

I-GUIDE FORUM 2025

Geospatial AI and Innovation for Sustainability Solutions

Co-located with the Sustainability Research and Innovation Congress

Sheraton Grand Chicago Riverwalk Chicago, Illinois, USA June 17-19, 2025

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KEYNOTE SPEAKERS



Jiawei Han University of Illinois Urbana-Champaign

Thomas Hertel Purdue University



Shaowen Wang University of Illinois Urbana-Champaign

INTRODUCTION We are delighted to welcome you to the I-GUIDE Forum 2025: Geospatial AI and Innovation for Sustainability Solutions, co-located with the Sustainability Research

Innovation for Sustainability Solutions, co-located with the Sustainability Research and Innovation Congress at the Sheraton Grand Chicago Riverwalk. Organized by the Institute for Geospatial Understanding through an Integrative Discovery Environment (I-GUIDE) that is funded by the U.S. National Science Foundation, this Forum brings together a vibrant community dedicated to advancing convergence and geospatial sciences for holistic sustainability solutions.

I-GUIDE's vision is to empower digital discovery and innovation by harnessing the geospatial data revolution. Our mission is to advance geospatial and convergence sciences in support of transformative sustainability solutions, guided by our framework of "Map, Connect, and Discover." Through this approach, I-GUIDE seeks to synergize expertise across disciplines to address the world's most urgent environmental and societal challenges.

Building on the success of previous Forums, the 2025 program highlights the frontiers of geospatial AI, cyberGIS, and data-intensive science for sustainability. This year, we are especially excited to partner with the Sustainability Research and Innovation Congress (SRI Congress), broadening opportunities for cross-sector collaboration and knowledge exchange. The Forum program features thought-provoking keynotes—including joint plenaries with SRI—engaging panels and paper sessions, hands-on tutorials and workshops, and interactive poster sessions. Topics will highlight emerging advances in geospatial AI and cyberGIS, along with their applications in disaster resilience, biodiversity, food-energy-water systems, public health, and beyond.

A central goal of I-GUIDE Forum 2025 is to foster geospatial data-intensive convergence research and education, providing a unique venue for researchers, AI and data scientists, cyberinfrastructure experts, educators, and practitioners from academia, government, and industry to connect and collaborate. Together, we aim to accelerate discovery, innovation, and impactful solutions for a more sustainable and resilient future.

We look forward to an inspiring and engaging Forum in Chicago!

General Chair

Shaowen Wang, University of Illinois Urbana-Champaign

Program Chairs

Anand Padmanabhan, University of Illinois Urbana-Champaign Diana Sinton, Cornell University / University Consortium for Geographic Information Science

KEYNOTE SPEAKERS

JIAWEI HAN

University of Illinois Urbana-Champaign



Jiawei Han is the Michael Aiken Chair Professor in the Department of Computer Science at the University of Illinois Urbana-Champaign. As a worldleading scholar in data mining and knowledge discovery, his research has established many foundational concepts and techniques in the field. His work focuses on data mining, information network analysis, database systems, and their application to transforming massive unstructured data into structured knowledge. He has made pioneering contributions to influential areas such as frequent pattern mining, data classification, and clustering.

Professor Han is one of the most cited authors in computer science, largely due to his seminal textbook, "Data Mining: Concepts and Techniques," which is used worldwide. His development of methods for mining heterogeneous information networks has created new pathways for research and application. Among his many honors are the ACM SIGKDD Innovation Award (2004), the IEEE Computer Society Technical Achievement Award (2005), and the IEEE W. Wallace McDowell Award (2009), the highest technical honor given by the IEEE Computer Society. He is a Fellow of the ACM, a Fellow of the IEEE, and a Fellow of the Royal Society of Canada.

THOMAS HERTEL

Purdue University



An internationally recognized leader in global economic analysis, Thomas Hertel is a Distinguished Professor of Agricultural Economics at Purdue University. His research investigates the critical impacts of international trade, environmental policy, and climate change on global food security, land use, and sustainability.

Professor Hertel's most significant contribution is the creation and leadership of the Global Trade Analysis Project (GTAP), a vital resource used by a worldwide network of researchers and policymakers. The project's database and modeling framework inform decisions at numerous international agencies. In recognition of his impact, Dr. Hertel has received the Alexander von Humboldt Research Prize and been named a Fellow of both the American Association for the Advancement of Science (AAAS) and the Agricultural and Applied Economics Association (AAEA).

