Member Spotlight

A monthly highlight featuring an ASEG member. All past member spotlights can be found in our newsletter archive.

We welcome **Babak Hejrani** under the spotlight in this issue as he shares his enlightening story!

Babak is a Geoscientist as part of the Onshore Seismic and Magnetotelluric team, Mineral Systems Branch at Geoscience Australia. He is also a visiting fellow at the Australian National University. Babak currently volunteers as the President of the ASEG ACT Branch.

I wear a few different geophysical hats. I'm currently a seismologist at Geoscience Australia, where I focus on seismic imaging primarily through the AusArray project. My background is in mathematics, but growing up in the earthquake-prone Zagros Mountains sparked my interest in the Earth's dynamics. After completing a PhD in geophysics in Denmark, I moved to Australia for a postdoc at the Australian National University, where I still hold an honorary visiting position. Alongside my research, I serve as the President of the ASEG ACT Branch.

1. Tell us who you are and what you do.

I am a mathematical geophysicist specializing in computational seismology, seismic imaging, and solving geophysical inverse problems. Currently, I work full-time at Geoscience Australia as a seismologist and hold an honorary visiting position at the Australian National University. My research focuses on creating seismic models of the Earth's crust and mantle at local, regional, and continental scales, which I then interpret in geological contexts.

2. How long have you been a geophysicist?

I began my academic journey as a mathematician, earning a bachelor's degree in pure mathematics from the University of Kurdistan. In 2014, I completed my PhD in geophysics at Aarhus University in Denmark. Afterward, I moved to Australia for a postdoctoral position at the Australian National University, where I worked on simulating seismic sources in 3D heterogeneous earth models. After three years of post-doc and two years as a research fellow at ANU, I joined Geoscience Australia, where I have been working on the AusArray project, which aims to image the Australian continent.

3. **What do you like most about being a geophysicist?**

   I love the theoretical aspects of numerical simulation of seismic waves, geophysical inverse problems, and coding. I enjoy writing, data analytics, and visualizing models. In addition to this, I find satisfaction in the practical aspects of the job: network design, managing field logistics, leading teams, and performing quality assurance on data.

4. **If you weren't a geophysicist, what would you be?**

   I've always had a deep interest in math, physics, and astronomy. But if I were to step outside the realm of natural sciences, I would likely explore evolutionary psychology, linguistics, or the origins of language and music in human evolution.

5. **What made you decide to become a geophysicist?**

   I didn't originally plan to be a geophysicist. Growing up in the Zagros Mountains in Kurdistan, I experienced multiple earthquakes, which sparked my curiosity about the Earth's structure and dynamics from an early age. Toward the end of my bachelor's degree in mathematics, I was introduced to geophysical problems, particularly in inverse theory. I was fascinated by how mathematically complex and elegant geophysical inverse problems could be. From that point on, I was hooked.

6. **What reaction do you get when you tell someone you're a geophysicist?**

   Most people don't know what geophysicists or seismologists do on a daily basis. I usually describe my job as something akin to taking X-rays or CT scans of the Earth's interior. A recent example was when I had a 3D scan of my tooth taken by a dentist, and we ended up discussing how our fields are quite similar, particularly in how we interpret the images!

7. **What aspect of geophysics do you enjoy the most?**

   I thrive on problem-solving. Geophysical data is often complex, and it feels like there are hidden treasures within the data waiting to be uncovered. Designing workflows and mathematical models to extract meaningful features from the data is the most rewarding part of being a geophysicist for me.

8. **Who is your most respected geophysicist?**

   One of my heroes in geophysics is Inge Lehmann, a Danish seismologist who, in 1936, discovered the Earth's solid inner core, surrounded by a liquid outer core, by analyzing seismic waves from distant earthquakes. Her work has been groundbreaking, and she's an inspiring pioneer, both as a scientist and a woman in geophysics.

9. **Do you think AI will take over your job, or will the human element remain vital to exploration successes?**

   AI is an incredible tool, particularly for automation. I've worked on developing workflows that automate certain parts of geophysical modeling, such as extracting information from raw data. These automated methods are faster and more objective. However, I don't believe AI will replace humans in geophysics. The human intellect and intuition remain essential for interpreting complex geophysical problems.

