Gian Matharu

gian@ualberta.ca
3676 30th St NW, Edmonton AB, Canada • 778-848-0808

EDUCATION

2014-2019 **Ph.D. Geophysics** (GPA: 3.8/4.0, expected Summer 2019)
University of Alberta, Alberta, AB
Thesis: Challenges in multi-parameter full waveform inversion
Supervisor: Prof. Mauricio Sacchi

2011-2014 **M.Sc. Geophysics** (GPA: 3.8/4.0)
University of British Columbia, Vancouver, BC
Thesis: Crustal anisotropy in a subduction zone forearc: Northern Cascadia
Supervisors: Prof. Michael Bostock and Prof. Nikolas I. Christensen
Collaborator: Prof. Jeroen Tromp

2007-2011 **Honours Bachelor of Science, Physics (First class w/ Distinction)**
University of British Columbia, Vancouver, BC

HONOURS & AWARDS

2015-2018 NSERC Alexander Graham Bell Canada Graduate Scholarship (National)
- Awarded to top-ranked doctoral students in the natural sciences or engineering. 160 recipients from 1544 nationwide applicants.

2015-2018 Alberta Innovates Technology Futures Scholarship (Provincial)
2015-2018 President's Doctoral Scholarship (Institutional)
2010 Rosemary Stewart Scholarship (Institutional)

RESEARCH INTERESTS

Full waveform inversion and seismic imaging
Inverse problems
High performance computing
Physics-constrained deep learning for exploration geophysics

PEER-REVIEWED PUBLICATIONS

Matharu, G., and M. D. Sacchi (2018), A subsampled truncated Newton method for multi-parameter full waveform inversion, *Geophysics,* 84 (3), 1-33.

Matharu, G., and M. D. Sacchi (2018), Source encoding in multi-parameter full waveform inversion, *Geophysical Journal International*, 214 (2), 792–810.

Matharu, G., Bostock, M.G., Christensen, N.I., and J. Tromp (2014), Crustal anisotropy in a subduction zone forearc: Northern Cascadia, *Journal of Geophysical Research: Solid Earth*, 119, 7058–7078.

CONFERENCE PROCEEDINGS

Matharu, G., Zuberi, M.A.H., and M. Sacchi (2019), Full waveform inversion in the western Canadian basin: From near surface to deep, EAGE 81st Annual Meeting, London, UK

Gao, W., **Matharu, G.,** and M. Sacchi (2019), Fast least-squares reverse-time migration via approximating the Hessian as the sum of Kronecker products, EAGE 81st Annual Meeting, London, UK

Matharu, G., Gao, W., and M. Sacchi (2019), Resolution analysis in seismic imaging using the Kronecker-factored Hessian, SIAM Conference on Mathematical & Computational Issues in the Geosciences, Houston, TX, USA

Matharu, G., and M. Sacchi (2018), A subsampled truncated Newton method for multi-parameter full waveform inversion, SEG 88th Annual Meeting, Anaheim, CA, USA

Matharu, G., and M. Sacchi (2017), Feasibility testing of simultaneous source elastic full waveform inversion, SEG 87th Annual Meeting, Houston, TX, USA

Matharu, G., and M. Sacchi (2017), Source-encoding in elastic full waveform inversion, IPAM workshop: Full Waveform Inversion and Velocity Analysis, UCLA, CA, USA

Matharu, G., and M. Sacchi (2016), Analyzing the role of model parameterization in elastic full waveform inversion, AGU Fall Meeting, San Francisco, CA, USA

Bostock, M., **Matharu, G.**, Christensen, N.I., and J. Tromp (2014), Crustal anisotropy in a subduction zone forearc: Northern Cascadia, AGU Fall Meeting, San Francisco, CA, USA

Matharu, G., Bostock, M., Christensen, N.I., Peter, D., and J. Tromp (2013), Investigating Elastic Anisotropy of the Leech River Complex, Vancouver Island using Finite Frequency Kernels, CIG/IRIS workshop: Seismic imaging of structure and source, Fairbanks, AK, USA

Matharu, G., Bostock, M., Christensen, N.I., Peter, D., and J. Tromp (2012), Shear wave splitting on Southern Vancouver Island: Measurements and modelling, AGU Fall Meeting, San Francisco, CA, USA

RESEARCH EXPERIENCE

2014-present **Ph.D. student, University of Alberta**

- Conducting research on elastic full waveform inversion and challenges associated with multi-parameter inversion.
- Developed finite-difference codes (C/MPI) and full waveform inversion workflow tools (Python) to deploy on high performance compute clusters.
- Exploring physics-constrained applications of deep learning in seismic imaging.

2011-2014 **M.Sc. student, University of British Columbia**

- Performed 3D anisotropic modelling to interrogate crustal anisotropy in the Cascadia subduction zone.
- Characterized crustal anisotropy using shear-wave splitting measurements in earthquake data.

2012 **Visiting student, Princeton university**

- Worked on 3D anisotropic seismic wave modelling using the spectral element method.

2011 **Research Assistant, University of British Columbia**

- Measured elastic wave speeds and anisotropy in rocks samples from the Olympic National Park (Washington).

TEACHING EXPERIENCE

2014 **Teaching Assistant, University of Alberta**

- Instructed 1st year physics laboratory sessions. Marked and evaluated reports for 20-30 students.

2011-2012 **Teaching Assistant, University of British Columbia**

Courses: Applied Geophysics, The Solid Earth, The Earth System and Environmental Evolution.

- Provided in-class assistance to undergraduate students during classes.
- Marked mid-term and final examinations.

MEMBERSHIP

2018-present	European Association of Geoscientists and Engineers
2013-present	Society of Exploration Geophysics
2011-present	American Geophysical Union

SKILLS C/C++, Python, MPI, OpenMP, MATLAB, Linux, HPC/Cluster computing, TensorFlow, Git

LANGUAGES English, Punjabi, Hindi

REFERENCES

Mauricio Sacchi (Ph.D. supervisor)
University of Alberta
780-492-1060
msacchi@ualberta.ca

Michael Bostock (M.Sc. supervisor)
University of British Columbia
(604) 822-2082
bostock@eos.ubc.ca