

Saikiran Tharimena

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Education

2017 PhD, Ocean and Earth Science (Seismology), *University of Southampton, Southampton, UK*

- Thesis: Global seismic imaging of lithospheric discontinuities using SS precursors
- Developed a new optimization algorithm, the Adaptive Difference Engine

2012 MSc (Distinction), Oceanography, *University of Southampton, Southampton, UK*

- Dissertation: A diagnostic method to estimate mixing in the ocean from the evolution of a passive tracer in tracer coordinates in a 3D numerical ocean circulation model

2011 BTech (CGPA 9.06), Civil Engineering, *Visvesvaraya National Institute of Technology, Nagpur, India*

- Environmental impact assessment of a thermal power plant on the hydrologic regime using remote sensing
- Multiple projects on land use, land cover mapping, satellite image processing, temporal studies of forest encroachment for the Supreme Court of India and Governments of Maharashtra and India
- Urban spatial decision support system (U-SDSS) for groundwater recharge through rainwater harvesting using high-resolution satellite data and GIS approach

Professional Experience

1. JPL Postdoctoral Fellow: Feb 2018 – Present

NASA Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA

- Seismology / 3D full waveform modelling of icy ocean worlds (Enceladus, Titan and Europa)
- Collaborator on InSight mission to Mars – Interior structure modelling using receiver functions
- Expertise in high performance computing – experience with NASA HPC, TACC, Google Cloud HPC
- Global seismic imaging of lithospheric and upper mantle discontinuities

2. Research Fellow: Feb 2017 – Jan 2018 | Visiting Research Fellow: Feb 2018 – Present

University of Southampton, National Oceanography Centre, Southampton, UK

- Passive imaging of the lithosphere asthenosphere boundary at the mid-Atlantic ridge (ongoing)
- Receiver function and SKS imaging of the lithospheric structure and anisotropy beneath Papua New Guinea (ongoing)
- Waveform modelling, signal processing, algorithm development, and optimization

3. Research Scientist: Feb 2017 – April 2017

Royal Research Ship (RRS) Discovery – PILAB expedition, Atlantic Ocean

- Cruise planning, instrument recovery control and management
- Seismic and bathymetry survey planning, data acquisition, processing and quality control

4. Research Scientist / Technical Expert: Nov 2014 – Jun 2016

Temporary Seismic Network in Papua New Guinea, University of Southampton, UK

- Land deployment and servicing of seismometers; data recovery, processing and quality control
- Cinematographer for the National Geographic Society – filmed a mini documentary on seismic deployment and interviews with local authorities and people about the influence of earthquakes on their lives

5. Teaching Assistant: Sept 2012 – Jun 2016

School of Ocean and Earth Science, University of Southampton, UK

- SOES 1003: IT communication, field and laboratory skills
- SOES 2003: GIS and remote sensing
- SOES 3021: Geophysical field methods – field trip (Brittany, France)
- SOES 3032: Global tectonics
- SOES 6024: Seafloor exploration and surveying 2
- SOES 6059: Basin Analysis (lab component – Petrel)

6. Research Intern: May 2010 – Jul 2010

Indian Space Research Organization (ISRO), Regional Remote Sensing Centre, Nagpur, India

- Image processing and analysis of digital elevation models (DEMs)
- Algorithm development for automatic extraction of geomorphological features from DEMs

7. Surveyor: Feb 2010 – Mar 2010

imaGIS Engineering Solutions Pvt. Ltd., Nagpur, India

- DGPS surveying for water flow characteristics around Raipur railway station for the PWD department

8. Civil Engineering Intern: Jun 2009 – Jul 2009

Larsen & Toubro Ltd., Engineering Construction and Contracts Division, Bangalore, India

- Construction planning and management
- Quality assessment and quality control

Awards and Honors

2017 Dean's Award for Research, University of Southampton, UK

2016 Winner – ILIaD Leadership, management and team management challenge, University of Southampton, UK

2015 Sustainability Action Award, University of Southampton, UK

2013/14 The Royal Astronomical Society research support grant

2012-17 Vice-Chancellor's Scholarship, University of Southampton, UK

2011 Academic excellence award, Visvesvaraya National Institute of Technology, Nagpur, India

Administrative Responsibilities

1. **Convener** – Planetary Sciences session on icy ocean worlds, AGU 2019

2. **Reviewer** – Earth and Planetary Science Letters, Journal of Geophysical Research, Nature Communications

3. **Conference Secretary**, British Geophysical Association – New Advances in Geophysics, London, UK (2015)

- Responsible for organizing including sponsorship, finances, hospitality and conference proceedings

4. **Advisor**, British Geophysical Association Postgraduate Research in Progress Meeting, Southampton, UK (2015)

- Lead negotiator for industrial sponsorships

5. **Eco-Schools – outreach program**, National Oceanography Centre, Southampton, UK (2012 – 2015)

- Educating young kids (7 – 11 years) from local schools about climate change, sustainable development, renewable energy, and social responsibility.

