2026 Asia GIS Conference - GIS in the AI Big Data Era

cum IGU GISc Commission Regional Conference

PROGRAMME

20 – 23 October, 2026

The Hong Kong Polytechnic University

Hong Kong, China

2026 Asia GIS Conference - GIS in the AI Big Data Era

cum IGU GISc Commission Regional Conference

20 - 23 Oct 2026 | Hong Kong, China

Asia GIS 2026 expects to bring together leading academics, government leaders, industry professionals, innovators, and practitioners from Hong Kong, the Asia-Pacific region, and the wider international GIS community to explore the evolving role of geospatial science and technology in artificial intelligence, big data, remote sensing, land surveying, digital twins, smart city development, and evidence-based decision-making.

Concurrently, the Hong Kong Institute of Surveyors (HKIS) and the Hong Kong GIS Association (HKGISA) have also jointly hosted the "1st Cross-Strait, Hong Kong and Macao Conference on the Development of Surveying and Geospatial Information " at the same venue.

The conference program features keynote talks, technical and parallel sharing sessions, poster presentation and networking events, designed to foster collaboration and innovation across sectors. Ultimately, to offer actionable insights for accelerating impact and shape the future of geospatial intelligence and smart cities.

Local Organizer:

Hong Kong Geographic Information System Association

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THE HONG KONG INSTITUTE OF SURVEYORS 香港測量師學會

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The Hong Kong Institute of Surveyors

Co-organisers

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International Geographical Union (IGU) Commission on Geographical Information Science

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Co-Host

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The Hong Kong Polytechnic University

Otto Poon Charitable Foundation Smart Cities Research Institute,
The Hong Kong Polytechnic University

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The Hong Kong Institute of Civil and Building Information Management

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Foreword - Welcome Message from the President

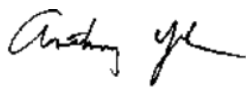
Dear Friends and Guests,

The first Asia GIS Conference was held at the Hong Kong Convention and Exhibition Centre of Hong Kong from 28-31 March 1994 under the title of “Asia GIS/LIS AM/FM and Spatial Analysis Conference” organized by the Hong Kong Geographical Association (HKGA) and the Geographic Information Systems Commission and Mathematical Models Commission of the International Geographical Union (IGU). As GIS was in its early stage of development, there was great interest in this Conference in Asia. The success of it has led to the establishment of the Hong Kong Geographic Information Association (HKGISA) on 9 January 1995 and also the organization of Asia GIS Conference more or less once every two years in Bangkok (1996), Taipei (1998), Tokyo (2001), Wuhan (2003), Johor Bahru (2006), Busan (2008), Kaohsiung (2010), Chiang Mai (2014), Hong Kong (2017) and Tokyo (2019) respectively. The Asia GIS Association was established in 2003 at the Asia GIS Conference in Wuhan in 2003 with Prof. Deren LI of Wuhan University as the Founding President, Prof. Ryosuke SHIBASAKI of University of Tokyo as the Founding Vice-President, and Prof. Anthony YEH of The University of Hong Kong as the Founding Secretary-General. The Asia GIS Conference was unfortunately interrupted by COVID-19. We are glad to be able to organize it again in Hong Kong to reconnect the GIS community in Asia.

As can be seen from the theme of the first Asia GIS Conference in Hong Kong in 1994 which was limited to AM/FM and spatial analysis, GIS has evolved in the last 30 years to be a well-established spatial management and planning tools and information for sustainable smart development. The theme of this Asia GIS Conference 2026 of “GIS in the AI Big Data Era” is a new milestone of GIS development. AI and big data provide powerful tools and data for GIS to operate on. They have created a lot of innovative research and applications for us to share and discuss in this Conference.

We welcome you to the Asia GIS Conference 2026 in Hong Kong, hoping you will have a fruitful conference and be better connected with the GIS community in Asia.

Best regards,



Prof. Anthony G.O. Yeh

Past-President of Asia GIS Association

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Programme Overview

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Day 1: 20 October 2026, Wednesday

Venue: Foyer of Jockey Club Auditorium, Hong Kong Polytechnic University

Time	Location	Programme
14:00 – 15:00	Foyer of Jockey Club Auditorium	Registration Starts
15:00 – 17:00	Rm ZS601/ZS1215 Rm AG710	Committee Meeting *(By Invitation Only)* Technical Workshop: *"GeoGateway: Unlocking Open Geospatial Data with CSDI portal and tools"*
16:00 – 17:30	Foyer of Jockey Club Auditorium	Poster & Booth Setup
18:00 – 19:00	Foyer of Jockey Club Auditorium	Welcome Drinks
19:00 – 21:00	Ju Yin House Seafood Restaurant	Committee Dinner *(By Invitation Only)*

Day 2: 21 October 2026, Wednesday

Venue: Jockey Club Auditorium, Hong Kong Polytechnic University

Lunch: Ju Yin House Seafood Restaurant (4/F, Communal Building)

Time	Location	Programme
08:30 - 0900	Foyer of Jockey Club Auditorium	Registration
09:00 – 10:15	Jockey Club Auditorium	Opening Ceremony of 1st Cross-Strait, Hong Kong Macao Conference on the Development of Surveying, Mapping and Geospatial Information
10:15 – 10:30	Foyer of Jockey Club Auditorium	Coffee Break
11:00 – 12:30	Foyer of Jockey Club Auditorium	Poster Presentation
12:30 – 14:00	Ju Yin House Seafood Restaurant	Lunch

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Time	Location	Programme
14:00 – 14:40	Jockey Club Auditorium	**Opening Ceremony** - Sr Paul TSUI, Vice President, Hong Kong Institute of Surveyors (HKIS) - Prof. Paulina WONG, President, Hong Kong GIS Association (HKGISA) - Prof. Fenzhen SU, Co-Chair, GISc Commission, International Geographical Union (IGU) - Prof. Anthony G.O. YEH, Past President, Asia GIS Association - Sr Raymond CHOI, Head of Spatial Data Office, Development Bureau, The Government of the Hong Kong Special Administrative Region of the People's Republic of China *(Title: GIS and Spatial Data Infrastructure (SDI) Development of Hong Kong)*
14:40 – 14:45		Group Photo
14:45 – 15:30		**Keynote Speech** ***GIS in the Age of AI and Big Data*** Prof. Michael GOODCHILD, University of California, Santa Barbara, USA
15:30 – 16:00	Foyer of Jockey Club Auditorium	Tea Break
16:00 – 16:45	Jockey Club Auditorium	**Keynote Speech** ***Spatio-temporal Intelligence Brings AI into the Physical World*** Prof. Deren LI, Wuhan University, China
16:45 – 17:30		**Keynote Speech** ***Urban Modelling with GIS and Digital Twins in the Age of AI and Big Data*** Prof. Michael BATTY, University College London, UK
18:30 – 19:00	Hotel Icon	Conference Dinner Reception
19:00 – 21:00		Conference Dinner

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Day 3: 22 October 2026, Thursday

Venue: Jockey Club Auditorium, Hong Kong Polytechnic University

Lunch: Ju Yin House Seafood Restaurant (4/F, Communal Building)

Time	Location	Programme			
08:30-09:00	Foyer of Jockey Club Auditorium	Registration			
09:00-10:30		**Parallel Session 1**			
	Breakout Rooms	**1A - Urban & Population Modeling** (Rm AG710)	**1B - Climate & Environmental Risk** (Rm QR403)	**1C - Transport, Wellbeing & Heritage** (Rm ZS1215)	
10:30-11:00	Foyer of Jockey Club Auditorium	Tea Break			
11:00-12:30		**Parallel Session 2**			
	Breakout Rooms	**2A - Geospatial AI & Agentic Systems** (Rm QR403)	**2B - Urban Form, Energy & Socioeconomic** (Rm AG710)	**2C - UAV & BIM Technologies inspection** (Rm ZS1215)	
12:30 - 14:00	Ju Yin House Seafood Restaurant	Lunch			
14:00-15:30		**Parallel Session 3**			
	Breakout Rooms	**3A - Urban Mobility & Travel Behaviour** (Rm AG710)	**3B - Spatial Data & Civic Tech** (Jockey Club Auditorium)	**3C - Air Quality & Thermal Comfort** (Rm ZS1215)	**3D - Street View Imagery & Visual Perception** (Rm BC302)

Time	Location	Programme
15:30 - 16:00	Foyer of Jockey Club Auditorium	Tea Break
16:00- 16:30	Jockey Club Auditorium	Panel Discussion: GIS Education and Development
16:30 – 16:50	Jockey Club Auditorium	Award Presentation & Closing Ceremony
17:00 – 19:00	Foyer of Jockey Club Auditorium	Poster & Booth Dismantle
18:00 – 20:00	TBC	Committee Dinner (for invited guests only)

Day 4: 23 October 2026, Thursday

This technical tour brings participants to two prominent IT landmarks in Hong Kong: the **HKSAR Geospatial Lab** and the **Hong Kong Science and Technology Parks (HKSTP)**.

A return shuttle bus will depart from PolyU at 8:30am, with participants expected to return by 1:00pm. The visit offers an opportunity to explore how geospatial technology and innovation ecosystems contribute to Hong Kong's development as a smart city.

Seats are limited and available on a first-come first-serve basis; please reserve your place at the registration counter!

Parallel Sessions (Paper Presentations)

22 October 2026, Thursday

08:30-09:00	Registration
09:00-10:30	Parallel Session 1

Parallel Session 1A – Urban & Population Modeling (Rm. AG710)

Chair:
Prof. Weifeng Li (Department of Urban Planning and Design, The University of Hong Kong, HKSAR)

Development of a Building Use Estimation Method Based on Open Data and AI Applicable to Developing Countries (PR01)

Presenter: *Mr. Takahito Shimizu (Tokyo City University, Japan)*
Co-author: *Yuki Akiyama*

Abstract: *Rapid urbanization in developing countries has increased the importance of detailed building use information for urban planning and policy making. Such information can support land-use and infrastructure planning and disaster risk assessment by revealing the distribution of residential, commercial, and other uses. However, existing geospatial open data often provide building locations and geometry but lack building use attributes, particularly in developing countries. This study develops a building use estimation method for developing countries using globally available open data and artificial intelligence, with Japan as an initial case study. We integrated PLATEAU, Japan's open 3D building data, with Points of Interest (POIs), railway and road networks, population, and nighttime light data to construct building-level features representing geometry, urban blocks, and surrounding environments. To address class imbalance, we developed a hierarchical framework that first estimates detached-house probability and then estimates four non-detached uses using models divided by the composition of POIs intersecting each building. These probabilities are integrated in a final model to classify buildings into five categories: detached houses, apartment buildings, commercial buildings, office and industrial buildings, and public and utility buildings. XGBoost and LightGBM were evaluated. XGBoost achieved an accuracy of 0.793 and a macro F1-score of 0.557, while LightGBM achieved 0.792 and 0.542, respectively. The F1-score for detached houses was approximately 0.89 for both algorithms. SHAP analysis indicated that building area and height were particularly important for detached-house classification. These results demonstrate the potential of the proposed framework for large-scale building use estimation and provide a basis for future validation in developing countries.*

Micro-Scale Residential Satisfaction Mapping Using Building-Level Urban Attributes and Machine Learning (PR14)

Presenter: *Mr. Taiga Matsubara (Tokyo City University, Japan)*
Co-author: *Takahito Shimizu, Kotaro Mizutani, Yuki Akiyama*
Abstract: *Improving residential satisfaction has become increasingly important in Japan in the context of promoting well-being. Although residential satisfaction has been widely studied, most assessments have been conducted at relatively coarse spatial scales, such as municipalities, leaving fine-scale spatial variations within these areas largely unexplored. Therefore, this study proposes a micro-scale residential satisfaction mapping approach based on building-level accessibility, road environment, and other urban spatial attributes derived from geospatial data, including Digital Road Maps and National Land Numerical Information. The study area comprises Ibaraki, Tochigi, and Gunma Prefectures in northern Kanto, Japan. First, a building-level dataset was constructed by assigning various urban spatial variables to individual buildings. The building-level data were then aggregated to the Oaza (submunicipal area) level to develop a residential satisfaction prediction model using LightGBM. The developed model was subsequently applied to building-level urban attributes to estimate fine-scale spatial variations in residential satisfaction within each Oaza. The results showed that spatial variations in estimated residential satisfaction could be represented using variables related to accessibility and road environment, such as distance to daily-life facilities and road width. Higher residential satisfaction was generally estimated around major railway stations in each prefecture, indicating that transportation accessibility and daily-life convenience are important spatial correlates of residential satisfaction. These results demonstrate the feasibility of using machine learning and building-level geospatial attributes to map residential satisfaction at a finer spatial scale. The proposed approach provides a basis for more detailed urban planning and policy analysis.*

Semantic Representation of Urban Space and Demographics in Latent Space: Alignment, Bias and Silence (PR44)

Presenter: *Ms. Xuan Li (Hanyang University, Korea)*
Co-author: *Sugie Lee*
Abstract: *Pre-trained foundation models are increasingly used in urban perception-related analysis and prediction models, yet what they encode about the relationship between places and people remains unexamined. The model variance of bias was often measured from the output instead of the training process. This study investigates how the semantic representation of place aligns to the demographics of the residence and visitors. Using Seoul as a case study, we designed an open vocabulary of demographic descriptions from census-style attributes jointly with urban places at neighborhood, using state-of-the-art text and vision–language embedding models: mircosoft-harrier-27b, tencent-kalm-12b, nvidia-llama-8b, qwen-8b, gemini-001 (Top 5 from multilingual embedding model leading-board) and openai- text-embedding-3-large. Embedding perception of Place-Demographics is measured as the difference of the cosine similarities between a place to an attribute and the place to the opposite attribute (e.g. young–old, affluent–poor, locals–immigrants). This index can cancel background noise and isolates a single social dimension from the high-dimensional embedding space. These results are then compared against ground truth: origin–destination flows by age and gender, the 2023 National Household Travel Survey, and census socio-economic statistics. We decompose the comparison into three categories: alignment, where embedding model follows observed real-world variance; bias, where embedding model exaggerates beyond behavior, such as systematically binding low-income descriptors to physically deteriorated areas; and silence, where embedding model carries no place-demographics signal. The results mostly consistent across embedding models. The audit delivers both an empirical map of embedding perception of urban space and a guideline of for future generative models on urban place.*

Transferable Building-Level Population Estimation Using Open Geospatial Data in Data-Scarce Regions (PR18)

Presenter: Mr. Itsuki Yamamoto *(Tokyo City University, Japan)*
Co-author*: Takahito Shimizu, Yuki Akiyama*
Abstract: *High-resolution population data are essential for urban planning, infrastructure, and disaster management. However, detailed population statistics are often limited in developing countries because large-scale population surveys require substantial costs and effort. Therefore, a transferable and cost-effective method for estimating detailed population distribution using limited local reference data is needed. This study proposes a transferable building-level population estimation method based on unit population density and widely available open building and POI data. POI data are used to estimate building use and classify areas based on regional characteristics. Unit population density, defined as population per unit of building floor area, is calculated from population survey data in sample areas and building floor area and is then applied to buildings in other areas. This approach enables detailed population estimation with limited population data. Japan was first used as a test area to examine how building type, urban characteristics, building height, and the spatial extent used to calculate unit population density affect estimation accuracy and transferability. The results showed that differences in residential environments improved estimation accuracy. Moreover, unit population densities derived from diverse areas showed greater transferability. The proposed method was then applied to Bangkok and five surrounding provinces in Thailand to examine its transferability across national contexts. The estimated population showed a clear relationship with the actual population aggregated into 1-km grids, with an overall R^2 of 0.635. These findings demonstrate that the proposed method can capture population patterns even when transferred from Japan to Thailand and provide a practical, low-cost approach to detailed population mapping in data-scarce regions.*

Deep Analysis of Machine Learning Models in Intelligent Dasymetric Mapping for High-resolution Population Data in Viet Nam (PR10)

Presenter: *Dr. Quang Hung Bui (Vietnam National University, Vietnam)*
Co-author: *Le Viet Bach, Nguyen Thanh Thuy*
Abstract: *Gridded population data (GPD) is essential for urban planning, sustainable land use, and disaster risk assessment. To create GPD, Intelligent Dasymetric Mapping (IDM) often uses tree-based machine learning, such as Random Forest and ensemble learning, to break down coarse census data at administrative levels into 100m×100m grids. However, these machine learning models assume that data points are independent and identically distributed, thereby ignoring geographic principles (Tobler's First Law) and failing to capture spatial non-stationarity. While spatially extended models, namely Geographical Random Forest (GRF), Geospatial Random Forest (GeoRF), and Geographical XGBoost (GXGB), address this issue, they have only been tested on small datasets containing hundreds or thousands of samples. Their ability to handle national-scale GPD with tens or hundreds of millions of pixels remains unexamined. This study introduces a computationally optimized algorithm to scale GRF, GXGB, and GeoRF to a nationwide level, then compares their spatial learning capabilities and population estimation accuracy against traditional baselines. Experimental results show that GRF delivers the best balance: it effectively learns spatial data with almost zero spatial autocorrelation in residuals (Moran's I =0.036) and achieves high accuracy (R2 = 88.55%), outperforming all other models. This study provides two methodological insights for GeoAI: first, combining multiple local models coordinated by distance captures spatial non-stationarity much better than a single global model; second, modeling geographic data should focus on the actual distance between data points rather than just their raw coordinates.*

Parallel Session 1B – Climate & Environmental Risk (Rm. QR403)

Chair:
Prof. Yan Liu (The Chinese University of Hong Kong, Hong Kong SAR)

LLM-D2T: An LLM-based Demand-to-Task Approach for Watershed Management Optimization (PR40)

Presenter: Mr. Xingchen Fan *(Institute of Geographic Sciences and Natural Resources Research CAS, China)*
Co-author: *Chengzhi Qin, Liangjun Zhu*
Abstract: *Spatial optimization provides an important means of identifying cost-effective watershed management plans. Existing approaches, however, mainly focus on solving spatial optimization problems, while problem formulation and executable task construction are completed in advance by domain experts. In practice, watershed-management stakeholders are often non-experts who express their management demands in natural language. Such demands may be ambiguous, informal, incomplete, and evolving during decision-making. Consequently, the traditional expert-mediated spatial optimization creates a knowledge barrier for stakeholders and limits the flexibility and transparency of incorporating their demands into the optimization. This study presents D2T-Opt, a knowledge-constrained large language model (LLM) framework for transforming natural-language management demands into executable spatial optimization tasks for watershed Best Management Practices (BMPs). D2T-Opt organizes the transformation into three stages: demand semantic structuring, optimization problem formulation, and task construction. At each stage, LLM generation is jointly constrained by domain knowledge and a stage-specific output schema, including the Basic Demand Unit, a BMP optimization problem template, and a standardized task-code template. The framework was evaluated across diverse natural-language watershed management demands. It exhibited high accuracy in transforming natural-language into structured demands and optimization problem formulations, while nine of ten cases produced valid task-construction outcomes. The results demonstrate the feasibility of using knowledge-constrained LLMs to transform stakeholder natural-language demands into executable BMP optimization tasks, supporting more accessible and traceable spatial decision support in watershed management.*

