

CURRICULUM VITAE
Yehuda Ben-Zion

Education:

B.Sc. Geology and Physics, The Hebrew University of Jerusalem (October 1982).
Ph.D. Geophysics and Seismology, University of Southern California (August 1990).

Present Position:

Professor of Earth Sciences, University of Southern California
Director of the Southern California Earthquake Center

Professional Experience:

Associate Professor of Earth Sciences, University of Southern California, 2001 - 2004
Assistant Professor of Earth Sciences, University of Southern California, 1997 - 2000
Research Associate of Geophysics, Harvard University, 1994 - 1995.
Post-Doctoral fellow, Harvard University (with Prof. J. R. Rice), 1991 - 1993.
Research Assistant, University of Southern California (with Prof. K. Aki), 1985 - 1990.

Visiting positions:

Visiting Professor, Tokyo College, Japan, 2022.
Visiting Professor, Rice University, 2017-2020.
Visiting Professor, Ecole Normale Supérieure, Paris, France, 2018.
Visiting Professor, IGP, Université Paris, Paris, France, 2018.
Visiting Professor, University of Science and Technology, China, 2018.
Visiting Professor, University of Oslo, Norway, 2017-2018.
Visiting Professor, University Grenoble Alpes, France, 2017.
Visiting Professor, Joseph Fourier University, Grenoble, France, 2011, 2014.
Visiting Professor, GeoForschungsZentrum GFZ, Potsdam, Germany, 2011-2018.
Visiting Professor, University of Western Australia, Perth, Australia, 2010.
Visiting Professor, Ludwig-Maximilians University, Munich, Germany, 2003.
Visiting Professor, The Earthquake Research Institute, University of Tokyo, Japan, 1996.
Visiting Research Associate, The Hebrew University of Jerusalem, 1995.

Research Interests:

Physics of earthquakes and faults, localization of deformation, high resolution imaging of fault zones and the crust, earthquake source properties, near-fault data, crustal stress and strain fields, composition of continuous seismic waveforms, temporal changes of seismic properties, dynamic ruptures in geologically relevant structures, brittle damage rheology, spatio-temporal seismicity patterns, earthquake forecasting, analysis of seismic hazard.

Classes Taught:

Processes and Changes in Science (CORE 103)
The Nature of Scientific Inquiry (MDA130)
Geo-Systems (GEOL450)
Modern Perspective on Crustal Dynamics (GEOL 530)
Physics of Earthquakes (GEOL 553)
Advanced Seismology (GEOL 552)
Physics of Earthquakes Seminar (GEOL 609)

Seminar on Strain Localization (Geol599)

Awards, Honors and Fellowships:

- Distinguished Sci. Seminar Series, Lawrence Berkeley National Laboratory, 2023
- Beno Gutenberg Medal, European Geosciences Union, 2022
- Wiess Visiting Professor fellowship, Rice University, 2017-2020
- Visiting Professor Fellowship, Ecole Normale Supérieure, Paris, France, 2018
- Visiting Professor fellowship, IPGP, Université Paris, Paris, France, 2018.
- Visiting Professor fellowship (under the High-end Foreign Experts Project, State administration of Foreign Experts Affairs, P.R. China), University of Science and Technology, China, 2017.
- Visiting Professor fellowship, University of Oslo, Norway, 2017-2018.
- Visiting Professor fellowship, University Grenoble Alpes, France, 2017.
- Humboldt Research Prize supplement, 2017.
- USC PhD mentoring award, 2016.
- Frontiers in Geosciences Lecture, Los Alamos National Laboratory, 2013
- Fellow, American Geophysical Union, 2011.
- Humboldt Research Prize, 2010-2011.
- Gladden Senior Visiting Fellowship, Inst. of Advanced Studies, University of Western Australia, 2010.
- Ranked 5th in total citations in a global survey of the ESI on "Earthquake Studies" for the period 2000-2010 <http://sciencewatch.com/ana/st/earthquakes2/>
- Mercator Fellowship of the German Research Society (DFG), 2003.
- Ranked 4th in citations per paper and 15th in total citations in a global survey of the ESI <http://www.esi-topics.com/earthquakes/> on "Earthquake Studies" for 1993-2003
- Zumberge Research and Innovation Fellowship, Univ. of Southern California, 1998.
- Visiting Professor Fellowship, Earthquake Research Inst., Univ. of Tokyo, 1996.
- Geophysics Graduate Student Achievement, Univ. of Southern California, 1989.
- W. M. Keck Foundation Fellowship, Univ. of Southern California, 1985-1988).
- Valedictorian, Natural Sciences Faculty, The Hebrew Univ. of Jerusalem, 1982.
- Natural Sciences Dean's Fellowship, The Hebrew Univ. of Jerusalem, 1980-1982.
- In top 1% of most cited Geosciences authors in the Essential Science Indicators database for the last 10 years.
- Named by Research.com in top 300 scientists in Earth Science world-wide, 2023
- Over 30 invited talks and keynote lectures in conferences, seminars and workshops in the last 3 years.
- Google h-index 82.