6. **Environmental Sub-Committee**, National Oceanography Centre, Southampton, UK (2012 – 2015)

- Policy decisions for environmental management at the National Oceanography Centre Southampton site, and the operation of the ISO 14001 certified environmental management system

7. **Graduate School Committee**, National Oceanography Centre, Southampton, UK (2012 – 2013)

- Influenced the discussion about the importance of STEM education and the concerns of international students during a meeting with the Science Minister Lord David Willetts at the National Oceanography Center on 10th October 2013. This was reflected in Lord Willetts' speech to the UK Parliament

8. **Executive Committee**, Entrepreneurship Cell, Visvesvaraya National Institute of Technology, Nagpur, India (2009 - 2011)

- Instrumental in founding an annual entrepreneurship summit, "**Consortium**", aimed at fueling entrepreneurial attitude amongst young engineers and fostering the importance of leadership and management practices
- Consequently, the E-Cell now has a dedicated seed funding program to help bring to life exceptional business ideas from students within the institute

9. **Prefect**, Visvesvaraya National Institute of Technology, Nagpur, India (2009 – 2011)

- Responsible for the wellbeing of 250 first year undergraduate students and 12 cafeteria staff living in the university hostel
- Reporting authority for building maintenance manager, cafeteria staff, and on-duty security staff
- Approving authority for hostel finances including maintenance, and cafeteria supplies
- Recognized by the university director and hostel management for integrity and impeccable work ethics

Additional Skills / Specialised Software Skills

Python, MATLAB, ArcGIS, ERDAS Imagine, Petrel, Caris Hips & Sips, ENVI, seismic data processing (terrestrial and marine), hydrographic surveying, survey planning and management, reflection seismology, high performance computing, Agile Project Management, algorithm development, optimization, remote sensing, numerical modelling, parallel computing, event organization, personnel and project management, and motivational speaker.

Professional Affiliations

- American Geophysical Union
- British Geophysical Association
- Life Member, Indian Society of Remote Sensing
- Life Member, Indian Science Congress
- Fellow, Royal Astronomical Society (2013 - 2018) (relinquished due to move to USA)
- Fellow, The Geological Society, London (2014 - 2018) (relinquished due to move to USA)

Publications

1. Drilleau M., **Tharimena S.**, et al., Mars Structure Service (MSS) 1: Single-station and single-event marsquake inversion. *Earth and Space Science* (2020) - **accepted**
2. Lognonne P., **Tharimena**, et al., Constraints on the shallow elastic and anelastic structure of Mars from InSight seismic data, *Nature Geoscience* (*in press*), DOI: 10.1038/s41561-020-0536-y
3. Rychert C.A., Harmon N., **Tharimena S.**, Seismic imaging of the base of the ocean plates. *Lithospheric Discontinuities, Geophysical Monograph* (2018), ISBN 978-1-119-24971-9
4. Harmon N., Rychert C.A., Agius M., **Tharimena S.**, Bas T.L., Kendall J.M., Constable S., Marine geophysical investigation of the Chain Fracture Zone in the equatorial Atlantic from the PI-LAB experiment, *Journal of Geophysical Research: Solid Earth* (2018), DOI: 10.1029/2018JB015982
5. Agius M., Harmon N., Rychert C.A., **Tharimena S.**, Kendall J.M., Sediment characterization at the equatorial Mid-Atlantic ridge from P-to-S teleseismic phase conversions recorded on the PI-LAB experiment. *Geophysical Research Letters* (2018), DOI: 10.1029/2018GL080565
6. Rychert C.A., Harmon N., **Tharimena S.**, Scattered wave imaging of a melt defined oceanic plate in Cascadia. *Science Advances* (2018), DOI: 10.1126/sciadv.aao1908
7. **Tharimena S.**, Rychert C.A., Harmon N., A unified continental thickness from seismology and diamonds suggests a melt defined plate. *Science* (2017b), DOI: 10.1126/science.aan0741
8. **Tharimena S.**, Rychert C.A., Harmon N., White P.R., Imaging Pacific lithosphere seismic discontinuities – Insights from SS precursor modelling. *Journal of Geophysical Research: Solid Earth* (2017a), DOI: 10.1002/2016JB013526
9. **Tharimena S.**, Rychert C.A., Harmon N., Seismic imaging of a mid-lithospheric discontinuity beneath Ontong Java Plateau. *Earth and Planetary Science Letters* (2016), DOI: 10.1016/j.epsl.2016.06.026

