

Urbi Basu

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<https://scholar.google.com/citations?user=9qObr2oAAAAJ&hl=en>

RESEARCH EXPERTISE

- Automated earthquake detection using machine learning based tools such as EQTransformer and PhaseNet
- Body and surface wave seismic tomography studies
- Real time seismic monitoring
- Marine seismic data time domain processing

EDUCATION

Ph.D. Geophysics

Aug 2014 - April 2019

Center for Earthquake Research and Information, University of Memphis, USA

Dissertation: Seismic velocity and anisotropy structure underneath the central United States.

Research Advisor: Dr. Christine A. Powell

Masters, Applied Geology

July 2012- May 2014

Indian Institute of Technology, Bombay (IITB), India

Thesis: Study of glauconites of Karai shale formation, Cauvery basin

Research advisor: Dr. Santanu Banerjee

Bachelors, Geology

July 2009- May 2012

Presidency College, University of Calcutta, India

APPOINTMENTS

- Postdoctoral Fellow – Seismology, New Mexico Institute of Mining and Technology, Oct 2022 – present
- Geophysicist, ExxonMobil India, May 2019 – September 2022
- Research Assistant, University of Memphis, August 2014 – April 2019
- Research Assistant, Indian Institute of Technology Bombay, August 2013 – May 2014
- Geoscience Summer Intern, Petra Energia Brazil, June -July 2013

RESEARCH EXPERIENCE

Postdoctoral Research Fellow – Seismology

Oct 2022 – present

New Mexico Institute of Mining and Technology

Research advisor: Dr. Susan Bilek

- Designed automated earthquake detection and location workflow using machine learning tools
- Assessed the performances of machine learning based seismic phase auto pickers such as PhaseNet and EQTransformer and template matching tools for automated earthquake detection
- Assisted in writing and submission of a USGS NEHRP grant proposal.
- Assisted in multiple fieldworks for seismic station maintenance for the New Mexico Tech Seismological Observatory
- Presented research findings at Seismological Society of America 2023 annual conference.

Geophysicist, ExxonMobil India

May 2019 – Sep 2022

- Led a five-member team on a real time microseismic monitoring project

- Managed all aspects of the project including technical quality, deadlines, workload distribution, interaction with geoscience and onsite technical teams
- Designed training schedules and training materials and mentored 5 junior geoscientists on microseismic monitoring.
- Established a technical workflow for passive seismic monitoring and implemented it into production environment.
- Communicated daily with global geoscience and management teams and presented technical findings.
- Performed marine seismic data processing for multiple study regions to create stacked volumes and 2D time migrated subsurface images.

Research Assistant

Aug 2014 – April 2019

Centre for Earthquake Research and Information, University of Memphis

Research advisor: Dr. Christine Powell

- Analysed seismic data using C language based seismic tomography code to create 2D subsurface model of Pn wave velocity and seismic anisotropy model of uppermost mantle underneath central United States
- Investigated multi-layer seismic anisotropy by inverting Rayleigh wave phase velocity dispersion curves for isotropic phase velocity and azimuthal anisotropy maps at different periods using the two-station method
- Published three research papers in peer-reviewed journals
- Assisted in seismic station maintenance fieldwork for the Northern Embayment Lithosphere Experiment (NELE)
- Presented research findings in geoscience national conferences in United States

Research Assistant

Aug 2013- May 2014

Indian Institute of Technology, Bombay Mumbai India

Research advisor: Dr. Santanu Banerjee

- Organised and managed individual field work for collecting glauconite samples.
- Conducted laboratory studies such as thin section, SEM(scanning electron microscope) and XRD(X-ray diffraction) analysis of glauconites of Cauvery basin
- Authored technical report with all research findings

Geoscience summer intern

June-July 2013

Petra Energia Rio de Janeiro Brazil

- Analysed multiple well log data (GR, porosity, density logs) using Petrophysics software to create 2D lithofacies model
- Determined multivariate statistical electrofacies to establish reservoir zones based on characterization from 2D facies model
- Estimated flow patterns and probable hydrocarbon fluid bearing zones
- Presented technical findings to geoscience leadership team and created detailed technical report

SKILLS AND INTERESTS

Technical Skills:

- Automated earthquake detections with machine learning tools
- Body wave and surface wave seismic tomography studies
- Real time seismic monitoring
- Marine seismic data processing
- Research and data analysis

Soft Skills:

- Team building and leadership
- Project management
- Excellent written and oral communication

- Languages: Bengali (native fluency), English (proficient in reading, writing and speaking), Hindi (intermediate)

Computing Skills:

