

Serdar Demirel

DATA SCIENTIST · GEOPHYSICIST · MATHEMATICIAN

Chemin du Devin, 4, 1012 Lausanne, SWITZERLAND

☎ (+41) 78-965-8320 | ✉ serdar.demirel@unil.ch | 📱 serdar-demirel-65099a50

Profile

Enthusiastic data scientist with over five years of experience in statistical modeling, data-driven modeling, optimization, and machine learning. Experienced in algorithm design and implementation. A team player able to use collaboration tools efficiently.

Education

University of Lausanne (UNIL)

Lausanne, Switzerland

PH.D. IN GEOPHYSICS

June 2013 - June 2018

Thesis title: Electrical Studies in Fractured Media

Thesis advisor: Dr. James Irving

Istanbul Technical University (ITU)

Istanbul, Turkey

M.Sc. IN GEOPHYSICAL ENGINEERING

2009 - 2012

Thesis title: Imaging Near-Surface Scatters by Scattered Surface Waves

Thesis advisor: Prof. Ayşe Kaşlılar

Istanbul Technical University (ITU)

Istanbul, Turkey

B.Sc. IN MATHEMATICAL ENGINEERING

2006 - 2011

Istanbul Technical University (ITU)

Istanbul, Turkey

B.Sc. IN GEOPHYSICAL ENGINEERING

2004 - 2009

Honors: Cum Laude

Relevant Coursework: *Advanced Differential Equations · Advanced Seismology · Computational Physics · General Inversion Theory in Geophysics · Scientific Computation · Signal Analysis in Geophysics · Special Topics in Seismic Exploration · Data Processing · Time Series Analysis*

Skills

Programming

- **Scripting:** Shell scripting, MATLAB/Simulink
- **Low level programming languages:** Fortran, C/C++, Python, OpenMP, MPI

Software Packages

COMSOL, IPI2WIN, RES2dINV, RES3dINV, RES2dMOD, Doris (Delft Object-oriented Radar Interferometric Software), Voxler, Surfer, Grapher

Operating systems

Linux, Windows XP, Mac OS X

Document Prep.

LaTeX, and Microsoft Office Suite

Web

PHP, Dreamweaver, Adobe CS5

Languages

Aramaic (Mother tongue; Fluent in writing and reading), Turkish (Mother tongue; Fluent), English (Fluent), French (Basic)

Academic Experience

Institute of Earth Sciences, University of Lausanne

Lausanne, Switzerland

RESEARCH ASSISTANT

June 2013 - June 2018

- I developed both **analytical and numerical** models to simulate electric current flow in 3D fractured rocks. Then, I validated the aforementioned models by computing the outcomes of COMSOL (finite-element software).
- I also worked on determining the Representative Elementary Volume (REV) size, which replaces the detailed model with a simplified one that preserves the effective properties of the fractured rocks. To find the optimal REV size, we estimate the **variance of singular values** of a tensor that establishes relation between hydraulic and electrical properties. To increase the effectiveness of the algorithm, I used randomly generated formations for the fractured rocks.
- I explored through **numerical modeling** whether electrical resistivity (ER) geophysical measurements, acquired from the Earth's surface, may potentially be used to identify and provide information about shallow bedrock fractures. To this end, I conducted systematic analysis on calculated data, such as comparison of the anomaly width and absolute value.
- I employed a numerical methodology to observe the effect of fracture networks on electric potential field distribution and inversion of the calculated results. A **stochastic approach** for inversion process was developed to acquire an understanding of the effect of fracture existence on rocks.

Center for Satellite Communications and Remote Sensing, Istanbul Technical University

Istanbul, Turkey

RESEARCH ASSISTANT

Mar. 2010 - June 2010

- I worked on interferometric synthetic aperture radar (InSAR) – radar technique used in geodesy and remote sensing – to measure centimeter-scale changes in deformation over spans of days to years. I also used the Doris software to estimate the change of the earth surface with time by processing raw data from various sensors.

Industry Experience

Kandilli Observatory and Earthquake Research Institute

Istanbul, Turkey

INTERNSHIP IN THE DEPARTMENT OF GEOPHYSICS

July 2008 - Aug. 2008

- Field exploration
- Locating fault systems by using the magnetotelluric method in the central Anatolia region

Yertek Engineering A.S.

