Alexander C. Michels

michels9@illinois.edu
alexandermichels.github.io

RESEARCH INTERESTS

- CyberInfrastructure & HPC
- CyberGIS & GIScience
- Health Geography
- Network Science
- Spatial Analysis & Statistics
- Transportation Geography

EDUCATION

Ph.D.	University of Illinois Urbana-Champaign, Urbana, IL. 2025 (expected) Informatics, Spatial concentration **Advisor:** Dr. Shaowen Wang
M.S.	University of Illinois Urbana-Champaign, Urbana, IL. 2024 (expected) Geography and Geographic Information Science
B.S.	Westminster College, New Wilmington, PA. 2019 Mathematics and Financial Economics

PUBLICATIONS *(Google Scholar, underline indicates student mentee)*

JOURNAL ARTICLES

[1] **A. Michels**, A. Padmanabhan, Z. Li, and S. Wang. "EasyScienceGateway: A new framework for providing reproducible user environments on science gateways". In: *Concurrency and Computation: Practice and Experience* (Oct. 2023). DOI: https://doi.org/10.1002/cpe.7929.

[2] J. Park, **A. Michels**, F. Lyu, S. Y. Han, and S. Wang. "Daily Changes in Spatial Accessibility to ICU Beds and Their Relationship with the Case-Fatality Ratio of COVID-19 in the State of Texas, USA". In: *Applied Geography* (Mar. 2023). ISSN: 0143-6228. DOI: https://doi.org/10.1016/j.apgeog.2023.102929.

[3] J.-Y. Kang, B. F. Farkhad, M.-p. S. Chan, **A. Michels**, D. Albarracin, and S. Wang. "Spatial Accessibility to HIV Testing, Treatment, and Prevention Services in Illinois and Chicago, USA". In: *PLOS ONE* 17.7 (July 2022), e0270404. ISSN: 1932-6203. DOI: https://doi.org/10.1371/journal.pone.0270404.

[4] **A. Michels**, J.-Y. Kang, and S. Wang. "Particle Swarm Optimization for Calibration in Spatially Explicit Agent-Based Modeling". In: *Journal of Artificial Societies and Social Simulation* 25.2 (Mar. 2022), p. 8. URL: https://doi.org/10.18564/jasss.4796.

[5] J.-Y. Kang, **A. Michels**, A. Crooks, J. Aldstadt, and S. Wang. "An integrated framework of global sensitivity analysis and calibration for spatially explicit agent-based models". In: *Transactions in GIS* 26.1 (Sept. 2021), pp. 100–128. URL: https://doi.org/10.1111/tgis.12837.

[6] J.-Y. Kang, **A. Michels**, F. Lyu, S. Wang, N. Agbodo, V. L. Freeman, and S. Wang. "Rapidly Measuring Spatial Accessibility of COVID-19 Healthcare Resources: A Case Study of Illinois, USA". In: *International Journal of Health Geographics* (2020). URL: https://doi.org/10.1186/s12942-020-00229-x.

PEER-REVIEWED CONFERENCE PAPERS

[7] **A. Michels**, M. Kotak, A. Padmanabhan, and S. Wang. "Streamlined HPC Environments with CVMFS and CyberGIS-Compute". In: *Forum 2023 - Harnessing the Geospatial Data Revolution for Sustainability Solutions*. Purdue e-Pubs. Oct. 2023. DOI: https://docs.lib.purdue.edu/iguide/2023/presentations/8/.

[8] **A. Michels** and S. Wang. "An Agent-Based Modeling Approach to Spatial Accessibility". In: *Forum 2023 - Harnessing the Geospatial Data Revolution for Sustainability Solutions*. Purdue e-Pubs. Oct. 2023. DOI: https://docs.lib.purdue.edu/iguide/2023/presentations/9/.

[9] I. Haqiqi, W. Hu, R. Kumaran, P.-C. Li, N. Manning, **A. Michels**, A. Nassar, J. Park, J. Shi, A. Tonks, and Z. Wang. "I-GUIDE Climbers: A Model for Multidisciplinary Academic Labs for Early Career Development". In: *Forum 2023 - Harnessing the Geospatial Data Revolution for Sustainability Solutions*. Purdue e-Pubs. Oct. 2023. DOI: https://docs.lib.purdue.edu/iguide/2023/presentations/13/.

[10] **A. Michels**, J. Park, B. Li, J.-Y. Kang, and S. Wang. "Impacts of Catchments Derived from Fine-Grained Mobility Data on Spatial Accessibility". In: *12th International Conference on Geographic Information Science (GIScience 2023)*. Ed. by R. Beecham, J. A. Long, D. Smith, Q. Zhao, and S. Wise. Vol. 277. Leibniz International Proceedings in Informatics (LIPIcs). Dagstuhl, Germany: Schloss Dagstuhl – Leibniz-Zentrum für Informatik, Sept. 2023, 52:1–52:6. URL: https://doi.org/10.4230/LIPIcs.GIScience.2023.52.