A GIS-Based Assessment of Biometeorological Conditions in Russia (PR38)

Presenter: *Mr. Timur Miriazov (Laboratory of Digital Demography FCTAS RAS, Russia)*
Abstract: *Climate maps describe spatial patterns of heat and cold, but by themselves they do not show how many people live under these conditions. This study proposes a GIS-based transition from climate mapping to population exposure mapping for Russia, a country with strong latitudinal gradients, sharp continentality, and highly uneven settlement. The aim is to assess biometeorological conditions as they are experienced by population rather than by territory alone. We combine gridded air temperature, humidity and wind indicators, derived thermal stress indices, and population distribution data in a single spatial framework. Climate surfaces are reclassified into comfort, cold stress and heat stress classes, overlaid with settlement and population grids, and aggregated for regions and municipalities. The approach produces exposure maps, seasonal profiles and rankings that show where adverse conditions coincide with population concentration. The expected results reveal not only the geography of climatic discomfort, but also differences between territorially dominant and demographically significant zones of exposure. This is important for public health, urban planning, adaptation policy and regional development in northern, continental and rapidly warming environments. The proposed workflow can be reproduced for other countries and scaled from national assessment to local planning of climate-sensitive infrastructure. Supported by Grant No. 25-78-30004*

Terrain and Land-Surface Structure as Controls on Snow Grain Size and Snow Pollution Patterns in the Chinese Altay Mountains (PR39)

Presenter: *Dr. Kelvin Keru Lu (Zhejiang University of Technology, China)*
Abstract: *Light-absorbing impurities darken mountain snowpacks and accelerate melt, yet the spatial organization of impurity loading in complex terrain is poorly resolved because ground sampling rarely spans the full elevation range in winter. This study retrieves snow grain size (SGS) and a relative snow pollution indicator (SP) across the Chinese Altay Mountains from Sentinel-3 OLCI (300 m, 2019-2024) via a two-channel radiative-transfer algorithm, attributing their patterns to elevation and land-surface structure using the geographical detector (GeoDetector) and structural equation modeling (SEM). SP peaks within a 1400-1700 m belt coinciding with dense forest rather than declining monotonically with elevation, while SGS is smallest beneath forest and built-up canopies and largest over open grassland and bare ground. GeoDetector attributes more SGS and SP variance (12.87% and 9.26%) to land-cover-derived roughness than to elevation, with a roughness-elevation interaction producing double-factor enhancement. SEM resolves the cascade: roughness suppresses SGS growth (-0.1932) and SGS suppresses SP (-0.3055), an indirect amplification of approximately 0.059 adding to a direct positive roughness-pollution path (0.1617). A three-tier validation against EMIT reflectance (60 m, 8 April 2024) confirms the NDSI and SGS chain is cross-sensor consistent (R = 0.84 and 0.75) but pixel-level SP sits below the detection limit (R = 0.06); elevation-belt enrichment profiles nonetheless converge (R = 0.78-0.79), showing the belt is a genuine surface signal while constraining SP to a pattern-level indicator. These results identify forest-mediated roughness as the dominant terrain control on impurity accumulation in mid-latitude mountains, with implications for albedo feedback and cryosphere monitoring design.*

Identification of surface mining and assessment of ecological restoration effects using GEE and Sentinel-2 image data - A case study on Yangtze River watershed, China (PR51)

Presenter: Ms. Zoey Zang *(The University of Hong Kong, Hong Kong SAR)*
Abstract: *Mineral resource development is essential for economic growth; however, its significance negative impacts on land, ecology, and the environment cannot be overlooked. This study aims to identify and assess the restoration status and ecological quality of large-scale surface mining areas, especially in the absence of specific mining location information. We propose a systematic workflow that utilises open-source remote sensing data. The process includes: (1) extracting surface mining areas using masking, morphological operations, and visual interpretation techniques; (2) constructing time-series of Bare Surface Percentage(BSP) for each mining area on the Google Earth Engine platform to distinguish between abandoned and active mines and examine their restoration rates; (3) creating the Remote sensing Ecological indicator for Mining areas(REM) to quantify the ecological quality and analyse its temporal changes. A total of 1183 mine sites were identified in the study area, of which 381 abandoned mines showed a significant decreasing trend in BSP from 2016 to 2021, with a median decline from 98% in 2016 to 81% in 2022, indicating improved vegetation recovery during this period. Additionally, the REM of abandoned mines generally exhibited a stable upward trend from 2016 to 2022. This study provides a systematic solution for identifying surface mining areas and monitoring the restoration scope and ecological quality on a broader scale. The methodology is extendable to other regions and can support further ecological restoration decision-making.*

Coastal Risk in Hong Kong: Distinguishing Exposure from Social Vulnerability (PR20)

Presenter: *Prof. Yan Liu (The Chinese University of Hong Kong, Hong Kong SAR)*
Co-author: *Zhen Wu*
Abstract: *Coastal cities face growing threats from sea-level rise, but the social impacts of flooding depend on how physical exposure intersects with existing urban disadvantages. This study develops a geospatial approach to analyze future extreme sea-level (ESL) exposure alongside present-day social–urban vulnerability in Hong Kong, a high-density, topographically complex metropolis with reclaimed shorelines and marked socio-spatial inequalities. Integrating 100-year ESL inundation maps (present-day, mid-century, and end-century) with 2021 census data on population, housing, built environment, and accessibility, we hold current population distribution constant, project future exposure, construct a comprehensive Urban Social Vulnerability Index, identify high-vulnerability areas that overlap with ESL zones, and test for disproportionate concentration of specific demographic and housing groups. Results show that ESL exposure expands significantly across all dimensions. Under the high-emission end-century scenario, inundated areas grow by ~50%, exposed impervious surfaces nearly double, and the exposed population rises from 1.20 million to 2.21 million. Hazard zones increasingly penetrate areas of high social vulnerability. Yet, vulnerability and physical exposure do not align uniformly. Within exposed zones, ethnic minorities and children are overrepresented relative to citywide shares, while public-rental, tenant, and small-unit households are underrepresented. These findings confirm that social vulnerability and spatial exposure are related but distinct risk dimensions. Future ESL conditions will affect more people and infrastructure, but consequences vary unevenly across places and groups. By distinguishing broad exposure expansion, high-intensity co-location, and group-specific concentration, our framework provides planning-relevant evidence for place-based adaptation and socially responsive climate governance in high-density coastal cities.*

Parallel Session 1C – Transport, Wellbeing & Heritage (Rm. ZS1215)

Chair:
Dr. Junwei Jacob Zhang (Lingnan University, Hong Kong SAR)

More movement, better wellbeing, or both? Examining age-specific pathways in digital self-management of chronic lower back pain (PR07)

Presenter: Prof. Pui Yun Paulina Wong *(Lingnan University, Hong Kong SAR)*
Co-author: *Junwei Jacob Zhang, Chi Wai Cheung, Hung Chak Derrick Ho, Po Alex Leung, Shifeng Wu*
Abstract: *Background/Objectives: In high-density, rapidly ageing Hong Kong, scalable self-management is needed to complement clinic-based care for chronic low back pain. Yet programmes often assume pain improves mainly by increasing physical activity. We investigated whether pain change during digital self-management was accompanied by activity, mental wellbeing or combined effects, and whether these differed between adults aged below 60 and those aged 60 or above. Methods: An eight-week observational panel included 73 Hong Kong adults with chronic low back pain. All completed baseline and four biweekly surveys; continuous use of workout app, smartwatch, and completed two in-depth interviews at the mid-point (week 4) and the end-point (week 8). Age-stratified longitudinal models examined pain and activity trajectories, participant-level change associations and predefined pain-activity-wellbeing profiles. Qualitative coding, supported by a computational topic-proportion audit, examined pacing, routine formation and contextual influences. Results: Survey pain decreased by 0.95 points below 60 and 1.07 points at 60 or above, with no clear difference in slope (interaction -0.02 points/week, 95% CI -0.13 to 0.08). Median early-to-late steps increased by 355/day below 60 but decreased by 512/day at 60 or above. Step change was weakly associated with pain change (Spearman rho=0.07), as were changes in self-reported activity, workout frequency, mental wellbeing, life satisfaction and sitting time. Pain improvement occurred with increased activity, stable activity or improved mental wellbeing. Interviews showed that doing more activity, feeling more motivated and experiencing pain relief did not necessarily co-occur. Participants adapted activity to pain, function, confidence and routines; accountability, together with human or social support, could sustain engagement, whereas persistent symptoms, other health problems, technical unreliability and limited personal relevance constrained it. Conclusions: Pain improvement was not consistently explained by increased activity alone, supporting adaptive, multi-component self-management rather than uniform step targets. For Hong Kong, the declining median step trend at age 60 or above suggests piloting more nearby, accessible indoor workout spaces and optional guided sessions that support safe pacing. For adults below 60, whose steps increased modestly, flexible walking goals and redeemable credits could be tested to sustain participation. Because interviews showed heterogeneous needs across ages, both approaches should remain personalised and be evaluated before scale-up.*

Embedding Geographic Knowledge in Transformers Improves Cross-City Transfer of Station Ridership Models (PR46)

Presenter: *Dr. Shun Nakayama (Senshu University, Japan)*
Abstract: *Transferring station ridership models from metropolitan areas could support transport planning in cities with limited training data. However, differences in station spacing and transit services may undermine transferability. This study examines whether embedding geographic knowledge—station attributes, distance decay, and spatial competition—in Transformers improves cross-city transfer. Using open building and railway data, we trained models in Tokyo and Kanagawa and evaluated their transfer to eleven Japanese urban regions. We compared a fixed-catchment model representing buildings within 800 m of each station with a variable-catchment model that estimates spatially distributed demand and allocates it among competing stations through a Huff-type mechanism. Both models were evaluated with and without station attributes describing connecting lines and service types. Without local calibration, the fixed-catchment model achieved rank correlations of 0.59–0.79 in six rail-oriented regions. In five regions with tram systems, station attributes increased mean rank correlation from 0.196 to 0.365 for the fixed-catchment model and from 0.203 to 0.497 for the variable-catchment model. With attributes, the variable-catchment model performed better on average in tram regions, whereas the fixed model performed better in rail-oriented regions. Local calibration improved ridership estimates, with calibrated transferred models outperforming locally trained models in Fukuoka and Sapporo. These findings highlight the value of embedding station attributes and spatial competition in ridership models while matching catchment representations to local transit systems. They also suggest that transferred station rankings and locally calibrated ridership levels provide a promising basis for applying metropolitan models to cities with limited training data.*

Natural Language Processing for Urban Transport Planning in a Rapidly Evolving AI Era (PR48)

Presenter: *Dr. Shuli Luo (The Chinese University of Hong Kong, Shenzhen, China)*
Co-author: *Xinlu Wu, Xiao Fu, Terry Yepeng Yao*
Abstract: *Natural Language Processing, particularly the advent of Large Language Models (LLMs), have fundamentally transformed urban transport planning by enabling planners to harness vast streams of unstructured text. This paper systematically reviews 248 studies published between 2020 and 2026, mapping how NLP integrates across the planning pipeline. We propose the Urban Text Sensing (UTS) framework, which conceptualizes city language as a distributed semantic sensor through five stages of the transport planning process: Sense, Ground, Infer, Validate, and Decide. Our findings reveal a clear shift from basic data extraction and classification toward complex multimodal fusion and multi-agent participatory planning. However, as AI systems transition from analytical tools to cognitive engines, critical challenges emerge regarding hallucinations, representation bias, scalability, explainability, and privacy. We argue that realizing the potential of LLMs in transport requires moving beyond isolated machine-learning metrics toward socio-technical validation that prioritizes policy validity, equity, and robust urban governance.*

Landscape Dynamics Around National Key Protected Cultural Relic Units of Ancient Architecture in China: Transitions and Heritage Designation Effects (PR55)

Presenter: *Mr. Shuaichen Yan (The University of Hong Kong, Hong Kong SAR)*
Co-author: *Jinfeng Xie, Fan Xue, Anthony Gar-On Yeh*
Abstract: *Ancient architecture is experienced within changing landscapes, yet designation research in China has focused mainly on physical structures. This study examines landscape transitions around National Key Protected Cultural Relic Units of ancient architecture and whether designation affects surrounding land use. Annual 30 m land-use data for 1985–2025 were analyzed within 100 m, 500 m, and 1,000 m buffers around the sites. We measured land-use shares, Shannon diversity, and aggregation, classified trajectories and transitions, and applied Callaway-Sant'Anna staggered difference-in-differences to 2,056 treated sites. Built-up-dominated landscapes became more common as agricultural-dominated landscapes declined, while ecological-dominated landscapes persisted. At 100 m scale, designation reduced built-up share (ATT = −0.0078, p = 0.0062) and increased agricultural share (ATT = 0.0081, p = 0.0325). Effects weakened with distance, and ecological share showed no precise response. Effects emerged over time and were clearest in the 1988 cohort. Stronger effects occurred in eastern, higher-GDP, higher-nighttime-light, and lower-slope areas and negative built-up effects at 100 m persisted across three-, five-, and ten-year intervals. Overall, landscapes around China's protected ancient architecture became more built-up dominated while heritage designation may modestly constrain nearby urban expansion and support agricultural retention with a spatially bounded and context-dependent influence. The protection of ancient architecture should also be understood within the broader spatial dynamics of heritage-landscape interactions, integrating heritage conservation with regional landscape planning.*

Mapping the Economic Burden and Street-Level Drivers of Road Traffic Accidents in Hong Kong (PR08)

Presenter: *Dr. Junwei Jacob Zhang (Lingnan University, Hong Kong SAR)*
Co-author: *Ka Hei Anson Yip, Pui Yun Paulina Wong*
Abstract: *Background/Objectives: Road traffic crashes impose substantial public-health and economic burdens, yet their long-term costs and street-level determinants remain poorly understood in compact, high-density cities. We examined spatio-temporal patterns, casualty costs, and risk factors in Hong Kong from 2007 to 2023. Methods: We analysed 267,920 georeferenced casualty crashes and aggregated outcomes across 5,630 streets. Fatality and injury costs were estimated using the value of a statistical life. Twenty-two road-network, pedestrian, roadside, topographic, and land-use variables were assembled from seven geospatial datasets. Support vector machines, random forests, extremely randomised trees, and extreme gradient boosting (XGBoost) were compared; the best models were interpreted using Shapley additive explanations (SHAP). Results: Annual crash frequency showed no significant trend, whereas estimated costs declined by 46%, from HK*

$8.48 billion (US 1.08$ *billion) in 2007 to HK* $4.60 billion (US 0.59$ *billion) in 2023 (R^2=0.70, p<0.001), primarily because fatalities and serious injuries decreased. XGBoost performed best for crash frequency (R^2=0.737) and economic costs (R^2=0.636). Pedestrian-route length and maximum street slope were the strongest positive predictors of crash frequency, while average slope was negatively associated with both outcomes. On-street parking and roadside-planter area increased predicted crash frequency and costs. Conclusions: Hong Kong reduced the severity-related economic burden of crashes despite stable overall frequency. Dense cities should prioritise pedestrian–vehicle separation, slope-sensitive road design, parking management, and planter maintenance at high-risk streets.*

10:30-11:00	Tea Break (Foyer of Jockey Club Auditorium)
11:00-12:30	Parallel Session 2

Parallel Session 2A – Geospatial AI & Agentic Systems (Rm.QR403)

Chair:
Dr. Wanglin Yan (Keio University, Japan)

Smart Earth Framework for Sustainable Development (PR09)

Presenter: *Prof. Chih-Hong Sun (National Taiwan University, Taipei)*

Abstract: *Sustainable development faces increasingly interconnected challenges involving climate change, biodiversity loss, socioeconomic inequality, resource pressures, and fragmented governance. At the same time, advances in Geospatial Big Data, Digital Twin Earth and Digital Twin City technologies, and Agentic AI create new opportunities for anticipatory and data-driven sustainability governance. This paper proposes the Smart Earth Framework for Sustainable Development (SEFSD), a four-layer architecture integrating Geospatial Big Data, Digital Twin Earth and Digital Twin City, commercial Agentic AI platforms, and a user-oriented SEFSD Portal. The framework connects the United Nations Sustainable Development Goals (SDGs) with geospatial evidence, Earth-system and urban conditions, scenario simulation, and AI-assisted decision support. Its Agentic AI layer enables users to identify relevant datasets, query Digital Twins, generate and compare alternative scenarios, and evaluate environmental, social, economic, and SDG-related outcomes. Importantly, SEFSD adopts a human-centered governance approach in which humans establish goals and constraints, AI provides analysis and recommendations, and continuous observations provide feedback for adaptive decision-making.*

Multimodal Large Language Models for Mobility-Based Demographic Reasoning (PR12)

Presenter: *Mr. Dejing Zhang (Tokyo City University, Japan)*
Co-author: *Zekun Cai, Yuki Akiyama, Ryosuke Shibasaki, Yingzhen Luo*
Abstract: *Long-term mobility trajectories can reveal patterns in people's daily activities and provide clues about their personal attributes. Previous studies have often relied on supervised learning, which requires labeled training data. Recent studies have also explored the use of large language models for trajectory analysis, but how mobility information should be organized and how multiple prediction tasks can be handled within a unified framework remain unclear. In this study, we propose a training-free method that uses a multimodal large language model to infer multiple user attributes from long-term mobility trajectories. Our framework combines three types of input: Life Rhythm visualizations, structured POI information, and selected behavioral indicators. The multimodal large language model jointly processes these inputs together and predicts gender, age group, occupation, home location, and workplace or school location in a single inference process. We evaluate the framework using trajectory data from 200 users in Japan and compare our method with conventional supervised learning methods and an LLM baseline using only raw trajectory records as input. The full framework performs best overall among the tested methods. Ablation results also show that the different input types provide complementary information. Life Rhythm visualizations are particularly useful for identifying home and workplace or school locations, while behavioral indicators are more helpful for predicting age and occupation. Gender prediction remains challenging, as the models tend to predict the majority class.*

