability into Convergence: Connecting Data, People, and Systems, Singapore, January 28 - 29, 2019.
- 2018 Minataka, D., Rouleau, M., **Zupko, R.**, Coscarelli, E., Experimental and Theoretical Investigations of the Fate of Organic Compounds Degradation in Advanced Oxidation Systems, International Water Association World Water Congress & Exhibition, Tokyo, Japan, September 16 - 21, 2018.
- 2018 **Zupko, R.**, Coscarelli, E., Rouleau, M., Minakata, D., Development of An Agent-based Model to Understand and Predict the Fate of Organic Compounds in Aqueous-phase Advanced Oxidation Processes, 256th ACS National Meeting & Exposition, Boston, Massachusetts, August 19 - 23, 2018.
- 2016 **Zupko, R.**, Ghimre, H., Nouhan, P., Rouleau, M., An Agent-based Model of Voluntary Incentive Programs for Sustainable Biofuel Development, Social Simulation Conference 2016, Rome, Italy, September 19 - 23, 2016.
- 2015 Arslanian, A., Bonner, D., Bugarinovic, I., Ford, M., Galushka, A., Liu, C. J., Martin, Z., O'Connor, F., Orcharton, A. A., Rodrigues, G. A., Sinnott, S. M., Stefanski, T. S., Valencia, J. A., Yaroshevsky, N. E., Zaman, S., **Zupko, R.**, Henstock, P. V., Toward an Open Source Suite to Bridge the Gap between Plate-Based Screening and Results, BioIT World: Conference & Expo '15, Boston, Massachusetts, April 21 - 23, 2015.
- 2014 **Zupko, R.**, Chouinard, D., Nichols, J., Polyanskyy, Y., Rabe, J., Rivituso, J., Bieber, C. Henstock, P. V., Lingolearn: Japanese Vocabulary Instruction and Assessment Software Utilizing Automatically Generated Kanji and Kana "Confusers", 28th JLTANE at Brown University, Providence, Rhode Island, June 7, 2014.
- 2012 Hodis, E., Watson, I., Theurillat, J., Zou, L., Place, C., Nickerson E., Auclair, D., Cibulskis, K., Sivachenko, A., Kryukov, G., Stransky, N., Ramos, A. H., Voet, D., Lawrence, M. S., Stojanov, P., Saksena, G., McKenna, A., Carter, S. L., Pugh, T., Noble, M., Lin, P., Lichtenstein, L., **Zupko, R.**, Sougnez, C., Guiducci, C., Onofrio, R.C., Ambrogio, L., Fennell, T., Chong, K., Winckler, W., Ardlie, K., Lander, E. S., Golub, T., Meyerson, M., Gabriel, S. B., Getz, G., Wagner, S., Schadendorf, D., Hoon, D. S. B., Chin, L., and Garraway, L. A., A glimpse into the somatic mutation landscape of melanoma through exome sequencing of 121 tumor-normal pairs [abstract]. In: Proceedings of the 103rd Annual Meeting of the American Association for Cancer Research; 2012 Mar 31-Apr 4; Chicago, Illinois. Philadelphia (PA): AACR; Cancer Res 2012;72(8 Suppl):Abstract nr 5056. doi:1538-7445.AM2012-5056

POSTERS

- 2023 **Zupko, R.J.**, Grace, D., Tran, T.N.A., Tran, K.T., Nguyen, T.D., Boni, M.F., Projected Prevalence and possible Drug Policy Interventions in Response to Artemisinin Resistant *Plasmodium falciparum* in Uganda, American Society of Tropical Medicine and Hygiene Annual Meeting, Chicago, Illinois, October 18-22, 2023.
- 2023 Tran, K.T., Nguyen, T.D., Weissman, D., Li, E.Z., **Zupko, R.J.**, Tran, T.N., Boni, M., Multi-Clonal Infections Have Stronger Effect on LD Reduction Than Interrupted Feeding in Malaria, Pennsylvania Parasitology Conference (PARaCon), State College, Pennsylvania, July 21 - 22, 2023.
- 2023 **Zupko, R.J.**, Leveraging Google Earth Engine to identify possible habitat for *Anopheles* mosquitoes in the Greater Mekong Subregion. PA GIS Conference, State College, Pennsylvania, April 10 - 12, 2023.
- 2022 **Zupko, R.J.**, Tran, T.N., Nguyen, T.D., Tran, K.T., Boni, M.F., Comparing the Development of Artemisinin Resistance in High and Low Prevalence Countries. Malaria: Confronting Challenges from Drug Discovery to Treatment, Breckenridge, Colorado, April 10 - 13, 2022.
- 2021 **Zupko, R.**, Tran, T., Nguyễn, Boni, M., Seasonal Risk Associated with Fixation of Antimalar-