Professional Service

- SCEC director, 2019-present
- EGU Beno Gutenberg Medal Committee, 2022-present
- Leader, Seismology Group of SCEC, 2016-2018
- Editor of *J. Geophys. Res.*, 2015-2022
- President, Mathematical Geophysics Committee of the IUGG, 2011-2019
- Editor of *Geophys. J. Int.*, 2005-2015

- Guest Editor of *Pure and Applied Geophys*, various time intervals in 2002-2018
- Site Visit Committee (University of Calgary, Alberta, Canada), Natural Sciences and Engineering Research Council of Canada, 2015
- Site Visit Committee (University of Western Ontario, Canada), Natural Sciences and Engineering Research Council of Canada, 2013
- Co-organizer of a 2018 “International Induced Seismicity Workshop” in Banff Canada <http://www.inducedseismicity.ca/Banff2018/>
- Co-organizer of a 2018 conference on Mathematical Geophysics, Nizhniy Novgorod, Russia <http://cmg2018.iapras.ru/>
- Co-organizer of a 2017 workshop on “Frontiers in Studies of Earthquakes and Faults” in Shenzhen China <http://fsef2017.ess.sustc.edu.cn/index.html>
- Co-organizer of a 2016 conference on Mathematical Geophysics, Paris, France <http://cmg2016.sciencesconf.org/>
- Co-organizer of a 2014 conference on Mathematical Geophysics, Merida, Mexico <http://eventos.iingen.unam.mx/IUGG2014/>
- Co-organizer of a 2013 workshop on “Properties and Processes of Crustal Fault Zones” in Erice Sicily http://istituto.ingv.it/resources/conference-archive/conferences-2013/Fault_Zones_Workshop/
- Co-organizer of a 2013 SAMSI workshop on “Dynamics of seismicity, earthquake clustering and patterns in fault networks” <http://www.samsi.info/Seismicity>
- Co-organizer of a 2013 BIRS workshop on “Statistics and Triggering of Earthquakes” <http://www.birs.ca/events/2013/2-day-workshops/13w2171>
- Co-organizer of a 2012 conference on Mathematical Geophysics, Edinburgh, UK <http://www.cmgedinburgh2012.org.uk/>
- Co-organizer of over 30 special sessions in scientific meetings and workshops
- Science Review Panel, Uniform California Earthquake Rupture Forecast Project, 2010-2016
- Advisory Committee, The 8th Int. Workshop on Statistical Seismology, China 2013
- IASPEI representative to the Math. Geophysics Committee of IUGG, 2002-2010
- Review Panel of NASA, Cryosphere and Geophysics, 2010
- Advisory Board, IUGG conference on Mathematical Geophysics, “Modeling Earth Dynamics: Complexity, Uncertainty and Validation”, Pisa Italy, 2010
- Review Panel of NAS, USAID Middle East Regional Cooperation Program, 2008

Academic Advisement:

- Total graduate students at USC (past and present) 28
- Current PhD students at USC 4
- Total post-doctoral scholars (past and present) 8
- Current post-doctoral scholars at USC 1
- Partial supervision of additional 12 students and 4 postdocs outside USC

Honors and Awards by Students

- Zhigang Peng, Outstanding Student Paper Award, American Geophysical Union meeting, 2002
- Zhigang Peng, Departmental seminar UCLA, 2003