KEYNOTE SPEAKERS

SHAOWEN WANG

University of Illinois Urbana-Champaign



Shaowen Wang is Associate Dean for Life and Physical Sciences in the College of Liberal Arts and Sciences at the University of Illinois Urbana-Champaign (UIUC), with professorial appointments in Geography and Geographic Information Science, Computing and Data Science, and Urban and Regional Planning. As a pioneering scholar in geospatial science, he currently leads two major initiatives: UIUC's CyberGIS Center for Advanced Digital & Spatial Studies and the NSF-supported Institute for Geospatial Understanding through an Integrative Discovery Environment (I-GUIDE).

His research focuses on advancing cyberGIS and geospatial data science to create scalable solutions for complex sustainability challenges. Dr. Wang has served in numerous national leadership roles, including as President of the University Consortium for Geographic Information Science (UCGIS) and as a member of the Board on Earth Sciences and Resources of the National Academies. For his transformative contributions, he has been elected a Fellow of the American Association for the Advancement of Science (AAAS), the American Association of Geographers (AAG), and the UCGIS.

ORGANIZING COMMITTEE

GENERAL CHAIR

Shaowen Wang University of Illinois Urbana-Champaign

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Diana Sinton Cornell University / University Consortium for Geographic Information Science

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X. Carol Song Purdue University

SPONSORSHIP CHAIR

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Nick Manning Michigan State University

LOCAL ARRANGEMENT CHAIR

Nattapon Jaroenchai University of Illinois Urbana-Champaign



ORGANIZING COMMITTEE

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Jeffrey Hamerlinck University of Wyoming

Thomas Hertel Purdue University

Yuqin Jiang University of Hawaii at Manoa

Peter Kedron UC Santa Barbara

Wenwen Li Arizona State University

Alexander Michels University of Illinois Urbana-Champaign

Eric Shook University of Minnesota

Kathleen Stewart University of Maryland

Rebecca Vandewalle University of Illinois Urbana-Champaign

John Wilson University of Southern California

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Song Gao University of Wisconsin-Madison

Jiawei Han University of Illinois Urbana-Champaign

Yingjie Hu University at Buffalo

David Johnson Purdue University

Zhenlong Li Penn State

Fangzheng Lyu Virginia Tech

Jinwoo Park Kyung Hee University

Ryan Sriver University of Illinois Urbana-Champaign

Wenwu Tang University of North Carolina at Charlotte

Andres Vina Michigan State University

Ningchuan Xiao The Ohio State University

Zhe Zhang Texas A&M University Leonardo Bobadilla Florida International University

