Jianbo Long - Curriculum Vitae

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Research Interests Keywords

Geophysical EM methods; modelling and inversion computation; numerical algorithms; magnetotelluric; joint inversion; finite element; meshfree; surface geometry inversion; unstructured meshes; water resources; geohazards; carbon reduction; mineral resources and other applications

Education

Ph.D., Geophysics

2020: Memorial University of Newfoundland, St. John's, Canada

Thesis: Forward modelling geophysical EM data using meshfree methods

(see URL: `http://research.library.mun.ca/id/eprint/14512`)

M.Sc, Geophysics

2014, Central South University, China

Thesis: 2-D minimum-structure inversion of time-domain airborne electromagnetic data using finite element method and nonlinear conjugate gradient optimization

B.Sc with major Applied Geophysics

2011, Central South University, China

Research/work experience

05. 2022 - present: **Postdoc Research Associate**. New research topic: Modelling of marine electromagnetic data with various applications in geological studies. (Memorial University of Newfoundland, Canada; NTNU, Norway)

09. 2021 - 03. 2022: **Senior Research Assistant**. New research topic: Surface geometry inversion of 3-D electromagnetic (magnetotelluric) and other geophysical data (seismic and potential) with unstructured discretizations for various near-surface applications. (Mount Allison University, Department of Mathematics and Computer Science, Canada)

05. 2020 - 09. 2021: **Postdoc Researcher**. Research topics: Investigation of geophysical electromagnetic computer modelling approaches for thin conductors, with industrial applications in mineral deposit explorations. 3-D geophysical electromagnetic data inversion based on unstructured tetrahedral meshes using finite element methods. (Memorial University of Newfoundland, Department of Earth Sciences, Canada)

2014-2020: (**Ph.D. thesis**) Development of new computer modelling software for 3-D geophysical electromagnetic data over Earth models with complex geometries. (Memorial University of Newfoundland, Department of Earth Sciences, Canada)

2012-2014: (**M.Sc thesis**) Development of algorithms and software for forward modelling and inverting 1-D and 2-D geophysical electromagnetic data. (Central South University, Department of Geosciences and Info-physics, China)

2012-2014: **(Field Geophysicist)** Data acquisition in field and data processing using software (e.g., Geosoft Oasis montaj, EMIT Maxwell) for potential field (gravity & magnetic), seismic, and electromagnetic (MT, transient) exploration methods. (Central South University, Department of Geosciences and Info-physics, China)

Teaching experience

2019: Teaching assistant for course PHYS 1050 (first-year undergraduate course), Department of Physics and Physical Oceanography, Memorial University.

2019: Instructor for the mini-enrichment course *A Story of Gravity* for high school students from Newfoundland and Labrador English School District (NLESD). (Geoscience outreach and education)

2019: Tutor at Aboriginal Resource Office, Memorial University, for undergraduate and graduate students with physics and math courses.

Peer-reviewed publications:

In preparation

Long, J. and S. Wang, A potential function approach for modelling 3-D magnetotelluric responses with 2-D boundary surfaces in an Earth model, *To be submitted to GJI*.

Long, J. and S. Wang, Coastal effect in 3-D marine magnetotelluric data.

Long, J. and C.G. Farquharson, Hybrid meshfree and finite-element modelling of 3-D magnetotelluric and controlled-source electromagnetic data.

Long, J., P. Lelievre and C.G. Farquharson, Surface geometry inversion for sharp boundaries: magnetotelluric examples.

Published

Long, J. and C.G. Farquharson, 2019, On the forward modelling of three-dimensional magnetotelluric data using a radial basis function-based mesh-free method: *Geophysical Journal International*, 219, 394 - 416.

Long, J. and C.G. Farquharson, 2019, Three-dimensional forward modelling of gravity data using mesh-free methods with radial basis functions and unstructured nodes: *Geophysical Journal International*, 217(3), 1577 - 1601.

Qiang, J., K. Man, **J. Long**, K. Lu, Y. Zhu, L. Chen, J. Li and X. Mao, 2016, 2.5-D inversion of time domain airborne electromagnetic data using nonlinear conjugate gradients: *Chinese Journal of Geophysics* (in Chinese), 59(12), 4701 - 4709.

Long, J. and J. Qiang, 2013, A research on continued fraction algorithm for calculating 1-D airborne transient electromagnetic field: *Journal of HuNan Science and Technology University* (in Chinese), 28(4), 86 - 91.

Qiang, J., Y. Li and **J. Long**, 2013, 1-D Occam inversion for airborne transient electromagnetic data: *Computing Techniques for Geophysical and Geochemical Exploration* (in Chinese), 20, 340 - 353.

Technical conference abstracts and proceedings:

Surface Geometry Inversion of Geophysical Electromagnetic Data, **J. Long**, P. Lelievre and C.G. Farquharson, December, 2023, *AGU Fall Meeting (submitted)*.

Advancing High-Performance Forward Modelling of Geophysical Electromagnetic Data Using Open-Source Packages, **J. Long**, December, 2023, *AGU Fall Meeting (submitted)*.