- Michael Lewis, Outstanding Student Paper Award, Seismological Society of America meeting, 2005
- Neta Wechsler, Outstanding Student Paper Award, American Geophysical Union meeting, 2007
- Ory Dor, Invited Plenary talk, Annual meeting of the Southern California Earthquake Center, 2008
- Iain Bailey, Outstanding Student Paper Award, Seismological Society of America meeting, 2008
- Michael Lewis, Departmental seminar UCSD, 2009
- Amir Allam, Outstanding Department TA Award, 2010, 2012
- Zhigang Peng, Charles F. Richter Early Career Award of the Seismological Society of America, 2010
- Amir Allam, Outstanding College and University TA Awards, 2013
- Zach Ross, Departmental seminar UCLA, 2014
- Yaman Ozakin, Seismology lab seminar, Caltech, 2014
- Zach Ross, Seismology lab seminar, Caltech, 2015
- Pieter-Ewald Share, Outstanding Department TA Award, 2014, 2015
- Hongrui Qiu, Outstanding Department TA Award, 2015
- Zach Ross, Departmental seminar UCSC, 2015
- Niloufar Abolfathian, Outstanding Department TA Award, 2015
- Pieter-Ewald Share, Outstanding Department TA Award, 2016
- Zach Ross, USC PhD Achievement Award, 2016
- Lei Qin, Outstanding Department TA Award, 2016
- Haoran Meng, Outstanding Department TA Award, 2016
- Hongrui Qiu, Outstanding Department TA Award, 2016
- Niloufar Abolfathian, Outstanding Student Paper Award, Seismological Society of America meeting, 2017
- Pieter-Ewald Share, Green postdoc fellowship (Scripps, UCSD), 2017
- Hongrui Qiu, Seismo lab seminar Caltech, 2018
- Zach Ross, Invited talk at the US Senate on behalf of the SSA, 2019
- Zach Ross, Keiiti Aki Young Scientist Award of the American Geophysical Union, 2019
- Lei Qin, Seismo lab seminar Caltech, 2019
- Zhigang Peng, Distinguished Service to SSA Award, 2020
- Malcolm White, USGS Earthquake Science Center Seminar, 2020

Publications

Books / Special Volumes

- Ben-Zion, Y., X Chen and H. Zhang, Editors, *Frontiers in Studies of Earthquakes and Faults, Pure Appl. Geophys.*, vol. 176, N. 3, 2019.
- Ben-Zion, Y. and A. Rovelli, Editors, *Properties and processes of crustal fault zones: Volume II, Pure Appl. Geophys.*, vol. 172, N. 5, 1003-1381, 2015.
- Ben-Zion, Y. and A. Rovelli, Editors, *Properties and processes of crustal fault zones: Volume I, Pure Appl. Geophys.*, vol. 171, N. 11, 2863-3174, 2014.

- Ben-Zion, Y. and C. G. Sammis, Editors, *Brittle deformation of solid and granular materials with applications to mechanics of earthquakes and faults*, *Pure Appl. Geophys.*, vol. 168, N. 12, 2147-2449, 2011.
- Ben-Zion, Y. and C. G. Sammis, Editors, *Mechanics, Structure and Evolution of Fault Zones*, *Pure Appl. Geophys.*, vol. 166, N. 10/11, 1533-1908, 2009.
- Ben-Zion, Y. and W. Lee, Editors, *Advances in Studies of Heterogeneities in the Earth Lithosphere: The Keiiti Aki Volume II*, *Pure Appl. Geophys.*, vol. 163, N. 2/3, 2006.
- Vere-Jones, D., Y. Ben-Zion and F. R. Zuniga, Editors, *Statistical Seismology*, *Pure Appl. Geophys.*, vol.162, N. 6/7, 374 pages, 2005.
- Ben-Zion, Y., Editor, *Seismic Motion, Lithospheric Structures, Earthquake and Volcanic Sources: The Keiiti Aki Volume*; *Pure Appl. Geophys.*, vol.160, N. 3/4, 351 pages, 2003.

Papers (* indicates student, ^ indicates postdoc)