Guofeng Cao University of Colorado Boulder

Abhirup Datta Johns Hopkins University

Courtney Flint Utah State University

Mike Goodchild UC Santa Barbara

Deanna Hence University of Illinois Urbana-Champaign

Myeonghun Jeong Chosun University

Jeon-Young Kang Kyung Hee University

Bo Li Washington University in St. Louis

Steven Manson University of Minnesota

Mohan Ramamurthy UCAR/Unidata

Lawrence Stanislawski USGS

David Tarboton Utah State University

Zhaonan Wang New York University Shanghai

Chaowei Yang George Mason University

Bo Zhao University of Washington



8:00 AM	Registration
9:00 AM	Morning Workshops & Tutorials
	 Introduction to the I-GUIDE Platform (Room: Mississippi)
	Alexander Michels, Erick Li, Yunfan Kang, Furqan Baig, Anand Padmanabhan, and Shaowen
	Wang
	Hands-on Tutorial: CyberTraining on Geospatial Data Processing Using Python in
	Hydrology (continues after break) (Room: Ohio)
	Jibin Joseph and Venkatesh Merwade
	 DeepEarth Workshop: Self-Supervised AI for Spatiotemporal Modeling of
	Ecosystems (continues after break) (Room: Arkansas)
	Lance Legel
10:30 AM	Morning Coffee Break
10:50 AM	Morning Workshops & Tutorials
	Enhancing Geospatial Data-intensive Knowledge Discovery with OpenSearch and
	LLM Search (Room: Mississippi)
	Yunfan Kang, Anand Padmanabhan, and Shaowen Wang
	Hands-on Tutorial: CyberTraining on Geospatial Data Processing Using Python in
	Hydrology (continued from before break) (Room: Ohio)
	Jibin Joseph and Venkatesh Merwade
	DeepEarth Workshop: Self-Supervised AI for Spatiotemporal Modeling of
	Ecosystems (continued from before break) (Room: Arkansas)
	Lance Legel
12:05 PM	Lunch (on your own)
1:30 PM	Afternoon Workshops & Tutorials
	 Introduction to the I-GUIDE Platform (Room: Mississippi)
	Alexander Michels, Erick Li, Yunfan Kang, Furqan Baig, Anand Padmanabhan, and Shaowen Wang
	CyberTraining: Broadening Adoption of Cyberinfrastructure and Geospatial Science
	Research and Workforce for Disaster Management (continues after the break) (Room: Arkansas)
	Zhe Zhang, Shaowen Wang, and Honggao Liu
	Analyzing Socio-Environmental Drivers of Urban Crime Using Machine Learning
	(continues after the break) (Room: Ohio)
	Mengling Qiao, Masahiko Haraguchi, and Upmanu Lall
	Bringing Science to Life: The Art of Cinematic Scientific Visualization (continues)
	after the break) (Room: Colorado)
	leff Carpenter, Matt Turk, Stuart Levy, and Bradley Thompson
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2:45 PM Afternoon Coffee Break

3:05 PM -I-GUIDE Panel: Geospatial AI and Innovation for Sustainability Solutions (Room:4:20 PMSheraton Ballroom III)

Chair: Shaowen Wang, Professor, University of Illinois Urbana-Champaign **Panelists:**

- Michael Goodchild, Professor Emeritus, UC Santa Barbara
- Damandeep Kochhar, EVP, Chief Platform & Technology Officer, HERE Technologies
- Siva Ravada, Vice President of Development, Oracle
- X. Carol Song, Chief Scientist, Rosen Center for Advanced Computing, Purdue University
- Daniel Sui, Senior Vice President & Professor, Virginia Tech

3:05 PM - Afternoon Workshops & Tutorials

- 5:15 PM
- From Compliance to Confidence: Applying the I-GUIDE Data Ethics Toolkit for Effective, Responsible, and Reproducible Geospatial Research (Room: Mississippi) Peter Darch and Kyra Abrams
- CyberTraining: Broadening Adoption of Cyberinfrastructure and Geospatial
 Science Research and Workforce for Disaster Management (continued from before
 break) (Room: Arkansas)

Zhe Zhang, Shaowen Wang, and Honggao Liu

 Analyzing Socio-Environmental Drivers of Urban Crime Using Machine Learning (continued from before break) (Room: Ohio)

Mengling Qiao, Masahiko Haraguchi, and Upmanu Lall

• Bringing Science to Life: The Art of Cinematic Scientific Visualization (continued from before break) (Room: Colorado)

Jeff Carpenter, Matt Turk, Stuart Levy, and Bradley Thompson



Wednesday June 18, 2025

8:00 AM	Registration
9:00 AM	Opening Plenary for the I-GUIDE Forum & the SRI Congress
	Jenney Sachs on Sustainable Development Solutions Network
10:30 AM	Morning Coffee Break
10:50 AM	Keynote: The State of I-GUIDE (Room: Sheraton Ballroom X)
	Shaowen Wang, University of Illinois Urbana-Champaign
	Chair: Michael Goodchild, University of California, Santa Barbara
12:00 PM	Lunch (on your own)
1:30 PM	I-GUIDE Paper Presentations Session: Frontiers in Geospatial and Sustainability
	Sciences (Room: Sheraton Ballroom X)
	Chair: Peter Darch, University of Illinois Urbana-Champaign
	Paper presentations (20 mins each including Q/A)
	 Historical Socio-Economic Drivers of Groundwater Stress and the Role of
	Governance
	Iman Haqiqi, Thomas Hertel, and Kavitha Srikanth
	Radiative Forcing and Sustainability Impacts of Aviation Contrails in 2035: Insights
	from SSP2-4.5 Projections
	Dharmendra Kumar Singh and Donald Wuebbles
	Exploring Dynamic Human Mobility of Diverse Social Groups Under Extreme Heat
	Conditions: A Simulation-Based Approach
	Xin Gu, Su Yeon Han, Soe Win Myint, Eunsang Cho, Yuanhui Zhu, and Joon-Seok Kim
2:30 PM	Group Photo
2:45 PM	Afternoon Coffee Break
3:05 PM	Keynote: Feeding the World, Grid by Grid: Spatial Trade-Offs under Crop Import Tariffs
	(Room: Sheraton Ballroom X)
	Thomas Hertel, Purdue University
	Chair: Venkatesh Merwade, Purdue University
3:45 PM	I-GUIDE Poster Introductions (Room: Sheraton Ballroom X)
	Chair: Nick Manning, Michigan State University
4:55 PM	Day 1 Wrap-up
5:00 PM	Poster Setup (Room: Sheraton Ballroom IX)
5:30 PM -	Poster Session & Reception (Room: Sheraton Ballroom IX)
7:30 PM	Chair: Diana Sinton, University Consortium for Geographic Information Science