An Evolving Knowledge Network for Geographic Model Use (PR36)

Presenter: *Mr. Tianyu Sheng (Nanjing Normal University, China)*
Co-author: *Min Chen*
Abstract: *Large language models (LLMs) increasingly provide plausible solutions for geospatial model selection, configuration, and use, raising a fundamental question: when is an explicit domain knowledge network still necessary? We address this question in green and low-carbon geospatial modeling, where the transferability of modeling experience depends not only on semantic similarity, but also on geographic context, process mechanisms, spatial scale, and model capability. We propose a case–model knowledge network with two mutually linked components. Model Cards organize declarative knowledge mainly from official documentation, procedural knowledge as executable or extensible modeling skills, and strategic knowledge summarized from accumulated case evidence. Case Cards represent modeling evidence as Goal + Bounded Context + Workflow + Evidence. Workflows are represented as heterogeneous chains that connect models through data, spatial transformations, algorithms, and other operations. New cases continuously refine model knowledge while preserving provenance and conflicting evidence. Our central hypothesis is that explicit domain knowledge provides added value beyond strong LLMs and prompt engineering when modeling experience is transferred to a new geographic context. We therefore introduce domain-aware case fingerprints describing climate, geographic and urban context, spatial configuration, intervention characteristics, dominant processes, scale, and modeling targets. Rather than equating textual similarity with transferability, the framework distinguishes the transferability of model choice, workflow, configuration, and scientific conclusions. The framework will be compared with LLM-only, prompt-enhanced, and unstructured retrieval baselines through case retrieval, model capability assessment, workflow reconstruction, evidence traceability, and transferability prediction. This study aims to establish a domain-grounded and reproducible foundation for intelligent geospatial modeling.*

Building Shared Spatial Intelligence with an AI Facilitator Agent in Community Planning Workshops (PR23)

Presenter: *Dr. Wanglin Yan (Keio University, Japan)*
Co-author: *Akihiro Ob, Takahiro Kanamori, Shun Nakayama*
Abstract: *Participatory community planning workshops bring together residents, public officials, professionals, businesses, and other stakeholders with different understandings of place. In practice, workshop knowledge is often fragmented across spoken discussion, maps, photographs, spatial data, and post-workshop reports. Human facilitators must manage participation, clarify spatial references, connect lived experience with evidence, and preserve the reasoning behind agreements, disagreements, and proposals. Much of the knowledge generated therefore remains implicit and difficult to trace, revise, or carry forward. This study distinguishes shared spatial knowledge, which emerges through dialogue among participants, from Shared Spatial Intelligence (SSI), defined as the externalized, structured, and accumulated form of that knowledge when experiences, evidence, interpretations, proposals, and unresolved issues are linked to places and discussion contexts. We developed a prototype AI Facilitator Agent on the LLM-based GIS platform mapbotica. The agent participates through voice or text, organizes discussion, links statements to maps and photographs, invokes spatial analysis when appropriate, monitors group progress, and generates structured reports while avoiding excessive intervention. The broader contribution is to frame an AI agent not merely as a tool, but as a persistent project member that participates in repeated workshops, carries forward project memory, and co-evolves with human actors and spatial knowledge. Rather than replacing human facilitators, the agent mediates between shared spatial knowledge and data-based knowledge. This provides an operational framework for human–AI co-evolution in community planning, in which each workshop becomes both a site of deliberation and a step in the cumulative development of SSI. Field application is being prepared in Tokyo.*

Parallel Session 2B – Urban Form, Energy & Socioeconomic (Rm. AG710)

Chair:
Prof. Tsz Nam Chan (Shenzhen University, China)

Unravelling intra-urban spatiotemporal disparities in housing price dynamics: An infrastructural approach using interpretable machine-learning methods in Shenzhen, China (PR33)

Presenter: *Dr. Lirong Hu (The University of Hong Kong, Hong Kong SAR)*
Co-author: *Shiliang Su, Shenjing He*

Abstract: *Housing inequalities have long been a pressing global issue, particularly in the context of rapidly transforming urban housing markets. However, intra-urban spatiotemporal disparities in housing price dynamics remain insufficiently understood. By developing an infrastructural approach operationalized through interpretable machine-learning methods that explicitly incorporate spatiotemporal heterogeneity, this study examines the complex capitalization of key infrastructures into housing prices, drawing on 288,570 second-hand housing transactions and multi-source geographic data from 2010 to 2023 in Shenzhen, one of the largest and most dynamic urban housing markets in China. The results reveal increasingly intensified housing price disparities, which are particularly pronounced within school catchment areas and 15-minute infrastructure-accessible neighborhoods. Compared with physical infrastructures, as well as structural and locational attributes, social infrastructures—especially public schools—are more decisively and consistently associated with housing prices. Their spatiotemporally heterogenous capitalization and increasingly salient threshold effects highlight the agency of social infrastructures in leveraging urban development and (re)shaping social inequalities, thereby advancing the understanding of housing price disparities. Finally, this study provides dynamic, fine-grained evidence to support locally calibrated and stage-sensitive urban planning and housing policies.*

Mapping the Drivers of Building Energy Reduction: Spatial Disentanglement of Energy Efficiency and Commercial Decline in Busan, South Korea (PR42)

Presenter: *Mr. Jiwoong Jeong (Ulsan National Institute of Science and Technology, South Korea)*
Co-author: *Jeongseob Kim, Junhyeok Song, Hyunji Park*
Abstract: *Reducing building energy consumption is a critical component of urban carbon-neutrality strategies. However, lower energy use does not necessarily indicate improved energy efficiency; it may also result from business closures, building vacancies, or declining economic activity. Energy consumption trends alone may therefore provide a misleading picture of local progress toward carbon neutrality. This study investigates whether changes in building energy consumption are attributable to improvements in energy efficiency or changes in the intensity of building use. It further examines the relative importance of these two mechanisms and their spatial variation within a city. The study focuses on Busan, South Korea, where commercial growth and decline coexist. A building-level database will be constructed by integrating electricity consumption data with building and business characteristics. Regression analysis will be used to identify factors associated with electricity consumption and assess the relative effects of energy efficiency and building use intensity. Hot spot analysis and other spatial techniques will then identify areas characterized by concentrated improvements in energy efficiency or changes in building use intensity, and the corresponding patterns of energy consumption change will be examined. The results are expected to distinguish areas where declining energy consumption reflects efficiency improvements from those where it is driven by reduced building use and commercial decline. The findings highlight the need for spatially disaggregated monitoring that identifies not only where energy use changes, but also why. Such diagnosis can support customized, place-based carbon-neutrality strategies tailored to the underlying conditions of different urban areas.*

Mapping the Spatiotemporal Dynamics of Commercial Building Transactions in Shrinking Cities (PR43)

Presenter: *Mr. Sanguk Han (Ulsan National Institute of Science and Technology (UNIST), South Korea)*
Co-author: *Jeongseob Kim*
Abstract: *Urban decline driven by population loss, aging, economic restructuring, and changing consumption patterns is a growing challenge worldwide. While commercial decline is commonly examined through business closures, retail vacancies, and reduced commercial activity, commercial real estate transactions may continue within declining areas. This raises an important question: where and when do commercial building transactions continue to occur, and are they randomly distributed or concentrated in particular locations? This study examines the spatiotemporal patterns of commercial building transactions across cities of different sizes in Gyeongsangbuk-do, South Korea. Rather than treating the region as a single urban system, cities are classified by urban size to compare differences in the spatial organization of commercial real estate markets. Commercial transaction records are integrated with building register data in a GIS environment. Transaction activity is measured using the number and floor area of traded commercial buildings relative to the existing commercial building stock. A fine-scale grid-based approach is used to identify spatial concentrations beyond administrative boundaries. Emerging Hot Spot Analysis is employed to examine how transaction concentrations emerge and change over time, without assuming specific hotspot patterns in advance. The study is expected to reveal whether transactions remain concentrated in established urban centers, emerge in new areas, or become redistributed as cities decline. Comparing cities of different sizes will further identify whether these patterns are common across shrinking cities or vary by urban scale and spatial structure. By shifting from static distributions of commercial decline to the spatiotemporal dynamics of real estate market activity, this study demonstrates how GIS can provide a complementary perspective on urban change in shrinking cities.*

A probability-based framework for measuring sensitivity to the modifiable areal unit problem (MAUP) (PR28)

Presenter: Dr. Xiang Ye *(*Nanjing Normal University*, China)*
Co-author: *Jiayi Chen*
Abstract: *The modifiable areal unit problem (MAUP) is one of the most fundamental and longstanding issues in geographical analysis. Over the decades, a substantial body of literature has documented the diverse impacts of the MAUP on various geographic variables and observations. It is noticeable that different geographic observations respond to the MAUP differently, and some observations are more sensitive to the MAUP than others. Nevertheless, the absence of a unified framework to quantify the sensitivity to the MAUP under different scenarios hinders rigorous expression and cross-case communication in the related fields. To overcome this challenge, this presentation introduces a probability-based framework to measure the sensitivity of a geographical observation to the MAUP. It defines the MAUP sensitivity of a geographical observation as the probability distribution of the deviation of a summary function from its default level under a specified type and intensity of MAUP-related operation. Exemplifications with demographic, socio-economic, and environmental datasets suggest that representing the MAUP sensitivity as a probability distribution can reveal asymmetry, multimodality, and even sign changes that a single-value statistic would conceal. The proposed framework provides a consistent and scenario-agnostic methodology for quantifying the MAUP sensitivity, and hopefully facilitates replicable and credible geographical research incorporating spatially aggregated datasets in the long run.*

Large-scale Geospatial Analytics: Fast Method and Software Development (PR35)

Presenter: *Prof. Tsz Nam Chan (Shenzhen University, China)*
Co-author: *Dingming Wu*
Abstract: *In the big data era, GIS researchers can collect many large-scale location datasets nowadays. To analyze these datasets, they utilize some advanced geospatial analysis tools, including kernel density visualization (KDV) and K-function, to detect hotspots or perform correlation analysis. However, many commonly used GIS software suites, including QGIS, ArcGIS, and SuperMap, cannot efficiently (or even feasibly) handle moderate/large-scale location datasets for supporting these tools. The reasons are threefold. First, these geospatial analysis tools are computationally expensive. Second, there is a lack of efficient methods in literature. Third, these software suites are normally based on some naïve methods. In this work, we will first present efficient methods that are developed by our team for handling these tools, i.e., KDV and K-function, under four settings, which are (1) spatial, (2) spatiotemporal, (3) network, and (4) network-temporal. Note that our efficient methods can achieve up to 1,000x speedups using million-scale location datasets compared with existing methods under a single machine setting. Then, we will discuss the state-of-the-art QGIS plugin, namely Fast Density Analysis (with 23,727 downloads, until 10th September 2026), and the python library, namely fastnsa (with 1,900 downloads, until 10th September 2026), which integrate these efficient methods. Lastly, we will highlight some possible future directions of this research area (e.g., develop efficient methods to support Moran's I, inverse distance weighting, and Kriging).*

Parallel Session 2C – UAV & BIM Technologies inspection (Rm. ZS1215)

Chair:
Prof. Fan Xue (The University of Hong Kong, Hong Kong SAR)

Semantic Gating for Robust UAV Localization in LoD 2/3 City Models (PR11)

Presenter: *Mr. Xicheng Yang (Hangzhou Dianzi University, China)*
Co-author: *Zhanghao Chen, Fangli Guan*
Abstract: *Many Asian cities now maintain LoD 2 and LoD 3 city models for their digital twin programmes. These vector models are compact, easy to keep current, and invariant to season and illumination. This makes them attractive reference maps for UAV localization in GNSS-denied urban environments. Using them is difficult. The model contains building geometry only, while the query image also contains vegetation, shadows and vehicles. Their edges are easily mistaken for building edges. Methods that estimate the 6-DoF pose by minimising a feature-based alignment cost are drawn towards this clutter, and converge to a wrong pose. Recent systems therefore retreat to coarse LoD 1 blocks, discarding detail that cities have paid to survey. We present SG-Loc, which retains LoD 2/3 detail and suppresses the clutter instead. A frozen semantic segmentation network labels each pixel of the query image. The labels are converted into a continuous per-pixel reliability map, which is multiplied into the visual features before pose estimation. Vegetation pixels approach zero weight and can no longer steer the solver; building pixels retain full weight. The same reliability values weight the coarse pose search and the least-squares refinement. We evaluate on two public benchmarks, UAVD4L-LoD (LoD 3.0) and Swiss-EPFL (LoD 2.0). On unseen Swiss-EPFL viewpoints, recall at 2 m and 2 degrees rises from 37.7% to 47.0%. On a vegetation-dominated subset the gain is 11.0 points. On high-fidelity maps accuracy matches the strongest published geometry-based method, and the city model is never modified. The talk covers required map quality, failure cases, and implications for LoD data providers.*

Knowledge-Enhanced Intelligent Detection of Levee Seepage Using UAV Visible-Infrared Imagery and a Large Vision-Language Model (PR22)

Presenter: Ms. Wanxiu Zhang *(Nanjing Normal University, China)*
Co-author: Bin Hu, Jiarong Wu, Zhanbo Chen
Abstract: *UAV-based levee seepage detection is challenged by visual ambiguity, thermal false positives (e.g., shadows, ponded water), and the weak generalization of deep learning models to domain shifts across varying regions and seasons. To address these, we propose a knowledge-enhanced intelligent detection framework integrating visible-infrared registration, Retrieval-Augmented Generation (RAG), and a Large Vision-Language Model (LVLM) with an Agent-driven mechanism. Specifically, an equivalent-parallax-based rapid registration technique efficiently aligns thermal fields with visible textures. Candidate anomalous regions of interest (ROIs) are extracted from thermal images via morphological extremum computation, and registered image pairs are stitched into composite inputs. Meanwhile, a multi-working-condition seepage feature knowledge base is constructed to formulate domain-specific prompts via RAG. These prompts are iteratively refined through an Agent-driven mechanism via closed-loop error analysis on small sample sets. Guided by the refined prompts, the LVLM leverages its cognitive-reasoning capability to accurately distinguish real seepage from complex interferences. Validated on field-verified UAV imagery from two distinct regions, our method achieves a 95.65% recall and an 89.8% F1-score, providing a reliable technical pathway for intelligent levee seepage diagnosis with broad engineering application prospects.*

AI Semantic and Instance Segmentation of Building Point Clouds for CIM-Ready As-Built Modeling (PR58)

Presenter: *Mr. Sou-Han Chan (The University of Hong Kong, Hong Kong SAR)*
Co-author: *Fan Xue, Longyong Wu, Anthony G.O. Yeh*
Abstract: *City Information Modeling (CIM) integrates diverse data categories to generate an all-encompassing and dynamic digital depiction of a city for advanced urban planning and development. Scan-to-BIM (building information modeling) is vital for CIM because it enables a more comprehensive understanding of buildings' spatial characteristics. However, a key challenge remains: effective and efficient point cloud-to-BIM-to-CIM processing. Rather, the gap is how to automate the processing of complex buildings' point clouds into 3D CIM objects while ensuring accuracy and robustness. Otherwise, a labeled point cloud that cannot be loaded, queried, or draped in ArcGIS or Cesium is not an as-built city model. To address this challenge, this paper presents a technological pipeline that has two objectives: to segment building point clouds for semantic labels and object instances, and to generate lightweight CIM outputs optimized for open-CIM platforms such as Cesium. To achieve the first objective, the pipeline processes building point clouds into objects through semantic and instance segmentation, automated architectural element reconstruction, and automated 3D BIM object registration. To achieve the second objective, the pipeline uses Level of Detail reduction to remesh large BIM models into a lightweight, textured CIM output. Two pilots were tested to demonstrate the pipeline. The re-trained OneFormer3D model reached a point-level F1 of 90.48% for general architectural elements, and semantic segmentation's 3D mIoU was 0.8298. Furthermore, the face-count compression reached up to 97.19% after furniture removal, with file size less than 1.5% of the original BIM. However, instance-level accuracy remains significantly lower than semantic-level accuracy.*

Inferring OD Flows under Public Events Using a Knowledge Graph-Enhanced Spatial Interaction Approach (PR26)

Presenter: *Ms. Keyu Lu (Sun Yat-sen University)*
Co-author: *Keyu Lu, Qiuping Li, Qiumeng Li, Suhong Zhou*
Abstract: *Public events, such as concerts, sports games, and exhibitions, can temporarily reorganize urban mobility by altering transportation operations and accessibility, making OD flow inference challenging when event-day OD observations are unavailable. This study formulates short-term OD flow inference under event conditions as a latent interaction inference problem between consecutive population states. We propose KG-OD, a knowledge graph-enhanced framework that incorporates event-conditioned transportation relations into OD flow inference. An urban event knowledge graph (UEKG) is constructed from event-related transportation information to represent relations among spatial grids through affected metro lines and road segments. These relational representations are integrated with geographic and population information to support structure-aware spatial propagation and context-adaptive gravity-based OD estimation. The model is trained using routine-day OD observations and evaluated on an unseen event day without using event-day OD data during model development. Using mobile positioning data from Guangzhou and the 136th Canton Fair, results show that KG-OD outperforms representative OD inference methods, with particularly pronounced improvements under the unseen event condition and for high-intensity and venue-associated mobility interactions. The findings demonstrate the potential of event-conditioned relational knowledge as a relational prior for zero-shot OD flow inference under event-induced mobility restructuring.*

Mapping the Barriers Network to Indoor Drone-based Building Inspections in Hong Kong: An Interpretive Structural Modelling (ISM) and MICMAC Approach (PR52)

Presenter: *Prof. Fan Xue (The University of Hong Kong, Hong Kong SAR)*
Co-author: *Chun Hei Chan*
Abstract: *In 2025, Hong Kong has more than 11,000 out of about 50,000 private buildings over 50 years old, which have exceeded a typical 50-year design lifespan. This huge ageing stock creates demand for safer, faster, and lower-cost inspection. However, prevailing methods remain limited as structural elements in high ceilings, voids, and vertical shafts are laborious to reach, ventilation ducts and false ceilings are hazardous or inaccessible to workers, and work at height is often time-consuming, costly, and prone to safety risk. Unmanned aerial systems, or drones, have been widely applied to outdoor façade inspection, yet their use indoors remains underdeveloped. Although existing literature has identified several key barriers, it has not mapped the network of barriers or the relationships among them. Moreover, up to the date of writing, there are no studies that have applied systematic approaches to map the barriers network specific to indoor drone inspections in Hong Kong. To address this gap, this paper aims to map the barriers network of drone adoption in indoor inspections of buildings in Hong Kong. A mixed-method approach was adopted, where a systematic literature review of 32 studies identified 20 potential barriers across five categories. These barriers were evaluated by 52 building professionals using a Likert-scale questionnaire. By applying a cut-off of 3.5 out of 5, the list was narrowed to 12 critical barriers, which were then modelled using ISM and MICMAC analysis. The ISM level partition places four technical and operational barriers at the base: GPS-denied navigation, limited battery life, spatial constraints, and poor lighting. Overall, the hierarchy implies that indoor drone adoption is not settled by removing one barrier.*