- 319) Trugman, D. T. and Y. Ben-Zion, 2023. Coherent Spatial Variations in the Productivity of Earthquake Sequences in California and Nevada, *The Seismic Record.*, in review.
- 318) *Hsu, Y.-F, I. Zaliapin and Y. Ben-Zion, 2023. Informative modes of seismicity in nearest-neighbor earthquake proximities, *J. Geophys. Res.*, in review.
- 317) *Yang, B., H. Meng, N. Gu, X. Liu, X. Chen, and Y. Ben-Zion, 2023. A Frequency Domain Methodology for Quantitative Evaluation of Diffuse Wavefield with Applications to Seismic Imaging, *J. Geophys. Res.*, in review.
- 316) Pischietta, M., L. M. Baker, J. B. Fletcher, F. Salvini, A. Rovelli, and Y. Ben Zion, 2023. Directional amplification across the San Jacinto fault zone, CA, *Seism. Res. Lett.*, in review.
- 315) Kwiatek, G., P. Martínez-Garzón, T. Goebel, M. Bohnhoff, Y. Ben-Zion and G. Dresen, 2023. Complex multi-scale preparatory processes of stick-slip events on rough laboratory faults, *J. Geophys. Res.*, in review.
- 314) *Zhang, H and Y. Ben-Zion, 2023. Enhancing regional seismic velocity model with higher-resolution local results using sparse dictionary learning, *Geophys. Res.*, in review.
- 313) McBeck, J., B. Cordonnier, Y. Ben-Zion and F. Renard, 2023. The relationship between deformation localization and catastrophic failure in fluid-saturated crystalline rocks in upper crustal conditions, *Tectonophysics*, in review.
- 312) *Vavra, E., H. Qiu, B. Chi, P.-E., Share, A. A. Allam, M. Morzfeld, F. Vernon, Y. Ben-Zion and Y. Fialko, 2023. Active dipping interface of the Southern San Andreas Fault revealed by space geodetic and seismic imaging, *J. Geophys. Res.*, in press.
- 311) *Zhang, S., B. Luo, Y. Ben-Zion, D. E. Lumley and H. Zhu, 2023. Monitoring terrestrial water storage, drought and seasonal changes in central Oklahoma with ambient seismic noise, *Geophys. Res. Lett.*, 50, e2023GL103419 doi: 10.1029/2023GL103419.
- 310) McBeck, J., B. Cordonnier, Y. Ben-Zion and F. Renard, 2023. The influence of confining stress and preexisting damage on strain localization in fluid-saturated crystalline rocks in the upper crust, *J. Geophys. Res.*, 128, e2023JB026987, doi: 10.1029/2023JB026987
- 309) *Zhang, H., H. Meng and Y. Ben-Zion, 2023. Lateral variations across the Southern San Andreas Fault Zone revealed from analysis of traffic signals at a dense seismic array, *Geophys. Res. Lett.*, 50, e2023GL103759, doi: 10.1029/2023GL103759.