8:00 AM	Registration
8:30 AM	Keynote: Embracing Large Language Models for Geospatial Applications: A Retrieval and Structuring Approach (Room: Sheraton Ballroom X)
	Jiawei Han, University of Illinois Urbana-Champaign
	Chair: Mohan Ramamurthy, University Corporation for Atmospheric Research
9:10PM	I-GUIDE Paper Presentations Session: Geospatial Data and Sustainability Sciences
	(Room: Sheraton Ballroom X)
	Chair: X. Carol Song, Purdue University
	Paper presentations (20 mins each including Q/A)
	 Assessing Vulnerabilities Associated with High-Risk Dams in Utah
	Courtney Flint, Michael Englert, and Upmanu Lall
	 Verification and Validation Methods for Gridded Models of Land and Water
	Iman Hagini, Thomas Hortal, and Kavitha Srikanth
	Machine Learning-based Variance Analysis of Brightness Temperature in Simulated
	Satellite Footprints
	Chhaya Kulkarni, Nikki Privé, and Vandana Janeja
	The Known Unknowns: Acknowledging Meta-Uncertainty in Coupled Human and
	Natural Systems Modeling
	Nicholas Manning and Andrés Viña
10:30 AM	Morning Coffee Break
10:50 PM	I-GUIDE Paper Presentations Session: CyberGIS & Cyberinfrastructure Innovation and Education (Room: Sheraton Ballroom X)
	Chair: Anand Padmanabhan, University of Illinois Urbana-Champaign
	Paper presentations (20 mins each including Q/A)
	Expanding Access to CyberGIS-Compute through Support for Heterogeneous
	Alexander Michels, Ian Zhang, Anand Padmanabhan, John Speaks, Rebecca Vandewalle, and
	Shaowen Wang
	 Mapping Responsible AI Workflows for Geospatial Data Science: Developing the I- GUIDE Data Ethics Toolkit
	Peter Darch, Kyra Abrams, and Ivan Kong
	Evaluating the Evaluation Matrices: Integrating Spatial Assessment in Geospatial AI
	Model Training and Evaluation
	Fangzheng Lyu

11:50 AM I-GUIDE Awards (Room: Sheraton Ballroom X)

Chair: Shaowen Wang, University of Illinois Urbana-Champaign



Thursday June 19, 2025

12:00 PM Lunch (on your own)

1:00 PM Panel: AI for Sustainability through Geospatial Innovation and Partnership (Room: Sheraton Ballroom X)

Chair: Shaowen Wang, University of Illinois Urbana-Champaign

Panelists:

- Aaron Addison, Executive Director, World Geospatial Industry Council
- Jiawei Han, Michael Aiken Chair Professor, Siebel School of Computing and Data Science, UIUC
- David Johnson, Associate Professor, Purdue University
- Angela Lee, Director, Education Solutions, Esri
- Michael Zentner, External Advisory Board Member, I-GUIDE

2:15 PM I-GUIDE and SRI Closing Ceremony Reception (Room: Sheraton Chicago Ballroom)

2:45 PM - Closing Plenary for the I-GUIDE Forum & the SRI Congress (Room: Sheraton Chicago 4:30 PM Ballroom)

Katharine Hayhoe, The Nature Conservancy Timothy L. Killeen, University of Illinois Urbana-Champaign Kristie L. Ebi, University of Washington Nicole Arbour, Belmont Forum Donald Wuebbles, University of Illinois Urbana-Champaign Michelle Relerford, NBC 5 News Today

