GIScience 2023

12-15th September, University of Leeds, UK

General Chairs:

Nick Malleson
Lex Comber
Alison Heppenstall

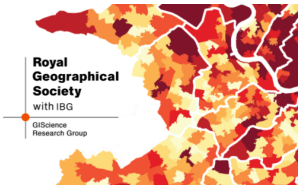
Welcome to GISciene 2023!

Welcome to the Twelfth International Conference on Geographic Information Science (GIScience). From its inception in 2000, GIScience remains the flagship conference in the field. The conference regularly brings together hundreds of international participants from academia, industry, and government to discuss and advance the state-of-the-art in geographic information science. We are delighted to host the 2023 conference at the School of Geography, University of Leeds, in collaboration with the University of Glasgow.

We would like to thank the Programme Chairs who have coordinated this years proceedings which has been been published in LIPIcs, the Leibniz International Proceedings in Informatics:

- Dr Roger Beecham, University of Leeds
- Dr Jed Long, Western University
- Dr Dianna Smith, University of Southampton
- Dr Qunshan Zhao, University of Glasgow
- Dr Sarah Wise, University College London

We would also like to thank our sponsors:



We hope you enjoy the conference.

Nick Malleson, Alexis Comber and Alison Heppenstall (General Chairs)

Contents

GIScience 2023

Key (Building numbers match the general University maps/signage)

Tuesday 12 September – Pre-conference workshops
20 - Maurice Keyworth Building (Registration and workshops)
29 - The Refectory (Lunch)
57 - The Great Hall (Conference Reception)

Wednesday 13 – Friday 15 September – GIScience 2023
60 - The Parkinson Building (Registration, refreshments, exhibition, poster boards)
78 - Michael Sadler Building (Presentations)

Useful Landmarks
32 - Leeds University Union (Shops)
P - Orange Zone Multi-Storey Car Park

UNIVERSITY OF LEEDS

1. Conference Timetable and Useful Information

Date	Time	Event	Location
Tuesday 12th	09:00 – 17:00	Workshops (registration from 08:30)	Maurice Keyworth building
	18:00 – 20:30	Welcome reception (with music, buffet and drinks)	Great Hall
Wednesday 13th	08:00 – 17:30	Conference registration	Parkinson Court
	08:45 – 17:30	Main conference sessions	Michael Sadler Building
Thursday 14th	08:30 – 17:00	Conference registration	Parkinson Court
	09:00 – 17:00	Main conference sessions	Michael Sadler Building
	19:00 – 22:00	Conference dinner	Queens Hotel, City Square, LS1 1PJ
Friday 15th	08:30 – 13:00	Conference registration	Parkinson Court
	09:00 – 13:00	Main conference sessions	Michael Sadler Building

Locations of parallel sessions

All conference sessions are in the Michael Sadler building:

Session A Rupert Beckett Lecture Theatre

Session B LG19

Session C LG15

Registration Desk

The registration desk will be located in the Parkinson Building and will be open from 08:30 every day (except for the workshops on Tuesday when it will be in the Maurice Keyworth building). If at any point during the conference you have a question, you can speak to someone there.

Posters

Posters will be displayed in the Parkinson Court for the duration of the conference. Special poster sessions have been arranged for Wednesday and Thursday at 1pm. During these sessions all poster authors have one minute to introduce their posters. There will be a prize for the best poster that all delegates can vote on. The prize will be awarded at the end of the conference.

Conference Reception

Join us for drinks, music and a buffet dinner from 18:00 in The Great Hall at the University of Leeds.

Conference Dinner

The conference dinner will be taking place on Thursday from 19:00, at the Queens Hotel, Leeds City Square. This is a 20 minute walk from the university campus.

Wifi

Eduroam is available for delegates from subscribing institutions. For those that don't have access to Eduroam, we have separate guest login details. These are available from the Registration desk.

2. Keynote Speakers at GIScience 2023

Caroline Kabaria, African Population and Health Research Center)

Dr Kabaria is a Research Scientist with expertise in Geoinformatics (GIS), Remote Sensing, Spatial Modelling and will be working with other researchers at the APHRC to develop methodological frameworks to integrate spatial evaluation in estimating the impacts of interventions, policy regulations and social trends with a spatial dimension.

