

Alexander C. Michels

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📖 Research Interests

- Agent-Based Models
- High-Performance Computing
- Spatial Analysis
- CyberInfrastructure
- Network Science
- Spatial Accessibility

🎓 Education

Ph.D. in Informatics

June 2019 - Present

University of Illinois at Urbana-Champaign

– Advised by Dr. Shaowen Wang in Spatial Informatics concentration.

M.S. in Geography and G.I.S.

August 2020 - Present

University of Illinois at Urbana-Champaign

B.S. in Mathematics and Financial Economics

August 2015 - May 2019

Westminster College

– Minor in Computer Science — Honors in Computer Science and Math — Graduated Cum Laude

💻 Research Experience

Research Assistant

📍 Champaign, IL

[CyberGIS Center](#) & [Geospatial Information Laboratory \(CIGI\)](#)

June 2019 - Present

- Building cyberinfrastructure using Docker Swarm, Hadoop and Kubernetes clusters. I manage an undergraduate research assistant and serve as lead developer of [CyberGIS-Jupyter](#)
- Programming spatially-explicit models for disease and land-use change

Informatics Researcher

📍 Los Angeles, CA

Institute for Pure and Applied Mathematics at UCLA / Praedicat, Inc.

June 2018 - August 2018

- Worked for IPAM to develop a novel algorithm for computational fact-checking on knowledge graphs and a self-supervised machine learning algorithm for sentence importance which outperformed TF-IDF.

📖 Publications

Journal Articles

- Kang, J.-Y., **Michels, A.**, A. Crooks, J. Aldstadt, and S. Wang (2021). “An Integrated Framework of Global Sensitivity Analysis and Calibration for Spatially Explicit Agent-Based Models”. In: *Transactions in GIS* Early View.n/a. URL: <https://doi.org/10.1111/tgis.12837>.
- Kang, J.-Y., **Michels, A.**, F. Lyu, S. Wang, N. Agbodo, V. L. Freeman, and S. Wang (2020). “Rapidly Measuring Spatial Accessibility of COVID-19 Healthcare Resources: A Case Study of Illinois, USA”. In: *International Journal of Health Geographics*. URL: <https://doi.org/10.1186/s12942-020-00229-x>.

Conference Papers

- Michels, A.**, A. Padmanabhan, Z. Li, and S. Wang (Oct. 2021). “Towards Reproducible Research on CyberGISX with Lmod and Easybuild”. In: *Gateways 2021*. URL: <https://doi.org/10.5281/zenodo.5569659>.
- Padmanabhan, A., Z. Xiao, R. Vandewalle, F. Baig, **Michels, A.**, Z. Li, and S. Wang (Nov. 2021). “CyberGIS-Compute for Enabling Computationally Intensive Geospatial Research”. In: *SpatialAPI'21: Proceedings of the 3rd ACM SIGSPATIAL International Workshop on APIs and Libraries for Geospatial Data Science*. DOI: <https://doi.org/10.1111/tgis.12837>.
- Padmanabhan, A., Z. Xiao, R. Vandewalle, **Michels, A.**, and S. Wang (Oct. 2021). “Enabling Computationally Intensive Geospatial Research on CyberGIS-Jupyter with CyberGIS-Compute”. In: *Gateways 2021*. Zenodo. URL: <https://doi.org/10.5281/zenodo.5570056>.

- Michels, A., J.-Y. Kang, and S. Wang (2020). “An Exploration of the Effect of Buyer Preference and Market Composition on the Rent Gradient Using the ALMA Framework”. In: *Proceedings of the 3rd ACM SIGSPATIAL International Workshop on GeoSpatial Simulation*. GeoSim '20. Seattle, Washington: ACM, pp. 48–51. ISBN: 9781450381611. URL: <https://doi.org/10.1145/3423335.3428167>.
- Kang, J.-Y., J. Aldstadt, Michels, A., R. Vandewalle, and S. Wang (2019). “CyberGIS-Jupyter for Spatially Explicit Agent-based Modeling: A Case Study on Influenza Transmission”. In: *GeoSim '19: Proceedings of the 2nd ACM SIGSPATIAL International Workshop on GeoSpatial Simulation*. Chicago, Illinois: ACM, pp. 32–35. ISBN: 978-1-4503-6956-5. URL: <https://doi.org/10.1145/3356470.3365531>.