GEOSPATIAL AI AND INNOVATION FOR SUSTAINABILITY SOLUTIONS

CHAIR



SHAOWEN WANG

Professor, University of Illinois Urbana-Champaign

Shaowen Wang is a Professor of Geography & Geographic Information Science and Computing & Data Science at the University of Illinois Urbana-Champaign (UIUC), with additional appointments in Information Sciences and Urban & Regional Planning. He serves as Associate Dean for Life and Physical Sciences in the College of Liberal Arts and Sciences and as a Senior Faculty Fellow in the Office of the Vice Chancellor for Research and Innovation at UIUC. Dr. Wang directs the CyberGIS Center for Advanced Digital and Spatial Studies and leads the National Science Foundation–supported Institute for Geospatial Understanding through an Integrative Discovery Environment (I-GUIDE). His research advances cyberGIS and geospatial data science to develop scalable solutions for complex geospatial problems and sustainability challenges. He previously served as President of the University Consortium for Geographic Information Science (UCGIS) and as a member of the Board on Earth Sciences and Resources of the National Academies of Sciences, Engineering, and Medicine. Dr. Wang is a Fellow of the American Association for the Advancement of Science (AAAS), the American Association of Geographers (AAG), and UCGIS.

PANELISTS



MICHAEL GOODCHILD

Professor Emeritus, UC Santa Barbara

Michael F. Goodchild is Emeritus Professor of Geography at UCSB. Until his retirement in June 2012 he was Jack and Laura Dangermond Professor of Geography, and Director of UCSB's Center for Spatial Studies. He was elected member of the National Academy of Sciences and Foreign Member of the Royal Society of Canada in 2002, member of the American Academy of Arts and Sciences in 2006, and Foreign Member of the Royal Society and Corresponding Fellow of the British Academy in 2010. He was Chair of the National Research Council's Mapping Science Committee from 1997 to 1999, and of the Advisory Committee on Social, Behavioral, and Economic Sciences of NSF from 2008 to 2010. His research interests center on geographic information science, spatial analysis, and uncertainty in geographic data.



DAMANDEEP KOCHHAR

Executive Vice President & Chief Platform & Technology Officer, HERE Technologies

Damandeep Kochhar is Executive Vice President and Chief Platform & Technology Officer at HERE Technologies, where he leads the company's core engineering and platform strategy, including development and operation of the highly automated mapping system that powers HERE's map creation, updates, and publishing. He joined HERE in 2015, bringing more than 20 years of experience in technology and product development from senior leadership roles at Genpact and GE Capital. Based in Chicago, Daman directs engineering teams that manage global content operations and scalable infrastructure, leveraging AI and cloud platforms to advance HERE's leadership in intelligent mapping. He holds a B. Eng. from Delhi College of Engineering and an MBA from the Indian Institute of Management, Calcutta.



SIVA RAVADA

Vice President of Development, Oracle

Siva Ravada is Vice President of Development at Oracle, where he leads core initiatives in enterprise software architecture, distributed systems, and cloud infrastructure. With more than two decades of experience in software engineering and product development, he has played a key role in advancing Oracle's strategic platforms, including work on Oracle Cloud Infrastructure (OCI) and mission-critical enterprise systems. Prior to his current role, he held senior engineering and leadership positions across several divisions at Oracle, contributing to the scalability and performance of large-scale database and middleware technologies. He is a frequent speaker at industry and developer conferences, and actively contributes to mentoring programs aimed at cultivating next-generation tech leaders. His professional interests include cloud-native design, data architecture, and platform engineering for large-scale applications.

GEOSPATIAL AI AND INNOVATION FOR SUSTAINABILITY SOLUTIONS



X. CAROL SONG

Chief Scientist, Rosen Center for Advanced Computing, Purdue University

X. Carol Song is Chief Scientist at the Rosen Center for Advanced Computing (RCAC) at Purdue University, where she also serves as Director of the Scientific Solutions Group. She has led or co-led numerous national-scale projects supported by the National Science Foundation, including the Anvil high-performance computing system, the GeoEDF geospatial data framework, and several cyberinfrastructure initiatives advancing data-driven science across disciplines. She has served on advisory committees for organizations such as the Coalition for Academic Scientific Computation (CASC), the Supercomputing Conference (SC), and Women in HPC. With a research background that spans high-performance computing, scientific workflows, and geospatial data systems, she has played a pivotal role in developing scalable platforms that support interdisciplinary research in climate science, geospatial analytics, and biosciences. Dr. Song earned her Ph.D. in Computer Science from the University of Illinois at Urbana-Champaign and her B.S. from Tsinghua University. Her research interests center on cyberinfrastructure for science, reproducible data workflows, and integrative platforms for data-intensive discovery.