- 308) ^Li, G. and Y. Ben-Zion, 2023. Daily and seasonal variations of shallow seismic velocities in southern California from analysis of H/V ratios and autocorrelations of seismic waveforms, *J. Geophys. Res.*, 128, e2022JB025682, doi: 10.1029/2022JB025682.
- 307) Share, P.-E., F. L. Vernon and Y. Ben-Zion, 2023. The variable continuous bimaterial interface in the San Jacinto fault zone revealed by dense seismic array analysis of fault zone head waves, *J. Geophys. Res.*, 128, e2022JB025070, doi: 10.1029/2022JB025070.
- 306) *Mizrahi, L., S. Nandan, W. Savran, S. Wiemer and Y. Ben-Zion, 2023. Question-driven ensembles of flexible ETAS models, *Seis. Res. Lett.*, 94, 829–843, doi: 10.1785/0220220230.
- 305) ^Cheng, Y., E. Hauksson and Y. Ben-Zion, 2023, Refined Earthquake Focal Mechanism Catalog for Southern California Derived with Deep Learning Algorithms, *J. Geophys. Res.*, 128, e2022JB025975, doi: 10.1029/2022JB025975.
- 304) ^Qiu, H., B. Chi and Y. Ben-Zion, 2023. Internal structure of the Garlock fault zone from Ridgecrest aftershocks recorded by dense linear seismic arrays, *Geophys. Res. Lett.*, 50, e2022GL101761, doi: 10.1029/2022GL101761.
- 303) ^Qin, L., H. Qiu, N. Nakata, S. Deng, A. Levander and Y. Ben-Zion, 2023. Variable daily autocorrelation functions of high frequency seismic data on Mars, 94, 746–758, *Seis. Res. Lett.*, doi: 10.1785/0220220196.
- 302) ^Sheng, Y., A. Mordret, F. Brenguier, P. Boué, F. Vernon, T. Takeda, Y. Aoki T. Taira and Y. Ben-Zion, 2023. Seeking Repeating Anthropogenic Seismic Sources: Implications for Seismic Velocity Monitoring at Fault Zones, *J. Geophys. Res.*, 128, e2022JB024725, doi: 10.1029/2022JB024725.
- 301) ^Qin, L., J. H. Steidl, H. Qiu, N. Nakata and Y. Ben-Zion, 2022. Monitoring seasonal shear wave velocity changes in the top 6 m at Garner Valley in Southern California with borehole data, *Geophys. Res. Lett.*, 49, e2022GL101189, doi: 10.1029/2022GL101189.
- 300) Ben-Zion, Y. and G. Dresen, 2022. A synthesis of fracture, friction and damage processes in earthquake rupture zones, *Pure Appl. Geophys.*, 179, 4323–4339, doi: 10.1007/s00024-022-03168-9.
- 299) Ben-Zion, Y., G. Beroza, M. Bohnhoff, A.-A. Gabriel and P. M. Mai, 2022. A grand challenge international infrastructure for earthquake science, *Seis. Res. Lett.*, 93, 2967–2968, doi: 10.1785/0220220266.
- 298) ^Sheng, Y., A. Mordret, K. Sager, F. Brenguier, P. Boué, B. Rousset, F. Vernon, Q. Higeret and Y. Ben-Zion, 2022. A hidden slow-slip event in the San Jacinto Fault Zone, CA, revealed by train-generated seismic tremors, *Geophys. Res. Lett.*, 49, e2022GL098509, doi: 10.1029/2022GL098509.
- 297) McBeck, J., Y. Ben-Zion, X. Zhou and F. Renard, 2022. Precursory off-fault deformation preceding slip along healed faults in restraining and releasing step overs: Insights from discrete element method models, *J. Geophys. Res.*, 127, e2022JB024326, doi: 10.1029/2022JB024326.
- 296) ^Liu, X., G. Beroza and Y. Ben-Zion, Ambient Noise Attenuation Tomography Reveals an Asymmetric Damage Zone across San Jacinto Fault near Anza, California, 2022, *Geophys. Res. Lett.*, 49, e2022GL099562, doi: 10.1029/2022GL099562.
- 295) Kurzon, I., V. Lyakhovsky, A. Sagy and Y. Ben-Zion, 2022. Radiated Seismic Energy and Source Damage Evolution from analysis of simulated dynamic rupture

- and far-field seismograms, *Geophys. J. Int.*, 231, 1705–1726, doi: 10.1093/gji/ggac279.
- 294) McBeck, J., Y. Ben-Zion and F. Renard, 2022. Predicting fault reactivation and macroscopic failure in discrete element method simulations of restraining and releasing step overs, *Earth Planet. Sci. Lett.*, 593, 117667, doi: 10.1016/j.epsl.2022.117667.
- 293) Kovchegov, Y., I. Zaliapin and Y. Ben-Zion, 2022. Invariant Galton-Watson Branching Process for Earthquake Occurrence, *Geophys. J. Int.*, 231, 567–583, doi: 10.1093/gji/ggac204.
- 292) Ross, Z. E., Y. Ben-Zion and I. Zaliapin, 2022. Geometrical properties of seismicity in California, *Geophys. J. Int.*, 231, 493–504, doi: 10.1093/gji/ggac189.
- 291) Fang, H., M. C. A. White, Y. Lu and Y. Ben-Zion, 2022. Seismic traveltime tomography of Southern California using Poisson-Voronoi cells and 20 years of data, *J. Geophys. Res.*, 127, e2021JB023307, doi: 10.1029/2021JB023307.
- 290) Share, P.-E., H. Qiu, F. L. Vernon, A. A. Allam, Y. Fialko and Y. Ben-Zion, 2022. General seismic architecture of the Southern San Andreas fault zone around the Thousand Palms Oasis from a Large-N nodal array, *The Seismic Record*, 2, 50–58, doi: 10.1785/0320210040.
- 289) ^Lu, Y. and Y. Ben-Zion, 2022. Validation of seismic velocity models in southern California with full-waveform simulations, *Geophys. J. Int.*, 229, 1232–1254, doi: 10.1093/gji/ggab534.
- 288) McBeck, J., Y. Ben-Zion and F. Renard, 2022. Volumetric and shear strain localization throughout triaxial compression experiments on rocks, *Tectonophysics*, 822, doi: 10.1016/j.tecto.2021.229181.
- 287) Touma, R., A. Aubry, Y. Ben-Zion and M. Campillo, 2022. Distribution of seismic scatterers in the San Jacinto Fault Zone, southeast of Anza, California, based on passive matrix imaging, *Earth Planet. Sci. Lett.*, 578, 117304, doi: 10.1016/j.epsl.2021.117304.
- 286) ^Lu, Y. and Y. Ben-Zion, 2022. Regional seismic velocity changes following the 2019 Mw7.1 Ridgecrest California earthquake from autocorrelations and P/S converted waves, *Geophys. J. Int.*, 228, 620-630, doi: 10.1093/gji/ggab350.
- 285) Zhang, X., S. Arrowsmith, S. C. Tsongas, C. Hayward, H. Meng and Y. Ben-Zion, 2022. A data-driven framework for automated detection of aircraft-generated signals in seismic array data using machine learning, *Seism. Res. Lett.*, 93, 226–240, doi: 10.1785/0220210198.
- 284) Zaliapin, I. and Y. Ben-Zion, 2022. Perspectives on clustering and declustering of earthquakes, *Seism. Res. Lett.*, 93, 386–401, doi: 10.1785/0220210127.
- 283) McBeck, J., J. M. Aiken, B. Cordonnier, Y. Ben-Zion and F. Renard, 2021. Predicting fracture network development in crystalline rocks, *Pure Appl. Geophys.*, doi: 10.1007/s00024-021-02908-7.
- 282) McBeck, J., Y. Ben-Zion and F. Renard, 2021. Fracture network localization preceding catastrophic failure in triaxial compression experiments on rocks, *Frontiers*, doi: 10.3389/feart.2021.778811.
- 281) *Cheng, Y., X. Wang, Z. Zhan and Y. Ben-Zion, 2021. Isotropic source components of events in the 2019 Ridgecrest, California, earthquake sequence, *Geophys. Res. Lett.*, 48, e2021GL094515, doi: 10.1029/2021GL094515.

