Niloufar Abolfathian

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Education

Ph.D. University of Southern California, USC, Los Angeles, CA 2020
Geophysics and Seismology, *Advisor:* Prof. Yehuda Ben-Zion

M.Sc. Swiss Federal Institute of Technology, ETH, Zurich, Switzerland 2014
Earth Sciences (Major in Geophysics), *Advisor:* Dr. Luis Dalguer

B.Sc. Sharif University of Technology, Tehran, Iran 2011
Chemical Engineering

Research Interests

I am interested in combining theoretical, computational and observational including seismic and geodetic, methods to come up with a better understanding of earthquake physics, fault mechanics, and further earthquake likelihood and seismic hazard analysis. I examine the state of the stress and strain in the fault zone area, studying the earthquake fault processes and associated crustal deformations. My other research interests comprise earthquake source physics, rupture dynamics, energy partitioning, and earthquake early warning.

Honors and Awards

- NASA Postdoctoral Program (NPP) Fellowship Award at the NASA Jet Propulsion Laboratory, 2020
- USC Dornsife Merit Fellowship, 2018-2019
- Outstanding Student Presentation Award, Seismological Society of America, 2017
- Outstanding Teacher Assistant, University of Southern California, 2015
- Birkigt Scholarship of ETH Zurich, 2012 and 2013

Publications

Abolfathian, N., Martínez-Garzón, P., & Ben-Zion, Y. (2020). Variations of stress parameters in the Southern California plate boundary around the South Central Transverse Ranges. *Journal of Geophysical Research: Solid Earth*, e2020JB019482. doi: 10.1029/2020JB019482

Abolfathian, N., Martínez-Garzón, P., & Ben-Zion, Y. (2019). Spatiotemporal Variations of Stress and Strain Parameters in the San Jacinto Fault Zone. *Pure and Applied Geophysics*, 1-24. doi: 10.1007/s00024-018-2055-y

Abolfathian, N., Johnson, C. W., & Ben-Zion, Y. (2019). Numerical Simulations of Stress Variations with Depth in a Model for the San Jacinto Fault Zone. *AGUFM*, *2019*, T13D-0303.

Martínez-Garzón, P., Ben-Zion, Y., **Abolfathian, N.**, Kwiatek, G., & Bohnhoff, M. (2016). A refined methodology for stress inversions of earthquake focal mechanisms. *Journal of Geophysical Research: Solid Earth*, *121*(12), 8666-8687. doi:10.1002/2016jb013493

Abolfathian, N. (2014). *3D Spontaneous Dynamic Rupture on Geometrically Complex Faults: the 2010 Mw 7.1 Darfield (New Zealand) Earthquake* (Master dissertation, ETH).

Professional Experiences

Postdoctoral Fellow Jet Propulsion Laboratory, California Institute of Technology, 2020-present

Research Assistant Department of Earth Sciences, University of Southern California, 2014-2020

Teaching Assistant Department of Earth Sciences, University of Southern California, 2014-2020

- Geosystems, Fall 2014
- Data Analysis in the Earth and Environmental Sciences, Fall 2015 **(Best TA Award)** & Fall 2019
- Earthquakes, Spring 2016 & Spring 2017
- Planet Earth, Spring 2018
- The Nature of Scientific Inquiry, Spring 2020

Internship Research Laboratories of Environment Protection Organization, 2010

Synergistic Activities

Affiliations

- Seismological Society of America (SSA), since 2013
- Southern California Earthquake Center (SCEC), since 2014
- American Geophysical Union (AGU), since 2016

Scientific Journal Reviewer

Journal of Geophysical Research (JGR), Solid Earth; Pure and Applied Geophysics (PAAG); Bulletin of Seismological Society of America (BSSA); Tectonics

Technical Session Chair

- Seismological Society of America, Annual Meeting, 2019, Seattle, WA
- Seismological Society of America, Annual Meeting, 2020, Albuquerque, NM

Workshops

- SCEC Cajon Pass Earthquake Gate Workshop, Sep. 2020
- UNAVCO InSAR Scientific Computing Environment (ISCE), ARIA Tools, and MintPy Training, Aug. 2020
- SCEC Community Geodetic Model (CGM), Sep. 2019, Palm Springs, CA
- SSA GeoGateway and Geodetic Imaging, Apr. 2019, Seattle, WA
- SCEC Community Stress Model (CSM), Jan. 2019, Pomona, CA (*Invited*)
- Modeling Earthquake Source Processes, Oct. 2018, Pasadena, CA
- SCEC Earthquake Gate Area Initiative, Sep. 2018, Palm Springs, CA
- Crustal Deformation Modeling, Jun. 2017, Golden, CO
- State of Stress in the Earth Crust, LANL, Oct. 2016, Santa Fe, NM

Fieldtrips

- Measuring fault rupture offsets, Jul. 2019, Ridgecrest, CA
- Examining crystalline rocks in the fault core and exposed brittle-ductile transition zone, Mar. 2019, San Jacinto Fault Zone, CA
- Visiting the earthquake gate area, Sep. 2018, Cajon Pass, CA
- Nodal array retrieval, Aug. 2018, Cahuilla and Pinon Flat, CA
- Geophone deployment, Feb. 2018, Anza, CA
- Surface geology and instrumentation, Oct. 2015, Toro Peak and Pinon Flat, CA
- Structural field mapping, Apr. 2012, Alps, Val d'Ossola, Italy

Selected Presentations

Selected Oral Presentations

Abolfathian, N. (to be presented Sep. 2020) SCEC Cajon Pass Earthquake Gate Workshop.

