

Deep Learning, Seismic Imaging and DAS

INTERESTS

Seismic Imaging, Inverse Problems, Deep Learning, Distributed Acoustic (Fiber-Optic) Sensing

SUMMARY

- Chair of The Leading Edge Editorial Board 2025-2026; Associate Editor of Geophysics 2025-2027
- J. Clarence Karcher Award 2023 from the SEG for contributions to Deep Learning (DL) in Geophysics, Distributed Acoustic Sensing (DAS), and Full-Waveform Inversion (FWI)
- Coordinated sections on Generative and Physics-Informed AI, Digitalization and DAS in SEG journals
- 10+ years of international research experience in geophysics (including PhD)
- Pioneered DL-based seismic low frequency extrapolation and velocity model building with real data
- 70+ publications, 20+ journal papers, 3 granted patents, 1000+ citations
- Mentored PhD students: Mahesh Kalita, Oleg Ovcharenko, Abdullah Alali, Aleksei Titov
- Key role in acquiring external funding, managing AI-4DFWI project while at KAUST
- Winner of NVIDIA-KAUST GPU Hackathons 2017, 2018
- Advanced Machine Learning on Google Cloud Specialization completed in 2025

2020 (Nov) → Senior (since 2023) Geophysicist at Aramco Americas, Houston Research Center

WORK

Focus: Machine Learning, Distributed Acoustic Sensing

EXPERIENCE

- Leading project on Vertical Seismic Profile (VSP) imaging in desert environment using DAS and ML
- Developed Multi-GPU DL-driven FWI of noisy dual-well DAS data acquired in desert environment
- Developed probabilistic DAS VSP inversion combining energy conservation principles and DL
- Proposed and implemented text-guided generation of seismic models using stable diffusion
- Lead organizer of workshops on geophysical DAS applications for the IMAGE 2023-2024 meetings
- Coauthored 10+ journal papers, 3 granted patents

2016 → 2020 Research Scientist (since 2019), Postdoctoral Fellow (2016-2019) at King Abdullah University of Science and Technology (KAUST, kaust.edu.sa), Physical Sciences and Engineering Department Seismic Wave Analysis Group (SWAG)

Focus: anisotropic elastic waveform inversion, regularizations and deep learning

- 30+ publications, 8 full papers, 3 as first author
- Mentor three PhD students: Mahesh Kalita, Oleg Ovcharenko and Pavel Plotnitskii
- Key role in acquiring .7mln external funding, managing the AI-FWI project (5 PhD students, 3 KAUST PIs, 2 external PIs)
- Created an ultimate guide (Atlas) to anisotropic elastic waveform inversion resolution
- Pioneered deep learning-based seismic low frequency extrapolation
- Winner of NVIDIA-KAUST GPU Hackathons 2017, 2018

2011 → 2015 Student Grant Recipient on "Full-waveform inversion" project sponsored by Shell GSI B.V.

Focus: obtain deeper understanding of how full-waveform inversion works

- 8 publications, 3 full papers, 2 as first author
- Award for excellence in geoscience from the Government of St. Petersburg, 2015
- **SEG student scholarship** award, 2015
- Developed wavenumber illumination theory to uncover the roles of multiples and head waves in FWI together with Prof. Wim Mulder from Shell

2010 → 2016 Engineer-Researcher (geophysicist) at Saint Petersburg State University, Faculty of Physics, Earth's Physics Department, Laboratory of Elastic Media Dynamics
Seismic data modeling, processing and inversion.

2018 → 2019 Co-founder at MedSeis

- Biotech. New way of doing ultrasonic medical imaging with CMUT sensors.
- Awarded proof-of-concept funding from the [PostUp/Taqadam KAUST programs](#)

EDUCATION

Institute of Physics of the Earth of the Russian Academy of Sciences (IPE RAS) & Saint Petersburg State University (SPBU), Russia

- **PhD in Geophysics** (2012-2016)

Thesis: *Pseudo-spectral full-waveform inversion in acoustic media*

Advisors: Boris M. Kashtan (SPBU) & Wim A. Mulder (Shell & TU Delft)

- **MSc in Physics (physics of the earth)** cum laude (2009-2012)

Advisors: Boris M. Kashtan & Vladimir N. Troyan (SPBU)

- **BSc in Physics (mathematical physics)** cum laude (2005-2009)

CODING

- Python, MATLAB, C
- PyTorch, TensorFlow
- \LaTeX , basic HTML, CSS, markdown
- bash, git

PROJECTS

- **deeplogs** is a convolutional neural network that builds velocity models from raw seismic data
- **Scattering Atlas** is a suite of MATLAB codes that quantifies resolution analysis for seismic inversion for arbitrary anisotropic elastic parameters
- **fastFWI** is a simple full-waveform inversion code to test different regularizations with **fastHelmholtz**

LANGUAGES

|| **English** Fluent || **Russian** Native || **German** Basic ||

HONORS AND AWARDS

- J. Clarence Karcher Award 2023 from the SEG
- Outstanding Young Professional at Aramco 2021
- In top 25 IMAGE 2021 presenters
- 1st place in **NVIDIA-KAUST GPU Hackathon** 2017, 2018
- Award for excellence in geoscience from **Government of St. Petersburg, 2015**
- **SEG student scholarship** award, 2015

LEADERSHIP

- Leading informal Geophysics ML interest group at Aramco Houston Research Center
- Project management of KAUST–Aramco project on AI 4D waveform inversion for reservoir monitoring
- Leading efforts on ML-based DAS VSP inversion
- Chairing The Leading Edge Editorial Board

KEY PUBLICATIONS

- 1) [Diffusion Model for DAS-VSP Data Denoising](#). *Sensors*, 23(20), p.8619.
D Zhu, L Fu, **V Kazei** & W Li
Sensors 2023
- 2) [Inverting distributed acoustic sensing data using energy conservation principles](#)
V Kazei, & K Osypov
Interpretation 2021
- 3) [Mapping full seismic waveforms to vertical velocity profiles by deep learning](#)
V Kazei, O Ovcharenko, P Plotnitskii, D Peter, X Zhang & T Alkhalifah
GEOPHYSICS 2021
- 4) [Scattering radiation pattern atlas: What anisotropic elastic properties can body waves resolve?](#)
V Kazei & T Alkhalifah
Journal of Geophysical Research: Solid Earth, 124. 2019
- 5) [Deep learning for low frequency extrapolation from multi-offset seismic data](#)
O Ovcharenko, **V Kazei**, M Kalita, D Peter & T Alkhalifah
GEOPHYSICS 2019

SELECTED CONFERENCE PAPERS

- Predicting density and velocity ahead of the bit with zero-offset VSP using deep learning,
V Kazei, A Titov, W Li, K Osypov
in top 25 at IMAGE (SEG) 2021
- Velocity model building by deep learning: From general synthetics to field data application
V Kazei, O Ovcharenko T Alkhalifah
SEG Annual meeting 2020
- Text-Guided Well Log-Constrained Realistic Subsurface Model Generation via Stable Diffusion
O Ovcharenko, **V Kazei**, W Li, and I Said.
85th EAGE Annual Conference Exhibition 2024

HOBBIES

windsurfing, swimming, water polo

REFERENCES

Available upon request