- 280) McBeck, J., Y. Ben-Zion, X. Zhou and F. Renard, 2021. The influence of preexisting host rock damage on fault network localization, *J. Structural Geol.*, 153, 104471.
- 279) ^Qiu, H., Y. Ben-Zion, R. Catchings, M. R. Goldman, A. A. Allam, and J. Steidl, 2021. Seismic imaging of the Mw 7.1 Ridgecrest earthquake rupture zone from data recorded by dense linear arrays, *J. Geophys. Res.*, 126, e2021JB022043, doi: 10.1029/2021JB022043.
- 278) *White, M. C. A., H. Fang, R. Catchings, M. R. Goldman, J. Steidl and Y. Ben-Zion, 2021. Detailed traveltimes tomography and seismic catalog around the 2019 M7.1 Ridgecrest, California, earthquake using dense rapid-response seismic data, *Geophys. J. Int.*, 227, 204-227, doi: 10.1093/gji/ggab224.
- 277) Share, P.-E., R. R. Castro, J. Antonio Vidal-Villegas, L. Mendoza and Y. Ben-Zion, 2021. High-resolution seismic imaging of the plate boundary in northern Baja California and southern California using double-pair double-difference tomography, *Earth Planet. Sci. Lett.*, 568, doi: 10.1016/j.epsl.2021.117004, article 117004.
- 276) McBeck, J., Y. Ben-Zion and F. Renard, 2021. Development of the force and fracture architectures during biaxial loading to macroscopic failure within and around healed fault zones, *J. Structural Geol.*, 147, doi: 10.1016/j.jsg.2021.104329, 104329.
- 275) ^Meng, H., Y. Ben-Zion and C. W. Johnson. 2021. Analysis of seismic signals generated by vehicle traffic with application to derivation of subsurface Q -values, *Seism. Res. Lett.*, doi: 10.1785/0220200457.
- 274) Bonilla, L. F. and Y. Ben-Zion, 2021. Detailed space-time variations of the seismic response of the shallow crust to small earthquakes from analysis of dense array data, *Geophys. J. Int.*, 225, 298–310, doi: 10.1093/gji/ggaa544.
- 273) Pinzon-Rincon, L., F. Lavoué, A. Mordret, P. Boué, F. Brenguier, P. Dales, Y. Ben-Zion, F. Vernon, C. Bean and D. Hollis, 2021. Humming trains in seismology: an opportunistic source for probing the shallow crust, *Seism. Res. Lett.*, doi: 10.1785/0220200248.
- 272) Kurzon, I., V. Lyakhovskiy and Y. Ben-Zion, 2021. Earthquake source properties from analysis of dynamic ruptures and far-field seismic waves in a damage-breakage model, *Geophys. J. Int.*, 224, 1793–1810, doi: 10.1093/gji/ggaa509.
- 271) *Qin, L., P.-E. Share, H. Qiu, A. A. Allam, F. L. Vernon and Y. Ben-Zion, 2021. Internal structure of the San Jacinto fault zone at the Ramona Reservation, north of Anza, California, from dense array seismic data, *Geophys. J. Int.*, 224, 1225–1241, doi: 10.1093/gji/ggaa482.
- 270) Kato, A. and Y. Ben-Zion, 2021, The generation of large earthquakes, *Nature Reviews Earth & Environment*, 2, 26–39, <https://doi.org/10.1038/s43017-020-00108-w>.
- 269) *Gradon, C., P. Roux, L. Moreau, A. Lecointre and Y. Ben-Zion, 2021, Characterization with dense array data of seismic sources in the shallow part of the San Jacinto fault zone, *Geophys. J. Int.*, 224, 1133–1140, doi: 10.1093/gji/ggaa411.
- 268) McBeck, J., J. Mathiesen, J. M. Aiken, Y. Ben-Zion and F. Renard, 2020. Deformation precursors to catastrophic failure in rocks, *Geophys. Res. Lett.*, 47, e2020GL090255, doi: 10.1029/2020GL090255.
- 267) Dresen, G., G. Kwiatak, T. Goebel and Y. Ben-Zion, 2020. Seismic and aseismic preparatory processes before large stick-slip failure, *Pure Appl. Geophys.*, 177, 5741-5760, doi: 10.1007/s00024-020-02605-x.