Dr Kabaria holds a PhD (2016) specializing in Spatial Epidemiology from the Open University, UK. Her research focused on mapping and understanding changing malaria transmission patterns within urban settings in Africa. Prior to joining APHRC, Dr Kabaria was a Post-Doctoral researcher at the KEMRI-Wellcome Trust Research Programme evaluating within spatial frameworks, the factors that influence disease transmission, the application of population and urbanization mapping for disease burden estimation as well as evaluating the impact of control interventions on transmission.

Joao Porto De Albuquerque, University of Glasgow

Professor Porto de Albuquerque is Professor in Urban Analytics at Urban Studies in the School of Social and Political Sciences at the University of Glasgow and Deputy Director of the Urban Big Data Centre (UBDC), where he leads the theme on "Urban Sustainability and Participation". Professor Porto de Albuquerque has a dual background in Computer Science and Social Sciences (University of Campinas, Brazil and Technical University of Dortmund, Germany) and works interdisciplinary as a digital human geographer combining geographic information science, human-centric computing, and development/sustainability studies. He is currently leading a research programme centred around the empowerment of vulnerable and deprived communities with citizen-generated data to improve resilience to health and environmental risks, including the Waterproofing Data Project (funded through the Belmont Forum/NORFACE by ESRC, FAPESP and BMBF) on citizen science for flood resilience, and the IDEAMAPS Ecosystem project funded by the Bill and Melinda Gates Foundation, combining AI and satellite imagery analysis with community-based research for mapping urban deprivation.

Linda See, International Institute for Applied Systems Analysis

Dr See, who holds a PhD from the School of Geography, University of Leeds, has research interests include artificial intelligence-based methods, geographic information systems (GIS), land cover, crowdsourcing and citizen science. As part of the Novel Data Ecosystems for Sustainability (NODES) group in the Advancing Systems Analysis (ASA) program, she works with the Geo-Wiki team on crowdsourcing of land cover, quality assurance of crowdsourced data, and community building. She has supported several crowdsourcing campaigns to gather reference data on human impact, land cover including cropland and crop types, agricultural field sizes, forest management, and the drivers of deforestation. She was recently the IIASA lead of the European Space Agency funded CAMALIOT project and led a successful crowdsourcing campaign to collect satellite navigation data using a mobile app. She is an editor of the journal Environment and Planning B: Urban Analytics and City Science.