[11] F. Baig, **A. Michels**, Z. Xiao, S. Y. Han, A. Padmanabhan, Z. Li, and S. Wang. "CyberGIS-Cloud: A Unified Middleware Framework for Cloud-Based Geospatial Research and Education". In: *Practice and Experience in Advanced Research Computing*. PEARC '22. Boston, MA, USA: Association for Computing Machinery, 2022. ISBN: 9781450391610. DOI: 10.1145/3491418.3535148. URL: https://doi.org/10.1145/3491418.3535148.

[12] **A. Michels**, J.-Y. Kang, and S. Wang. "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, 2020, pp. 48–51. ISBN: 9781450381611. URL: https://doi.org/10.1145/3423335.3428167.

[13] J.-Y. Kang, J. Aldstadt, **A. Michels**, R. Vandewalle, and S. Wang. "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, 2019, pp. 32–35. URL: https://doi.org/10.1145/3356470.3365531.

PEER-REVIEWED CONFERENCE EXTENDED ABSTRACTS

[14] Z. Li, **A. Michels**, A. Padmanabhan, A. Nassar, D. G. Tarboton, and S. Wang. "CyberGIS-Jupyter for Water - An Open Geospatial Computing Platform for Collaborative Water Research". In: *AGU Fall Meeting Abstracts*. Vol. 2022. Dec. 2022. URL: https://ui.adsabs.harvard.edu/abs/2022AGUFMIN32A..05L.

[15] A. Padmanabhan, Z. Xiao, R. Vandewalle, F. Baig, **A. Michels**, Z. Li, and S. Wang. "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*. Nov. 2021. DOI: https://doi.org/10.1145/3486189.3490017.

[16] **A. Michels**, A. Padmanabhan, Z. Li, and S. Wang. "Towards Reproducible Research on CyberGISX with Lmod and Easybuild". In: *Gateways 2021*. Oct. 2021. URL: https://doi.org/10.5281/zenodo.5569659.

[17] A. Padmanabhan, Z. Xiao, R. Vandewalle, **A. Michels**, and S. Wang. "Enabling Computationally Intensive Geospatial Research on CyberGIS-Jupyter with CyberGIS-Compute". In: *Gateways 2021*. Zenodo, Oct. 2021. URL: https://doi.org/10.5281/zenodo.5570056.

RESEARCH GRANTS

2023 PI (Co-PI: Dr. Shaowen Wang), 400,000 credits
Advanced Cyberinfrastructure Coordination Ecosystem: Services & Support (ACCESS)
ACCESS Explore Allocation for "SPACTS: a spatial partitioning algorithm for computing travel-time zones at scale" (CIS230031)

AWARDS

2023 Teacher Ranked as Excellent By Their Students, Center for Innovation in Teaching & Learning

2023 Student of the Year 2022, CyberGIS Center

2022 SESYNC Graduate Research Fellow, National Socio-Environmental Synthesis Center (SESYNC)

2020 Third Place, UIUC GIS Day Virtual Student Poster Competition, UIUC Department of Geography & Geographic Information Systems

2020 Computational Research Techniques Fellowship, Texas Advanced Computing Center (TACC)

2020 First Place, Robert Raskin Student Competition, Cyberinfrastructure Group, American Association of Geographers (AAG)

2019 UCGIS Prize for Advances in Geospatial Problem Solving, Ammerican Association of Geographers (AAG) / University Consortium for Geographic Information Science (UCGIS)

SELECTED PRESENTATIONS

INVITED TALKS

2022 "CyberGIS-Compute: Enabling Simplified Access to High Performance Computing for your Geospatial Computation" with Dr. Anand Padmanabhan. *NSF Institute for Geospatial Understanding through an Integrative Discovery Environment (I-GUIDE) - Virtual Consulting Office*. Virtual. Nov. 2, 2022.

2022 "CyberGIS-Compute: Geospatial Middleware for Simplifying Access to High-Performance Computing" with Dr. Anand Padmanabhan. *NSF Institute for Geospatial Understanding through an Integrative Discovery Environment (I-GUIDE) - Virtual Consulting Office*. Virtual. July 27, 2022.

CONFERENCE TALKS

2023 "Impacts of Catchments Derived from Fine-Grained Mobility Data on Spatial Accessibility". *International Conference on Geographic Information Science (GIScience)*, Leeds, UK, Sept 13, 2023

2023 "Exploring Road Infrastructure Inequities Across the Conterminous U.S.". *American Association of Geographers (AAG) Annual Meeting*, Denver, CO, March 25, 2023

2022 "SCAMEL: Spatial Accessibility Analysis at Scale". *American Association of Geographers (AAG) Annual Meeting*, Virtual, February 28, 2022

2021 "Towards Reproducible Research on CyberGISX with Lmod and Easybuild". *Gateways*, Virtual. Oct 21, 2022

2020 "An Exploration of the Effect of Buyer Preference and Market Composition on the Rent Gradient using the ALMA Framework". *3rd ACM SIGSPATIAL International Workshop on GeoSpatial Simulation*, Virtual. November 3, 2020

2020 "Particle Swarm Optimization for Calibration in Spatially Explicit ABMs". *American Association of Geographers (AAG) Annual Meeting*, Virtual. April 10, 2020

TUTORIALS & WORKSHOPS

2023 "CyberGIS-Compute: Geospatial Middleware for High-Performance Computing" with Anand Padmanabhan and Shaowen Wang. *I-GUIDE Forum 2023*. New York City, NY. Oct 4, 2023.