Awards

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| UIUC GIS Day Virtual Student Poster Competition | November 2020 |
| “Third Place” | UIUC Department of Geography & Geographic Information Systems |
| Cyberinfrastructure Specialty Group Robert Raskin Student Competition | April 2020 |
| “First Place for Research in Geospatial Cyberinfrastructure” | American Association of Geographers (AAG) |
| UCGIS Prize for Advances in Geospatial Problem Solving | July 2019 |
| “Advancing Reproducibility in Geospatial Research at the AAG-UCGIS Summer School 2019” | AAG-UCGIS |
| Best Robot in Division Prize for Senior Unique Division | April 2018 |
| “Robot in the Division with the lowest Total Final Scores” | Trinity Fire Fighting Robot Contest |
| North America Award for Level 2 | April 2018 |
| “The top North American robot in Level 2” | Trinity Fire Fighting Robot Contest |
| COMAP International Mathematical Modeling Competition Honorable Mention | January 2017 |
| “excellent modeling and sensitivity analysis” | COMAP International Mathematical Modeling Competition |

Presentations

Oral Presentations

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| Towards Reproducible Research on CyberGISX with Lmod and Easybuild | October 2021 |
| <i>Gateways 2021</i> | 📍 Virtual |
| An Exploration of the Rent Gradient using the ALMA Framework | November 2020 |
| <i>3rd ACM SIGSPATIAL International Workshop on GeoSpatial Simulation</i> | 📍 Virtual |
| Particle Swarm Optimization for Calibration in Spatially Explicit ABMs | April 2020 |
| <i>American Association of Geographers</i> | 📍 Virtual |
| Capturing the Predictive Power of Cortical Learning Algorithms | April 2019 |
| <i>National Conference on Undergraduate Research</i> | 📍 Atlanta, GA |
| Computational Fact-Checking through Knowledge Graphs | January 2019 |
| <i>AMS Contributed Paper Session at 2019 Joint Mathematics Meeting</i> | 📍 Baltimore, MD |
| Information Extraction and Aggregation for Business Profiling | July 2018 |
| <i>Invited Talk at Institute for Pure and Applied Mathematics</i> | 📍 Los Angeles, CA |
| Repeated Play Games | April 2017 |
| <i>MAA, Allegheny Mountain Section Meeting</i> | 📍 Pittsburgh, PA |
| Optimizing Throughput, Cost, and Safety in Toll Booth Plazas | February 2017 |
| <i>Pi Mu Epsilon Regional Conference</i> | 📍 Youngstown, OH |

Poster Presentations

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| ScalableAccess: Fine-Grain Travel-Time Polygons for Accessibility at Scale | November 2021 |
| <i>UIUC GIS Day</i> | 📍 Champaign, IL |
| The Effect of Buyer Preference and Market Composition on the Rent Gradient | November 2020 |
| <i>UIUC GIS Day</i> | 📍 Champaign, IL |

Particle Swarm Optimization for Calibration in Spatially Explicit ABMs

UIUC SESE Research Review

February 2020

📍 Champaign, IL

CyberGIS-Jupyter for Spatially Explicit Agent-based Modeling

UIUC GIS Day

November 2019

📍 Champaign, IL

CyberGIS-Jupyter for Sustainable and Reproducible Geospatial Analytics

UIUC GIS Day

November 2019

📍 Champaign, IL

Computational Fact-Checking through Knowledge Graphs

Undergraduate Research Poster Session at 2019 Joint Mathematics Meeting

January 2019

📍 Baltimore, MD

🏛 Teaching Experience

Teaching Assistant and Tutor

Westminster College

📍 New Wilmington, PA

August 2015 - December 2018

- Assisted professors in grading, working with students individually, and developing curriculum for classes covering coursework in Calculus, Computer Science, and Operations Research.

💰 Funding & Grants

Computational Research Techniques Fellowship

Awarded funds to attend the TACC Summer Institute on Applied Parallel Programming

June 2020

TACC

Financial Opacity and Challenges to Forest Governance in Indonesia and Malaysia *February 2020*

Graduate Pursuit Member

National Socio-Environmental Synthesis Center (SESYNC)

👥 Professional Associations

American Association of Geographers (AAG)

Specialty Groups:

- Cyberinfrastructure
- Socialist and Critical Geography
- Transportation Geography
- Economic Geography
- Spatial Analysis and Modeling

🔧 Professional Service

Session Organizer, Computation and Uncertainty of Spatial Accessibility

February 2022

AAG 2022 Symposium on Data-Intensive Geospatial Understanding in the Era of AI and CyberGIS

Student Director, AAG CyberInfrastructure Specialty Group (CISG)

April 2021 - Present

American Association of Geographers (AAG)

⚙ Technical Skills

📊 **Data Science:** G.I.S., Git, Machine Learning, Parallel Programming, Network Science

🔗 **Languages:** Python, Bash, Java, C++, R, SQL

📦 **Technologies:** Cloud Computing, Docker, Hadoop (HDFS/Spark/Yarn), Kubernetes, OpenStack, Terraform

💻 **Operating Systems:** Linux (esp. Mint & Ubuntu), Windows