- Software:
 1. Machine learning tools for earthquake detection (EQTransformer, Phasenet)
 2. Seismic Analysis Code (SAC)
 3. Generic mapping tools (GMT)
 4. Shearwater Reveal (seismic reflection data processing software)
- Programming language: Python, Matlab, Shell and awk script

PUBLICATIONS

- Basu, U., Bilek, S.L., and Litherland, M., (*planned submission, January 2024*). Optimizing automated earthquake detection methods in Delaware Basin, southeastern New Mexico, *Bulletin of the Seismological Society of America*.
- Basu, Urbi, and Christine A. Powell. "Velocity and azimuthal anisotropy structure underneath the Reelfoot Rift region from Rayleigh wave phase velocity dispersion curves." *Geophysical Journal International* 228, no. 1 (2022): 291-307.
- Basu, Urbi, and Christine Powell. "Pn tomography and anisotropy study of the central United States." *Journal of Geophysical Research: Solid Earth* 124, no. 7 (2019): 7105-7119.
- Geng, Yu, Urbi Basu, and Christine A. Powell. "Shear velocity structure beneath the central United States from the inversion of Rayleigh wave phase velocities." *Journal of Geophysical Research: Solid Earth* 126, no. 11 (2021): e2021JB022632.

CONFERENCE PRESENTATIONS

- Basu, Urbi, Susan Bilek and Mairi Litherland. "Optimizing earthquake detection methods in Delaware Basin, southeastern New Mexico." In *2023 American Geophysical Union Fall Meeting, San Francisco USA (oral presentation)*
- Basu, Urbi, Susan Bilek and Mairi Litherland. "Optimizing earthquake detection methods in Delaware Basin, southeastern New Mexico." In *2023 Seismological Society of America Annual Meeting, San Juan USA (poster)*
- Basu, Urbi, and Christine Ann Powell. "Velocity and anisotropy structure beneath the Reelfoot Rift region from Rayleigh wave phase velocity dispersion curves." In *2018 American Geophysical Union Fall Meeting, Washington DC USA (oral presentation)*
- Basu, Urbi, and Christine Ann Powell. "Identifying Moho depths and velocity anomalies in the uppermost mantle of the Mississippi Embayment from Pn tomography and anisotropy studies." In *2017 American Geophysical Union Fall Meeting, New Orleans USA (poster)*
- Basu, Urbi, and Christine Ann Powell. "Identifying Moho depths and velocity anomalies in the uppermost mantle of the Mississippi Embayment from Pn tomography." In *2017 EarthScope National Meeting, Alaska USA (poster)*

AWARDS

- Distinguished employee recognition award 2021 – ExxonMobil India
- Seismology Student Workshop 2018 travel grant, Lamont-Doherty Earth Observatory Columbia University
- College of Arts & Sciences Travel Enrichment award for Fall 2017, University of Memphis
- IRIS-EarthScope USArray Data Processing Short Course 2017 scholarship, Indiana University Bloomington, USA
- 2017 EarthScope National Meeting Scholarship, Anchorage Alaska USA

- Graduate travel funding, Spring 2017, University of Memphis
- On to the future travel grant to attend 2016 GSA Annual Meeting, Denver USA
- Secured all India rank 2nd in Master's admission examination (JAM) 2012 in Geology

PROFESSIONAL ASSOCIATIONS

- Seismological Society of America
- American Geophysical Union

PROFESSIONAL WORKSHOPS

- Earth Educators Rendezvous and workshop 2023 – Pasadena California
- Seismology Student Workshop 2018 (Seismological Society of America) – Lamont Doherty Earth Observatory, Columbia University
- Communicating science for impact – 2017 EarthScope national meeting, Anchorage Alaska
- IRIS USArray Advanced Short Course 2017 – Indiana University Bloomington

GEOSCIENCE FIELD EXPERIENCES

- New Mexico Tech Seismological Observatory field work for seismometer maintenance and instrument retrieval in multiple New Mexico locations
- Wavefields Demonstration Community Experiment IRIS (Installation of seismometers and seismic nodes), Oklahoma USA *June 2016*
- Northern Embayment Lithosphere Experiment (NELE) project field work for seismometer maintenance and instrument retrieval, USA *May 2015*
- Field sample collections, fossil study and study of structures of glauconitic shale and sandstone of Cauvery basin India *Aug 2013*
- Structural mapping, understanding of fault propagation fold, fault zones, deformation structures in the Kutch region, India *Dec 2012*
- Primary study of the structure and working conditions of underground and open pit mines of manganese, dolomite and limestone, Maharashtra India *Feb 2012*
- Lithological and structural mapping of Aravalli Supergroup, Rajasthan India *Dec 2010*
- Introduction to general field techniques and study of sedimentary rocks and their associated structures, Himalayas, India *Jan 2010*