DANIEL SUI

Senior Vice President & Professor, Virginia Tech

Dr. Daniel Sui is Senior Vice President for Research and Innovation and Professor of Geography and Public & International Affairs at Virginia Tech, where he leads the university's research strategy, enterprise operations, and innovation ecosystem. He previously served as Vice Chancellor for Research and Innovation at the University of Arkansas and Division Director for Social and Economic Sciences at the National Science Foundation. An internationally recognized geographer and expert in geographic information science, Dr. Sui was a Guggenheim Fellow and Woodrow Wilson Center Fellow. He has published more than 230 scholarly works and has delivered over 70 keynote presentations globally. Dr. Sui has advised multiple federal agencies on issues related to open science, geospatial data governance, and ethical innovation. HIs research focuses on the intersections of geography, public policy, and data science, particularly in areas of open GIS, location-based services, and the social implications of emerging technologies.

AI FOR SUSTAINABILITY THROUGH GEOSPATIAL INNOVATION AND PARTNERSHIP

Thursday June 19, 2025 1:30 PM - 2:45 PM Sheraton Ballroom X

CHAIR



SHAOWEN WANG

Professor, University of Illinois Urbana-Champaign

Shaowen Wang is a Professor of Geography & Geographic Information Science and Computing & Data Science at the University of Illinois Urbana-Champaign (UIUC), with additional appointments in Information Sciences and Urban & Regional Planning. He serves as Associate Dean for Life and Physical Sciences in the College of Liberal Arts and Sciences and as a Senior Faculty Fellow in the Office of the Vice Chancellor for Research and Innovation at UIUC. Dr. Wang directs the CyberGIS Center for Advanced Digital and Spatial Studies and leads the National Science Foundation–supported Institute for Geospatial Understanding through an Integrative Discovery Environment (I-GUIDE). His research advances cyberGIS and geospatial data science to develop scalable solutions for complex geospatial problems and sustainability challenges. He previously served as President of the University Consortium for Geographic Information Science (UCGIS) and as a member of the Board on Earth Sciences and Resources of the National Academies of Sciences, Engineering, and Medicine. Dr. Wang is a Fellow of the American Association for the Advancement of Science (AAAS), the American Association of Geographers (AAG), and UCGIS.

PANELISTS



AARON ADDISON

Executive Director, World Geospatial Industry Council

Aaron Addison is the Executive Director of the World Geospatial Industry Council (WGIC), where he leads global initiatives to advance the value, accessibility, and responsible use of geospatial data across sectors. He brings over 30 years of experience in geospatial science and leadership, including previous roles as Executive Director of the University Consortium for Geographic Information Science (UCGIS) and Director of Geospatial Programs at Washington University in St. Louis. His work spans industry engagement, public policy, and international collaboration, with a strong focus on education, workforce development, and sustainability. At WGIC, he also leads the GeoAction Africa initiative, which supports the use of geospatial tools to address development challenges across the African continent.



JIAWEI HAN

Michael Aiken Chair Professor, Siebel School of Computing and Data Science, UIUC

Jiawei Han is the Michael Aiken Chair Professor in the Department of Computer Science at the Siebel School of Computing and Data Science, University of Illinois Urbana-Champaign. A leading researcher in data mining, data science, and knowledge discovery, Dr. Han has made foundational contributions to pattern mining, text mining, and graph mining. He has authored or co-authored more than 800 research publications and several widely used textbooks, including "Data Mining: Concepts and Techniques." He is a Fellow of the ACM, IEEE, and AAAI, and has received numerous awards including the ACM SIGKDD Innovation Award and IEEE Computer Society Technical Achievement Award. Dr. Han has served on editorial boards and program committees for major conferences in data science and artificial intelligence, and has advised dozens of Ph.D. students who have gone on to successful careers in academia and industry. His current research focuses on text-rich information networks, responsible data mining, and constructing structured knowledge from massive unstructured data.