12:30-14:00	Lunch (Ju Yin House Seafood Restaurant)
14:00-15:30	Parallel Session 3

Parallel Session 3A – Urban Mobility & Travel Behaviour (Rm. AG710)

Chair:
Prof. Ying Sylvia He (The Chinese University of Hong Kong, Hong Kong SAR)

Customized decision-making support per location's characteristics of spatial accessibility: A case study of emergency healthcare in New York City (PR04)

Presenter: *Dr. Jinwoo Park (Kyung Hee University, South Korea)*
Co-author: *Fangzheng Lyu, Alexander Michels, Ian Zhang, Shaowen Wang*
Abstract: *Dynamic spatial accessibility, incorporating temporal dimension into spatial accessibility measurements, is in the spotlight because of significant temporal variations in urban phenomena (e.g., traffic congestion or floating population). Despite its importance, there are two significant gaps, particularly in existing healthcare access literature: 1) limited consideration of the dynamic nature in healthcare accessibility, and 2) limited support of dynamic spatial accessibility for practical policymaking. Our study aims to improve spatial accessibility measurement using time-dependent data and to summarize temporal sequences to support effective decision-making. Specifically, we measure hourly changes in spatial accessibility to emergency healthcare resources in New York City with a Gaussian two-step floating catchment area (G2SFCA) method. We then employ sequence analysis to detect and cluster unique temporal changes in accessibility measures. Our results reveal that each location provides distinct temporal changes in its healthcare accessibility owing to the dynamic urban phenomena. In addition, we find that census tracts can be grouped into 14 clusters based on combinations of temporal changes (i.e., stationary versus non-stationary) and accessibility levels (i.e., high, moderate, or low). Therefore, our findings can inform flexible policy responses to the diverse needs of locations. For example, to improve accessibility, certain areas could extend the operating hours of existing healthcare resources, or additional hospitals could be established in other locations. Given that decision-making is often constrained by limited resources, our study sheds light on how to make optimal allocations of healthcare resources to effectively reduce inequality in access. *This abstract summarizes previously published work: Park, J., Lyu, F., Michels, A., Zhang, I., & Wang, S. (2026). Customized decision-making support per location's characteristics of spatial accessibility: A case study of emergency healthcare in New York City. Computers, Environment and Urban Systems, 128, 102458.*

Multimodal Mobility Reshapes Age Inequalities in Urban Green-Space Access (PR05)

Presenter: *Ms. Mingjie Duan (The University of Hong Kong, Hong Kong SAR)*
Co-author: *Xiaoyue Tan, Xiaolin Zhu, Jiacheng Guo, Chongyang Wang*
Abstract: *Access to urban nature is jointly structured by where green spaces are located, how transport networks connect them, and how mobility varies across age groups. Here we quantify this interaction across 1,622 street-block groups in Hong Kong using an age-stratified, time-based Gaussian two-step floating catchment area framework integrating walking, Mass Transit Railway, and bus travel with cohort-specific mobility parameters. We find that age inequalities vary sharply with destination type: under walking conditions, the relative accessibility gap between younger and older adults is 6.0% for urban parks but rises to 26.3% for country parks, where access requires longer and more demanding journeys. Multimodal transport substantially increases accessibility and compresses spatial inequality, with disadvantage-weighted Gini coefficients declining from 0.42 to 0.16 for younger adults and from 0.46 to 0.14 for older adults. Bus-based accessibility is spatially more even than rail-based accessibility, while low-access areas remain strongly clustered, revealing persistent geographic constraints despite broader network reach. Together, these results show that age-related inequality in access to urban nature is not a fixed property of green-space distribution, but an emergent outcome of destination function, transport-network structure, and population-specific mobility. This framework provides a transferable basis for identifying where transport and green-space planning can jointly reduce mobility-mediated environmental inequalities in dense and ageing cities.*

Understanding the spatio-temporal variation in travel distance by mode, seasonality, age and gender: a comparison of two major Australian metropolitan areas (PR32)

Presenter: *Dr. Yibo Wang (The University of Queensland, Australia)*
Co-author: *Jonathan Olsen, Jonathan Corcoran, Lynette Cheah*
Abstract: *Urban expansion and population growth are placing increasing pressure on everyday transport systems in metropolitan areas. These challenges exhibit pronounced spatial variation, ranging from peak-hour congestion in densely populated inner-city areas to limited public transport coverage and long commuting distances in outer suburbs. Meanwhile, the challenges are shaped by temporal factors, including seasonality, differences between weekdays and weekends, and the impact of public and school holidays. Transitioning from car travel to public transport can reduce the burden on transportation systems and provide sustainability benefits. Understanding the spatio-temporal variation in travel distance is therefore essential for supporting the development of metropolitan areas that are sustainable, accessible and equitable. Using two years of aggregated daily mobile phone mobility data from Sydney and Melbourne, two of Australia's largest metropolitan areas, we examine variations in travel distance across population groups of different ages and genders, metropolitan rings, and transport modes. We further investigate how these variations are associated with temporal factors and built environment factors such as density, diversity and design. Results show that travel distances increased across all metropolitan rings and modes, with shorter distances among women and older people. Distances generally increased from Monday to Friday but declined during public and school holidays, while car and walking distances showed stronger seasonality in outer rings. Associations with public transport and road network coverage varied substantially across metropolitan rings and between Sydney and Melbourne. The findings extend time geography to urban transport research and provide evidence for improving transport infrastructure and reducing accessibility inequalities.*

Do Telehealth Platforms Reduce Spatial Inequality in Healthcare Access? (PR41)

Presenter: *Mr. Dakyum Lee (Hanyang University, South Korea)*
Co-author: *Junhyeon Kweon, Sugie Lee*
Abstract: *This study empirically examines whether telehealth services mitigate spatial inequality in healthcare access across South Korea. Spatial equity in medical access plays a crucial role in public health and social welfare, especially in the case of primary health institutions, which provide first-contact medical care for local residents. Telehealth services have been expected to improve accessibility and equity in rural healthcare. However, concerns have been raised about the limitations of telehealth services, which may deepen the existing inequality between rural and urban areas. To address this, we measured healthcare accessibility in two ways: physical accessibility, using a Gaussian Two-Step Floating Catchment Area (G2SFCA) method, and virtual accessibility, using a Two-Step Virtual Catchment Area (2SVCA) method modified to reflect the institutional and sociodemographic conditions of South Korea. The results indicated that potential virtual accessibility was distributed more equitably across space than physical accessibility, with a population-weighted Gini coefficient of 0.086 for virtual accessibility, compared with 0.261 for physical accessibility. Although telehealth considerably alleviated nationwide spatial inequality compared with in-person accessibility, the effect was not spatially uniform. Telehealth appears to weaken micro-level spatial gaps arising from the local distribution of medical supply, but in primary health care it does not fully offset the inequality structured by proximity to the Seoul metropolitan area and urbanization. These findings provide insight into whether telehealth reduces the gap between urban and rural areas in primary health care, and offer implications for health policy.*

Big geospatial data for urban mobility and travel behaviour research in smart cities (PR31)

Presenter: *Prof. Ying Sylvia He (The Chinese University of Hong Kong, Hong Kong SAR)*
Co-author: *Sui Tao, Zhenzhen Wang, Shuli Luo*
Abstract: *Travel behaviour research depends on data to represent human mobility. The availability of data generated by information and communication technologies, digital platforms, and location-enabled devices has expanded its evidence base and strengthened its links with smart-city development. This paper reviews the transition from conventional travel data to new and emerging data and discusses their applications in urban mobility research. It focuses on GPS and vehicle trajectory data, public-transport smart-card records, mobile-phone location data, and geotagged social-media and volunteered geographic information. It also briefly considers street-view imagery, remote-sensing data, and emerging infrastructure data such as electric-vehicle charging records. The review discusses how GPS and platform data support the study of shared and emerging mobility services; how smart-card data can be enriched to infer missing trip information and visualise public-transport travel patterns; how mobile-phone data can reveal daily mobility patterns; and how social-media data can capture users' activities, experiences, and perceptions in geographic contexts. Street-view imagery and remote-sensing data can provide measures of streetscape and built-environment conditions relevant to mobility. Together, these sources offer fine-grained spatial and temporal information that can reveal patterns difficult to observe through conventional surveys alone. At the same time, they have data-specific limitations, including incomplete trip information and privacy concerns. The paper therefore argues that new and conventional data should be viewed as complementary rather than interchangeable. Situating these data sources within the development of smart cities, the review clarifies their contributions and limitations and considers how GIS-based urban analytics can support transport planning and smart-city practices.*

Parallel Session 3B – Spatial Data & Civic Tech (Jockey Club Auditorium)

Chair:
Prof. Xintao Liu (The Hong Kong Polytechnic University, Hong Kong SAR)

The New Hong Kong Geocode and its Potential Applications in HK (PR15)

Presenter: *Ms. Olivia Kwok (Survey and Mapping Office, Lands Department, Hong Kong SAR)*
Co-author: *Ho Chiu Elton Chan*
Abstract: *Have you ever had difficulty communicating your location to others? Imagine every location in Hong Kong can be communicated with absolute clarity and predictable precision—where seamless collaboration between diverse sectors is not just a vision, but a reality. To address the challenge and the vision of bringing the spatial intelligence across all sectors, the Lands Department of the Hong Kong Special Administrative Region Government introduced HKGCode (Hong Kong Geocode) in 2026, an official and standardised discrete spatial grid system built upon the well-established HK1980 projected coordinate system. Utilizing an encoding scheme, HKGCode establishes a three-level hierarchical structured-cell partitioning at regional, site and standard resolutions. Each code uniquely identifies a specific geospatial area across Hong Kong, helping people who need to communicate a location but struggle to name it. HKGCode is a local discrete grid system that serves as a unified and interoperable spatial container, a new breed of spatial data infrastructure. Its native parent-child hierarchy enables efficient grouping, neighboring, and roll-up of location data. Stakeholders across public utilities, commercial logistics, and smart city sectors can utilize HKGCode to contribute their own data to realize multi-dimensional data analytic. HKGCode generalizes sensitive locational information, allowing for open access while maintaining precise details for internal operations. By bridging traditional location systems and innovation, HKGCode creates an accessible, scalable, and collaborative geospatial framework for the next-generation smart city infrastructure in Hong Kong.*

Walkin'HK: Explore Your Nearby Walkable Zone (PR34)

Presenter: *Sr. Oengus Chun-To Lam (Survey and Mapping Office, Lands Department, HKSAR)*
Co-author: *Tony Hoi-wai Wong*
Abstract: *Public value from spatial data infrastructure depends not only on data availability, but also on applications that turn disperse geospatial data into solutions for everyday needs. The Common Spatial Data Infrastructure (CSDI) in Hong Kong provides a digital cornerstone for spatial data, making geospatial data widely accessible to the public to drive smart city development, innovation and public services advancement. The Survey and Mapping Office (SMO) of the Lands Department (LandsD), serving as the spatial data agency of the Government and the technical supporting arm of the Spatial Data Office under the Development Bureau, continues to advance geospatial infrastructure, including the 3D Visualisation Map and 3D Pedestrian Network while promoting practical applications of spatial data. This paper presents Walkin'HK, a geospatial web application developed by SMO that translates multidimensional geospatial data into practical walkability intelligence. Integrating more than 240 sets of 2D and 3D spatial data, Walkin'HK supports walkable zone and nearby facility analysis, as well as diversified route planning and optimisation. Using the 3D Pedestrian Network as the backbone for spatial analysis, the application analyses walking conditions such as ramp, stairs, elevator, slopes, etc., and provides shortest, flat surface and barrier-free routing options. It supports government initiatives for a more walkable, healthy and low-carbon city and demonstrates how spatial intelligence can contribute to 15-minute neighbourhood concepts. Beyond its technical functions, Walkin'HK provides a reference model for multidisciplinary collaboration. Through the Special Interest Group on Geospatial Social Innovation established under the Memorandum of Understanding between LandsD and the Hong Kong Polytechnic University, SMO collaborates with the Research Institute for Land and Space and the Jockey Club Design Institute for Social Innovation of the Hong Kong Polytechnic University, bringing together government geospatial capabilities, academic expertise and social-innovation perspectives. Walkin'HK demonstrates how CSDI can evolve from digital infrastructure into an enabling geospatial platform that supports cross-sector collaboration, evidence-based decision-making and community-oriented innovation.*

From Data to Intelligence: Unlocking Spatial Intelligence with Common Spatial Data Infrastructure (PR17)

Presenter: *Ms. Tammy Ho (Spatial Data Office, Development Bureau, HKSAR Government, Hong Kong SAR)*
Co-author: *Vicky Chan, Janet Chiu*
Abstract: *Common Spatial Data Infrastructure (CSDI), developed and managed by Spatial Data Office of Development Bureau with the support of Innovation, Technology and Industry Bureau, has been serving as a spatial data infrastructure for share, discover, access and use of spatial data. The corresponding CSDI Portal facilitates data exchange and supports development of innovative smart city applications and artificial intelligence (AI) development. To further unlock the potential of CSDI to the wider community by reducing technical barriers to geospatial analysis, this paper evaluates the feasibility of integrating AI, specifically large language models (LLMs), retrieval-augmented generation (RAG) and muti-agents system with spatial data to enhance accessibility and automate spatial analytical workflows. We prove the concept through an AI-powered conversational spatial data assistant, "GeoFun: Your Spatial Data AI Assistant" ("the Assistant") in the theme of Vacant Government Sites, that interprets users' natural language questions, selects relevant CSDI datasets, automates geospatial analysis and presents results via interactive 3D Digital Map with data-driven responses. Users can obtain insights through conversational interaction, without the need to download datasets or operate specialised Geographic Information System (GIS) software. By bridging the gap between geospatial tools and diverse users across public, private, and government sectors, the Assistant can significantly lower the technical entry barrier to spatial data insights and support data-driven decision making. This study has proven the feasibility of AI-Spatial Data integration, examining how AI can reshape the way users discover, access, and utilise spatial data. This demonstrates the transformative potential of the CSDI to evolve beyond a one-stop spatial data infrastructure into a spatial intelligence ecosystem, not only promoting the significance of spatial data sharing, but also fostering AI-enabled governance, innovation, and data-driven decision making.*

The science of urban informatics (PR56)

Presenter: *Prof. Wenzhong Shi (The Hong Kong Polytechnic University, Hong Kong SAR)*
Co-author: *Fan Shi, Anshu Zhang*
Abstract: *Cities are complex systems formed through the interactions among people, space, the environment, infrastructure, and socioeconomic activities. They are characterized by multiple scales, dynamism, nonlinearity, and high uncertainty. In the face of interconnected and continuously evolving problems within urban systems, neither the theoretical framework of a single discipline nor data technologies alone can provide a complete explanation. It is precisely the complex-system nature of cities that has driven urban informatics to gradually transform from a tool-oriented system focused on urban data processing and technological applications into an interdisciplinary science integrating urban science, computer science, and geographic information science. Centered on the core theme of "the science of urban informatics," this presentation traces the developmental logic through which the field has moved from technology-driven applications toward scientific construction. Urban informatics takes complex urban systems as its research object. Through the deep integration of multidisciplinary knowledge, data, and methods, it seeks to discover, explain, and predict urban phenomena and their evolutionary patterns, while also examining the relationships among data, models, human cognition, and urban decision-making. From the perspectives of research objects, core scientific questions, theories and methods, modes of knowledge production, and academic communities, the presentation will demonstrate that urban informatics is forming a scientific research paradigm characterized by reproducibility, quantifiability, transparency, and testability, while continuously proposing new hypotheses, methods, and theories. The scientific development of urban informatics not only expands humanity's capacity to understand complex urban systems, but also provides a new knowledge foundation for more scientific, reliable, and human-centered urban decision-making.*

Smart Cities and Common Spatial Infrastructure in HK (PR59)

Presenter: *Prof. Xintao Liu (The Hong Kong Polytechnic University , Hong Kong SAR)*
Abstract: *This paper introduces a human-centered evolution in geospatial AI systems, transitioning from natural-language open data access to interactive geomatics education. Despite the wealth of spatial data in Hong Kong's Common Spatial Data Infrastructure (CSDI) portal, non-professional users face significant barriers in dataset discovery and complex GIS tool execution. To lower these technical barriers, we first developed GeoDataGPT, a task-driven paradigm integrating Large Language Models (LLMs) with Retrieval-Augmented Generation (RAG) to convert natural-language queries into executable GeoSQL scripts and multi-modal spatial insights. Building on this foundation, we present GeoAI Mentor, an interactive educational platform designed for geomatics learning. Through three iterative developments—grounding answers in domain knowledge bases, establishing a unified Agent Hub for direct tool invocation, and implementing process-guided instructional agents—GeoAI Mentor exposes sub-step intermediate results for transparent learning. Together, these systems bridge answers, action, and understanding in smart spatial governance.*

Parallel Session 3C – Air Quality & Thermal Comfort (Rm. ZS1215)

Chair:
Prof. Hung Chak Ho (City University of Hong Kong, Hong Kong SAR)

Too Hot to Walk? Evaluating Aging Equity Under Extreme Thermal Stress in Hilly and Complex Urban Environments (PR13)

Presenter: *Dr. Man Hei Jeffrey Chang (The Chinese University of Hong Kong, Hong Kong SAR)*
Co-author: *Hiu Wang Lau, Jean Woo, Eric Tsz-Chun Lai, Hung Chak Ho*

