Xiaolong Wei

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Education

2018–2022 **Ph.D. in Geophysics**, University of Houston, Houston, USA

2015–2018 **M.S. in Geology**, Northwest University, Xi'an, China

2011–2015 **B.S. in Geophysics**, China University of Geosciences, Beijing, China

Professional Appointment

2023–present **Postdoctoral Research Fellow**, Stanford University, Stanford, USA

Research Interests

- Geophysical separate and joint inversions
- Uncertainty analysis
- Critical mineral exploration
- Geology differentiation
- Decision driven geophysics
- Deep learning algorithms applied to geophysical and/or geological interpretations

Grants

2020–2021 $1,000; Proposal:"Uncertainty Analysis of Geophysical Inversions Conditioned on Spatial Distributions of Geologic Units"; Student Research Funding Program (independent of advisor) from EAS Department at University of Houston; PI: Xiaolong Wei

Awards & Honors

2022	Dan E. Wells Outstanding Dissertation Award, University of Houston, Houston, USA
2022	The Innovation Prize in Frank Arnott - Next Generation Explorers Award ($3,000CAD)
2022	SEG Lucien LaCoste Scholarship ($5,305.12)
2022	Outstanding Graduate Work in Geophysics, University of Houston, Houston, USA ($1,250)
2022	The Best Paper in the Mining Sessions at 2021 IMAGE Annual Meeting, Denver, CO, USA (co-author)
2022	The Best Student Paper in the Mining Sessions at 2021 IMAGE Annual Meeting, Denver, CO, USA
2021	Student Travel Award, University of Houston, Houston, USA
2021	SEG Technical Program Registration Grant
2021	SEG John R. Butler Jr. Scholarship ($510.86)
2021	The Best Poster in the Mining Sessions at 2020 SEG Annual Meeting, Online
2020–2021	Outstanding Academic Achievement, University of Houston, Houston, USA ($700×2)
2016–2018	The First Prize Scholarship, Northwest University, Xi'an, China (×3)
2015	The Best Bachelor Thesis, China University of Geosciences, Beijing, China
2013	The Second Prize Scholarship, China University of Geosciences, Beijing, China

Professional Service & Outreach

Peer-Reviewer

2023–present	Geophysical Prospecting
2022–present	Geocarto International, SEG Conference Proceeding
2021–present	Geophysics, Geophysical Journal International, IEEE Transactions on Geoscience and Remote Sensing, Acta Geophysica

Conferences

2022	Session Chair for GM 1: Inversion Insights at IMAGE Annual Meeting, Houston, Texas, USA
2021	Session Chair for MG P1: New Methods and Case Histories 1 at IMAGE Annual Meeting (SEG and AAPG joint annual conference), Denver, Colorado, USA

Affiliations

2022–Present	European Geosciences Union (EGU)
2021–Present	Geophysical Society of Houston (GSH)
2020–Present	American Geophysical Union (AGU), European Association of Geoscientists & Engineers (EAGE)
2018–Present	Society of Exploration Geophysicists (SEG)

Others

2020–2021	Contributor of the joint inversion code to SimPEG (https://simpeg.xyz/)

Publications

Peer-reviewed

7. **Wei, X.**, Sun, J. and Sen, M., 2022 Quantifying uncertainty of salt body shapes recovered from gravity data using trans-dimensional Markov chain Monte Carlo sampling. *Geophysical Journal International*, 232(3), pp.1957-1978. doi:10.1093/gji/ggac430

6. **Wei, X.**, Li, K. and Sun, J., 2021 Mapping critical mineral resources using airborne geophysics, 3D joint inversion and geology differentiation: A case study of a buried niobium deposit in the Elk Creek carbonatite, Nebraska, USA. *Geophysical Prospecting*. doi:10.1111/1365-2478.13280

5. **Wei, X.** and Sun, J., 2021. 3D probabilistic geology differentiation based on airborne geophysics, mixed Lp norm joint inversion and petrophysical measurements. *Geophysics*, 87(4), pp.1-67. doi:10.1190/geo2021-0833.1

4. Hu, Y., **Wei, X.**, Wu, X., Sun, J., Chen, J., Huang, Y. and Chen, J., 2021. A deep learning enhanced framework for multi-physics joint inversion. *Geophysics*, 88(1), pp.1-70. doi:10.1190/geo2021-0589.1

3. **Wei, X.** and Sun, J., 2021. Uncertainty analysis of 3D potential-field deterministic inversion using mixed L p norms. *Geophysics*, 86(6), pp.G133-G158. doi:10.1190/geo2020-0672.1

2. Sun, J. and **Wei, X.**, 2020. Recovering sparse models in 3D potential-field inversion without bound dependence or staircasing problems using a mixed Lp-norm regularization. *Geophysical Prospecting*, 69(4), pp.901-910. doi:10.1111/1365-2478.13063.

1. Sun, J., Melo, A., Kim, J.D. and **Wei, X.**, 2020. Unveiling the 3D undercover structure of a Precambrian intrusive complex by integrating airborne magnetic and gravity gradient data into 3D quasi-geology model building. *Interpretation*, 8(4), pp.1-50. doi:10.1190/INT-2019-0273.1.