Sarah Williams, MIT

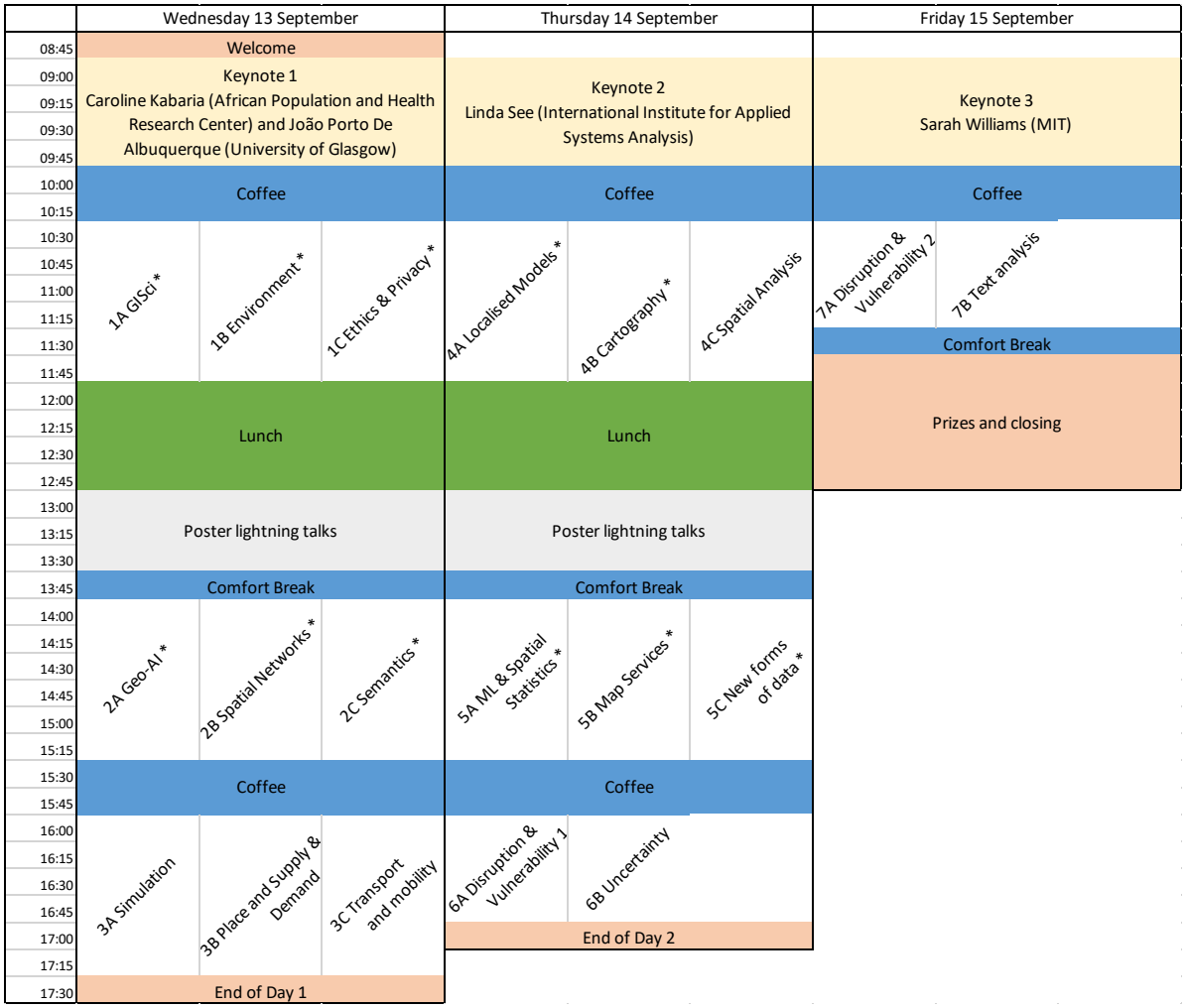
Dr Williams is an Associate Professor of Technology and Urban Planning at the Massachusetts Institute of Technology (MIT) where she is also Director of the Civic Data Design Lab and the Leventhal Center for Advanced Urbanism. Williams' combines her training in computation and design to create communication strategies that expose urban policy issues to broad audiences

and create civic change. She calls the process Data Action, which is also the name of her recent book published by MIT Press. Williams is co-founder and developer of Envelope.city, a web-based software product that visualizes and allows users to modify zoning in New York City. Before coming to MIT, Williams was Co-Director of the Spatial Information Design Lab at Columbia University's Graduate School of Architecture Planning and Preservation (GSAPP). Her design work has been widely exhibited including work in the Guggenheim, the Museum of Modern Art (MoMA), Venice Biennale, and the Cooper Hewitt Museum. Williams has won numerous awards including being named one of the top 25 technology planners and Game Changer by Metropolis Magazine. Her latest exhibition, currently being shown at the Venice Biennale, Distance Uknown, explores the risks and opportunities of migration to the Americas and helped to influence recent US migration policies.

3. Papers and Sessions

3.1 Programme Overview

Sessions marked with * contain a long paper.



3.2 Detailed Schedule

Papers marked with * are long papers.

