Anant Hariharan

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OBJECTIVE

I am a structural seismologist with experience in the development, comparison, and interpretation of seismic observations of the interior of the Earth. My doctoral work explores methodological improvements to seismic images made using long-period surface wave measurements.

EDUCATION

Brown University, Providence, RI — Expected August 2023
Doctor of Philosophy, Geophysics

Brown University, Providence, RI — May 2020
Master of Science, Earth Sciences

Cornell University, Ithaca, NY — May 2018
Summa Cum Laude, Bachelor of Arts
Double Majors in Physics and Geological Sciences, and *Distinction in All Subjects*

PUBLICATIONS

Hariharan, A., C.A. Dalton. Minimizing Overtone Interference in Love Wave Phase Velocities: Application to USArray Data. *In Review at GRL.*

Hariharan, A., C.A. Dalton, J.C. Babikoff, & G. Ekström. Controls on surface wave overtone interference. Geophysical Journal International, 228, 1665-1683, https://doi.org/10.1093/gji/ggab424, 2021.

Nathan, E.M., **A. Hariharan**, D. Florez, & K.M. Fischer. Multi-Layer Seismic Anisotropy Beneath Greenland. Geochemistry, Geophysics, Geosystems, 22(5), e2020GC009512, https://doi.org/10.1029/2020GC009512, 2021.

Hariharan, A., C.A. Dalton, Z. Ma, & G. Ekström. Evidence of overtone interference in fundamental-mode Rayleigh wave phase and amplitude measurements. Journal of Geophysical Research: Solid Earth, 125(1), e2019JB018540, 2020.

Mookherjee, M., J. Tsuchiya, **A. Hariharan**. Crystal structure, equation of state, and elasticity of hydrous aluminosilicate phase, topaz-OH (Al_2SiO_4 $(OH)_2$) at high pressures. Physics of the Earth and Planetary Interiors, 251, 24-35, https://doi.org/10.1016/j.pepi.2015.11.006, 2016.

Mookherjee, M., D. Mainprice, K. Maheshwari, O. Heinonen, D. Patel, **A. Hariharan**. Pressure induced elastic softening in framework aluminosilicate-albite ($NaAlSi_3O_8$). Scientific reports, 6(1), 1-10, https://doi.org/10.1038/srep34815, 2016.

AWARDS

- *Outstanding Student Presentation Award* — 2021
  American Geophysical Union
- *NSF Graduate Research Fellowship* — 2018 - 2023
  National Science Foundation
- *Hunter R. Rawlings III Cornell Presidential Research Scholar* — 2016 - 2018
  Cornell University
- *Chester Buchanan Memorial Award* — 2018
  Department of Earth and Atmospheric Sciences, Cornell University
- *Tanner Dean's Scholar of the College of Arts and Sciences* — 2014 - 2018
  Cornell University, College of Arts and Sciences

- *Dean's List* 2014 - 2017
  Cornell University
- *Michael William Mitchell Memorial Fund Award* 2017
  Department of Earth and Atmospheric Sciences, Cornell University
- *Category Winner for Best Presentation* 2017
  Spring Research Forum, Cornell Undergraduate Research Board.
- *SEG Scholarship* 2017
  Society of Exploration Geophysicists

RELEVANT EXPERIENCE

Internship Summer 2022-Present
Sandia National Laboratories, Ground-Based Nuclear Detonation Detection Group, Albuquerque, NM

- Eliminated redundancy in global datasets of body-wave arrival times and inverted these datasets for global wavespeed models
- Identified systematic timing errors in global datasets of body-wave arrival times

Research Experience Jan 2016 - May 2018
Cornell Earthquake Seismology Group, Ithaca, NY

- Processed body wave data recorded by seismometers deployed adjacent to the Main Ethiopian Rift to understand the impact of nearby rifting on crustal and upper mantle deformation.

Summer Internship Summer 2017
University of Maryland College Park, College Park, MD

- Developed a wavelet-based approach to quantify geographic variations in the spectra of heterogeneity present within global and regional tomographic models.

Research Experience May 2014 - May 2015
Cornell Mineral Physics Group, Ithaca, NY

- Used crystallographic methods to interpret *ab initio* simulations and study the behavior of hydrous mineral phases occurring at high temperatures and pressures.

SERVICE & LEADERSHIP

Reviewer for:

- **Mechanical Systems and Signal Processing** 2021-present
- **Geophysical Journal International** 2022-present

Organizer
Remote Online Sessions for Emerging Seismologists 2021 - present

- Planned lectures and organized course materials for an international, asynchronous course attended by 300+ students. Provided technical support and computing tutorials, as well as contributed to writing a grant for future sessions.

Student Representative
American Geophysical Union Seismology Section 2020 - 2022

- Served on the executive committee for the Seismology Section. Helped curate and keep section website up-to-date and participated in section meetings and activities.

GeoClub Treasurer 2019 - 2020
Brown University, Providence, RI

- Managed finances for the Department of Earth, Environmental, and Planetary Sciences graduate students.

Geophysics Seminar Organizer 2020
Brown University, Providence, RI
- Organized a series of weekly geophysics lectures, including inviting scientists from other institutions.