Istanbul, Turkey

INTERNSHIP IN THE GEOPHYSICS GROUP

July 2007 - Aug. 2007

- Field exploration
- Seismic data processing

Faculty of Mines, Istanbul Technical University

Istanbul, Turkey

INTERNSHIP IN THE DEPARTMENT OF GEOPHYSICS

July 2006 - Aug. 2006

- Worked on 3D elastic wave propagation modeling in layered media

Teaching Experience

University of Lausanne

Lausanne, Switzerland

GEOPHYSICAL FIELD WORK, LABORATORY STUDIES OF DATA PROCESSING

June 2013 - June 2017

- I was a teaching assistant for two graduate courses: Exploration Geophysics and Environmental Geophysics. In the dedicated lectures, I explained electrical resistivity tomography procedure, which is applied to image sub-surface structures via electrical resistivity measured at the surface. Thereby, the students learn how to interpret the sub-surface compositions, and they confirm if the technique provides meaningful results compared with geological data at hand.

Extracurricular Activity

Support Center for Education

Istanbul, Turkey

TUTOR

Sep. 2010 - Dec. 2012

- I worked as a teacher in a local support center in Istanbul (which helps students perform better in the national university entrance examination). I taught high school level mathematics, geometry, and physics. Also, I taught my students how to reduce their stress levels during exams.

Awards

Istanbul Technical University

Istanbul, Turkey

HIGH HONOR AND HONOR LIST FOR ALL SEMESTERS

2004 - 2011

Professional Memberships

MEMBER OF THE AMERICAN GEOPHYSICAL UNION (AGU)

2014 - Present

Publications

Theses

- [T4] S. Demirel, "Electrical Studies in Fractured Media", Doctor of Philosophy Thesis, Institute of Earth Sciences, University of Lausanne, Lausanne, Switzerland, August 2018.
- [T3] S. Demirel, "Imaging Near-Surface Scatters by Scattered Surface Waves", Master of Science Thesis, Institute of Earth Sciences, Istanbul Technical University, Istanbul, Turkey, January 2012.
- [T2] S. Demirel, "Differential Invariants for a Surface", Bachelor of Science Thesis, Istanbul Technical University, Istanbul, Turkey, September 2010.
- [T1] S. Demirel, "Modeling of Acoustic Wave Propagation in Random Media", Bachelor of Science Thesis, Istanbul Technical University, Istanbul, Turkey, September 2009.

Journal Publications

- [J3] Serdar Demirel, James Irving and Delphine Roubinet, "Comparison of REV size and tensor characteristics for the electrical and hydraulic conductivities in fractured rock", *Geophysical Journal International*, *Provisionally Accepted*, April 2018.
- [J2] Serdar Demirel, Delphine Roubinet, James Irving, and Emily Voytek, "Characterizing near-surface fractured-rock aquifers: insights provided by the numerical analysis of electrical resistivity experiments", *Water*, 10 (9): 1117, August 2018.
- [J1] Victor Caballero Sanz, Delphine Roubinet, Serdar Demirel and James Irving, "2.5-D discrete-dual-porosity model for simulating geo-electrical experiments in fractured rock," *Geophysical Journal International*, 209 (2): 1099-1110, February 2017.

Conference Publications

- [C4] S. Demirel, J. Irving and D. Roubinet, "Estimation of REV size and tensor characteristics for the electrical and hydraulic conductivities in fractured rock", *Proceedings of the American Geophysical Union Fall Meeting*, San Francisco, USA, December 12-16, 2016.
- [C3] S. Demirel, D. Roubinet and J. Irving, "Modeling Electric Current in 3D Fractured Media", *Proceedings of the American Geophysical Union Fall Meeting*, San Francisco, USA, December 15-19, 2014.
- [C2] S. Demirel, D. Roubinet and J. Irving, "Modeling Electric Current in 3D Fractured Media", *Proceedings of the 11th Swiss Geoscience Meeting*, Lausanne, Switzerland, November 15-16, 2013.
- [C1] S. Demirel and A. Kaşlılar, "Examining the Effect of Depth and Size of the Scatterer in Inverse Scattering of Surface Waves", *Proceedings of the Istanbul International Geophysical Conference And Oil & Gas Exhibition*, Istanbul, Turkey, September 17-19, 2012.

References

REFERENCES AVAILABLE UPON REQUEST.