Session		Paper Title	Authors
		1A GISci. Chair: Shawn Laffan	
1A	10:30	Map Reproducibility in Geoscientific Publications: An Exploratory Study*	Eftychia Koukouraki; Christian Kray
1A	11:00	Toward Causal Aware GIS - Events as cornerstones	Nina Polous
1A	11:15	Causal effects under spatial confounding and interference	Jing Zhang
1A	11:30	From Reproducible to Explainable GIScience	Mark Gahegan
1A	11:45	Modeling affordances	Sabine Timpf; Franziska Klügl
		1B Environment. Chair: Jed Long	
1B	10:30	Genetic programming for computationally efficient land use allocation optimization*	Moritz Hildemann; Alan T. Murray; Judith A. Verstegen
1B	11:00	How does travel environment affect mood? A study using geographic ecological momentary assessment in the UK	Milad Malekzadeh; Darja Reuschke; Jed Long
1B	11:15	Unlocking the Power of Mobile Phone Application Data to Accelerate Transport Decarbonisation	Xianghui Zhang; Tao Cheng
1B	11:30	How to improve joint suitability mapping for search space reduction?	Haoyu Wang; Jennifer Miller
1B	11:45	Harnessing the sunlight on facades - an approach for determining vertical photovoltaic potential	Franz Welscher; Ivan Majic; Franziska Hübl; Rizwan Bulbul; Johannes Scholz
		1C Ethics and Privacy. Chair: Ana Basiri	
1C	10:30	Platial k-anonymity: Improving location anonymity through temporal popularity signatures*	Grant McKenzie; Hongyu Zhang
1C	11:00	The Ethics of AI-Generated Maps: DALLE·2 and AI's Implications for Cartography	Qianheng Zhang; Yuhao Kang; Robert Roth
1C	11:15	Towards an inclusive urban environment: A participatory approach for collecting spatial accessibility data in Zurich	Hoda Allahbakhshi
1C	11:30	Confidential, decentralized location-based data services	Benjamin Adams
1C	11:45	How to count travelers without tracking them between locations	Nadia Shafaeipour; Maarten van Steen; Frank Ostermann
		2A Geo-AI. Chair: Rich Harris	
2A	14:00	Transitions in Dynamic Map Labeling*	Thomas Depian; Guangping Li; Martin Nöllenburg; Jules Wulms
2A	14:30	Calculating Shadows with U-Nets for Urban Environments	Dominik Rothschedl; Franz Welscher; Franziska Hübl; Ivan Majic; Daniele Giannandrea; Johannes Scholz; Matthias Wastian; Niki Popper
2A	14:45	Estimating the Impact of a Flood Event on Property Value and its Diminished Effect Over Time	Nazia Sodial; Oleksandr Galkin; Aidan Slingsby

2A	15:00	Framework for motorcycle real-time risk assessment using onboard panoramic camera	Natchapon Jongwiriyanurak; Zichao Zeng; Meihui Wang; James Haworth; Garavig Tanaksaranond; Jan Boehm
2A	15:15	Evaluating the Effectiveness of Large Language Models in Representing Textual Descriptions of Geometry and Spatial Relations	Yuhan Ji; Song Gao
		2B Spatial Networks. Chair: Sabine Timpf	
2B	14:00	Visualizing Geophylogenies - Internal and External Labeling with Phylogenetic Tree Constraints*	Jonathan Klawitter; Felix Klesen; Joris Y. Scholl; Thomas C. van Dijk; Alexander Zaft
2B	14:30	A Personalised Pedestrian Navigation System	Urmi Shah; Jia Wang
2B	14:45	Anonymous routing using minimum capacity clustering	Maike Buchin and Lukas Plätz
2B	15:00	Assessing epidemic spreading potential with Encounter Netwrk	Behnam Tahmasbi; Farnoosh Roozkhosh; X. Angela Yao
2B	15:15	Betweenness Centrality in Spatial Networks: A Spatially Normalised Approach	Christian Werner; Martin Loidl
		2C Semantics. Chair: Henrikki Tenkanen	
2C	14:00	Do You Need Instructions Again? Predicting Wayfinding Instruction Demand*	Negar Alinaghi; Tiffany C.K. Kwok; Peter Kiefer; Ioannis Giannopoulos
2C	14:30	Does generalisation matters in pan-scalar maps?	Azelle Courtial; Guillaume Touya
2C	14:45	Exploring Map App Usage Behaviour Through Touchscreen Interactions	Donatella Zingaro; Mona Bartling; Tumasch Reichenbacher
2C	15:00	Why is Greenwich so common? Quantifying the uniqueness of multivariate observations	Andrea Ballatore; Stefano Cavazzi
2C	15:15	Geography and the Brain's Spatial System	May Yuan; Kristen Kennedy
		3A Simulation. Chair: Andrew Crooks	
3A	16:00	Agent-Based Modelling and Disease: Demonstrating the Role of Human Remains in Epidemic Outbreaks	Huixin Liu; Sarah Wise
3A	16:15	Navigation in complex space: an Bayesian Nash Equilibrium-informed agent-based model	Yiyu Wang; Jiaqi Ge; Alexis Comber
3A	16:30	Using the Dynamic Microsimulation MINOS to Evidence the Effect of Energy Crisis Income Support Policy	Robert Clay; Luke Archer; Alison Heppenstall; Nik Lomax
3A	16:45	Calibration in a Data Sparse Environment: How Many Cases Did We Miss?	Robert Manning Smith; Sarah Wise; Sophie Ayling
3A	17:00	A Data-Driven Decision-Making Framework for Spatial Agent-Based Models of Infectious Disease Spread	Emma Von Hoene; Amira Roess; Taylor Anderson
3A	17:15	Exascale agent-based modelling for policy evaluation in real-time (ExAMPLER)	Alison Heppenstall; Gary Polhill; Mike Batty
		3B Place and Supply and Demand. Chair: Dianna Smith	
3B	16:00	Understanding People's Perceptions of Their Liveable Neighbourhoods: A Case Study of East Bristol	Elisa Covato; Shelan Jeawak