- ial Resistance Through Importation, American Society of Tropical Medicine and Hygiene Annual Meeting, National Harbor, Maryland, November 17 - 21, 2021.
- 2021 **Zupko, R.**, Tran, T., Nguyễn, T., Somé, F., Ouédraogo, J.B., Boni, M., Projected Development of Antimalaria Drug Resistance in Burkina Faso Using High Resolution Spatial Modeling, 2021 MIDAS Network Annual Meeting, Virtual Conference, May 10-13, 2021.
- 2019 **Zupko, R.**, Rouleau, M., Incorporation of Agent-Based Modeling and Life Cycle Sustainability Assessment to Improve Assessment of Woody-Biomass Based Biofuels, Bioenergy Sustainability Conference, Nashville, Tennessee, October 21 - 22, 2019.
- 2017 Mayer, A., **Zupko, R.**, Rouleau, M., ForestSim: An ABM Simulation of Bioenergy Sustainability, Agent-Based Modeling (ABM) 17, San Diego, California, April 20-22, 2017.
- 2016 Rouleau, M., **Zupko, R.**, Ghimre, H., Nouhan, P., ForestSim: An Agent-Based Simulation for Bioenergy Sustainability Assessment, Social Simulation Conference 2016, Rome, Italy, September 19 - 23, 2016.
- 2016 Davis, C., Halaharvi, V., Mitchell, R., Rosenberg, C., Seing, M., Williams, R., **Zupko, R.**, Henstock, P., Accelerating Screening from Plates to Analysis Through a Flexible Web-Based Platform, BioIT World: Conference & Expo '16, Boston, Massachusetts, April 5-7, 2016
- 2016 Abhilash, S., Dube, S., Girija, T., Leinicke, S., Okongwu, C., Sanford, J., **Zupko, R.**, Zhang, T., Potier, Y., Neumeyer, S., Rotstein, S., Henstock, P., HELM Editor Project: An Open-Source, Web-Based Biomolecule Editor, BioIT World: Conference & Expo '16, Boston, Massachusetts, April 5-7, 2016.
- 2011 Voet, D., Lin, P., Lichtenstein, L., **Zupko, R.**, Saksena, G., Noble, M., Cibulskis, K., Gabriel, S., Lander, E., Chin, L., Getz, G., Firehose: An Analysis Infrastructure, The Cancer Genome Analysis First Annual Scientific Symposium, Washington, D.C., November 17 - 18, 2011.

Honors & Awards

- 2019 Dean's Award for Outstanding Scholarship, *Michigan Technological University*
- 2008, 2010 Catalyst Award, *Novartis Institutes for Biomedical Research*
- 2004 Surgeon General's Medical Information Systems Airman of the Year, *United States Air Force*

Grants

- 2019 Doctoral Finishing Fellowship (stipend + tuition), *Michigan Technological University*
- 2018 Student Research Grant, *Great Lakes Research Center*

Consulting

- 2023 **World Health Organization**, project consultant for "[Production of] updated maps of the risk of emergence and spread of *pfhrp2/3* gene deletions in sub-Saharan Africa (SSA) and Asia"

Teaching

- 2024 - Present **e-Cornell Course Facilitator, eCornell, Cornell University**
Python Programming, a professional certificate consisting of six courses
- 2018 **Graduate Teaching Instructor, Michigan Technological University**
U.S. Military History (Undergraduate)