Abstract: *Extreme heat can intensify mobility barriers for older adults, yet urban thermal inequities are often assessed without explicitly mapping walkable cooling access under extreme hot-weather conditions. This paper investigates aging equity under extreme thermal stress in hilly and complex urban environments by integrating mobile microclimatic monitoring, weather observations from the Hong Kong Observatory (HKO), slopes and accessibility of pedestrian network data, and neighborhood sociodemographic information to support thermal comfort modeling and interpretation of Physiological Subjective Temperature (PST) for older adults. Wet Bulb Globe Temperature (WBGT) measurements were collected through mobile monitoring, together with data on the availability of climate-controlled community hubs and mobility assessments based on a 3D pedestrian network. Thermal exposure is quantified by computing WBGT anomalies between the HKO record and conditions in two Hong Kong districts (Kwun Tong and Yau Tsim Mong), and anomaly signals were translated into mobility-relevant estimates of 5-minute reachable climate-controlled hubs. The study further estimates thermal stress along hilly pedestrian routes in these two districts. Hotspots of temperature extremes are identified, and the coverage of covered walkways over these hotspot areas is evaluated. Finally, the study synthesizes these outputs into a "5-minute Thermal Walkability Map" and a "Community Map for Heat Resilience" to characterize where older residents face the highest heat risk and where cooling access is most constrained. The results provide a route-informed, equity-focused framework for identifying heat vulnerability at both the neighborhood and micro-pathway scales, supporting targeted interventions to improve cooling access and reduce thermal mobility exclusion.*

Joint Impacts of Incense Burning on Thermal Comfort and Air Quality in Hong Kong's Dense Urban Environment (PR30)

Presenter: *Ms. Wenhui Cai (Lingnan University, Hong Kong SAR)*
Co-author: *Paulina Pui Yun Wong, Qian Chayn Sun, Siqin Wang, Sissi Chen*
Abstract: *Temples are integral to the cultural and religious landscape of dense urban environments such as Hong Kong, yet the environmental implications of routine incense burning remain insufficiently understood. This study examines spatiotemporal variations in thermal comfort and air quality around a semi-open temple across summer and winter. Field measurements were integrated with spatial analysis, using Normal Effective Temperature (NET) and Physiological Equivalent Temperature (PET) to characterize thermal conditions and PM2.5 concentrations to assess air-quality variation. Results revealed substantial spatial and temporal heterogeneity in thermal discomfort. Outdoor temperatures were approximately 1.3 °C above the regional thermal-comfort level in both seasons, while the adjacent park showed the greatest NET variability, particularly around midday. Daytime periods consistently exhibited the highest thermal stress. Associations between PM2.5 and thermal-comfort indices also varied seasonally. In summer, PM2.5 was strongly positively associated with both NET and PET, with elevated values particularly evident near areas of active incense burning. In winter, nonlinear convex relationships indicated increasingly rapid rises in thermal discomfort at higher PM2.5 concentrations. PET also reflected these relationships, with observed increases of approximately 0.1 °C in summer and 0.2 °C in winter under higher PM2.5 concentrations. These findings demonstrate the value of integrating microclimatic, air-quality, and spatial observations to identify environmental stress around culturally significant urban spaces. They support place-specific mitigation strategies that balance thermal and air-quality management with the preservation of religious and cultural practices.*

Time-varying importance of urban form for the canopy-layer urban heat island: Evidence from hourly IoT sensor data and feature importance analysis in Seoul, South Korea (PR45)

Presenter: *Dr. Na Li (Hanyang University, South Korea)*
Co-author: *Sugie Lee*

Abstract: *Urban heat mitigation strategies commonly rely on a fixed ranking of urban form drivers, yet the thermal influence of vegetation, buildings, and impervious surfaces is unlikely to remain constant over time. This study asks when, rather than whether, individual urban form features influence on the canopy-layer urban heat island (CUHI) in Seoul as a case. Hourly air temperature records from more than 1,000 IoT sensors were used to derive CUHI intensity at 9 AM, 3 PM, and 9 PM in each season. For each time–season combination, a gradient-boosted decision tree model was trained on green, building, road, and water cover and building height-related features, and feature importance was extracted to identify the dominant driver. The stability of these rankings was then assessed across years and hours of the day. Model fit ranged from R^2 = 0.47 to 0.85. Green cover was the dominant driver in the morning and at night, with its nighttime influence lowest in winter and highest in autumn, whereas building cover dominated in the afternoon, especially in summer. Road cover importance was highly stable over time, while green cover, water cover, and building height varied considerably, particularly building height at night. These results indicate that the effectiveness of a mitigation measure depends on the time of day and season it targets and that planning should be differentiated by time rather than guided by a single static ranking. Dense sensor networks and interpretable machine learning thus offer a path toward time-aware heat island mitigation strategies.*

Digital Demographic Observatory: Mapping Demographic Heterogeneity through Web GIS and Big Data (PR60)

Presenter: *Dr. Vadim Bezverbny (Federal Center of Theoretical and Applied Sociology of the Russian Academy of Sciences, Russia)*

Abstract: *National demographic indicators conceal substantial territorial differences in the relationships between population change and socioeconomic development. This paper presents Russia's Digital Demographic Observatory as a framework for linking regional demographic analysis with interactive geospatial monitoring. We examine how regional correlation profiles can inform a geographically differentiated approach to demographic policy.*

The empirical foundation comprises Rosstat demographic and socioeconomic series for 85 regions over 1990–2025, covering 59 indicators. Regional correlation matrices describe relationships involving population size, fertility, life expectancy, net migration, urbanisation and population density. K-means and hierarchical clustering group regions according to similarities in these relationships. The Observatory's Web GIS prototype supports interactive exploration of indicators across territories and periods; integrating analytical profiles with this interface provides the proposed spatial decision-support framework.

Completed project research identifies four regional types with distinct configurations of demographic and socioeconomic associations. Life expectancy is positively associated with gross regional product per capita and negatively associated with poverty, while fertility commonly exhibits inverse relationships with urbanisation and credit burden. These findings are interpreted as descriptive associations, with temporal trends and spatial dependence requiring explicit treatment before explanatory or predictive use.

The methodological contribution is to make the structure of regional associations an explicit object of geospatial monitoring, supporting context-sensitive territorial assessment. Further development will extend this foundation towards spatially informed machine-learning forecasts, evaluated on held-out regions and subsequent periods. The approach offers a basis for comparative research on uneven demographic change in Asian settlement systems.

PM2.5 exposure among taxi drivers in a Chinese city: A rapid assessment with satellite-derived information and urban mobility data (PR19)

Presenter: *Prof. Hung Chak Ho (City University of Hong Kong, Hong Kong SAR)*
Co-author: *Pengxiang Zhao*
Abstract: *Taxi drivers in a Chinese megacity are frequently exposed to traffic-related particulate matter (PM2.5) due to their job nature, busy road traffic, and urban density. A robust method to quantify dynamic population exposure to PM2.5 among taxi drivers is important for occupational risk prevention, however, it is limited by data availability. This study proposed a rapid assessment of dynamic exposure to PM2.5 among drivers based on satellite-derived information, air quality data from monitoring stations, and GPS-based taxi trajectory data. An empirical study was conducted in Wuhan, China, to examine spatial and temporal variability of dynamic exposure and compare whether drivers' exposure exceeded the World Health Organization (WHO) and China air quality guideline thresholds. Kernel density estimation was conducted to further explore the relationship between dynamic exposure and taxi drivers' activities. In general, taxi drivers' weekday and weekend 24-h PM2.5 exposure was 83.60 μg/m3 and 55.62 μg/m3 respectively, 3.4 and 2.2 times than the WHO's recommended level of 25 μg/m3. Specifically, drivers with high PM2.5 exposure had a higher average trip distance and smaller activity areas. Although major transportation interchanges/terminals were the common activity hotspots for both taxi drivers with high and low exposure, activity hotspots of drivers with high exposure were mainly located in busy riverside commercial areas within historic and central districts bounded by the "Inner Ring Road", while hotspots of drivers with low exposure were new commercial areas in the extended urbanized area bounded by the "Third Ring Road". These findings emphasized the need for air quality management and community planning to mitigate the potential health risks of taxi drivers.*

Parallel Session 3D – Street View Imagery & Visual Perception (Rm. BC302)

Chair:
Dr. Yan Zhang (The Chinese University of Hong Kong, Hong Kong SAR)

Training-Free Building Facade Material Recognition and City-Scale Mapping via Multi-Source Urban Data (PR29)

Presenter: *Mr. Jinhua Yu (Sun Yat-sen University, China)*
Co-author: *Guangzhao Chen, Xiaoping Liu, Wenzhuo Luo*
Abstract: *Reliable building-level information underpins knowledge-intensive applications in building-stock characterization, urban energy analysis, and digital urban management, yet important envelope attributes such as facade materials remain largely absent from existing urban geospatial databases. Street-view imagery provides direct observations of vertical facades, but supervised approaches typically require extensive city-specific annotations and model training, limiting scalable information acquisition across cities. To address this gap, this study proposes an automated building-information enrichment framework that converts panoramic street-view observations into building-indexed facade material information. Its training-free recognition component, Fantasy Building, introduces a Facade Prototype Bank (FPB) that encodes facade-specific visual priors as a compact non-parametric memory and integrates them into frozen foundation-model inference, enabling facade-focused filtering and open-vocabulary recognition without task-specific training or city-level annotations. A height-aware cross-view mapping method further integrates street-view orientation, building footprints, and building height to associate image-space material observations with individual building entities in GIS space. Across three validation cities, Fantasy Building consistently outperformed existing training-free baselines, while building-level mapping achieved up to 81.92% precision and 77.44% F1-score. Applied to 10 cities using two building-footprint sources, the framework generated comparable city-scale facade material products and demonstrated transferability across diverse urban contexts. Their spatial plausibility was further supported by independent nighttime-light observations. Overall, the proposed framework provides a scalable pathway for transforming unstructured street-view observations into structured building-level information, supporting building-stock characterization and downstream applications in urban energy, microclimate, heat-risk assessment, and sustainable urban management. Code and datasets will be released upon publication.*

Urban Landscape Character Mapping Based on Semi-Supervised Graph Networks and Street View Images (PR53)

Presenter: *Mr. Jinfeng Xie (The University of Hong Kong, Hong Kong SAR)*
Co-author: *Anthony G.O. Yeh*
Abstract: *Urban landscape character mapping is fundamental to urban design, heritage conservation, and landscape management. Traditional methods rely on field surveys and manual classification, which are time-consuming and susceptible to subjective assessments. Moreover, existing clustering methods yield spatially fragmented results that lack the continuity required for landscape character zoning. To address this gap, this research proposes an automated urban landscape character zoning method based on street view images and semi-supervised graph neural networks. The method constructs a graph structure where nodes represent street view sampling points connected by road network topology. A pre-trained DINOv3 model extracts visual features from concatenated multi-directional street view images, which are then transformed into embeddings through a GATv2-based graph encoder. The semi-supervised learning framework incorporates three loss components: contrastive loss for node consistency, graph smoothness loss for spatial coherence, and triplet loss guided by expert-annotated image groups to align embeddings with planners' perceptual judgments. Ward hierarchical clustering with road network constraints generates multi-scale zoning results. Using Hong Kong's Kowloon area as a case study, we collected 38,848 street view images and generated zoning results from 2 to 30 hierarchical levels. Comparison with Hong Kong's existing manual landscape survey results demonstrates high spatial similarity in zone boundaries and distribution, validating the method's effectiveness for automated large-scale landscape character zoning. This research contributes threefold. First, network based on road network topology constraints ensure spatially continuous landscape zones with clear boundaries, overcoming the fragmentation problem of traditional clustering. Second, hierarchical clustering reveals both macro-scale differences and local details without presetting cluster numbers, providing flexible multi-scale analytical frameworks. Third, semi-supervised learning incorporates planning domain knowledge through minimal expert annotations, aligning automated results with planning practice standards.*

Accurate assessment of human-perceived window view openness using city information models and visual AI (PR54)

Presenter: *Ms. Siyuan Meng (The University of Hong Kong, Hong Kong SAR)*
Co-author: *Fan Xue, Anthony G.O. Yeh*
Abstract: *Window view openness is highly valued by urban dwellers, especially in high-density cities, for stress relief, life satisfaction, and productivity. Quantifying human-perceived window view openness is therefore significant for healthy urban development. However, existing assessments mainly rely on individual objective view metrics, e.g., sky proportion and view distance, and are typically limited to small urban areas, thereby failing to fully capture human perception. Leveraging geovisualization of photorealistic 3D City Information Models (CIMs) and visual AI, we introduce a Perceived Window View Openness Index (PWVOI) together with an accurate citywide assessment method. First, PWVOI is defined as the average human-perceived openness rating of representative window views across a city generated from photorealistic 3D CIMs. Then, an AutoML-based human-perception model is developed to estimate PWVOI from deep features extracted by pre-trained ResNet101 and DeepLab V3+. Lastly, the model can infer human perceptions for the remaining CIM-generated window views, thereby scaling window-view perception to city-scale computation. Experimental results in Hong Kong demonstrated accurate estimation of human-perceived window view openness, with deep-feature-based models achieving a maximum R^2 of 0.906, consistently outperforming individual semantic view metrics, e.g., view distance, building proportion, and sky proportion ($R^2 \leq 0.723$). The proposed approach enables perception-oriented assessment of window view openness for any building with photorealistic 3D CIMs, providing scalable and quantitative evidence for real estate valuation, architectural and urban design, and urban health analytics.*

Constructing a Resource Network for Data–Model Associative Retrieval and Recommendation in Geographic Modeling (PR25)

Presenter: *Mr. Xinyong Li (Nanjing Normal University, China)*
Co-author: *Yuanqing He, Zizhuo Zhang, Zhiyi Zhu, Songshan Yue, Yongning Wen, Min Chen*
Abstract: *Geographic modeling and simulation are essential methods for investigating complex geographic processes, such as urban expansion, land use change, and the hydrological cycle. Their implementation relies on diverse data and model resources to support model construction, calibration, and validation. However, these resources' growing volume and dispersion across distributed platforms make piecemeal manual retrieval time-consuming and labor-intensive, ultimately hindering their efficient discovery. To address this challenge, this study proposes a method for constructing a resource associative network that links data and models to facilitate data and model discovery. The proposed strategy includes four components: (1) a unified representation model is established for data and models to ensure consistent expression; (2) hierarchical associative relationships between resources are defined and quantified; (3) a resource associative network is constructed through the establishment of resource nodes and edges; (4) based on the resource network, an associative retrieval and recommendation method is proposed to realize the joint retrieval and intelligent recommendation of the data and model resources. To validate the practicality of the proposed method, a prototype system was developed and applied in a case study on flood forecasting. The results show that in the process of data collection and model construction, this method effectively improves the retrieval efficiency of resources, supporting broader adoption in geographic modeling and simulation.*

Geospatial Foundation Model for Multi-Frequency and Cross-City Urban Noise Mapping (PR27)

Presenter: *Dr. Yan Zhang (The Chinese University of Hong Kong, Hong Kong SAR)*
Co-author: *Mei-Po Kwan*

Abstract: *Urban noise mapping is increasingly supported by GeoAI, yet conventional approaches often focus on overall sound levels, overlook frequency-specific acoustic characteristics, and have limited transferability across cities. We first developed a multimodal fusion framework integrating street-view imagery and remote sensing imagery for fine-grained multi-frequency noise mapping. Using 35,276 street-noise recordings covering 23 frequency bands from 100 Hz to 16 kHz, a pretrained vision transformer was used to extract and fuse ground-level and overhead environmental features. The framework generated 50-m-resolution noise maps and achieved stronger predictive performance for mid-frequency noise, while explainable analyses identified buildings, roads, sidewalks, terrain, and road width as important determinants of street-level noise. Building on this image-fusion framework, we further examined whether geospatial foundation models can improve the physical representation and cross-city transferability of traffic-noise estimation. We introduced the AlphaEarth Foundation model, pretrained on large-scale multimodal Earth observations, to capture urban morphology, three-dimensional structure, surface characteristics, vegetation, and meteorological conditions associated with sound generation and propagation. The resulting framework achieved an R^2 above 0.84 and supported transferable traffic-noise estimation across multiple cities, enabling comparisons of spatial exposure and environmental inequality. Together, these studies demonstrate a progression from multimodal image fusion for frequency-specific street-level mapping to physically informed geospatial foundation models for scalable cross-city noise assessment. The framework highlights the potential of GeoAI to support more transferable, fine-grained, and policy-relevant urban environmental sensing.*

15:30-16:00	Tea Break (Foyer of Jockey Club Auditorium)
16:00-16:30	Panel Discussion GIS Education and Development (Jockey Club Auditorium)
16:30-17:00	Award Presentation & Closing Ceremony (Jockey Club Auditorium)

75-min Breakout Sessions Format:

2 min	Session Chair Welcome
75 min	15-min presentation for each presenters
10 min	Q&A Session (for 5 presenters)
3 min	Certificate & Photo

Poster Presentation

21 October 2026, Wednesday

From 8:30	Registration
11:00-12:30	Poster Presentation

A Multi-Index Approach for Drought Risk Assessment in the Arid and Semi-Arid Regions of Pakistan (PO01)

Presenter: *Mr. Ebadat Ur Rehman (Northwest A&F University, China)*

Abstract: Drought is a frequent climatic hazard in Pakistan, damaging agriculture and water resources, especially in arid and semi-arid regions. Existing drought monitoring there is often limited by sparse weather data and a lack of integrated, high-resolution estimates. This study builds a framework for drought monitoring and risk mapping in South Punjab, Pakistan, integrating meteorological and remote sensing data through GIS-based fuzzy overlay, then projecting future risk with time-series forecasting. The analysis draws on 22 years (2000–2021) of satellite vegetation data (NDVI) and 19 to 30 years of precipitation and temperature records from five ground stations in a low-data region. Mean annual precipitation ranged from 11.8 to 23.3 mm, against potential evapotranspiration averaging 144.7 to 162.2 mm per month. Rahim Yar Khan faced the most severe drought, with SPI and RDI reaching −2.84 and −2.82. Across the region, 47% of the area falls under extreme drought risk and 26% under high risk. Forecasts (test-set error roughly 15.5 to 33.0 mm) show drying will continue at Rahim Yar Khan, while the rest of the network holds near or above its 2003–2021 baseline. Future drought risk in South Punjab is therefore concentrated in specific districts, not spread evenly. Linking district-scale projections to local forecasts gives early warning and adaptation planning a finer-scale basis than broader regional assessments can provide.

How Do Street-View Semantic Class Definitions Affect Land Use Regression Predictions of Urban Air Pollution? (PO06)

Presenter: *Ms. Hongjie Wu (Lingnan University, Hong Kong SAR)*

Abstract: Background/Objectives: Street-view imagery provides pedestrian-level environmental information that may complement conventional GIS predictors in land use regression (LUR) models. This study evaluates the predictive contribution of street-view features and examines how semantic class definitions influence air pollution predictions in Hong Kong.