AI FOR SUSTAINABILITY THROUGH GEOSPATIAL INNOVATION AND PARTNERSHIP

Thursday June 19, 2025 1:30 PM - 2:45 PM Sheraton Ballroom X



DAVID JOHNSON

Associate Professor, Purdue University

David Johnson is the Talwar Rising Star Associate Professor of Industrial Engineering and Political Science at Purdue University. He is the social science and policy lead in the Network Coordinating Office for NSF's Natural Hazards Engineering Research Infrastructure, the organization that coordinates operations of major natural hazards experimental facilities like wind tunnels and shake tables, and a member of the Department of Homeland Security's Health, Food, and Agriculture Resilience Consortium. He also co-chairs the Society for Risk Analysis' annual meeting. David's interdisciplinary research focuses on decision-making under uncertainty with applications in environmental policy and climate change adaptation. He studies issues including coastal flood risk management, renewable energy policy, and water scarcity and quality management. Most notably, he is lead developer of the flood risk model used to assess the impacts of a wide range of flood protection systems for Louisiana's \$50-billion Comprehensive Master Plan for a Sustainable Coast.



ANGELA LEE

Director, Education Solutions, Esri

Angela Lee is Director of Education Solutions at Esri, leading the company's engagement with educators, academic institutions, and students to develop and implement GIS curricula, research initiatives, and institutional strategies worldwide. Based in the Greater Minneapolis–St. Paul area, she oversees Esri's Educational License Program and drives outreach through events such as the Esri Education Summit, GIS LATAM, and campus-focused workshops to promote the integration of ArcGIS into teaching, learning, and campus administration. Active in the GIScience education community, she has contributed to research on digital pedagogy, notably co-authoring work on "Rethinking GIScience education in an age of disruptions" published in Transactions in GIS in April 2025. She holds a Master's degree in Library and Information Science from the University of Minnesota and began her career in academic libraries, also serving as a liaison with the Borchert Map Library during her graduate studies.



MICHAEL ZENTNER

External Advisory Board Member, I-GUIDE

Michael Zentner is a retired entrepreneur and researcher serving on the External Advisory Board of I-GUIDE, where he contributes expertise in sustainable scientific software, cyberinfrastructure, and science gateway development. He recently held key roles at the San Diego Supercomputer Center (SDSC) as Director for Sustainable Scientific Software, Director of the HUBzero® project, and co-PI for nanoHUB.org, a widely used science gateway with millions of users. With nearly two decades of entrepreneurial experience, he founded and led technology companies focused on data analytics, optimization, and collaboration before transitioning to academia and science infrastructure. He holds a B.S. in Chemical Engineering from the University of Illinois, an M.S. and Ph.D. in Chemical Engineering from Purdue University, and dual MBAs from Purdue's Krannert School of Management and TIAS School for Business and Society in the Netherlands.



Biased Commute: Analysis of Geospatial Al Bias in Mobile Apps

Kyra Abrams

Application of Python-based Water Balance Model (pyWBM) for Soil Moisture Prediction and Drought Risk Assessment

Tahsina Alam, Theo Avila, David Lafferty, and Ryan Sriver

Bridging Data and Discovery: A Scalable Knowledge Graph Platform with Object Storage and Administrative Oversight

Furqan Baig, Arunesh Kumar, Yunfan Kang, Erick Li, Anand Padmanabhan, and Shaowen Wang

Green Stormwater Infrastructure: Potential Effects on Mosquito Habitats and West Nile Virus Prevalence in the United States

Caylee Chan, Andrew Mackay, and Brian Allan

A Geospatial Knowledge Hypercube Framework for Predicting Harmful Algal Blooms

Ulysses Echeverria, Jimeng Shi, and Leonardo Bobadilla

SpatialSearch: A LLM-Driven Framework for Semantic Geospatial-Textual Search

Wei Hu, Bowen Jin, Jiawei Han, and Shaowen Wang

AI-Driven Spatial, Semantic, and Full-Text Search: An Integrated Framework for the I-GUIDE Platform

Yunfan Kang, Erick Li, Furqan Baig, Anand Padmanabhan, and Shaowen Wang

Spatial Analysis of Social Vulnerability and Crime Disparities through Interpretable Machine Learning

Daniel Kiv, Alex Michels, and Shaowen Wang

I-GUIDE Platform User Environment for Enabling Geospatial Data-intensive Knowledge Discovery and Sharing