- 2017 - 2018 **Graduate Teaching Assistant, Michigan Technological University**
U.S. Military History (Undergraduate)
Global Issues (Undergraduate)
- 2014 - 2016 **Teaching Assistant, Harvard Extension School**
Software Design: Principles, Models and Patterns (Graduate)
Software Engineering (Graduate Capstone)

STUDENTS MENTORED / SUPERVISED

- 2023 Carter Farinha, Undergraduate Research Assistant
2022 - 2023 Deborah Grace, Undergraduate Research Assistant
2020 - 2021 Haojun Li, Undergraduate Research Assistant (supervised by Maciej Boni)

Other Talks

- 2023 “Integrating space and geography in individual-based models,” AMMnet Special Event: Geospatial Analysis and Spatial-temporal Modelling Mini-Symposium, Applied Malaria Modeling Network (AMMnet), March 30, 2023.
- 2022 “Drug Resistant Malaria: Current Status & Future Directions,” The Millennium Café, Materials Research Institute, Pennsylvania State University, August 30, 2022.
- 2019 “Biofuels in the Western Upper Peninsula, a life cycle assessment of a proposed biorefinery in Ontonagon,” Department of Social Sciences, Michigan Technological University, March 1, 2019.

Other Writing

- 2023 **Zupko, R.**, Uwimana, A., Research Briefing: Modeling to guide drug policy response to artemisinin-resistant malaria in Rwanda, *Nature Medicine*, October 2023.
- 2023 **Zupko, R.**, Review of *Cyberwar: How Russian hackers and trolls helped elect a president: What we don’t, can’t, and do know [Revised Edition]*, by Kathleen Hall Jamieson. *The Social Science Journal*. ahead-of-print.
- 2021 **Zupko, R.**, Review of *Global Algorithmic Capital Markets: High Frequency Trading, Dark Pools, and Regulatory Challenges*, by Walter Mattli (Ed.). *The Social Science Journal*. 59(2), 334–335.
- 2020 **Zupko, R.**, Review of *Equilibrium Models in Economics: Purposes & Critical Limitations*, by L. A. Boland. *The Social Science Journal*, 57(2), 262–263.
- 2019 **Zupko, R.**, Review of *Complexity and Evolution: Toward a New Synthesis for Economics*, by D. S. Wilson & A. Kirman (Eds.). *The Social Science Journal*, 56(1), 141–142.

Professional Experience

- 2024 - Present **Altamira Technologies**, Senior Data Scientist
- 2017 - 2018 **Michigan Technological University**, Research Assistant (Ad Hoc)
- 2015 - 2018 **Xeratec**, Senior Software Developer
- 2014 - 2015 **Essen BioScience** (acquired by Sartorius), Senior Software Engineer
- 2014 **University of Michigan**, Senior Applications Programmer/Analyst
- 2012 - 2014 **Permabit** (acquired by Red Hat), Software Engineer
- 2013 **Protivent**, Software Developer (Contract)
- 2011 - 2012 **Scholastic**, Senior Release Engineer (Contract)
- 2011 **Broad Institute**, Software Engineer
- 2007 - 2011 **Novartis Institutes for Biomedical Research**, Software Systems Analyst Specialist
- 2006 - 2007 **Terminal Velocity FM**, Software Engineer

2002 - 2006 **Air Force Institutes for Operational Health, United States Air Force**, Staff Sergeant / Computer Programmer

Certifications

2015 - Present **Certified Information Systems Security Professional (CISSP)**
(ISC)², License 530179

Professional Development

2022 GCERT in Remote Sensing and Earth Observation
 Pennsylvania State University
2021 POSTBAC CERT in Geographic Information Systems
 Pennsylvania State University
2017 GCERT in Sustainability
 Michigan Technological University

Professional Memberships

2015 - present **IEEE**, Senior Member

Review Activities

2023 - 2024 *Scientific Reports* editorial board member, infectious disease
2020 - present 50+ reviews for 10+ journals, comprehensive listing on Web of Science:
<https://www.webofscience.com/wos/author/record/AAI-9778-2021>