Mingke Erin Li, Ph.D.

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Education

2023 Ph.D., Geomatics Engineering, University of Calgary, Canada

2019 M.Sc., Forestry, University of New Brunswick, Canada

2017 B.Sc., GIScience, Nanjing Forestry University, Nanjing, China

Research Interests

Discrete Global Grid Systems
Geographic Information Science
Spatial Databases and Spatial Data Mining
GeoAI
Digital Earth
Environmental Modeling

Peer-reviewed Publications

2025 **Li, M.**; Liang, S.H.L. Harmonized Global to Regional Gridded Methane Inventories in A Discrete Global Grid Framework. *Earth System Science Data*.

2025 **Li, M.**; Liang, S.H.L. Enabling a Digital Earth for Methane Emissions Management with Equal-Area Discrete Global Grids. *International Journal of Digital Earth*. Accepted.

2025 Liao, C.; Engwirda, D.; Cooper, M.; **Li, M.**; Fang, Y. Discrete Global Grid System-based Flow Routing Datasets in the Amazon and Yukon Basins. *Earth System Science Data*. 17(5), 2035–2062.

2024 **Li, M.**; Tousignant, C.; Chaudhuri, C.; Chabbouh, A. Utilizing Serverless Framework for Dynamic Visualization and Operations in Geospatial Applications. *International Journal of Digital Earth.*17(1), 2392835.

2024 Liu, J.; Li, J.; Qiao, L.; **Li, M.**; Stefanakis, E.; Zhao, X.; Huang, Q.; Wang, H.; Zhang, C. QuadGridSIM: A Quadrilateral Grid-based Method for High-performance and Robust Trajectory Similarity Analysis. *Transactions in GIS*. 00, 1–25.

2022 **Li, M.**; McGrath, H.; Stefanakis, E. Multi-scale Flood Mapping under Climate Change Scenarios in Hexagonal Discrete Global Grids. *ISPRS International Journal of Geo-Information.* 11(12), 627.

2022 **Li, M.**; McGrath, H.; Stefanakis, E. Topographic Operations in Hexagonal Discrete Global Grid Systems. *International Journal of Applied Earth Observation and Geoinformation*. 113, 102985.

2022 **Li, M.**; McGrath, H.; Stefanakis, E. Geovisualization of Hydrological Flow in Hexagonal Grid Systems. *Geographies.* 2(2), 227-244.

2021 **Li, M.**; McGrath, H.; Stefanakis, E. Integration of Heterogeneous Terrain Data into Discrete Global Grid Systems. *Cartography and Geographic Information Science*. 48(6), 546-564.

2020 **Li, M.**; Stefanakis, E. Geospatial Operations of Discrete Global Grid Systems – A Comparison with Traditional GIS. *Journal of Geovisualization and Spatial Analysis.* 4(2), 26.

2020 **Li, M.**; Stefanakis, E. Geo-feature Modeling Uncertainties in Discrete Global Grids: A Case Study of Downtown Calgary, Canada. *Geomatica.* 74, 175-195.

2020 **Li, M.**; MacLean, D.A.; Hennigar, C.R.; Ogilvie, J. Previous Year Outbreak Conditions and Spring Climate Predict Spruce Budworm Population Changes in the Following Year. *Forest Ecology and Management.* 458, 117737.

2019 **Li, M.**; MacLean, D.A.; Hennigar, C.R.; Ogilvie, J. Spatial-Temporal Patterns of Spruce Budworm Defoliation within Plots in Québec. *Forests.* 10, 232.

Conference Presentations

2025 **Li, M.E.**; Liang, S.H.L. Talking to the Planet: Natural Language x Digital Earth for Disasters. Oral presentation at the 133rd OGC Member Meeting - Innovation Summit, Oct. 2025, Boulder, U.S.

2025 **Li, M.E.**; Liang, S.H.L. Ask, Retrieve, Analyze: A Multi-Agent DGGS Framework for GenAI-Driven Methane Data. Oral presentation at the 133rd OGC Member Meeting - Discrete Global Grid Systems DWG, Oct. 2025, Boulder, U.S.

2025 **Li, M.E.**; Liang, S.H.L. Standardizing Spatial Intelligence for Gridded Methane Inventories: DGGS Meets EmissionML. Oral presentation at the 132nd OGC Member Meeting - EmissionML SWG, Jun. 2025, Online.

2025 **Li, M.E.**; Liang, S.H.L. Beyond the Graticule: Spatially Explicit Methane Inventories Using Discrete Global Grids. Oral presentation at the 132nd OGC Member Meeting - Discrete Global Grid Systems DWG, Jun. 2025, Online.

2025 **Li, M.E.**; Liang, S.H.L. Beyond the Graticule: Spatially Explicit Methane Inventories Using Discrete Global Grids. Oral and poster presentation at CanCH4 Symposium, May 2025, Ottawa, Canada.

2024 **Li, M.E.**; Liang, S.H.L. Mapping Methane: A Review of Bottom-up Gridded Inventories. Oral presentation at the 130th OGC Member Meeting - EmissionML ad-hoc, Nov. 2024, Online.