Methods: Annual mean NO_2 and $PM_{2.5}$ concentrations from 17 monitoring stations in 2024 were modeled using ridge regression. Conventional GIS predictors included road density, land use, station type, and building frontal area index (FAI). Street-view predictors included sky, greenery, road, and building visibility. Model performance was assessed using nested leave-one-station-out cross-validation. Sensitivity analyses compared narrow, broad, and disaggregated semantic definitions, as well as alternative GIS baseline specifications.

Results: Incorporating street-view features improved NO_2 prediction compared with conventional GIS-based models, whereas no consistent improvement was observed for $PM_{2.5}$. Different semantic class definitions influenced predictive performance, and broader definitions did not necessarily produce better results. Separating certain semantic categories sometimes performed better than combining them into aggregated indicators. Furthermore, the predictive contribution of street-view features varied across GIS baseline specifications and monitoring station subsets, indicating sensitivity to model configuration and sample composition.

Conclusions: Street-view features may improve NO_2 prediction, but their benefits are pollutant-specific and sensitive to semantic definitions and GIS model specifications. Given the small sample size, further validation is needed to assess the robustness and generalizability of these findings.

Optimized Spatially Stratified Heterogeneous Sampling for Soil Surveys under Sample Size and Cost Constraints (PO07)

Presenter: *Dr. Fengbei Shen (Chinese Academy of Sciences, China)*

Abstract: Soil pollution surveys require balancing sampling effort, cost, and estimation uncertainty, particularly in spatially heterogeneous environments. However, conventional sampling designs optimize only part of this trade-off or require extensive auxiliary information. Here, we developed an Optimized Environmental Pollution Sampling Survey (OEPSS), which formulates sampling design as an explicit optimization problem under spatially stratified heterogeneity (SSH). OEPSS jointly incorporates stratum-specific variability, sampling cost, and sample-size constraints to minimize estimation uncertainty and extends to multiple contaminants through an integrated-variance criterion. OEPSS was evaluated using synthetic experiments under varying SSH conditions and a real-world soil pollution survey. Compared with random, grid-based, Neyman, and Bethel sampling designs, OEPSS generally achieved lower estimation variance and inference errors under heterogeneous conditions, with its advantage becoming more pronounced when sampling costs were considered. In the real-world application, OEPSS reduced the overall integrated variance while simultaneously accounting for six contaminants. These results demonstrate that OEPSS provides a quantitative and resource-efficient framework for prospective soil pollution survey design under spatial heterogeneity and practical budget constraints.

Semantic Retrieval of Urban and Regional Form from Multi-Temporal Aerial Imagery and Historical Maps via a Vision Foundation Model (PO10)

Presenter: *Mr. Lewei Lin (Tokyo City University, Japan)*

Abstract: Aerial imagery and maps are complementary sources of geographic information. Aerial imagery records the physical appearance of the ground surface, whereas maps represent geographic features through abstract cartographic symbols. Together, they provide valuable information for understanding past terrain, land use, and urban contexts, supporting analyses of regional change and disaster risk. Despite their complementary nature, direct comparison and integrated retrieval within the semantic spaces learned by existing representation models remain difficult due to the representational gap between these two modalities arising from differences in image acquisition characteristics and cartographic conventions. Accordingly, this study constructs a shared latent space that suppresses format-specific variations while preserving the regional morphology recorded at each point in time and evaluates the feasibility of semantic retrieval across time-series aerial imagery and historical maps. We evaluate 240 development images sampled from five regions in Japan and first compare three models: CLIP, RemoteCLIP and OpenCLIP with all model parameters frozen. Based on this comparison, OpenCLIP is selected and partially fine-tuned the final two blocks and final LayerNorm of its image encoder using five-fold cross-validation. In out-of-fold (OOF) evaluation, the fine-tuned model achieves absolute mAP gains of 0.174 for area-form retrieval and 0.150 for feature-presence retrieval over the frozen OpenCLIP baseline. The qualitative retrieval assessment using a total of 200 queries in English and Japanese also indicates an overall improvement. These findings suggest that the approach can improve the efficiency of archival-material retrieval and facilitate access to source materials needed for analyses such as urban change.

A Near-Real-Time UAV Framework Based on Optimized Sampling and Improved SI for Nitrogen Topdressing (PO13)

Presenter: *Mr. Aohua Tang (Chang'an University, China)*

Abstract: Winter wheat is one of the world's most important food crops, and nitrogen (N) management plays a critical role in determining yield formation and resource use efficiency. However, conventional fertilization practices are typically based on empirical, field-uniform applications, which fail to capture within-field spatial heterogeneity, resulting in mismatches between N supply and crop demand. Meanwhile, existing unmanned aerial vehicle (UAV)-based variable-rate nitrogen recommendation (VRNR) approaches often rely on time-consuming image stitching and complex parameterization, limiting their capability for near-real-time decision-making. In addition, the lack of yield-driven constraints and the disconnection between sensing, decision-making, and field operations further hinder their application in smart agriculture.

To address these challenges, this study proposes a near-real-time nitrogen topdressing framework for winter wheat at the jointing stage, termed RNT_Wheat (operationally defined as a processing efficiency of <5 min ha-1). The framework consists of two key components. First, an intelligent sampling-interpolation method based on non-spliced multispectral UAV imagery is developed. By integrating growth-based zoning based on spectral characteristics, centroid sampling, and spatial interpolation, the method bypasses conventional image stitching and enables rapid acquisition of within-field crop growth information. Second, an improved sufficiency index (SI) algorithm is proposed, which integrates target yield-driven nitrogen demand with real-time crop growth status, and introduces percentile-based constraints and dynamic adjustment mechanisms to enhance recommendation adaptability and stability.

The results demonstrate that the proposed sampling-interpolation method effectively captures spatial variability (r = 0.75, nRMSE = 0.26, MAE = 0.05), while significantly improving computational efficiency to 287 s ha-1, enabling near-real-time decision-making. The improved SI algorithm expands the nitrogen recommendation range (50-173.3 kg N ha-1) and achieves better alignment with crop growth variability. Simulation results indicate that, under nitrogen-deficient conditions, the proposed framework substantially increases yield and net profit. Under nitrogen-sufficient conditions, it maintains yield while reducing nitrogen input by approximately 20%. Furthermore, when extended to the satellite scale, the framework maintains yield within 0.4% of observed values, reduces nitrogen input by approximately 15%, and slightly improves economic returns.

Overall, this study establishes an integrated workflow of "rapid UAV sensing, near-real-time decision-making, automatic prescription generation, variable-rate N application," significantly improving both the efficiency and accuracy of nitrogen management in winter wheat, and providing a practical pathway toward fully automated precision fertilization in smart agriculture.

Regional Road Extraction from Continuous Street-View Panoramas (PO14)

Presenter: *Mr. Hu Zao (Hangzhou Dianzi University ITMO Joint Institute, China)*

Abstract: Up-to-date and spatially complete road data constitute a fundamental GIS layer for urban planning, navigation, and transportation network maintenance. However, road mapping from overhead remote sensing imagery remains vulnerable to occlusions caused by tree canopies, buildings, vehicles, and cast shadows, often resulting in missing or fragmented road representations. Street-view panoramas provide complementary ground-level observations, yet existing panorama-to-bird's-eye-view (BEV) methods are primarily designed for local, camera-centered perception and offer limited support for georeferenced regional mapping. To bridge this gap, we propose RegionBEV, a georeferenced cross-view framework that transforms continuous street-view panoramas into spatially coherent regional road semantic maps. RegionBEV integrates a Road Boundary-Aware Feature Enhancement Module (RBFEM) into the panorama-to-BEV transformation to strengthen road-boundary cues and structural representations. The resulting local BEV predictions are georeferenced using their corresponding acquisition poses and projected into a common spatial reference system. A georeferenced multi-location fusion strategy then aggregates overlapping predictions according to observation coverage and prediction confidence, thereby suppressing viewpoint-specific errors, improving spatial consistency, and reconstructing continuous regional road representations. The framework is evaluated on eight simulated towns generated using CARLA and a real-world street-view panorama dataset covering 8.68 km². RegionBEV achieves an overall IoU of 84.06% on the simulated dataset, outperforming the previous SOTA by 5.41 percentage points, and obtains a regional road IoU of 70.98% in the real-world study area. These results demonstrate that georeferenced ground-level observations can effectively improve the completeness and spatial continuity of regional road maps, highlighting the potential of RegionBEV to complement remote-sensing-based road extraction and support urban road network updating.

The Blatten avalanche in the Swiss Alps: insights into cascading hazard under a warming climate (PO16)

Presenter: *Mr. Xiaoqiang Cheng (Chang'an University, China)*

Abstract: Global warming has enormous impacts on the world's mountain cryosphere, yet the mechanisms governing the evolution of cascading rock-ice avalanches (RIA) remain poorly understood. On 28 May 2025, a RIA exceeding 6.5×106 m3 detached from Birch Glacier, Switzerland, generating one of the largest recent mass-movement events in the European Alps. Here, we reconstruct its preconditioning, triggering and dynamic evolution using high–resolution satellite imagery, seismic records, meteorological observations, eyewitness videos and numerical modelling. We show that persistent glacier advance and progressive crevasse propagation destabilized the glacier over the past five decades, while loading of the glacier by rock debris from the rock slope failures at Kleines Nesthorn were a main cause for the glacier collapse and avalanche. We further reveal that frictional heating during the avalanche process induced ice-water phase transitions that reduced basal resistance and accelerated the avalanche to peak velocities of ~63.5 m s-1, while dynamic mass entrainment increased its volume by ~30%. Our findings provide a process-based understanding of the cascading evolution of large rock–ice avalanches and establish a framework for improving early warning of cryospheric disasters in a warming climate.

Artificial Intelligence for Spatio-Temporal-Spectral Enhancement in Agricultural Remote Sensing: Progress, Challenges, and Perspective (PO17)

Presenter: *Mr. Rongfei Duan (Chang'an University, China)*

Abstract: Accurate agricultural monitoring remains fundamentally constrained by the inherent trade-offs among spatial, temporal, and spectral (STS) resolutions in remote sensing. Artificial intelligence (AI), particularly deep learning, has emerged as a pivotal paradigm to mitigate these limitations through algorithmic STS enhancement. This paper reviews over 540 recent publications to bridge the gap between technical advancements and agronomic realities. We analyze core architectures—convolutional neural networks (CNNs), transformers, and diffusion models—and evaluate their functional evolution within the agricultural "identification-monitoring-decision" hierarchy. Despite significant algorithmic strides, current methodologies frequently operate as task-specific workflows, hindering the full integration of crop growth biophysics. To address these bottlenecks, we propose a cohesive "data-method-platform" strategic roadmap: constructing AI-driven virtual constellations for continuous data generation, integrating physics-informed machine learning for advanced methodological frameworks, and developing an end-to-end intelligent platform for near-real-time agricultural services. This integrated pathway delineates a promising trajectory toward an action-oriented agricultural intelligence ecosystem, offering a comprehensive reference for the advancement of precision

agriculture.

Research on the representation method of integrating spatio-temporal dimension relations for land circulation (PO18)

Presenter: *Mr. Xinying Zhong (China University of Mining and Technology, China)*

Abstract: Rural modernization is essential to Chinese-style modernization. Land—a key factor in rural development—has complex transfer relationships. Rural land circulation is a fundamental step in rural development and natural resource management, but in the practical management, it is not a simple problem of registration or approval, specific terms, the land can be legitimately transfer, not only to determine contract relations, the flow time and validity of the contract, Combine red block position, use control, ecological protection, certificate of approval, such as remote sensing image and field verification of multi-source information comprehensive judgment. Currently, knowledge graphs are evolving from static triples to spatio-temporal enhanced representation methods, which are constantly improving their knowledge expression capabilities. However, when dealing with business scenarios such as rural land transfer that simultaneously possess dynamics, constraints, and evidence sensitivity, The core scientific problem is: "How to construct a new relationship representation model that enables spatio-temporal, rules, and traceability information to deeply couple with the entity relationship itself, thereby supporting dynamic, restrictive, and credible knowledge reasoning."we propose SPOTSR: a unified model that combines “Subject–Relationship–Object” with “Space, Time, Rules, and Traceability.” It enables dynamic, rule-based, and traceable representation of land transfers. SPOTSR supports intelligent rural land supervision and bridges knowledge graphs with GeoAI and large language models—shifting geographic knowledge from recording facts to reasoning.

Spatiotemporal Modeling of Particulate Matter in Hong Kong Bus-Waiting Environments: Implications for Transportation Demand Management (PO19)

Presenter: *Mr. Chun Tin Sky Lam (The University of Hong Kong, Hong Kong SAR)*

Abstract: The urban heat island (UHI) exacerbates local air pollution, particularly where road emissions are trapped within high-density urban morphologies. Numerous studies have found that longwave radiation released from building surfaces forms a temperature inversion layer, and heavy traffic flow increases air pollutant concentrations, which amplifies air pollution in the evening.

However, these studies neglected the extent of variation in air pollutant concentrations between street canyons and semi-enclosed environments at different time slots. This study bridges the gap by evaluating the temporal variation in PM1.0, PM2.5, and PM10 concentrations in street canyon bus stops (SC-BS) and semi-enclosed bus termini (SE-BT) across Hong Kong, utilizing time-synchronized low-cost sensors over multi-day field campaigns in 15-minute sampling intervals and GIS-based spatial-temporal modeling to analyze pollutant dispersion across distinct urban spatial typologies on sunny afternoons and evenings.

Empirical results reveal that particulate matter concentrations in SE-BT consistently exceed those in SC-BS. At SE-BT, PM1.0, PM2.5, and PM10 concentrations peaked at three times higher levels on sunny afternoons and increased to four to five times higher during sunny evenings, compared to SC-BS. Ventilation mechanisms and architectural enclosure contribute to these discrepancies. Nevertheless, bus frequency is a more significant contributor to amplifying the spatiotemporal variation in air pollutant concentrations.

These findings offer pragmatic insight for transportation demand management (TDM). By implementing flexible working arrangements and optimizing bus dispatch, stakeholders can mitigate rush-hour overcrowding and bus idling, thereby improving localized air quality across different bus-waiting environments.

Learning Cycling Behavior Preferences from Trajectory Data Using Deep Inverse Reinforcement Learning (PO20)

Presenter: *Mr. Zhaoxin Wang (Sun Yat-Sen University, China)*

Abstract: With the widespread adoption of bike-sharing systems, cycling has become an important mode of short-distance urban travel. Understanding cyclists' route-choice behavior is therefore essential for active transportation planning and the design of cycling-friendly streets. Existing studies have largely relied on discrete choice models to characterize cycling route preferences, with particular emphasis on travel time and distance. However, such approaches have limitations in capturing high-dimensional and nonlinear effects associated with road characteristics and spatial perceptions of the street environment. This study proposes a deep inverse reinforcement learning framework for modeling cyclists' route-choice behavior by learning a latent reward function from bike-sharing GPS trajectories. First, multi-source contextual features relevant to cycling route choice are constructed by integrating road attributes with streetscape characteristics derived from street-view imagery. Second, a deep IRL model is employed to infer the latent reward function underlying cyclists' observed route-choice decisions from expert trajectories. Finally, SHAP-based interpretability analysis is applied to the learned reward function to quantify the contributions of individual features and reveal their associations with cyclists' route preferences. The proposed framework is evaluated using bike-sharing GPS trajectories collected on Xiamen Island, China. Results based on 27,611 cycling trajectories show that the generated routes exhibit substantially smaller spatial deviations from the observed trajectories than those produced by baseline models, demonstrating the effectiveness of the proposed approach in reproducing cyclists' route-choice behavior. Further analysis indicates that cyclists make systematic trade-offs between distance and turning costs while also exhibiting preferences related to road-type composition and streetscape environments, revealing a dynamic balance between physical travel costs and environmental perceptions during route choice. These findings provide a new perspective for understanding the latent behavioral preferences underlying bike-sharing route choice and offer implications for active transportation planning, cycling-friendly street design, and personalized route recommendation.

Towards Net Zero and Environmental Safety: AI Bird and Tree Health Monitoring via Laser-Based Carbon Mapping (PO21)

Presenter: *Mr. Hong Kiu Chan (Hong Kong Institute of Vocational Education (Sha Tin), Hong Kong SAR)*

Abstract: Nowadays, Hong Kong is facing the challenges of climate change and biodiversity loss due to excessive carbon emissions and rapid urbanisation.

To achieve net-zero targets, it requires a focus on carbon reduction and ecological preservation at the same time. Therefore, this study presents a multidisciplinary framework combining Land Surveying, Geographic Information Systems (GIS), Remote Sensing, and Artificial Intelligence (AI) to assess carbon dynamics and monitor biodiversity near IVE (Morrison Hill).

For biodiversity monitoring, CCTV PTZ camera and acoustic monitoring capture environmental data processed by bird AI thermal and audio recognition to identify the bird's nesting durations, location and species. Concurrently, land surveying techniques apply spatial data to triangulate precise 3D spatial coordinates and the flight path of birds in GIS platform. Also, it could identify the habitat stress by combining the GIS traffic noise layers with the flight path of the birds.

For carbon assessment, backpack laser scanner (LiDAR) and handheld laser scanner (SLAM) generate high-density 3D point cloud models of urban trees to calculate tree-level carbon storage, carbon storage hotspots and trees volume by emitting high-frequency laser beam. Furthermore, combining 3D scanned tree volume with thermal imaging camera data to see how campus greenery reduces the building's surface temperatures, reducing energy consumption. Meanwhile, this project also used air quality meter to analyse estimated emissions from proximate sources.

By integrating these technologies and measurement systems, this can contribute to Hong Kong's smart green city blueprint and sustainable development vision, helping Hong Kong to achieve carbon neutrality by 2050.

Hyperspectral Landslide Mapping: An Unsupervised Spatial–Spectral Learning Approach (PO25)

Presenter: *Ms. Yulong Zhou (China University of Geosciences (Wuhan), China)*

Abstract: Landslides pose significant threats to human lives, infrastructure, and regional development, making timely and large-scale landslide mapping essential for disaster management and geospatial decision-making. However, automated landslide extraction remains challenging because high-quality labeled data are often limited in both availability and geographic coverage. Unsupervised approaches offer a promising alternative, but existing methods based primarily on multispectral imagery may struggle to distinguish landslides from spectrally similar surface materials.

This presentation introduces an unsupervised spatial–spectral learning framework for landslide extraction using high-resolution hyperspectral imagery. The proposed framework jointly exploits spectral signatures and spatial structures to characterize landslide surfaces without relying on manually annotated training samples. It combines hierarchical spatial representation learning, prototype-guided spectral feature extraction, and graph-based spatial–spectral fusion to capture fine-scale spatial patterns, discriminative spectral characteristics, and structural relationships across the scene.