Erick Li, Furqan Baig, Yunfan Kang, Rohan Colaco, Pierre Hanlet, Nattapon Jaroenchai, Anand Padmanabhan, and Shaowen Wang



Modeling Community Resilience through Spatiotemporal Trajectory Clustering: A Deep Generative Approach to Hurricane Evacuation Analysis

Kenan Li, Yunhan Jiang, and Nan Lin

Scaling Geospatial Analysis: Distributing an HPC Workflow with Apache Sedona and GCP

Sonal Naik, Andrew Tan, Paul Jiang, Vidit Patel, and Akshath Ravikiran

Spatial Dynamics of Ecological Footprint in Sub-Saharan Africa: Systematic Maps

Josephine Andrea Niangue

Atmospheric Patterns Associated with Dam Overtopping Across Sub-Regions in the Eastern United States

Hodo Orok and Deanna Hence

Analyzing Changes in the Environment at Muni Pomadze Ramsar Site and Keta Lagoon Complex

Francis Quayson

Spatiotemporal Analysis of Wetland Degradation in the Keta Lagoon Using Remote Sensing

Francis Quayson

How Effective are Large Time Series Models in Hydrology? A Study on Water Level Forecasting in Everglades

Rahuul Rangaraj, Jimeng Shi, Azam Shirali, Rajendra Paudel, Yanzhao Wu, and Giri Narasimhan

Hypercube Retrieval-Augmented Generation for Scientific Question-Answering

Jimeng Shi, Sizhe Zhou, Bowen Jin, Wei Hu, Giri Narasimhan, Shaowen Wang, and Jiawei Han

Land Use and Vulnerability to Sea Level Rise: Environmental Justice in New York City Lia Soorenian

Exploring Spatial Configuration of Local Climate Zones with Stable Lower Land Surface Temperature for Sustainable Urban Heat Island Mitigation

Maoping Wang and Song Gao



Beyond the Boundaries of Polar Low Genesis: Data-Intensive Insights from a Historic Storm

Roy Wang and Robert Rauber

GeoAl-Driven Insights into Urban Microclimate Exposures

Michael Wimberly, Yusuf Jamal, Andrews Korah, Shomen Mukherjee, and Courtney Murdock

Mapping Uninhabitable Houses in Detroit Using Large Vision-Language Models

Xiaohao Yang, Mark Lindquist, and Derek Van Berkel

Uncovering the Impact of Building Spatial-functional Information on Urban Livability Using Machine Learning

Wen Zhou, Claudio Persello, Alfred Stein, and Shaowen Wang

Geospatial AI for Sustainable Agriculture: Rice Calendar Modeling with Space-Embedded MultiRocket-Hydra Time Series Extrinsic Regression in Monsoon Asia

Hanchen Zhuang, Sensen Wu, Song Gao, Zhen Yan, and Zhenhong Du

I-GUIDE SPATIAL AI CHALLENGE 2024

WINNERS ANNOUNCED!

We are delighted to recognize the top teams whose submissions stood out for their innovation, technical rigor, and strong commitment to open science. After a competitive review process, the following projects were selected as this year's winners:



02nd Wildfire Threat Detection for Transportation Infrastructure

Team: CNA Corporation

This project presented a U-Net-based deep learning pipeline to detect wildfire risks threatening transportation infrastructure. The approach was recognized for its strong use of open data, attention to FAIR data practices, and real-world emergency planning relevance.

These winning projects exemplify the innovative spirit and collaborative potential of the spatial AI community. By advancing reproducible, AI-driven solutions for real-world sustainability challenges, each team has contributed meaningfully to the future of spatial AI.

To explore all winning entries, and project details, visit: <u>https://i-guide.io/spatial-ai-challenge-2024/</u>



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St GeoMapCLIP Team: Purdue RCAC

This project introduced GeoMapCLIP, an enhanced version of GeoCLIP designed to localize unknown geospatial images using visual cues. The judges praised its reproducibility, generalizability, and effective storytelling. Its cross-domain applicability—including agriculture, hydrology, and historical mapping—made it a standout.





Pipeline for Roof Material and Geometry Classification Team: Roof Mapper

Targeting urban disaster resilience, this project classified roof materials using satellite imagery and OpenStreetMap data. The judges highlighted its practical focus, integration of open tools, and welldocumented methodology.

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NOTEBOOKS

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