3B	16:15	Place Identity: A Generative AI's Perspective	Kee Moon Jang; Junda Chen; Yuhao Kang; Junghwan Kim; Jinhyung Lee; Fábio Duarte
3B	16:30	Predicting visit frequencies to new places	Nina Wiedemann; Ye Hong; Martin Raubal
3B	16:45	Impacts of Catchments Derived from Fine-Grained Mobility Data on Spatial Accessibility	Alexander Michels; Jinwoo Park; Bo Li; Jeon-Young Kang; Shaowen Wang
3B	17:00	Geographic analysis of trade-offs between amenity and supply effects in new office buildings	Kazushi Matsuo; Morito Tsutsumi; Toyokazus Imazeki
3B	17:15	Achieving least relocation of existing facilities in spatial optimisation: a bi-objective model and solution approaches	Huanfa Chen; Rongbo Xu
		3C Transport and mobility. Chair: Urska Demsar	
3C	16:00	Visual Methods for Representing Flow Space with Vector Fields	Gong Zhaoya; Zhang Han; Thill Jean-Claude
3C	16:15	Understanding the complex behaviours of electric vehicle drivers with agent-based models in Glasgow	Zixin Feng; Qunshan Zhao; Alison Heppenstall
3C	16:30	Uncovering Spatiotemporal Patterns of Travel Flows under Extreme Weather Events by Tensor Decomposition	Zhicheng Deng; Zhaoya Gong; Pengjun Zhao
3C	16:45	Finding feasible routes with reinforcement learning using macro-level traffic measurements	Mustafa Can Ozkan; Tao Cheng
3C	17:00	Mobility Vitality: Assessing Neighborhood Similarity through Transportation Patterns in New York City	Dan Qiang; Grant McKenzie
3C	17:15	Simulating and Validating the Traffic of Blackwall Tunnel Using TfL Jam Cam Data and Simulation of Urban Mobility (SUMO)	Chukun Gao
		4A Localised models. Chair: Steve Manson	
4A	10:30	Benchmarking regression models under spatial heterogeneity*	Nina Wiedemann; Henry Martin; René Westerholt
4A	11:00	Counter-Intuitive Effect of Null Hypothesis on Moran's I tests under Heterogenous Populations	Nishi Hayato; Ikuho Yamada
4A	11:15	A Hierarchical and Geographically Weighted Regression Model and Its Backfitting Maximum Likelihood Estimator	Yigong Hu; Richard Harris; Richard Timmerman; Binbin Lu
4A	11:30	Multiscale spatially and temporally varying coefficient modelling using a Geographic and Temporal Gaussian Process GAM (GTGP-GAM)	Alexis Comber; Paul Harris; Chris Brunsdon
4A	11:45	Introducing a General Framework for Locally Weighted Spatial Modelling Based on Density Regression	Yigong Hu; Binbin Lu; Richard Harris; Richard Timmerman
		4B Cartography. Chair: Roger Beecham	
4B	10:30	Data-spatial layouts for grid maps*	Nathan van Beusekom; Wouter Meulemans; Bettina Speckmann; Jo Wood
4B	11:00	Development of a semantic segmentation approach to old-map comparison	Yves Annanias; Daniel Wiegreffe; Anreas Niekler; Marta Kuźma; Francis Harvey