2023 "CyberGIS-Compute: Geospatial Middleware for Simplifying Access to High-Performance Computing" with Furqan Baig. *Accelerating Computing for Emerging Sciences (ACES) Workshop 2023*. League City, TX. July 15, 2023.

2023 "CyberGIS-Compute: Geospatial Middleware for High-Performance Computing". *Annual Meeting of the American Association of Geographers (AAG) 2023*. Denver, CO. March 24, 2023.

POSTER PRESENTATIONS

2021 "ScalableAccess: Travel-Time Polygons for Accessibility at Scale". *UIUC GIS Day*, Champaign, IL. November 17, 2021

2021 "Rapidly Measuring Spatial Accessibility of COVID-19 Healthcare Resources: A Case Study of Illinois, USA". *UIUC SESE Research Review*, Champaign, IL. April 23, 2021

2020 "Effect of Buyer Preference and Market Composition on the Rent Gradient". *UIUC GIS Day*, Champaign, IL. November 18, 2020

2020 "Particle Swarm Optimization for Calibration in Spatially Explicit ABMs". *UIUC SESE Research Review*, Champaign, IL. February 14, 2020

2019 "CyberGIS-Jupyter for Spatially Explicit Agent-based Modeling". *UIUC GIS Day*, Champaign, IL. November 13, 2020

2018 "Computational Fact-Checking through Knowledge Graphs". *Undergraduate Research Poster Session at 2019 Joint Mathematics Meeting*, Baltimore, MD. January 19, 2019

RESEARCH EXPERIENCE

2019-Present **Research Assistant**
CyberGIS Center & Geospatial Information Laboratory (CIGI)

2020 - 2022 **SESYNC Graduate Research Fellow**
National Socio-Environmental Synthesis Center (SESYNC)

2018 **Informatics Researcher**
Institute for Pure and Applied Mathematics at UCLA / Praedicat, Inc.

INDUSTRY EXPERIENCE

2018 - 2019 **Systems Administrator and Software Engineer**
Titan Radio and WCN 24/7, New Wilmington, PA

2018 **Data Scientist**
Treloar & Heisel, New Castle, PA

2018 **Data Scientist**
Institute for Pure and Applied Mathematics at UCLA / Praedicat, Inc., Los Angeles, CA

TEACHING AND MENTORING

Courses Taught as Instructor of Record

Spring 2023 **Business Location Decisions (GGIS/BADM 205)**
Department of Geography and Geographic Information Science, UIUC
List of Teachers Ranked as Excellent By Their Students

Undergraduate Student Mentees

2023 - Ian Zhang

2023 - Jeffrey Huang

2023 - John Speaks

2022 - 2023 Taylor Ziegler, software engineering intern

2022 - 2023 Mit Kotak, pursuing PhD at MIT

2019 - 2022 Zimo Xiao, pursuing MS at CMU

Teaching Assistant and Tutor New Wilmington, PA
Westminster College *Aug 2015 - Dec 2018*

– Assisted professors in grading and working with students individually for classes covering coursework in Math, Computer Science, and Operations Research.

Math Tutor New Wilmington, PA
Independent Contractor *Aug 2016 - May 2018*

– Worked with middle and high-school aged students to expand their Math skills.

PROFESSIONAL ASSOCIATIONS

American Association of Geographers (AAG)
Specialty Groups:

- Applied Geography
- Cyberinfrastructure
- GIScience & GIS
- Health and Medical Geography
- Spatial Analysis and Modeling
- Transportation Geography

Association for Computing Machinery (ACM)
Special Interest Groups:

- SIGSPATIAL (Spatial Information)

SERVICE

CONFERENCES AND WORKSHOPS

2023-2024 **Symposium Program Co-Chair**, AAG 2024 Symposium on Geospatial Data Science for Sustainability

2023 **Reviewer**, Institute for Geospatial Understanding through an Integrative Discovery Environment (I-GUIDE) Forum

2022-2023 **Symposium Program Co-Chair**, AAG 2023 Symposium on Harnessing the Geospatial Data Revolution for Sustainability Solutions

2023 **Session Chair**, "Data-intensive and Computational Geography," AAG 2023 Symposium on Harnessing the Geospatial Data Revolution for Sustainability Solutions

2022 **Session Organizer**, "Computation and Uncertainty of Spatial Accessibility," AAG 2022 Symposium on Data-Intensive Geospatial Understanding in the Era of CyberGIS

JOURNAL REVIEWER

- Geocarto International, Taylor & Francis

PROFESSIONAL ORGANIZATIONS

2022-Present **Director, AAG CyberInfrastructure Specialty Group (CISG)**

2021-2022 **Student Director, AAG CyberInfrastructure Specialty Group**

DEPARTMENTAL SERVICE

2022 **Program Ambassador**, UIUC Informatics Program
Hosted Q&A sessions for prospective and incoming Informatics students