Gil Averbuch

seismo-acoustic scientist

Personal

Gil
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05-Sep-1985
Israel

Contact

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Languages

Hebrew mother tongue
English fluency
Dutch basic

Programming experience

Python, MATLAB, C, C++, LaTeX, Generic Mapping Tools. Codes: 2D finite difference acoustic wave propagation, 3D ray-tracing in a moving medium, 2D spectral elements wave propagation in a coupled solid-fluid system, Fast Field Program for wave propagation in a solid Earth-ocean-atmosphere system, finite difference and Fourier-type acoustic parabolic equation solver, array processing, time-frequency analysis, images feature extraction.

Education

2022–present **Postdoctoral scholar** Woods Hole Oceanographic Institution, Woods Hole, MA, USA
My research focuses on 1) 3D spatio-temporal underwater acoustic source localization, 2) climatic effects on the global seismo-acoustic ambient wavefield, 3) seismo-acoustic coupling on Venus, and 4) seismo-acoustic monitoring of offshore wind turbines.
Advisors: Dr. Ying-Tsong Lin and Dr. John A Collins

2020–2022 **Postdoctoral researcher** Southern Methodist University, Dallas, Texas, USA
My research focused on 1) study wave propagation in a coupled solid Earth-atmosphere system, and 2) using infrasonic signals to quantify short temporal variations in the atmosphere. For that, I designed, coordinated, and ran seismic and infrasonic field campaigns, and worked on advances in signal processing and seismo-acoustic numerical models.
Advisor: Prof. dr. Stephen Arrowsmith

2015–2020 **PhD** Applied Geophysics Delft University of Technology, The Netherlands
Seismo-acoustic research. Wave propagation in a coupled Earth-ocean-atmosphere system. Data analysis techniques and numerical models are used to explain seismo-acoustic events. In particular, to explain the generation of acoustic waves in the atmosphere from underwater and underground sources.
Advisor: Prof. dr. Läslo Evers

2013–2015 **MSc, cum laude** Geosciences Tel Aviv University, Israel
Infrasound wave propagation and ray trajectories in a stratified moving atmosphere with a 3D ray tracer. Development of a 2D spectral elements code for wave propagation in a coupled solid Earth-atmosphere system.
Advisor: Prof. dr. Colin Price

2010–2014 **BSc** Geosciences Tel Aviv University, Israel

Experience

2018–present **Peer review**
Reviewer for international journals. Last year I reviewed a book on numerical modeling methods for outdoor sound propagation.

2022 **Organizing a conference session** Acoustical Society of America, USA
Organizing and co-chairing a special session covering topics related to infrasound and the seismo-acoustic wavefield.

2021 **Teaching** Southern Methodist University, Dallas, Texas, USA
Signal processing for MSc and PhD students. The class covered theory and practical examples of spectral analysis, filters, convolution and cross-correlation, and array processing techniques.

Organizing a conference session Seismological Society of America, USA
Organizing and co-chairing a special session covering topics related to infrasound and the seismo-acoustic wavefield.

2018 **Numerical modeling symposium** Delft University of Technology, The Netherlands
Organizing a wave propagation numerical modeling workshop. The workshop covered theory and practical examples of different seismic and acoustic numerical modeling techniques such as finite-difference, spectral elements, ray-tracing, and exact solutions.

2016 **WAVES meeting** Doorn, The Netherlands
Organizing an international four-day meeting for the WAVES ITN fellows. The duty required arranging facilities, scheduling presentation, invite external speakers.

Fellowships

2022–present **Postdoctoral Scholar** Woods Hole Oceanographic Institution.
Funded by the Ocean Bottom Seismic Instrument Center at the Woods Hole Oceanographic Institution

2015–2018 **ERC fellow in WAVES ITN.** Horizon 2020
European Union's Horizon 2020 research and innovation program under the Marie Sklodowska-Curie Grant (grant number 641943).

Publications

ORCID iD:orcid.org/0000-0002-0403-9354
Research Gate:www.researchgate.net/profile/Gil-Averbuch

2023 Seismo-Acoustic Coupling in the Deep Atmosphere of Venus
G. Averbuch, R. Houston, A. Petculescu
The Journal of the Acoustical Society of America,153, 1802, doi:10.1121/10.0017428

2022 Evidence for short temporal atmospheric variations observed by infrasonic signals. Part 1: the troposphere.
G. Averbuch, M. Ronac-Giannone, S. Arrowsmith, J. F. Anderson
Earth and Space Science, e2021EA002036, doi:10.1029/2021EA002036

Evidence for short temporal atmospheric variations observed by infrasonic signals. Part 2: the stratosphere.
G. Averbuch,R. Sabatini S. Arrowsmith
Earth and Space Science, e2022EA002454 https://doi.org/10.1029/2022EA002454

