ALEXANDER C. MICHELS

CURRICULUM VITAE

CONTACT INFORMATION

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RESEARCH INTERESTS

- CyberInfrastructure & HPC
- CyberGIS & GIScience
- Environmental Data Science & Justice
- Health Geography
- Spatial Analysis & Statistics
- Urban Informatics

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
Geography

B.S. Westminster College, New Wilmington, PA. 2019
Mathematics and Financial Economics

PUBLICATIONS *(underline indicates student mentee)*

Journal Articles Under Review

[R3] **A. Michels**, J. Park, J.-Y. Kang, and S. Wang. "An Areal Approach to Spatial Accessibility Analysis". *Geographical Analysis* (under review).

[R2] **A. Michels**, C. Vogiatzis, and S. Wang. "Road Infrastructure Inequity in the Conterminous United States Revealed with a Scalable Geospatial Computing Approach". *Scientific Reports* (under review).

[R1] F. Lyu, E. Zhu, Y. Song, X. Ma, **A. Michels**, Y. Kang, and S. Wang. "Quantifying Urban Retrofitting: Where, When and What". *Geographical Analysis* (under review).

Journal Articles

[J8] **A. Michels**, A. Padmanabhan, Z. Xiao, M. Kotak, F. Baig, and S. Wang. "CyberGIS-Compute: Middleware for democratizing scalable geocomputation". *SoftwareX* 26 (2024). DOI: 10.1016/j.softx.2024.101691.

[J7] **A. Michels**, J. Park, J.-Y. Kang, and S. Wang. "SPASTC: A Spatial Partitioning Algorithm for Scalable Travel-time Computation". *International Journal of Geographical Information Science* 38.5 (2024). DOI: 10.1080/13658816.2024.2326445.

[J6] **A. Michels**, A. Padmanabhan, Z. Li, and S. Wang. "EasyScienceGateway: A new framework for providing reproducible user environments on science gateways". *Concurrency and Computation: Practice and Experience* 36.4 (Oct. 2023). DOI: 10.1002/cpe.7929.

[J5] 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". *Applied Geography* (Mar. 2023). DOI: 10.1016/j.apgeog.2023.102929.

[J4] 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". *PLOS ONE* 17.7 (July 2022). DOI: 10.1371/journal.pone.0270404.

[J3] **A. Michels**, J.-Y. Kang, and S. Wang. "Particle Swarm Optimization for Calibration in Spatially Explicit Agent-Based Modeling". *Journal of Artificial Societies and Social Simulation* 25.2 (Mar. 2022). DOI: 10.18564/jasss.4796.

[J2] 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". *Transactions in GIS* 26.1 (Sept. 2021). DOI: 10.1111/tgis.12837.

[J1] 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". *International Journal of Health Geographics* (2020). DOI: 10.1186/s12942-020-00229-x.

Peer-Reviewed Conference Papers

[C8] **A. Michels**, M. Kotak, A. Padmanabhan, J. Speaks, and S. Wang. "Providing Accessible Software Environments Across Science Gateways and HPC". *Practice and Experience in Advanced Research Computing 2024: Human Powered Computing*. PEARC '24. Providence, RI, USA: Association for Computing Machinery, 2024. DOI: 10.1145/3626203.3670614.

[C7] **A. Michels**, M. Kotak, A. Padmanabhan, and S. Wang. "Streamlined HPC Environments with CVMFS and CyberGIS-Compute". *I-GUIDE Forum 2023*. Oct. 2023. DOI: 10.5703/1288284317677.

[C6] **A. Michels** and S. Wang. "An Agent-Based Modeling Approach to Spatial Accessibility". *I-GUIDE Forum 2023*. Oct. 2023. DOI: 10.5703/1288284317670.

[C5] 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". *I-GUIDE Forum 2023*. Oct. 2023. DOI: 10.5703/1288284317667.

[C4] **A. Michels**, J. Park, B. Li, J.-Y. Kang, and S. Wang. "Impacts of Catchments Derived from Fine-Grained Mobility Data on Spatial Accessibility". *12th International Conference on Geographic Information Science (GIScience 2023)*. Vol. 277. Sept. 2023. DOI: 10.4230/LIPIcs.GIScience.2023.52.

[C3] 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". *Practice and Experience in Advanced Research Computing*. PEARC '22.

Boston, MA, USA: Association for Computing Machinery, 2022. DOI: 10.1145/3491418.3535148.