- 266) ^Qiu, H. A. A. Allam, F.-C. Lin, Y. Ben-Zion, 2020. Analysis of Fault Zone Resonance Modes Recorded by a Dense Seismic Array Across the San Jacinto Fault Zone at Blackburn Saddle, *J. Geophys., Res.*, 125, e2020JB019756, doi: 10.1029/2020JB019756.
- 265) *Cheng, Y. and Y. Ben-Zion, 2020. Variations of earthquake properties before, during and after the 2019 M7.1 Ridgecrest, CA, earthquake, *Geophys., Res., Lett.*, 47, e2020GL089650, doi: 10.1029/2020GL089650.
- 264) Catchings, R. D., M.R. Goldman, J.H. Steidl, J.H. Chan, A.A. Allam, C.J. Criley, Z. Ma, D.S. Langermann, G.J. Huddleston, A.T. McEvilly, D.D. Mongovin, E.M. Berg, and Y. Ben-Zion, 2020. Nodal Seismograph Recordings of the 2019 Ridgecrest Earthquake Sequence, *Seism. Res. Lett.*, 91, 3622–3633, doi: 10.1785/0220200203.
- 263) *Juarez, A. and Y. Ben-Zion, 2020. Effects of Shallow Velocity Reductions on Three-dimensional Propagation of Seismic Waves, *Seism. Res. Lett.*, 91, 3313–3322, doi: 10.1785/0220200183.
- 262) *Abolfathian, N., Martínez-Garzón P. and Y. Ben-Zion, 2020. Variations of stress parameters in the Southern California plate boundary around the South Central Transverse Ranges, *J. Geophys., Res.*, 125, e2020JB019482, doi: 10.1029/2020JB019482.
- 261) *Cheng, Y., Y Ben-Zion, F. Brenguier, C. W. Johnson, P.-E. Share, A. Mordret, P. Boué, Z. Li, and F. Vernon, 2020. An automated method for developing a catalog of small earthquakes using data of a dense seismic array and nearby stations, *Seism. Res. Lett.*, 91, 2862–2871, doi: 10.1785/0220200134.
- 260) Ben-Zion, Y. and I. Zaliapin, 2020. Localization and coalescence of seismicity before large earthquakes, *Geophys. J. Int.*, 223, 561–583, doi: 10.1093/gji/ggaa315.
- 259) Schulte-Pelkum, V., Z. E. Ross, K. Mueller and Y. Ben-Zion, 2020. Tectonic inheritance with dipping faults and deformation fabric in the brittle and ductile southern California crust, *J. Geophys., Res.*, 125, e2020JB019525, doi: 10.1029/2020JB019525.
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