Diego Domenzain **PhD Geophysics & Seismology • MSc Mathematics**

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Geophysics
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Research scientist specializing in physics-based inverse problems & optimization methods.

- From numerical modeling to joint non-linear optimization.
- Matlab, Python, TensorFlow, PyTorch, Julia, Bash and C.
- Scientific, parallel and cloud computing.
- Combinatoric optimization methods.
- Iterative image processing techniques.
- Deep learning methods for pic2pic mapping.
- Novel imaging techniques using **full waveform inversion (FWI)**.
- Memory and time efficient DC resistivity forward and inverse model.
- Field data survey design and acquisition: radar, and DC resistivity.
- Seismic elastic FWI and gravimetry exploration methods (current project).

Experience

Colorado School of Mines (CSM) 2020 *Post-doctoral Researcher* in the Geophysics Department

- Coupling deep learning and physics-based exploration methods (implementing TensorFlow).
- Field data joint inversion of electromagnetic methods (own code).
- Multi-physics inversion using elastic full-waveform, gravimetry, and DC resistivity data (own code).

Boise State University (BSU) 2015 - 2019 *Ph.D.* Geophysics & Seismology (GPA 3.76/4)

- Joint NSF project with the *Applied Mathematics Department* at BSU.
- Dissertation: *Joint inversion using electromagnetic waves and steady currents*

Michigan Technological University (MTU) 2012 - 2014 *MSc.* Discrete Mathematics (GPA 3.45/4)

- Exploring Finite Geometries and Error Correcting Codes.
- Dissertation: *Maximal arcs, above and beyond*

Publications

Efficient inversion of 2.5D electrical resistivity data using the discrete adjoint method. Geophysics 86, (2021): 1-54. Diego Domenzain, John Bradford, Jodi Mead.

Joint inversion of full-waveform inversion GPR and ER data. Part 1. Geophysics 85, no.6 (2020): 1-72. Diego Domenzain, John Bradford, Jodi Mead.

Joint inversion of full-waveform inversion GPR and ER data. Part 2. Geophysics 85, no.6 (2020): 1-74. Diego Domenzain, John Bradford, Jodi Mead.

* *Inversion of 2.5D electrical resistivity data using the discrete adjoint method*. SEG 2020 Fall meeting. Diego Domenzain, John Bradford, Jodi Mead.

* *Joint inversion of full-waveform GPR and ER data enhanced by the envelope transform and cross-gradients*. GPR 2020 biannual meeting. Diego Domenzain, John Bradford, Jodi Mead.

* *Joint inversion of GPR and ER data*. SEG Technical Program Expanded Abstracts 2018: pp. 4763-4767. SEG Fall meeting 2018. Diego Domenzain, John Bradford, Jodi Mead.

The symbol * denotes expanded abstract.

Professional Activities

Colorado School of Mines. 2019 - present.
Postdoctoral Researcher

- Enhancing geo-radar imaging techniques with machine learning and full-waveform inversion.
- Member of the research groups,
    - Center for Wave Phenomena (CWP)
    - Center for Gravity, Electrical and Magnetic Studies Methods (CGEM)

Boise State University. 2015 - 2019.
Research Assistant

- National Science Foundation (NSF) fully funded project for the development of a joint inversion algorithm using *ground penetrating radar* (GPR) and *electrical resistivity* (ER) data for imaging electrical properties in the Earth's subsurface.
- This grant was given to the *Applied Mathematics Department* for joint collaboration with the *Geophysics Department* at Boise State University.

Teaching Assistant

- Statistical Methods for Geoscience (Graduate)
- Geophysical Methods (Graduate/Undergraduate)
- Geophysical Instrumentation (Graduate/Undergraduate)
- Natural Disasters: A Geoscience Perspective on Natural Hazards, Climate Change, and Society (Undergraduate)

TU-Delft. 2018.
Visiting Scholar

- Academic visit to TU-Delft under the supervision of Evert Slob and Dominique Ngan-Tillard.

Michigan Technological University. 2012 - 2014.
Research Assistant

- Understanding finite fields and embedded mathematical structures.
- A step forward in understanding prime numbers.

Teaching Assistant

- Calculus I (Undergraduate)
- Calculus III (Undergraduate)
- Calculus IV (Undergraduate)

Honors

Teaching assistantship. Boise State University. Teaching assistant for graduate course of Statistical Methods covering tuition and stipend.

Research assistanship. Boise State University. Graduate research assistant for the Applied Mathematics NSF funded project DMS-1418714 covering tuition and stipend.

Research assistanship. Boise State University. Graduate research assistant for the Applied Mathematics NSF funded project DMS-1720472 covering tuition and stipend.

Teaching assistantship. Michigan Tech. Teaching assistant for undergraduate course of Calculus I-IV covering tuition and stipend.

Conferences & Proceedings

Diego Domenzain, John Bradford, Jodi Mead. *Inversion of 2.5D electrical resistivity data using the discrete adjoint method*. SEG 2020 Fall meeting.

Diego Domenzain, John Bradford, Jodi Mead. *Joint inversion of full-waveform GPR and ER data enhanced by the envelope transform and cross-gradients*. GPR 2020 biannual meeting (postponed for 2022 because of COVID-19).

John Bradford, AR Mangel, D Domenzain. *Reverse-Time Migration and Full-Waveform Inversion of Surface Ground-Penetrating Radar Data*. AGU Fall meeting 2018.

Diego Domenzain, John Bradford, Jodi Mead. *Joint inversion of GPR and ER data using the adjoint method*. AGU Fall meeting 2018.

Diego Domenzain, John Bradford, Jodi Mead. *Joint inversion of GPR and ER data*. SEG Technical Program Expanded Abstracts 2018: pp. 4763-4767. SEG Fall meeting 2018.

Diego Domenzain, John Bradford, Jodi Mead. *Imaging by joint inversion of electromagnetic waves and DC currents*. SIAM-Geosciences meeting 2017.

Diego Domenzain, John Bradford, Jodi Mead. *Imaging by joint inversion of electromagnetic waves and DC currents*. SAGEEP 2017.

Diego Domenzain, John Bradford, Jodi Mead. *Forward modeling of ground penetrating radar (GPR) and electric resistivity tomography (ERT) using finite difference time domain and finite volume methods, first steps for a joint inversion*. AGU Fall meeting 2016.

Attended Workshops

Image Reconstruction from Millimeters to the Globe. Summer 2018. Lorentz Center, Leiden University, NL.

17th International Conference on Ground Penetrating Radar. Summer 2018. Rapperswil, Switzerland.

Inverse problems. Summer 2016. Colorado State University, USA.

Computational and Analytical Aspects of Image Reconstruction. Summer 2015. ICERM, Brown University, USA.

Leadership

NOSOTROS-MTU. President of the student organization NOSOTROS at MTU.

- Organized schedule and budget on an entire year of activities, mostly camping around the Keweenaw.

SEG-BSU Student Chapter. President.

- Directed Python and Git coding workshop.
- Lead geophysics field survey at the old Idaho Penitentiary cemetery. We found some dead bodies there.

Outreach

Climate change communicator. BSU lead in educational project between SEG Student Chapters at BSU and TU-Delft informing younger generations about climate change challenges and the use of geophysics to solve them.

Didactic inventor. Design of new activities for teaching high mathematical subjects to elementary school children at the Museum of Science in the university's campus.