Upcoming Publications (in review / in press)

1. Agius M., Rychert C.A., Harmon N., **Tharimena S.**, Kendall J.M. Thin mantle transition zone beneath the equatorial mid-Atlantic ridge from the PI-LAB experiment, *Nature* (2019 – *in review*)
2. Rychert C.A., Harmon N., Kendall J.M., Constable S., **Tharimena S.**, Wang S., Bogiatzis P., Schlaphorst D., Agius M., Hicks S., A dynamic tectonic plate base defined by ephemeral melt beneath the Atlantic Ocean, *Nature Geoscience* (2019 – *in review*)
3. Harmon N., Rychert C.A., Kendall J.M., Agius M., Bogiatzis P., **Tharimena S.**, Evolution of the oceanic lithosphere in the equatorial Atlantic, evidence for small scale convection from the PI-LAB experiment, *Journal of Geophysical Research: Solid Earth* (2020 – *submitted*)
4. Wang S., Li F., Panning M.P., **Tharimena S.**, Vance S.D., Song WenZ, Ambient noise tomography with common receiver clusters in distributed sensor networks. *IEEE Transactions on Signal and Information Processing Over Networks* (2020 – *submitted*)
5. Knapmeyer-Endrun B., **Tharimena S.**, et al., Crustal thickness and layering of Mars from InSight seismic data, *Science* (2020 – *ready for submission*)
6. **Tharimena S.**, Rychert C.A., Harmon N., Agius M., Kendall J.M., Melt at the lithosphere asthenosphere boundary beneath the equatorial mid-Atlantic Ridge, *Journal of Geophysical Research: Solid Earth* (2020)
7. **Tharimena S.**, Panning M., Vance S.D., Staehler S.C., Boehm C., van Driel M., Seismic structure of Enceladus' ice shell from flexural and Crary modes, *Journal of Geophysical Research: Planets* (*ready for submission*)

8. **Tharimena S.**, Rychert C.A., Harmon N., Resolving global discontinuity structure from the Moho to the mantle transition zone – an adaptive seismic imaging technique using reflected body waves, *Geophysical Research Letters (ready for submission)*

White Papers

1. Vance S.D., Banerdt S.W.B., Kedar S., Panning M.P., Pike T.W., Stahler S.C., **Tharimena S.**, Planetary Seismology: The Solar System's Ocean Worlds, *Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA (2020 – in process)*
2. **Tharimena S.**, Katpatal Y.B., Spatial Decision Support System (SDSS) for ground water recharge through rooftop rainwater harvesting in urban areas using high resolution satellite data and GIS (2011) Enceladus Distributed Geophysical Explorer (EDGE), a strategic research and technology development, *Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA (2019 – in process)*

Conference Abstracts (Only from 2019 - current)