Writer and Editor, "The Research Paper" Science Literary Magazine
Cornell University 2014 - 2018
- Wrote articles about Cornell University research for a broad audience. I was also selected to serve on the editorial board of this student-run publication for three years.

Co-President, Earth and Atmospheric Sciences Student Association
Cornell University 2015 - 2018
- Managed undergraduate student group finances and outreach activities, as well as organized multiple research symposia to showcase undergraduate research.

TEACHING & MENTORING

Graduate Student Mentor, Spring 2020-Present
Brown University, Providence, RI
- Helped advise an undergraduate student through a research project aimed at improving the quality of Rayleigh wave phase velocity measurements. Provided guidance with method development and coding. Project resulted in a poster at the American Geophysical Union Fall Meeting 2021.

Teaching Assistant Fall 2021
Brown University, Providence, RI
- Solid Earth Geophysics, EEPS 1610
- Responsible for grading all problem sets and answering student questions in thrice-weekly remote and in-person office hours, as well as asynchronously via Slack. I led two lab sessions, one of which I developed from scratch on surface-wave seismic tomography.

Course Assistant Spring 2021
Brown University, Providence, RI
- Natural Disasters, EEPS 0160M
- Created three video lectures on seismology and volcanology. Held weekly office hours.

SKILLS

Programming: Python, MATLAB, GMT, LaTeX, Shell Scripting, SQL Developer, Fortran.
Field: Familiar with broadband and nodal seismometer deployments and servicing.
Languages: English (native), Spanish and Hindi (conversational).
Areas of Focus: Signal Processing, Inverse Theory, Data Mining, Structural Seismology

RELEVANT COURSEWORK

Geosciences: Earthquake Seismology, Advanced Seismology, Global Tectonics, Solid Earth Geophysics, Rheology of the Crust and Mantle, Physical Volcanology, Structural Geology, Advanced Structural Geology, Earthquake Record Reading, Interior of the Earth, Geodynamics, Seismology, Active Tectonics, Advanced Seismology, Data Analysis in the Geosciences, Introduction to Biogeochemistry

Quantitative: Continuum Physics of Solid Earth, Modeling in Natural Sciences, Computing using MATLAB, Multivariable Calculus for Engineers, Linear Algebra for Engineers, Electromagnetism, Oscillations Wave and Quantum Physics, Thermodynamics, Basics of Quantum Mechanics, Applications of Quantum Mechanics, Intermediate Electricity and Magnetism

SELECTED CONFERENCE PRESENTATIONS

Hariharan, A., C. A. Dalton, Minimizing Love wave overtone interference in phase velocity measurements via a targeted selection of earthquake sources. AGU Fall Meeting 2021.

Russell, J. B., C. A. Dalton, & **A. Hariharan**, Array-based observations of Rayleigh-Wave attenuation in the Pacific. AGU Fall Meeting 2021.

J. Grossman, **A. Hariharan**, & C. A. Dalton, A new metric for improving the quality of Rayleigh wave phase-velocity Measurements, AGU Fall Meeting 2021.

Nathan, E.M., **A. Hariharan**, & K. M. Fischer. Greenland's mantle transition zone and crustal structure revealed by receiver functions, AGU Fall Meeting 2021.

Hariharan, A., C.A. Dalton, J.C. Babikoff, & G. Ekström. Controls on surface wave overtone interference, AGU Fall Meeting 2020.

Hariharan, A., C.A. Dalton, Z. Ma, G. Ekström, & D. W. Forsyth. Overtone interference in fundamental-mode Rayleigh wave phase and amplitude, AGU Fall Meeting 2019.

Nathan, E.M., **A. Hariharan**, D. Florez, H.E. Krueger, I. Gama, J. Krogh, N. Zhao, & K.M. Fischer. Seismic anisotropy in the Greenland mantle from shear wave splitting, AGU Fall Meeting 2019.

Hariharan, A., V. Lekic, F. J. Simons, & P. Moulik (2019). An evolving multi-scale repository of heterogeneity from the reconciliation of community Earth models, AGU Fall Meeting 2019.

FIELDWORK

- *Active Source Experimentation, Rio Grande, New Mexico* 2017
  Broadband seismometer servicing runs, and active-source profiling of the Socorro magma body
- *Nodal Seismometer Retrieval in Oklahoma* 2016
  Retrieval of a massive rapid-response nodal deployment of seismometers to investigate aftershocks from the M5.8 Pawnee Quake.
- *Broadband Seismometer Deployment in Oklahoma* 2016
  Deployed broadband seismometers in Oklahoma for an array designed to monitor induced seismicity.
- *Broadband Seismometer Servicing in Ithaca, New York* 2016
  Serviced seismometers deployed in the Cornell Seismic Network to monitor instrument health and ensure continual recording of data, regardless of the number of snakes around the seismometers.
- *Field Mapping in the Andes, Argentina* 2015
  Engaged in field mapping exercises in the Andes, including an independent mapping project. Worked in diverse geologic settings and recorded data for cross-sections, stereographic projections, and stratigraphic columns.