2023 **Li, M.**; McGrath, H.; Stefanakis, E. Flood susceptibility analysis on hexagonal grid meshes: a case study in southern New Brunswick, Canada. Poster presentation at GIS in Education and Research Conference, Mar. 2023, Toronto, Canada.

2022 **Li, M.**; McGrath, H.; Stefanakis, E. Analytical operations for terrain data modeled in Discrete Global Grid Systems. Oral presentation at Canadian Cartographic Association Annual Conference, May 2022, Online.

2021 **Li, M.**; McGrath, H.; Stefanakis, E. Integration of multi-source terrain data on Discrete Global Grids in Canada. Oral presentation at Canadian Cartographic Association Annual Conference, May 2021, Online.

2020 **Li, M.**; Stefanakis, E.; McGrath, H. National terrain data management on Discrete Global Grids in Canada. Oral presentation at AutoCarto 2020, Oct. 2020, Online.

2018 **Li, M.**; MacLean, D.A.; Hennigar, C.R.; Ogilvie, J. Spatial-tempol patterns of spruce budworm defoliation within measured plots in Québec. Oral presentation at the 9th Bi-Annual Eastern Canada - USA Forest Science Conference, Oct. 2018, Fredericton, Canada.

2018 **Li, M.**; MacLean, D.A. GIS analyses of factors influencing spruce budworm outbreak initiation in northern New Brunswick. Oral presentation at SERG International Workshop, Feb. 2018, Edmonton, Canada.

Other Invited Talks

2025 Discrete Global Grid Systems (DGGS) and Their Role in Methane Emission Inventories. Presented at the Monthly Lunch and Learn at SensorUp Inc., May 2025, Online.

2022 Flood Susceptibility Modeling in Discrete Global Grids under Climate Change Scenarios. Presented at the Canada Centre for Mapping and Earth Observation, Natural Resources Canada, Oct. 2022, Online.

2022 Geospatial Data Analysis in Discrete Global Grid Systems – Progress and Perspectives. Presented at the China Agricultural University, May 2022, Online.

2022 Quantization, Analysis, and Application of Terrain Data Modeled in Discrete Global Grid Systems. Presented at the International Society for Photogrammetry and Remote Sensing Working Group IV/7 (Geo-Data Management) Webinar, Jan. 2022, Online.

2021 Integration Platform for Canadian Terrain Data: A DGGS Perspective. Presented at the Canada Centre for Mapping and Earth Observation, Natural Resources Canada, Apr. 2021, Online.

Work Experience

2024-present *Postdoctoral Associate, University of Calgary*

- Enhance the quality of gridded methane emission inventories in the oil and gas sectors by Discrete Global Grid Systems.
- Development of the Emission Event Modeling Language, an emerging OGC standard that has the potential for global impact in leveraging geospatial sensing data for emissions reduction.
- Development of a scalable geospatial intelligence framework that integrates DGGS and generative AI to enable dynamic, location-aware querying and interpretation of methane emissions data.

2023-2024 *Geospatial Scientist, Geosapiens Inc.*

- Large-scale DEM modeling with forests and buildings removed using XGBoost.

- On-the-fly operations and visualization on serverless AWS Lambda powered by Discrete Global Grid Systems.
- Coastal flood model development and fluvial flood model calibration based on Height Above the Nearest Drainage model.
- Flood defense model development using feature identification in 2D geospatial fields.

2020-2023 *Lab Instructor, Department of Geomatics Engineering, University of Calgary*

- ENGO 351 Introduction to Geospatial Information Systems.
- ENGO 451 Design and Implementation of Geospatial Information Systems.

2022 *Research Internship, Canada Centre for Mapping and Earth Observation, Natural Resources Canada*

- Flood susceptibility mapping under climate change – a part of the National Flood Hazard Identification and Mapping Program.

2020-2022 *Research Assistant, Department of Geomatics Engineering, University of Calgary*

- Large network analysis component in the project evaluating the impact of gasoline station infrastructure contraction on stranded assets.
- Flood susceptibility modeling by machine learning in hexagonal grid systems.
- Automating geospatial data extraction via web services and multi-format data integration.

2017-2018 *Teaching Assistant, Faculty of Forestry and Environmental Management, University of New Brunswick*

- ENVS 6008 Management of Natural Systems.
- FOR 2281 Introduction to GIS with Applications in Environmental Management I.
- FOR 2282 Introduction to GIS with Applications in Environmental Management II.
- GIS Training for Natural Resource Professionals Workshop.

Awards & Honors

2022 Canadian Cartographic Association Best Presentation Award

2022 Esri Young Scholars Award – First Runner-up

2021-2022 CRSNG-CREATE DOTS Program Award

2021 Esri Canada Centre of Excellence App Challenge – First Runner-up

2020-2021 Geomatics Engineering Department FGS Award at the University of Calgary

2018 SERG International Graduate Student Award

Memberships

2025-present OGC EmissionML SWG

2024-present ISPRS WG IV/12 Grid Modelling for Full-space Integration and Calculation

2024-present	OGC Discrete Global Grid Systems DWG & SWG
2022-2023	Canadian Cartographic Association
2022-2023	Association of Canadian Map Librarians and Archivists
2021-2022	ISPRS WG IV/4 Data Management for Spatial Scenarios
2019-2023	Esri Canada Centre of Excellence