4B	11:15	The FogDetector: A User Survey to Measure Disorientation in Pan-Scalar Maps	Guillaume Touya; Justin Berli
4B	11:30	Resiliency: A Consensus Data Binning Method	Arpit Narechania; Alex Endert; Clio Andris
4B	11:45	On the Cartographic Communication of Places	Franz-Benjamin Mocnik
		4C Spatial Analysis. Chair: Adam Dennett	
4C	10:30	Building alternative indices of socioeconomic status for population modeling in data-sparse contexts	Angela Cunningham; Joseph Tuccillo; Tyler Frazier
4C	10:45	Investigating MAUP Effects on Census Data Using Approximately Equal-Population Aggregations	Yue Lin; Ningchuan Xiao
4C	11:00	Status poles and status zoning to model urban residential land prices: Status-Quality Trade Off theory	Thuy Phuong Le; Alexis Comber; Binh Quoc Tran; Phe Huu Hoang; Huy Quang Man; Linh Xuan Nguyen; Tuan Le Pham; Tu Ngoc Bui
4C	11:15	Inferring the history of spatial diffusion processes	Takuya Takahashi; Geneviève Hannes; Nico Neureiter; Peter Ranacher
4C	11:30	Characterizing Urban Expansion Processes Using Dynamic Spatial Models – a European Application	Alex Hagen-Zanker; Jingyan Yu; Susan Hughes; Naratip Santitissadeekorn
4C	11:45	Project-Based Urban Dynamics: A Novel Method for Assessing Urban Sprawl	Nir Fulman; Yulia Grinblat; Itzhak Benenson
		5A ML and Spatial Statistics. Chair: Sarah Wise	
5A	14:00	A Comparison of Global and Local Statistical and Machine Learning Techniques in Estimating Flash Flood Susceptibility	Jing Yao; Ziqi Li; Xiaoxiang Zhang; Changjun Liu; Liliang Ren
5A	14:15	Reducing False Discoveries in Statistically-Significant Regional-Colocation Mining: A Summary of Results*	Subhankar Ghosh; Jayant Gupta; Arun Sharma; Shuai An; Shashi Shekhar
5A	14:45	Exploring the Use of Machine and Deep Learning Models for OpenStreetMap Data Quality Assessment and Improvement	Salim Miloudi; Bouhadjar Meguenni
5A	15:00	Moran eigenvectors-based spatial heterogeneity analysis for compositional data	Zhan Peng; Ryo Inoue
5A	15:15	Smarter Than Your Average Model - Bayesian Model Averaging as a Spatial Analysis Tool	Christopher Brunsdon; Paul Harris; Alexis Comber
		5B Map Services. Chair: Levi Wolf	
5B	14:00	Semi-supervised Learning from Street-View Images and OpenStreetMap for Automatic Building Height Estimation*	Hao Li; Zhendong Yuan; Gabriel Dax; Gefei Kong; Hongchao Fan; Alexander Zipf; Martin Werner
5B	14:30	Power of GIS Mapping: ATLAS Flood Maps 2022	Munazza Usmani; Hafiz Muhammad Tayyab Bhatti; Francesca Bovolo; Maurizio Napolitano