The proposed approach demonstrates the potential of high-resolution hyperspectral imagery for unsupervised landslide mapping and provides an annotation-free strategy for identifying landslide areas in regions with limited labeled data. By reducing dependence on manual annotation while exploiting rich spatial and spectral information, the framework offers a promising direction for scalable landslide inventory generation and efficient geospatial disaster monitoring. It may further support the development of continuously updated landslide databases for regional and large-area applications.

Spatial-Spectral Sequence Modeling for Hyperspectral Geological Interpretation: From GDS-ZY Dataset to SSGeoMamba Framework (PO26)

Presenter: *Mr. Xuwei Xu (China University of Geosciences (Wuhan), China)*

Abstract: Hyperspectral remote sensing provides rich diagnostic spectral information for geological mapping, yet accurate interpretation remains challenging because of high spectral similarity among lithological units, complex spatial distributions, and insufficient benchmark datasets for geological applications. This study introduces GDS-ZY, a hyperspectral geological interpretation dataset constructed from ZY1-02D imagery over the Gangdese region of Tibet, together with SSGeoMamba, a spatial-spectral sequence modeling framework for geological information extraction. GDS-ZY contains 153 spectral bands and 17 geological categories, providing a dedicated benchmark for evaluating hyperspectral geological interpretation methods under complex geological and terrain conditions. SSGeoMamba jointly models spectral signatures and spatial contextual information through a Global Contextual Modeling Path and a Spectral-Spatial Modeling Path. A Mamba-enhanced feature fusion module is further introduced to capture long-range dependencies and integrate complementary spatial-spectral representations, while spectral consistency regularization improves feature discrimination among spectrally similar geological units. Experimental results demonstrate that SSGeoMamba consistently outperforms representative hyperspectral classification and deep learning baselines, particularly in heterogeneous geological regions with fragmented spatial patterns and complex lithological contacts. The proposed dataset and framework provide an effective approach for intelligent geological mapping from satellite hyperspectral observations and demonstrate the potential of sequence modeling for large-scale geological remote sensing applications.

Spatial Reasoning Beyond Question Answering: Evidence from GeoRelBench (PO27)

Presenter: *Dr. Zheng Ren (The Hong Kong University of Science and Technology (Guangzhou), China)*

Abstract: Understanding spatial relations is essential for AI systems to interpret environments and follow spatial instructions. Existing studies have evaluated spatial reasoning in multimodal large language models (MLLMs) through question-answering tasks. Yet correct answers alone provide limited evidence of robust understanding of the underlying spatial relations. Real-world geospatial vector data provide an underexplored setting for testing these capabilities because spatial relations can be explicitly represented, computed, manipulated, and objectively verified. We introduce GeoRelBench, a benchmark that evaluates MLLMs through a progressive framework spanning spatial understanding, geometric computation, and constrained spatial editing. Grounded in urban geographic data, GeoRelBench covers a broad range of topological, directional, metric, and configurational relations using structured GeoJSON and map images as inputs. Geometry-derived reference answers and explicit constraint checks enable verification of spatial judgments and geometric modifications. Under the evaluated protocols, GeoJSON inputs generally yield stronger performance than map images, while combining the two does not consistently improve upon GeoJSON alone. The tested models perform well on some spatial relation judgments but struggle with precise geometric computation and constrained editing. Most failed GeoJSON edits produce valid geometries that do not satisfy all requested spatial constraints. GeoRelBench provides a diagnostic basis for studying spatial representations and constraint satisfaction, with potential relevance to spatial consistency in world models and spatial instruction grounding in embodied AI.

Task-Driven Semantic–Visual Coordination for Adaptive Geovisualization in Complex Spatial Scenes (PO28)

Presenter: *Mr. Hao Luo (Lanzhou Jiaotong University, China)*

Abstract: For a given geovisualization task, not all available information is equally relevant, nor should all task-relevant information receive equal visual emphasis. However, conventional visualization design primarily maps data properties to visual variables, providing limited support for determining what information should be emphasized for a specific task and how multiple visual encodings should be coordinated when presented together. This becomes particularly problematic in complex spatial scenes involving heterogeneous data and compound analytical tasks.

This study proposes a task-driven semantic–visual coordination framework consisting of three stages. First, a complex task is decomposed into structured sub-tasks, and semantic relationships between task requirements and heterogeneous data sources are quantified to estimate their task-specific information contributions. Second, these contributions are translated into candidate visual variables and corresponding levels of visual emphasis through semantic–visual mapping. Third, because individually appropriate visual encodings may conflict or become indistinguishable when combined, task signal-to-noise ratio, perceptual discriminability, and task-relation graphs are used to identify and coordinate redundant or competing visual channels.

A road-flooding navigation scenario demonstrates the workflow from task decomposition and information-contribution estimation to visual-variable allocation and conflict-aware optimization. The results show that the framework can differentiate task-relevant information priorities and generate coordinated visual-parameter configurations, providing a computable basis for adaptive geovisualization in complex GIS and digital-twin environments.

None of my Business? STEMifying microclimatic thermal auditing for everyone's Business (PO30)

Presenter: *Dr. Man Hei Jeffrey Chang (The Chinese University of Hong Kong, Hong Kong SAR)*

Abstract: Climate extremes and densely compact urban form are widely recognized as key drivers of extreme hot weather and heat-wave events in cities. In the IPCC Sixth Assessment Report (IPCC, 2022), the accumulation of anthropogenic heat associated with urbanization is identified as a factor that intensifies local warming. Exposure to high temperatures within built environments poses serious health risks, including heat stroke and cardiovascular and respiratory disorders (Lee et al., 2015), with heightened vulnerability in school settings. Therefore, identifying urban extreme-heat "hotspots" and developing heat-precautionary alerts are essential for reducing public health and social insecurity for at-risk populations. In the digital era of the Internet of Things (IoT), unmanned aerial vehicles (UAVs), machine learning, and smart-city applications, low-cost thermal-sensing tools have become increasingly accessible and replicable for public agencies and educators. This study integrates school-based STEM education with a portable low-cost LoRa sensor network and FLIR drone-based sensing to characterize heat heterogeneity across building floors and multiple outdoor environments at a local school (e.g., garden areas, pedestrian pavements, playgrounds, and a basketball court). The initiative also highlights the value of school–university–industry collaboration in designing scientific educational programmes. Through hands-on activities that involve students in experimental design, field measurements, and data analysis using Geographic Information Systems (GIS), the project promotes practical, "down-to-earth" science learning. The outputs further support the creation of school-based heat-precautionary guidelines for thermal auditing and promote practical science literacy.

Progressive spatial stratified symbolic regression for interpretable modeling of variable relationships (PO31)

Presenter: *Mr. Wenhui Zhang (Institute of Geographic Sciences and Natural Resources Research, CAS, China)*

Abstract: Surface-environment heterogeneity often causes relationships among geographic variables to vary across spatial strata. For geographical explanation, spatial inference models should not only predict attributes reliably but also reveal the functional form of each relationship and the geographic conditions under which it applies. Post-hoc explanation methods typically summarize black-box outputs through variable contributions or surrogate approximations; therefore, they do not directly reveal stratified functions, applicability ranges, or boundaries where relationships change. Existing stratified symbolic regression methods still face mismatches between stratification boundaries and function applicability ranges, limited learning of differentiated stratified functions, and discontinuous inference near stratification boundaries under hard stratum assignment. This study proposes Progressive Spatial Stratified Symbolic Regression (PS³R), which iteratively couples spatial stratification with stratum-specific symbolic function learning and uses stratum-membership-weighted inference to smooth predictions near stratification boundaries. Controlled experiments showed that PS³R avoided unnecessary stratification without heterogeneity and recovered principal multi-condition rules and functions with noise and heterogeneity. In a national soil bulk density case, PS³R generated stratum-specific functions and rules involving organic matter, climate, and soil texture, significantly reduced inference error relative to four symbolic-regression baselines, and achieved overall accuracy similar to common machine-learning models. PS³R provides an intrinsically interpretable approach to geographically stratified relationship modeling.

Discrepancies Between Cognitive Maps and Physical Topology in Visually Repetitive Indoor Environments (PO32)

Presenter: *Mr. Jiapeng Gao (Lanzhou Jiaotong University, China)*

Abstract: Large indoor environments often combine regular layouts with highly repetitive visual features. Despite their apparent simplicity, these environments may make it difficult to distinguish places and maintain a coherent understanding of location during movement. This raises two questions: how do people connect successive experiences into a cognitive map, and how does this representation diverge from the actual spatial structure?

Using underground parking facilities as a typical setting, this study proposes to examine continuity in spatial understanding, defined as maintaining knowledge of one's current location, previous movements, and connections between visited places. It focuses on place confusion and misremembered connectivity, and asks whether repeated exploration and more distinctive visual cues help bring cognitive maps into closer correspondence with the actual spatial topology.

A controlled virtual reality study will use a model based on an actual underground parking facility. Visual distinctiveness will vary while geometry and connectivity remain constant. Participants will complete route learning and repeated exploration, with trajectories and gaze recorded. At selected learning stages, place recognition and connectivity reconstruction tasks will elicit remembered spatial relations. Treating intersections as nodes and traversable corridors as edges, reported relations will be compared with the experienced portion of the actual network to quantify place confusion, false connections, and omitted connections, while separating uncertain responses from incorrect judgments. These discrepancies will be related to pauses, backtracking, and route choices, and tracked across learning stages.

External Data Use and Integration Methods in Urban Research Using Mobile Network Population Data: A Scoping Review (PO33)

Presenter: *Mr. Seung Gyu Oh (Kyungsung University, South Korea)*

Abstract: Mobile network data is widely used to understand how people are spread out and move around in cities and regions. However, this data is not typically used on its own. Researchers often combine it with other data like census data, land use and buildings, transport data, points of interest, records about health or disasters, and others. Despite the growing use of these sources, prior studies have mainly described which external datasets were used, with less attention to the roles those datasets performed and how they were integrated with mobile network population data.

We conducted a scoping review of urban studies using mobile network population data, following JBI guidance and PRISMA-ScR. Six databases were searched for studies published between January 1, 2000 and August 28, 2026. Of 1,318 records identified, 191 duplicates were removed, 1,127 records were screened, and 154 studies were included after full-text assessment.

Across these studies, 519 records(2-3 external data sources per paper) were charted and classified into 13 categories. Population, household, and socioeconomic data were most common (103 records, 19.8%), followed by built environment, land-use, and spatial data (75, 14.5%) and transport and travel data (60, 11.6%). The main roles were estimation/calibration (47.2%), explanation (29.5%), and validation (13.5%). Spatial join/overlay was the most frequent integration method (74.2%), while temporal integration and quality-handling methods were often not reported. External data type and primary role also showed a moderate descriptive association (Cramér's V=0.336).

The review shows that external data are used for different purposes, including validation, estimation, adjustment, and interpretation of mobile network population data. The proposed Data Type–Role–STVQ framework organizes these practices and provides a reference for selecting and integrating external data in future urban research.

Spatial heterogeneity of intervention benefits in sequential pocket park planning (PO34)

Presenter: *Mr. Runyu Miao (Chinese Academy of Sciences, China)*

Abstract: In high-density built-up areas, limited space for large new green spaces has made small-scale interventions such as pocket parks increasingly important for improving urban green-space services. Identifying effective intervention locations under limited resources is therefore a key planning challenge. Although previous studies have shown that identical green-space interventions can generate different benefits across locations, such spatial heterogeneity is typically identified only once before planning, and its validity during sequential interventions remains unclear. Using sequential pocket-park provision in central Wuhan as a case study, this study examines how service-state changes induced by prior interventions reshape the spatial heterogeneity of intervention benefits and how updated heterogeneity can guide subsequent site selection. We construct a 3SFCA-based service-state updating environment and develop a Heterogeneity-Aware Graph Reinforcement Learning (HA-GRL) model for sequential planning. Results reveal substantial spatial heterogeneity in intervention benefits, which does not fully coincide with existing service needs. As planning proceeds, the overall spatial pattern remains relatively stable, but some high-priority candidates are reordered because of changes in supply–demand relationships, service competition, and spatial overlap. Persistently relying on initial benefit heterogeneity degrades planning performance, whereas decisions based on updated benefit heterogeneity improve planning outcomes, although gains diminish as update frequency increases. HA-GRL effectively identifies high-value candidates under the current state and performs consistently across independent evaluation metrics and planning scenarios. These findings suggest that intervention-benefit heterogeneity should be dynamically reassessed as service conditions evolve and continuously incorporated into sequential spatial decision-making.

Comprehensive Assessment of Soil Salinization: Spatiotemporal Changes, Classification, and Driving Forces in the Songnen Plain, China (PO36)

Presenter: *Dr. Yang Han (Northeast Normal University, China)*

Abstract: Soil salinization will lead to land degradation and pose a serious threat to agricultural production and food security. Da'an City is one of the areas with concentrated distribution of salinized soil in the Songnen Plain, where the degree of salinization is very serious. A clear grasp of the spatiotemporal change rules of salinized soil in Da'an City is of great significance for the management of saline-alkali land in the Songnen Plain. Due to the strong spatiotemporal variability of soil salinity, the performance of machine learning algorithms will change with the differences in research areas, measured data and remote sensing data. Therefore, it is necessary to explore spectral indices and machine learning methods suitable for soil salinity estimation in Da'an City.

An Annual Urban Renewal Dataset and Spatiotemporal Analysis across China from 1988 to 2023 (PO38)

Presenter: *Mr. Zhixin Qi (Sun Yat-sen University, China)*

Abstract: Urban renewal is a major strategy for improving urban land use efficiency and supporting sustainable urban development in China, yet consistent evidence on its long-term spatial patterns remains limited. This study develops a national geospatial framework to identify demolition-related urban renewal and examine its spatial heterogeneity and associated factors. Using Landsat time-series imagery and Google Earth Engine, we have constructed an annual urban renewal dataset at 30 m resolution for China covering 1988–2023. A multi-index detection approach combines a land clearing index with vegetation and water exclusion rules and prior built-up extents to identify demolition and land clearance within existing urban areas. GIS indicators characterize renewal intensity, recurrence, location, and the balance between renewal and outward expansion. Random forest models and SHAP analysis integrate socioeconomic indicators, building morphology, and points of interest to examine city-level variation in renewal area. Results show that national renewal intensity, measured as annual renewal area relative to built-up area, increased from 0.208% in 1988 to 0.249% in 2022. Upward trends occurred in 73.3% of the 375 city-level units examined. Eastern and central China experienced increasing intensity, whereas rapid built-up expansion diluted renewal intensity in western China. Approximately 94% of detected renewal pixels recorded only one event. Local fiscal revenue and built-up area emerged as leading predictors of renewal area. These findings reveal uneven redevelopment trajectories across China. The framework and dataset provide a consistent basis for comparing urban renewal across cities and decades and informing regionally differentiated planning.

Evaluating Pocket Parks for Urban Heat and Particulate Matter Mitigation Using Field Sensing and GIS: Evidence from Hong Kong as a Representative High-Density City (PO39)

Presenter: *Mr. Shihao Hu (The Hong Kong Polytechnic University, Hong Kong SAR)*

Abstract: Rapid urbanization exacerbates heat stress and particulate matter (PM) pollution in high-density cities, yet the combined mitigating effects of pocket parks remain insufficiently understood. This study investigates six pocket parks in Yau Tsim Mong, Hong Kong, to evaluate urban heat island (UHI) intensity and PM2.5/PM10 concentrations. Air temperature and PM were measured in the morning, afternoon and at night. Five characteristics were quantified using GIS and vegetation assessments: floor area ratio (FAR), building density, park area, tree canopy ratio (TCR) and shrub canopy ratio (SCR). Their relationships with UHI and park cooling island intensities were examined using regression analysis, Pearson correlation and partial least squares regression. UHI intensity ranged from 0.7 to 2.1°C in the morning, −1.77 to 1.87°C in the afternoon and 1.86 to 2.83°C at night. FAR was the main driver of afternoon UHI, while park area was most influential for nighttime UHI mitigation and afternoon PM2.5 reduction. Higher nighttime FAR was associated with reduced PM2.5 mitigation, suggesting constraints on pollutant dispersion in densely developed surroundings. TCR and SCR showed weaker but positive associations with pollutant reduction. These findings indicate that pocket-park performance depends on park size, vegetation structure, surrounding built density and time of day. Integrating field sensing and GIS can support the planning of pocket parks for thermal comfort and air-quality benefits in compact urban environments.

A Spatial-SHapley Additive exPlanation-Network Framework for Interpreting Electricity Consumption in China (PO40)

Presenter: *Mr. Yiyan Li (The University of Hong Kong, Hong Kong SAR)*

Abstract: Electricity consumption is a key source of greenhouse gas emissions, making it critical to understand what drives it for sustainable energy planning. Existing studies, however, often ignore spatial differences and interactions among drivers. This study develops a Spatial-SHAP-Net framework that incorporates both spatial heterogeneity and interaction effects, tested on 293 Chinese prefecture-level cities from 2017 to 2019. Results show: (1) Nighttime light intensity and GDP are the top two drivers; (2) Central, western, and northeastern regions exhibit more varied primary drivers, while temperature factors matter most in the south; (3) GDP serves as a core intermediary linking other drivers. This work provides a new analytical approach for capturing spatial disparities and driver relationships, offering insights for targeted regional energy policy.

Introduction to Keynote Speakers

Prof. Michael Batty

University College London, United Kingdom

Michael Batty is Bartlett Professor of Planning at UCL and Chair of the Centre for Advanced Spatial Analysis. He has worked on computer models of cities since the 1970s and his most recent book *The Computable City* (2024) is a history of how computers and digital technologies are changing the form and function of cities. From 1979 to 1990, he was Professor of Town Planning at the University of Wales at Cardiff, and from 1990-1995, Associate Director of the NCGIA at the State University of New York at Buffalo. He is a Fellow of the British Academy (FBA) and the Royal Society (FRS), was awarded the CBE in 2004 and the Gold Medals of the RGS in 2015 and the RTPI in 2016. He is a foreign Academician of the China Academy of Sciences and a Foreign Fellow of the Indian National Science Academy.

Brief Summary

Many new developments in computing, in particular the transition from numerical processing to textual modelling, are making deep inroads into geospatial applications. Not one model but many of the same system, increasingly called digital twins, are fast emerging while new forms of big data collected from a huge variety of sensors are dominating new ways to represent and model the geospatial world. Many of these developments are being informed by AI which is rapidly moving from early ideas on machine learning to large language models. This in turn is changing the nature of modelling and is likely to have profound implications for our theories about how cities form and function. In this lecture, I will illustrate many of these ideas using the large scale digital twin of the British urban system that we have been developing over the time when many of these new technologies have been developed.

