

**Mingke Erin Li, Ph.D.**[mingke.li@ucalgary.ca](mailto:mingke.li@ucalgary.ca)**Education**

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- 2023 Ph.D., Geomatics Engineering, University of Calgary, Canada  
2019 M.Sc., Forestry, University of New Brunswick, Canada  
2017 B.Sc., Geographic Information Science, Nanjing Forestry University, Nanjing, China

**Research Interests**

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

**Peer-reviewed Publications**

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- 2026 **Li, M.E.**; Liang, S.H.L. Harmonized Global to Regional Gridded Methane Inventories in A Discrete Global Grid Framework. *Scientific Data*. Under review.
- 2026 Liao, C; **Li, M.**; Little B. uraster: Structured Raster to Unstructured Mesh. *The Journal of Open Source Software*. Under review.
- 2026 **Li, M.E.**; Liang, S.H.L. Natural Language to DGGS-Aware Methane Insights with a Multi-LLM-Agent Framework. *Proceedings in Spatial Knowledge and Information Canada 2026*. xx(xx): xx. <https://doi.org/xxx>.
- 2026 **Li, M.E.**; Liang, S.H.L. Enabling a Digital Earth for Methane Emissions Management with Equal-Area Discrete Global Grids. *International Journal of Digital Earth*. 19(1), 2607210.
- 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.**; Stefanakis, E.; McGrath, H. National Terrain Data Management on Discrete Global Grids in Canada. *AutoCarto2020*.
- 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

- 2026 **Li, M.E.**; Liang, S.H.L. Natural Language to DGGS-Aware Methane Insights with a Multi-LLM-Agent Framework. Oral presentation at the 9th Conference on Spatial Knowledge and Information (SKI) Canada, Feb. 2026, Banff, Alberta, Canada.
- 2025 **Li, M.E.**; Liang, S.H.L. Talking to the Planet: Natural Language x Digital Earth for Disasters. Oral presentation at the 133<sup>rd</sup> 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 133<sup>rd</sup> 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 132<sup>nd</sup> 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 132<sup>nd</sup> 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 130<sup>th</sup> 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-temporal patterns of spruce budworm defoliation within measured plots in Québec. Oral presentation at the 9<sup>th</sup> 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

- 2026 Introduction to Discrete Global Grid Systems (DGGS). Guest lecture at ENGO 551 Advanced Spatial Topics. University of Calgary. Jan 2026.
- 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.
- 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.
- 2022 Geospatial Data Analysis in Discrete Global Grid Systems – Progress and Perspectives. Presented at the China Agricultural University, May 2022.
- 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.
- 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.

### 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 Discrete Global Grid Systems 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.

- 2020-2023

- Flood defense model development using feature identification in 2D geospatial fields.

*Sessional 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

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| 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

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| 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   |