5B	14:45	Application of GIS in Public Health Practice: a Consortium's Approach to Tackling Travel Delays in Obstetric Emergencies in Urban Areas	Jia Wang; Itohan Osayande; Peter Macharial; Prestige Tatenda Makanga; Kerry Wong; Tope Olubodun; Uchenna Gwacham-Anisiobi; Olakunmi Ogunyemi; Abimbola Olaniran; Ibukun-Oluwa Abejirinde; Lenka Beňová; Bosede Afolabi; Aduragbemi Banke-Thomas
5B	15:00	Progress in Constructing an Open Map Generalization Data Set for Deep Learning	Cheng Fu; Zhiyong Zhou; Jan Winkler; Nicolas Beglinger; Robert Weibel
5B	15:15	Building-level comparison of Microsoft and Google open building footprints datasets	Jack Gonzales
		5C New forms of data. Chair: Qunshan Zhao	
5C	14:00	Towards a multidimensional interaction framework for promoting public engagement in citizen science projects*	Maryam Lotfian; Jens Ingensand; Christophe Claramunt
5C	14:30	Digital Injustice: A Case Study of Land Use Classification using Multisource Data in Nairobi, Kenya	Wenlan Zhang; Chen Zhong; Faith Taylor
5C	14:45	The Ups and Downs of London High Streets Throughout COVID-19 Pandemic: Insights from Footfall-Based Clustering Analysis	Xinglei Wang; Xianghui Zhang; Tao Cheng
5C	15:00	Understanding active travel networks using GPS data from an outdoor mapping app	Marcus Young
5C	15:15	National-scale spatiotemporal variation in driver behaviour	Elliot Karikari; Manon Prédhumeau; Peter Baudain; Ed Manley
		6A Disruption and Vulnerability 1. Chair: Mark Gahegan	
6A	16:00	An Interpretable Index of Social Vulnerability to Environmental Hazards	Joseph Tuccillo
6A	16:15	Beware the rise of models when they are wrong : Looking at Heat Vulnerability with a Spyglass	Seda Salap-Ayca; Erica Akemi Goto
6A	16:30	Exploring Energy Deprivation across Small Areas in England and Wales	Meixu Chen; Alex Singleton; Caitlin Robinson
6A	16:45	Development and Operationalisation of Local Sustainability Indicators - A Gobal South Perspective on Data Challenges and Opportunities for GIScience	Stefan Steiniger; Carolina Rojas; Ricardo Truffello; Jonathan Barton
		6B Uncertainty. Chair: Jiaqi Ge	
6B	16:00	Uncertainty in causal neighborhood effects: a multi-agent simulation approach	Cecile de Bezenac
6B	16:15	An Evaluation of the Impact of Ignition Location Uncertainty on Forest Fire Ignition Prediction using Bayesian Logistic Regression	David Röbl; Rizwan Bulbul; Johannes Scholz; Mortimer Müller; Harald Vacik
6B	16:30	An Integrated Uncertainty and Sensitivity Analysis for Spatial Multicriteria Models	Piotr Jankowski; Arika Ligmann-Zielinska; Zbigniew Zwolinski; Alicja Najwer

6B	16:45	Uncertainty Quantification in the Road-level Traffic Risk Prediction by Spatial-Temporal Zero-Inflated Negative Binomial Graph Neural Network(STZINB-GNN)	Xiaowei Gao; James Haworth; Dingyi Zhuang; Huanfa Chen; Xinke Jiang
7A Disruption and Vulnerability 2. Chair: Rachel Franklin			
7A	10:30	Waffle Homes: Utilizing Aerial Imagery of Unfinished Buildings to Determine Average Room Size	Carson Woody; Ty Frazier
7A	10:45	A Data Fusion Framework for Exploring Mobility around Disruptive Events	Evgeny Noi; Somayeh Dodge
7A	11:00	Understand the Geography of Financial Precarity in England and Wales	Zi Ye; Alex Singleton
7A	11:15	From change detection to change analytics: Decomposing multi-temporal pixel evolution vectors	Victoria Scherelis; Patrick Laube; Michael Doering
7B Text analysis. Chair: Jing Yao			
7B	10:30	GeoQAMap - Geographic Question Answering with Maps leveraging LLM and open knowledge base	Yu Feng; Linfang Ding; Guohui Xiao
7B	10:45	When Everything is 'Nearby': How Airbnb Listings in New York City Exaggerate Proximity	Mikael Brunila; Priyanka Verma; Grant McKenzie
7B	11:00	Agent-based modeling of consumer choice by utilizing crowdsourced data and deep learning	Boyu Wang; Andrew Crooks
7B	11:15	Understanding the spatial complexity in landscape narratives through qualitative representation of space	Erum Haris; Anthony Cohn; John Stell

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All paper authors and the titles of their papers (clickable in the electronic version)

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