Introduction to Keynote Speakers

Prof. Deren Li

Academician, Chinese Academy of Science & Chinese Academy of Engineering;
Wu Han University, China

Prof. Deren Li is a scientist in photogrammetry and remote sensing from Wuhan University, China. He enjoys dual memberships of both Chinese Academy of Sciences and Chinese Academy of Engineering. He received doctor degree from University of Stuttgart in 1985 and honorary doctorate from ETH Zürich in 2008. In 2012, International Society for Photogrammetry and Remote Sensing awarded him an Honorary Member, the number of which ISPRS limits to a maximum of ten at any time as the highest honor. In June 2024, he was awarded the national top sci-tech award for the year 2023. He is the honorary director of the academic committee of LIESMARS, director of Collaborative Innovation Center of Geospatial Technology.

Brief Summary

The world is material, matter is in constant motion, and this dynamic physical world is described through spatio-temporal information. In the era of Internet of Everything and artificial intelligence, spatio-temporal data acquisition, processing, information extraction and knowledge mining need to become intelligent. Thus, Prof. Deren Li proposed Spatio-temporal Intelligence. Spatio-temporal Intelligence can automatically answer questions of When, Where, What Object, What Change, Why and What Reaction. Spatio-temporal Intelligence is also integral to service science, intelligently delivering right data, information, and knowledge to right people at right place and right time. This paper will describe how Spatio-temporal Intelligence brings artificial intelligence into the physical world.

Introduction to Keynote Speakers

Prof. Michael Goodchild

University of California, Santa Barbara, United States

Michael F. Goodchild is Professor Emeritus of Geography at the University of California, Santa Barbara. He received his BA degree from Cambridge University in Physics in 1965 and his PhD in Geography from McMaster University in 1969. His research and teaching interests focus on geographic information science, including uncertainty in geographic information, discrete global grids, and volunteered geographic information. He was elected member of the US National Academy of Sciences in 2002, and Foreign Member of the Royal Society and Corresponding Fellow of the British Academy in 2010. He has published over 600 books and articles.

Brief Summary

The practice of GIS is being revolutionized by advances in AI and Big Data. We are being overwhelmed by the volume, variety, and velocity of data, and by new forms of data that allow us to ask new kinds of questions. Generative AI is prompting new concerns about ethics, about the user experience, about privacy, and about employment. Foundation models are being promoted as a replacement for traditional modeling and prediction, and syllabi for GIS are being rethought and redesigned, in response to questions about the future of GIS expertise. Yet the basic principles of GIScience remain largely unchallenged by this essentially technological progress.

Helpful Information

Conference Registration

The Asia GIS Conference 2026 Registration Desk is located in the **Foyer of Jockey Club Auditorium.** Please be sure to pick up your Name Tag, Latest Programme Booklet, and Programme Leaflet if available, which will update you on the latest changes of the programme.

The Registration Desk will be staffed during the following hours:

20 October: 14:00-18:00

21 October: 8:30-18:00

22 October: 8:30-17:00

Presentation Tips

- Each parallel session contains 4-5 papers. Each presenter has 15 minutes to present the paper, followed by Q&A.
- In 15 minutes you can typically present about five double-spaced pages at a pace that listeners can comfortably follow.
- Do not attempt to read your paper. Do not turn your back to the audience to read a projected text and do not read out what your audiences can read for themselves.
- Indicate at the beginning of your talk if you will distribute your paper in hard copy at the end of the session or if you are willing to send electronic versions when you return home.
- Concentrate on what is new, interesting and different rather than providing full theory and methodology.
- If you have any concerns about setting up your presentation, please go to the session room 20 minutes before the start of your session to set up your presentation and ask conference staff to assist you before your scheduled presentation.
- If you do experience trouble at the very last minute of your presentation (it happens!) – please step aside immediately and offer the time to another presenter while you work out your trouble – and do not hesitate to ask us for help. We will do what it takes to get you up and going.

Session Chair Guideline

- Please arrive at the session room ten minutes prior to the scheduled starting time and introduce yourself to the presenters.
- Inform the presenters of the maximum time that they can use for their paper presentation. This time can vary depending on the number of papers in the session and whether there is a discussant requiring time to respond.
- A helper in the room will help you to monitor the time of the presentations by showing last 5 minutes, 3 minutes and STOP signs to the paper presenters.
- When introducing the session - please be brief - tell the audience how many papers will be presented, how long each presentation will be and whether there will be time for questions.
- For each paper, introduce the author and the title of the paper.
- In managing the Q&A-time, please ask questioners to identify themselves and to keep their comments as short as possible to allow the presenters to respond in full.
- Please ensure the session finishes on time. Sessions that overrun will affect next sessions.

Useful Information

Emergency

- Emergency Service (Police, Fire, Ambulance) 999

Info Lines

- Telephone Directory Enquiries 1081
- Hong Kong Tourism Board Visitor Hotline 2508-1234
- Weather Information 187-8200
- Overseas IDD and Cardphone Enquiries 10013
- Department of Health 2961-8989
- Consumer Council 2929-2222
- Hong Kong International Airport 2181-0000
- Transport Complaints Unit 2889-9999

Tourist Information

- Hong Kong Tourism Board website www.discoverhongkong.com

Zika Virus Infection

The Alert Response Level under the Government's Preparedness and Response Plan for the Zika Virus Infection is activated.

For personal protection, the followings are essential:

- Prevent mosquito proliferation
- Take additional preventive measures when engaging in outdoor activities
- Pregnant women and women preparing for pregnancy should not travel to areas with ongoing Zika virus transmission

Check out the website of Centre for Health Protection(www.chp.gov.hk/) for guidelines and updates. You can also call the Enquiry Hotline (2125-1111) which is operating 24 hours for more details.

Hospital

In case you do not feel well, it is for your and other people's good that you go to hospital immediately. The closest hospital is **Queen Elizabeth Hospital:**

Queen Elizabeth Hospital

30 Gascoigne Road, King's Park, Kowloon

Tel: 3506 8888

You may browse the *"Estimated waiting time of all A&E department upon arrival"* online at Accident & Emergency Waiting Time.

Local Organizer:

Hong Kong Geographic Information System Association — HKGISA

THE HONG KONG INSTITUTE OF SURVEYORS 香港測量師學會 — HKIS

Co-Organizer(s):

AsiaGIS Association — Asia GIS Association

IGU UGI — IGUUGI

Location of The Hong Kong Polytechnic University

The Hong Kong Polytechnic University (PolyU) is conveniently situated in the heart of the city, making it easily accessible by various means of public transportation:

- **By MTR:**
  Alight at Hung Hom Station on the East Rail Line or Tuen Ma Line, then take the footbridge at Exit D1 or A1 to reach the campus.
- **By Bus:**
  Option 1: Take any tunnel bus passing through the Cross Harbour Tunnel and alight at the Cross Harbour Tunnel Toll Plaza bus stop. Then, take the footbridge to reach the campus. Option 2: Take any bus route that stops at the Hong Kong Polytechnic University bus stop on Cheong Wan Road, which is the main entrance of PolyU.
- **By Taxi**
  Hail an urban red taxi and request to be dropped off at our main entrance on Cheong Wan Road.

From Hong Kong International Airport to PolyU

The Hong Kong Polytechnic University (PolyU) is conveniently situated in the heart of the city, making it easily accessible by various means of public transportation:

- **By MTR:**
  First take Airport Express from Hong Kong International Airport to Tsing Yi Station. Next interchange to Tung Chung Line for Hong Kong Station at Tsing Yi Station Platform 4. Then interchange to Tuen Ma Line for Wu Kai Sha Station at Nam Cheong Station Platform 2. Get off at Hung Hum Station and take the footbridge at Exit A1 or D1 to the campus. A single journey takes around 40 minutes for the ride and costs HK$65 (with *Octopus*)/HK$82.5 (without Octopus). For more details, please read the *MTR website*.
- **By Bus:**
  Take Cityflyer route A21 from Airport (Ground Transportation Centre) Bus Terminus to Hung Hom Station. Take the footbridge at Hung Hom Station Exit D1 or A1 that leads you to the campus. It takes around 75 mins for the ride and costs HK$34.6. For more details, please read the *Citybus & NWFB website*.
- **By Taxi:**
  Take Urban red taxis to go to PolyU and drop off at the main entrance at Cheong Wan Road. It costs around HK$280 and takes around 45 mins for the ride. Additional charges occur for large baggage. The toll and return toll are both payable by a passenger for cross-harbour hiring. For details, please read *taxi fare*.

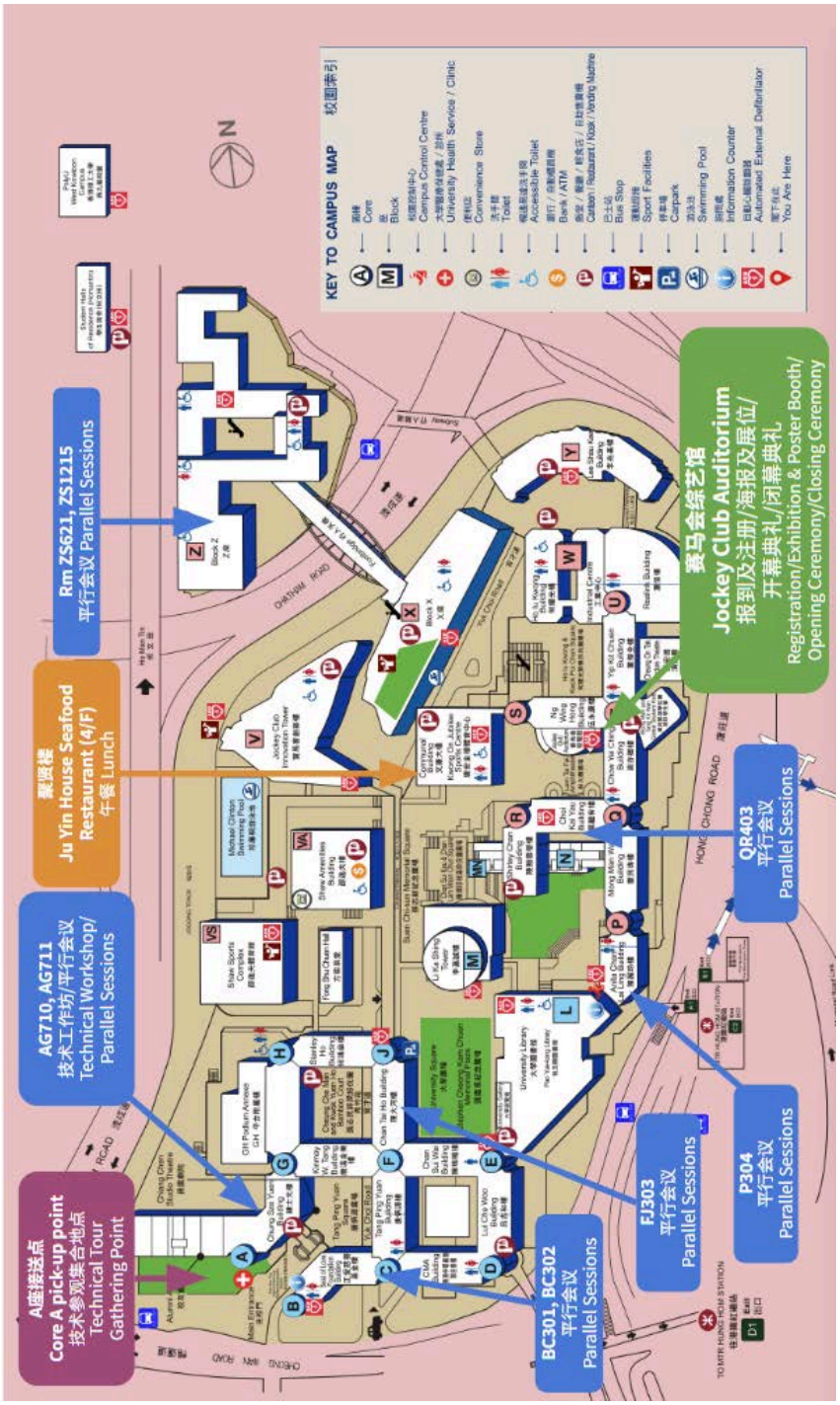
From the West Kowloon High-Speed Rail Station to PolyU

The Hong Kong Polytechnic University (PolyU) is conveniently situated in the heart of the city, making it easily accessible by various means of public transportation:

- **By MTR:**
  From the West Kowloon High-Speed Rail Station, take the Tuen Ma Line bound for Wu Kai Sha Station. Alight at Hung Hom Station and take the footbridge at Exit A1 or D1 to reach the campus. The journey takes approximately 5 minutes and costs HK $5.5 (with an Octopus) or HK$6.5 (without Octopus). For more details, please refer to the *MTR website*.
- **By Taxi:**
  Hail an urban red taxi at the West Kowloon High-Speed Rail Station and request to be dropped off at PolyU's main entrance on Cheong Wan Road. The journey takes approximately 10 minutes and costs around HK$45. Additional charges may apply for large

baggage. For details, please refer to the *taxi fare*.

Venue Map



Local Organizer:

Hong Kong Geographic Information System Association — HKGISA

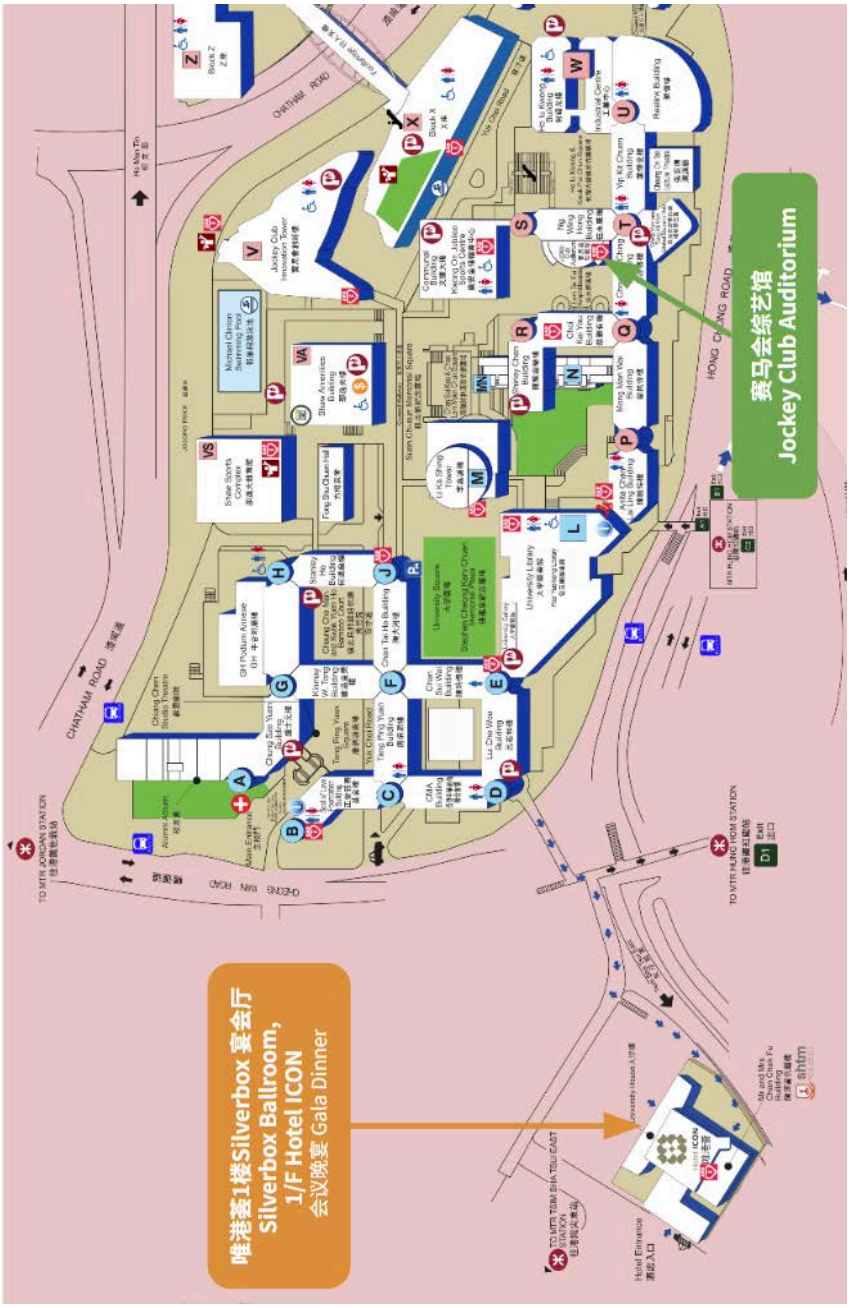
THE HONG KONG INSTITUTE OF SURVEYORS 香港測量師學會 — HKIS

Co-Organizer(s):

AsiaGIS Association — Asia GIS Association

IGU UGI — IGUUGI

Location Map of Gala Dinner



Free Wi-Fi is available at The Hong Kong Polytechnic University

(3) Wi-Fi.HK

SSID	Service locations	Eligible users	Login ID & Password
Wi-Fi.HK via PolyU	• PolyU Campus	• Visitors	Not require Login ID and Password (2 hours per session free Wi-Fi access. Need to re-connect after 2 hours connection time.)

Information about Jockey Club Auditorium

Location

Jockey Club Auditorium is conveniently located within the campus of The Hong Kong Polytechnic University, adjacent to a network of public transportation with Hong Kong Cross Harbour Tunnel, MTR Hung Hom Station and a wide selection of restaurants and hotels in its proximity.

Catering Facilities

Lawn Café - G/F & 1/F Block N

Mon - Fri: 8:00am - 9:00pm

Sat: 8:00am - 6:00pm

Sun / Public Holiday: 10:00am - 6:00pm

American Diner - Podium Courtyard, FGHJ Core

Mon - Fri: 8:00am - 10:00pm

Sat: 8:00am - 6:00pm

Sun / Public Holiday: 10:00am - 6:00pm

WY Kiosk - Podium Courtyard, Core WY

Mon - Sat: 7:30am - 7:30pm

Sun / Public Holiday: Closed

Special Admission for Disabled

Wheelchair user spaces, accessible restrooms and lift are available at the Auditorium. If a special admission arrangement for the disabled is needed, please contact us at 2766 7100 in advance.