Abolfathian, N. (2019) Spatial Variations of Stress Patterns Near the South Central Transverse Ranges in Southern California, SSA Annual Meeting, Seattle, WA.

Abolfathian, N. (2019) Stress Patterns in San Jacinto fault zone and South Central Transverse Ranges, Earth Science Department Seminar, University of Southern California **(Invited)**

Abolfathian, N. (2019) Stress Patterns in San Jacinto fault zone and South Central Transverse Ranges, SCEC Community Stress Model (CSM) Workshop, Pomona, CA. **(Invited)**

Abolfathian, N., & Ben-Zion Y. (2018) Variations of stress parameters near Cajon Pass from inversion of focal mechanisms, Cajon Pass Earthquake Gate Area Workshop, SCEC Meeting, Palm Springs, CA. **(Invited)**

Abolfathian, N., Martínez-Garzón P., & Ben-Zion Y. (2017) Spatio-temporal variations of stress parameters in the San Jacinto fault zone, SSA Annual Meeting, Denver, CO. **(Student Presentation Award)**

Abolfathian, N., Martínez-Garzón P., & Ben-Zion Y. (2016), Towards detailed characterization of spatio-temporal variations in stress parameters along the San Jacinto fault zone, State of Stress in the Earth Crust Workshop by Los Alamos National Laboratory, Santa Fe, NM.

Selected Poster Presentations

Abolfathian, N., Johnson C.W., & Ben-Zion Y. (2019). Numerical simulations of stress variations with depth in a model for the San Jacinto fault zone. Abstract T13D-0303, AGU Fall Meeting, San Francisco, CA.

Abolfathian, N., Johnson C.W., & Ben-Zion Y. (2018). Numerical simulations of stress variations with depth near the brittle-ductile transition of a strike-slip fault. SSA Annual Meeting. Miami, FL.

Abolfathian, N., Martínez-Garzón P., & Ben-Zion Y. (2017). Spatio-temporal variations of stress parameters in the San Jacinto Fault Zone. SCEC Annual Meeting. Palm Springs, CA.

Abolfathian, N., Martínez-Garzón P., & Ben-Zion Y. (2016). Towards detailed characterization of spatio-temporal variations in stress parameters along the San Jacinto fault zone. Abstract T43E-3096A, AGU Fall Meeting. San Francisco, CA.

Abolfathian, N., Martínez-Garzón P., & Ben-Zion, Y. (2016). Towards detailed stress anatomy of San Jacinto fault zone. SSA Annual Meeting. Reno, NV.

Selected Research Experiences

Numerical simulations of stress variations with depth in a model for the San Jacinto Fault Zone

Analyzing the spatio-temporal variations of stress and strain parameters near the Southern Central Transverse Ranges and San Jacinto Fault Zone

Estimating rupture directivity of moderate earthquakes with spectral analysis, utilizing the azimuthal variations of corner frequencies

3D Spontaneous dynamic rupture on geometrically complex faults: the 2010 Mw 7.1 Darfield (New Zealand) earthquake

Examining the accuracy of waveforms in order to construct once-and-for-all database for arbitrary seismograms upon spherically symmetric Earth models

Programming 2D diffusion and 2D elasticity codes using finite element method (FEM)

Modeling slab break-off with finite difference method (FDM)

Skills

Computational	Programming Languages: Matlab, Python, Bash Experience with numerical modeling, inversion, meshing tools Software Packages: Cubit, SPECFEM3D, AxiSEM, Pylith. Visualization: GMT, Paraview.
Languages	Persian (native), English (fluent), French (Beginner)

Media Interviews

- Interview on 'Fundamentals of Earthquake Science and Early Warning System' for radio program (670AM) 'Marz Haye Danesh' hold by the Association of Professional and Scholars of Iranian Heritage (APSIH), Nov. 2019, (in Persian)
- Interview on 'Volcanoes' for podcast 'RadioRaz', 2015, (in Persian)
- Interview on 'Earthquakes' for podcast 'RadioRaz', 2015, (in Persian)

Volunteer Involvements

- President of the Persian Cultural and Academic Student Association (PACSA) 2017-2018, uscpacsa.org
- Board member of the Persian Cultural and Academic Student Association (PACSA) 2016-2020.
- Board member of the Iranian Graduate Student Association (IGSA), 2016-2017.
- Night Sky Photography, earth.usc.edu/~nabolfat/My_Albums

Referees

Dr. Eric Fielding — Email: Eric.J.Fielding@jpl.nasa.gov

Principal Scientist, Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA

Prof. Yehuda Ben-Zion — Email: benzion@usc.edu

Professor of Earth Sciences, University of Southern California, Los Angeles, CA

Director of the Southern California Earthquake Center

Dr. Patricia Martinez Garzon — Email: patricia@gfz-potsdam.de

Principal Investigator of the Helmholtz Young Investigator Group "SAIDAN: Seismic and Aseismic deformation in the brittle crust: Implications for anthropogenic and natural hazard", GFZ German Research Centre for Geosciences, Potsdam, Germany

Prof. Charles Sammis — Email: sammis@usc.edu

Professor of Earth Sciences, University of Southern California, Los Angeles, CA

Dr. Luis A. Dalguer — Email: luis.dalguer@alumni.ethz.ch

Earthquake scientist at the Swiss Seismological Service, ETH Zurich, Switzerland

Now Seismologist and structural engineer at 3Q-Lab Earthquake Seismology & Structural Engineering Consultants

Prof. Taras Gerya — Email: taras.gerya@erdw.ethz.ch

Professor for Geodynamics and Analytical and Numerical Modeling of Geological and Planetary Processes, Department of Earth Sciences, ETH Zurich, Switzerland