Accurate modelling of marine magnetotelluric data using high-order finite element methods, **J. Long** and S. Wang, 2023, *28th General Assembly of the International Union of Geodesy and Geophysics (IUGG), Berlin, Germany (11-20 July 2023)*.

Modelling 3D coast effects in marine magnetotelluric data using edge-based finite element method, **J. Long** and S. Wang, 2022, *25th Electromagnetic Induction Workshop (EMIW)*.

Meshfree modelling of 2-D MT data with RBF-FD and unstructured points, **J. Long** and C.G. Farquharson, 2020, *SEG Annual Meeting Expanded Abstract (90th International Meeting and Exhibition)*.

Meshfree modelling of 3-D controlled-source EM data: A new method to treat the singular source terms, September, 2019, **J. Long** and C.G. Farquharson, *Society of Exploration Geophysicists (SEG) 89th International Meeting Expanded Abstracts*.

Three-dimensional magnetotelluric modelling with an RBF-based meshfree method and unstructured points, August, 2018, **J. Long** and C.G. Farquharson, *24th EM Induction Workshop*, Helsingør, Denmark.

Computational modelling of geophysical data without meshing the physical model, February, 2018, **J. Long** and C.G. Farquharson, *Geological Association of Canada (GAC) - Newfoundland Annual Technical Meeting*, St John's, Canada.

Electromagnetic forward modelling for realistic Earth models using unstructured tetrahedral meshes and a meshfree approach, December, 2017, C.G. Farquharson, **J. Long**, X. Lu and P.G. Lelièvre, AGU Fall Meeting, New Orleans.

A three-dimensional RBF-FD solver for modelling geophysical gravity data with unstructured nodes, September, 2017, **J. Long** and C.G. Farquharson, *9th International Workshop of Meshfree Methods for Partial Differential Equations*, Bonn, Germany.

Three-dimensional controlled-source EM modelling with radial basis function-generated finite differences: A meshless approach, September, 2017, **J. Long** and C.G. Farquharson, *Society of Exploration Geophysicists (SEG) 87th International Meeting Expanded Abstracts*.

Geophysical electromagnetic data modelling with radial basis function generated finite differences, March, 2017, **J. Long** and C.G. Farquharson, *6th International Symposium on Three-Dimensional Electromagnetics (3-D EM)*, Berkeley, CA.

Open-source Software and Codes

* 2-D EM (magnetotelluric) forward modelling code with finite element method.
  (see URL: https://github.com/InfinityHub/FE2D_DomainDecop)

Professional Activities

Professional Volunteering

Reviewer for peer-reviewed journals: Pure and Applied Geophysics, Computer & Geosciences, Geophysical Journal International, Journal of Computing Physics, Scientific Reports, Journal of Applied Geophysics, Physics of the Earth and Planetary Interiors

Reviewer for SEG Annual Meeting (now IMAGE) Technical Abstracts Program – sessions: Mineral Resources; EM Methods

Conference presentations

Presenter at the 28th General Assembly of the International Union of Geodesy and Geophysics (IUGG), July, 2023, Berlin, Germany.

Presenter at the 25th Electromagnetic Induction Workshop (EMIW), September, 2022, Cesme, Turkey.

Presenter at the 90th SEG Annual Meeting, October, 2020 (virtual).

Presenter at the 24th Electromagnetic Induction Workshop (EMIW), August, 2018, Helsingør, Denmark.

Presenter at GAC - Newfoundland Annual Technical Meeting, February, 2018, St John's, Canada.

Attendee at the Exploration 17: Decennial Minerals Exploration Conferences (DMEC), October, 2017, Toronto, Canada.

Presenter at the 9th International Workshop of Meshfree Methods for Partial Differential Equations, September, 2017, Bonn, Germany.

Presenter at the 87th SEG Annual Meeting, September, 2017, Houston, TX.

Presenter at the 6th International Symposium on Three-Dimensional Electromagnetics (3-D EM), March, 2017, Berkeley, CA, USA.

Attendee at the 5th International Conference of Environmental and Engineering Geophysics, June, 2012, Changsha, China.

Presenter at the 27th Annual Meeting of Chinese Geophysical Society (CGS), October, 2011, Changsha, China.

Affiliations

Member of the Society of Exploration Geophysicists (SEG), 2012-2021, 2023-present.

Academic Awards & Honours

Awards

2023: Grosserer, Cand. Jur. Halvdan Bjørum's Legacy scholarship for geology study, NTNU

2019: Fellow of the School of Graduate Studies, Memorial University

2014 - 2018: School of Graduate Studies Fellowship, Memorial University

2012 - 2013: Ji Shan Award, Central South University

2011: First prize in National Mathematical Contest in Modelling (graduates group), China

2009: National Endeavor Scholarship for undergraduates, China

2008: National Scholarship for undergraduates, China

Honours

2020: Pass with Distinction for doctoral thesis defense, Memorial University

2011: Excellent College Graduate, Central South University

2009: Excellent College Student, Central South University

2008: Best Individual winner in the Geoscience Knowledge Contest 2008 (undergraduates group), Central South University