Conference proceedings

8. **Wei, X.**, Sun, J. and Sen, M., 2022. Trans-dimensional Bayesian gravity inversion and uncertainty analysis for salt reconstruction. In *IMAGE Technical Program Expanded Abstracts 2022*

7. **Wei, X.** and Sun, J., 2021. 3D probabilistic geology differentiation using mixed L p norm joint inversion constrained by petrophysical information. In *IMAGE Technical Program Expanded Abstracts 2021* doi:10.1190/segam2021-3586619.1.

6. **Wei, X.** and Sun, J., 2021. Uncertainty analysis of 3D geophysical inversion using airborne gravity gradient data conditioned on rock sample measurements. In *IMAGE Technical Program Expanded Abstracts 2021* doi:10.1190/segam2021-3586552.1.

5. Hu, Y., **Wei, X.**, Wu, X., Sun, J., Chen, J., Chen, J., Huang, Y., 2021. Deep learning-enhanced multiphysics joint inversion. In *IMAGE Technical Program Expanded Abstracts 2021* doi:10.1190/segam2021-3583667.1.

4. Li, K., **Wei, X.**, Sun, J., 2021. Geophysical characterization of a buried niobium and rare earth element deposit using 3D joint inversion and geology differentiation: A case study on the Elk Creek carbonatite2021. In *IMAGE Technical Program Expanded Abstracts 2021* doi:10.1190/segam2021-3585069.1.

3. **Wei, X.** and Sun, J., 2020. Uncertainty analysis of joint inversion using mixed Lp-norm regularization. In *SEG Technical Program Expanded Abstracts 2020* (pp. 925-929). Society of Exploration Geophysicists. doi:10.1190/segam2020-3428359.1.

2. **Wei, X.** and Sun, J., 2020. Quantifying uncertainties of deterministic geophysical inversions using mixed Lp norms. In *SEG Technical Program Expanded Abstracts 2020* (pp. 1404-1408). Society of Exploration Geophysicists. doi:10.1190/segam2020-3420227.1.

1. Sun, J., Melo, A., Deok Kim, J. and **Wei, X.**, 2020. Characterizing a Precambrian intrusive complex by integrating potential field data into 3D quasi-geology model building. In *SEG Technical Program Expanded Abstracts 2020* (pp. 1374-1378). Society of Exploration Geophysicists. doi:10.1190/segam2020-3428385.1.

Conference abstracts

3. **Wei, X.** and Sun, J., 2021, December. Building 3D probabilistic geology differentiation models using mixed Lp norm joint inversion, airborne geophysics and petrophysical information. In *AGU Fall Meeting Abstracts*.

2. **Wei, X.** and Sun, J., 2021, December. Analyzing uncertainty of 3D inversion using airborne geophysical data conditioned on petrophysical measurements. In *AGU Fall Meeting Abstracts*.

1. Li, K., **Wei, X.**, Sun, J., 2021, December. Characterizing a buried niobium deposit using airborne geophysics, joint inversion, and geology differentiation. In *AGU Fall Meeting Abstracts*.

Open code and data

3. **Wei, X.** and Sun, J., 2021. Joint inversion of gravity gradient and magnetic data using mixed Lp norm regularization (1.0). *Zenodo*. doi:10.5281/zenodo.5774303.

2. **Wei, X.** and Sun, J., 2021. Interactive geology differentiation and 3D visualization of geological units (1.0). *Zenodo*. doi:10.5281/zenodo.5774309.

1. Sun, J., and **Wei, X.**, 2020. Solving the bound dependence and staircasing problems in 3D potential-field sparse inversions using a mixed Lp-norm regularization (1.0). *Zenodo*. doi:10.5281/zenodo.4057134.

Teaching Experience

2020 GEOL7330: Potential Field Methods of Geophysical Exploration (graduate core course), **guest lecturer**. *University of Houston.*

2019 GEOL4355: Geophysical Field Camp, **teaching assistant**. *University of Houston.*

Invited Talks

09/2022 A Bayesian framework for uncertainty quantification of salt body shapes using gravity data. *Geophysical Society of Houston.*

11/2021 Build probabilistic quasi-geology models based on multiple airborne geophysical data and sparse joint inversions (online). *Geophysical Society of Houston.*

09/2021 From deterministic to probabilistic geoscience modeling: analyzing uncertainties of geophysical inversions and constructing probabilistic subsurface models conditioned on petrophysical measurements (online). *SimPEG monthly seminar.*

Certifications

2022 Convolutional Neural Networks course given by Dr. Andrew Ng through Coursera, Inc.

2022 Remote pilot for the small unmanned aircraft system issued by Federal Aviation Administration

2021 FAA Part 107 Knowledge Test Prep for Drone Pilot on Udemy, Inc.

2021 ISInProG@Lario - 2021 International School on Inverse Problems in Geophysics on the shore of the Lario Lake

2021 Magnetotellurics (MT) short course given by Dr. Alan G. Jones

2018 Machine Learning course given by Dr. Andrew Ng through Coursera, Inc.