[C2] **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". *Proceedings of the 3rd ACM SIGSPATIAL International Workshop on GeoSpatial Simulation*. GeoSim '20. Seattle, Washington: ACM, 2020. DOI: 10.1145/3423335.3428167.

[C1] 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". *GeoSim '19: Proceedings of the 2nd ACM SIGSPATIAL International Workshop on GeoSpatial Simulation*. Chicago, Illinois: ACM, 2019. DOI: 10.1145/3356470.3365531.

Conference Abstracts

[A4] 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". *AGU Fall Meeting Abstracts*. Vol. 2022. Dec. 2022.

[A3] A. Padmanabhan, Z. Xiao, R. Vandewalle, F. Baig, **A. Michels**, Z. Li, and S. Wang. "CyberGIS-Compute for Enabling Computationally Intensive Geospatial Research". *SpatialAPI'21: Proceedings of the 3rd ACM SIGSPATIAL International Workshop on APIs and Libraries for Geospatial Data Science*. Nov. 2021. DOI: 10.1145/3486189.3490017.

[A2] **A. Michels**, A. Padmanabhan, Z. Li, and S. Wang. "Towards Reproducible Research on CyberGISX with Lmod and Easybuild". *Gateways 2021*. Oct. 2021. DOI: 10.5281/zenodo.5569659.

[A1] A. Padmanabhan, Z. Xiao, R. Vandewalle, **A. Michels**, and S. Wang. "Enabling Computationally Intensive Geospatial Research on CyberGIS-Jupyter with CyberGIS-Compute". *Gateways 2021*. Zenodo, Oct. 2021. DOI: 10.5281/zenodo.5570056.

RESEARCH FUNDING

2024 SDOH & Place Fellowship, Healthy Regions & Policies Lab

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)

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

AWARDS

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

2023 Student of the Year 2022, CyberGIS Center

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, American 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

2024 "Spatial Accessibility with Machine-Learned Driving Times". *SDOH & Place Symposium*, Chicago, IL, June 15, 2024

2024 "Putting the Area in Catchment Areas: An Areal Approach to Spatial Accessibility Analysis". *American Association of Geographers (AAG) Annual Meeting*, Honolulu, HI, April 16, 2024

2023 "Streamlined HPC Environments with CVMFS and CyberGIS-Compute". *I-GUIDE Forum*, New York City, NY, Oct 6, 2023

2023 "An Agent-Based Modeling Approach to Spatial Accessibility". *I-GUIDE Forum*, New York City, NY, Oct 5, 2023

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 "Geospatial Knowledge Discovery Harnessing Pre-trained Language Models on CyberGISX" with Zhaonan Wang, Wei Hu, and Anand Padmanabhan. *2023 NSF HDR Ecosystem Conference*. Denver, CO. Oct 17, 2023.

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

2023 "CyberGIS-Compute: Middleware for Democratizing Scalable Geocomputation". *2023 NSF HDR Ecosystem Conference*, Denver, CO. October 16, 2023

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

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-present Ian Zhang, B.S. in CS+Math, UIUC

2023-present Jeffrey Huang, B.S. in CS+Statistics, UIUC

2023-present John Speaks, B.S. in CS+Linguistics, UIUC

2022-23 Mit Kotak (purusing Ph.D. at MIT), B.S. in Physics, UIUC

2022-23 Taylor Ziegler (software engineering intern), B.S. in CS, UIUC

2019-22 Zimo Xiao (pursuing MS at CMU), B.S. in CS+GGIS, UIUC

Certificates and Workshops

May 2023 Certificate in Foundations of Teaching, The Center for Innovation in Teaching & Learning, University of Illinois Urbana-Champaign

Jan 2023 Graduate Academy for College Teaching, The Center for Innovation in Teaching & Learning, University of Illinois Urbana-Champaign

SERVICE

Professional Organizations

2022-26 **Director, AAG CyberInfrastructure Specialty Group (CISG)**

2021-22 **Student Director, AAG CyberInfrastructure Specialty Group**

Conferences and Workshops

2024 **Symposium Organizer**, AAG 2024 Symposium on Geospatial Data Science for Sustainability

2024 **Session Organizer**, "Challenges and Opportunities of Spatial Accessibility 1 & 2." AAG 2024 Symposium on Geospatial Data Science for Sustainability

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

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
- International Journal of Geographical Information Science (IJGIS), Taylor & Francis

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 Group: SIGSPATIAL (Spatial Information)