Atmospheric waves and global seismoacoustic observations of the January 2022 Hunga eruption, Tonga.
R. S. Matoza, D. Fee, J. D. Assink, A. M. Iezzi, D. N. Green,...**G. Averbuch**..., D. C. Wilson
Science, may 2022. ISSN 0036-8075, doi:10.1126/SCIENCE.ABO7063

2021 The spectrogram, method of reassignment, and frequency-domain beamforming.
G. Averbuch
The Journal of the Acoustical Society of America 149, 747, doi:10.1121/10.0003384

Event Location with Sparse Data: When Probabilistic Global Search is Important.
S. Arrowsmith, J. Park, I. Che, B. Stump, **G. Averbuch**
Seismological Research Letters, doi.org/10.1785/0220200292

The 2010 Haiti earthquake revisited: An acoustic intensity map from remote atmospheric infrasound observations.
S. Shani-Kadmiel, **G. Averbuch**, P. S. M. Smets, J. D. Assink, L. G. Evers
Earth and Planetary Science Letters, 2021, 560, doi:10.1016/j.epsl.2021.116795

2020 Conversations between the Earth and Atmosphere: A study on the seismo-acoustic wavefield.
G. Averbuch
PhD thesis, doi.org/10.4233/uuid:6ee6ec6d-9ffc-461f-9278-da38a7409d01

Infrasound observations of sprites associated with winter thunderstorms in the eastern mediterranean.
D. Applbaum, **G. Averbuch**, C. Price, Y. Yair, and Y. Ben-Horin
Atmospheric Research, 2020, 235,doi:10.1016/j.atmosres.2019.104770

Probabilistic inversion for submerged source depth and strength from infrasound observations.
G. Averbuch, R. M. Waxler, P. S. M. Smets, L. G. Evers
The Journal of the Acoustical Society of America 147, 1066, doi.org/10.1121/10.0000695

Long-range atmospheric infrasound propagation from subsurface sources.
G. Averbuch, J. D. Assink, L. G. Evers
The Journal of the Acoustical Society of America 147, 1264, doi.org/10.1121/10.0000792

CLEAN beamforming for the enhanced detection of multiple infrasonic sources.
O. F. C. den Ouden, J. D. Assink, P. S. M. Smets, S. Shani-Kadmiel, **G. Averbuch**, L. G. Evers
Geophysical Journal International, 2020, 221, doi: 10.1093/gji/ggaa010

2019 The Mount Meron Infrasound Array: an infrasound array without a noise reduction system.
G. Averbuch, Y. ben-Horin, P. S. M. Smets, L. G. Evers
Geophysical Journal International, 2019, 219 (2), pp: 1109-1117, doi.org/10.1093/gji/ggz350

2018 A Seismo-Acoustic Analysis of the 2017 North Korean Nuclear Test.
Assink, J. D., **G. Averbuch**, S. Shani-Kadmiel, P. S. M. Smets, L. G. Evers
Seismological Research Letters, 2018, 89 (6), pp: 2025-2033, doi.org/10.1785/0220180137
*All authors contributed equally

Extracting low signal-to-noise ratio events with the Hough transform from sparse array data.
G. Averbuch, J. D. Assink, P. S. M. Smets, L. G. Evers
Geophysics, 83(3), WC43-WC51, doi:10.1190/GEO2017-0490.1

2016 On the infrasound detected from the 2013 and 2016 DPRK's underground nuclear tests.
Assink, J. D., **G. Averbuch**, P. S. M. Smets, and L. G. Evers
Geophys. Res. Lett. (2016), 43, 3526–3533, doi:10.1002/2016GL068497
*All authors contributed equally

Datasets and programs

Infrasound data set.
G. Averbuch, S. Arrowsmith
International Federation of Digital Seismograph Networks. https://doi.org/10.7914/SN/3B_2021

pyoad: open-source package to read and process ocean acoustics data.
G. Averbuch
https://github.com/Gilaverbuch/pyoad

SA FFP: seismo-coustic fast field program for a solid Earth-ocean-atmosphere system.
G. Averbuch
https://github.com/Gilaverbuch/SA_FFP

Invited talks

2021 Evidence for short temporal atmospheric (tropospheric) variations observed by infrasonic signals.
G. Averbuch, M. Ronac-Giannone, S. Arrowsmith, J. F. Anderson
The Journal of the Acoustical Society of America (November 2021)

2019 Probabilistic inversion for submerged or buried source depth and strength from infrasound observations.
G. Averbuch, R. M. Waxler, L. G. Evers
The Journal of the Acoustical Society of America 145, 1868, doi.org/10.1121/1.5101751