1. S. D. Vance, B. G. Bills, M. P. Panning, C. Cochrane, K. Soderlund, T. Nordheim, J. M. Brown, B. Journaux, Marshall Styczinski, C. Paty, S. Tharimena, M. Melwani Daswani, M. Neveu, K. Chin. Coupling Geochemistry to Magnetic Induction, Gravity, and Seismology in Icy Ocean Worlds (*JpGU 2020*)
2. B. Knapmeyer-Endrun, F. Bissig, N. Compaire, R. Joshi, R. Garcia, A. Khan, D. Kim, V. Lekic, L. Margerine, M. Panning, M. Schimmel, N. Schmerr, E. Stutzmann, B. Tauzin, **S. Tharimena**, E. Bozdogan, D. Peter, A.-C. Plesa, P. Lognonné, S. Smrekar, W. B. Banerdt. Seismic Constraints on the Crustal Structure of Mars from InSight Receiver Functions (*LPSC 2020*)
3. S. D. Vance, B. G. Bills, C. Cochrane, M. Melwani Daswani, M. P. Panning, K. Soderlund, S. Stähler, **S. Tharimena**. Geophysical Investigations of Titan's Habitability (*Titan Through Time Workshop, Boulder, Colorado, 2020*)
4. **Tharimena S.**, Panning M.P., Staehler S., Vance S., Boehm C., van Driel M. Estimating ice shell thickness of icy moons from flexural and cary waves using 3D seismic simulations (AGU 2019)
5. **Tharimena S.**, Rychert C.A., Harmon N. Resolving global discontinuity structure from crust to the mantle transition zone using SS precursors (AGU 2019)
6. Rychert C.A., Harmon N., Constable S., Kendall J.M., **Tharimena S.**, Wang S., Agius M., Bogiatzis P., Schlaphorst D., Hicks S.P., A global view on mantle melt dynamics from the lithosphere-asthenosphere boundary to the transition zone, insights from the PI-LAB experiment (AGU 2019)
7. Lognonne P, et al. SEIS first year: nm/s² (and less) broadband seismology on Mars and first steps in Mars-Earth-Moon comparative seismology (AGU 2019)
8. Rychert C.A., Harmon N., Constable S., Kendall J.M., **Tharimena S.**, Wang S., Agius M., Bogiatzis P., Schlaphorst D., Hicks S.P., A dynamic lithosphere-asthenosphere boundary dictated by variations in melt generation and migration: Results from the PI-LAB experiment in the equatorial mid-Atlantic (AGU 2019)
9. Drilleau et al. The Mars Structure Service for InSight: Single station marsquake inversions for structure (AGU 2019)
10. Kendall J.M, Harmon N., Rychert C.A., Schlaphorst D., Agius M., **Tharimena S.**, Bogiatzis P. The anisotropic seismic signature of plate formation at a slow spreading center (AGU 2019)
11. Panning M.P., Banerdt W.B., Lognonne P. et al. Extraterrestrial Seismology: The perspective after nearly 1 year of InSight on Mars (SAGE/GAGE 2019)
12. **Tharimena S.**, Panning M.P., Staehler S., Vance S., Boehm C., van Driel M. Insights into the seismic structure of icy moons from full waveform modeling (LPSC 2019)
13. Vance S.D, et al. Enceladus Distributed Geophysical Exploration (AbSciCon 2019)
14. Vance S.D, et al. Enceladus Distributed Geophysical Exploration (LPSC 2019)

Invited Talks

1. Seismic imaging of a dynamic plate beneath the Pacific and the equatorial mid-Atlantic ocean (UCLA, 2019)
2. Seismology on icy ocean worlds: Full waveform modeling of Enceladus (NASA JPL – ICE, 2019)
3. Modeling 3D seismic wavefield on Titan and icy moons (NASA Astrobiological Institute: Titan, 2019)
4. A global perspective of the lithosphere-asthenosphere system: from continents to oceans (IISER Pune, 2019)
5. Seismic investigations of icy ocean worlds (CSIR-National Geophysical Research Institute, 2019)

6. From continents to oceans – the evolution of the lithosphere-asthenosphere system (CSIR-National Geophysical Research Institute, 2018)
7. A systematic search for the base of the Pacific lithosphere (AGU, 2017)
8. Environmental sustainability and sustainable development (EcoSchools, National Oceanography Centre, 2014, 2015)
9. Seismic imaging of a mid-lithospheric discontinuity beneath Ontong Java Plateau (British Geophysical Association New Advances in Geophysics, LAB, 2015)
10. Introduction to global seismology: An engineer's perspective (Visvesvaraya National Institute of Technology, Nagpur, 2015)

Press Coverage

1. How thick is a continent? Seismic waves and diamonds hold clues (Cosmos Magazine, <https://cosmosmagazine.com/geoscience/how-thick-is-a-continent-seismic-waves-and-diamonds-hold-clues>)
2. An improved thickness estimate for Earth's continents (Phys Org, <https://phys.org/news/2017-08-thickness-earth-contients.html>)
3. A thorny debate in plate tectonics may finally be resolved (The Atlantic, <https://www.theatlantic.com/science/archive/2017/08/how-deep-is-a-continental-plate/537393/>)