Diego Domenzain PhD Geophysics & Seismology • MSc Mathematics

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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

- Developed theory and wrote code for a novel multi-physics non-linear inversion algorithm joining full-waveform radar and DC resistivity data. This work is featured in several scientific publications.
- Developed theory and wrote code of a non-linear inversion efficient in memory and computation-count of 2.5-dimensional DC resistivity data. This work is featured in two scientific publications.
- Implemented novel non-linear inversion algorithms on field data acquired on a control alluvial aquifer. This work is currently under review.
- Experience in numerical modeling of partial differential equations using high performance computing. Specifically for non-homogeneous media, time-domain elastic and electromagnetic waves, and steady state processes. This work is the basis for several scientific publications.
- The code for the mentioned projects so far can be found here.
- Implemented an epidemiology model to project when lockdown could be lifted after COVID-19 hit. This work helped my angst be *put to work* and can be found here.
- Developed a deep learning framework for subsurface exploration using minimal training data. This work is currently on-going and is hosted here.
- During my mathematics and physics upbringing, I have learned various optimization schemes ranging from graph theory, Markowitz portfolio optimization, and digital signal processing. A gallery of code can be found here.

Education

Colorado School of Mines 2020 — *Post-doctoral Researcher* in the Geophysics Department
Boise State University 2015 - 2019 — *Ph.D.* Geophysics & Seismology (GPA 3.76/4)
Michigan Technological University 2012 - 2014 — *MSc.* Discrete Mathematics (GPA 3.45/4)

Selected 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.

Honors

NSF *Applied Mathematics & Geophysics* Research Assistant grant that funded my PhD degree. Collaborated in writing a successful one-year extension for this grant.
MSc Teaching Assistant grant. Taught Calculus courses during my Master degree.
Both grants covering full tuition and stipend.