10. Do you have any volunteering experience?

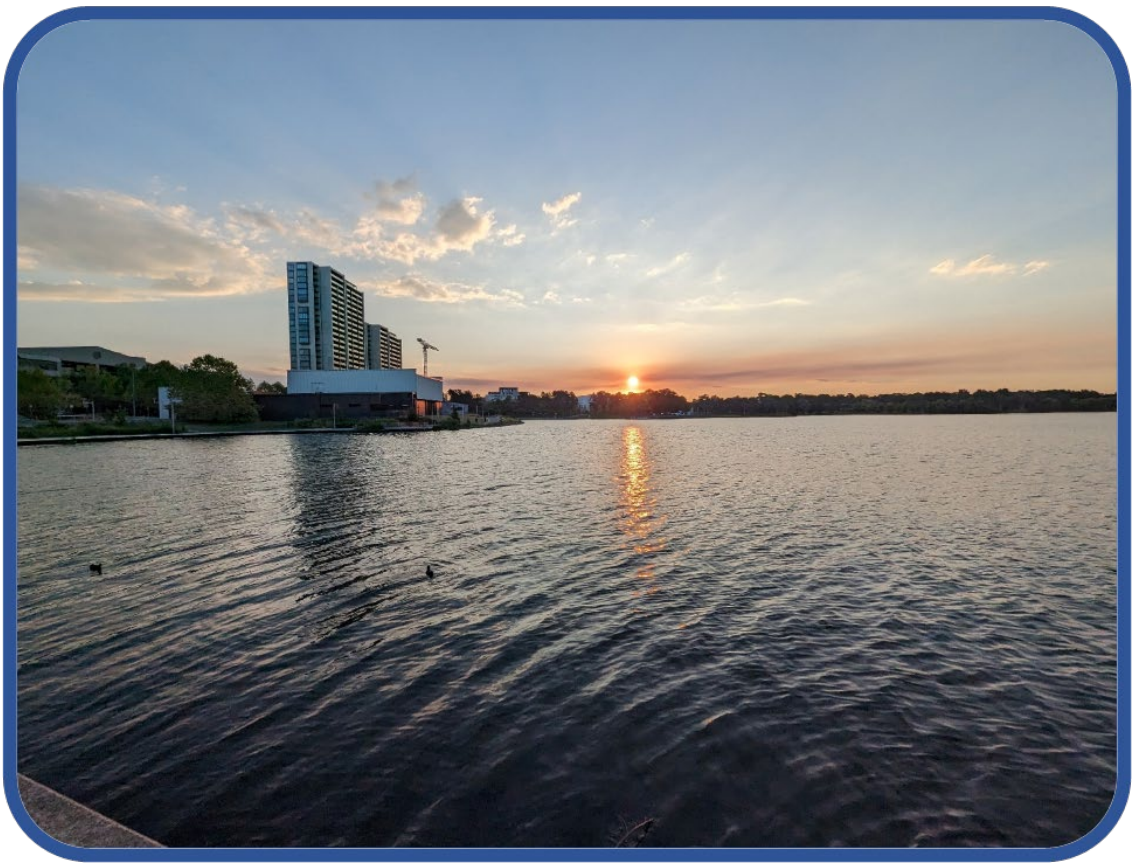
I served on the Inclusion, Diversity, Equity, and Accessibility (IDEA) committee at ANU from 2019 to 2021. Currently, I serve as the ASEG ACT Branch President.

11. What do you do in your spare time?

I'm married to a fellow geophysicist, and we often exchange ideas about our work in our free time. Outside of work, I play electric guitar and am passionate about progressive music. I also enjoy gardening, particularly sustainable landscaping, a skill I honed during the pandemic. I'm a dedicated cat lover and owner. My wife and I also love traveling, especially to Southeast Asia.

12. Where was your best sunrise/sunset location?

Here is a sunset over lake Ginninderra. I usually go for a walk here in the afternoon.



Sunset over lake Ginninderra few minutes away from my house.

13. What are you reading at the moment?

I have been reading a few books in the past year or so:

Stuff of Thought by Steven Pinker

A Universe from Nothing by Lawrence Krauss

No Friends but the Mountains by Behrouz Boochani

Sapiens by Yuval Noah Harari.

14. What's your most treasured textbook?

First Course in Probability by Sheldon Ross

Topology, by James R. Munkres