

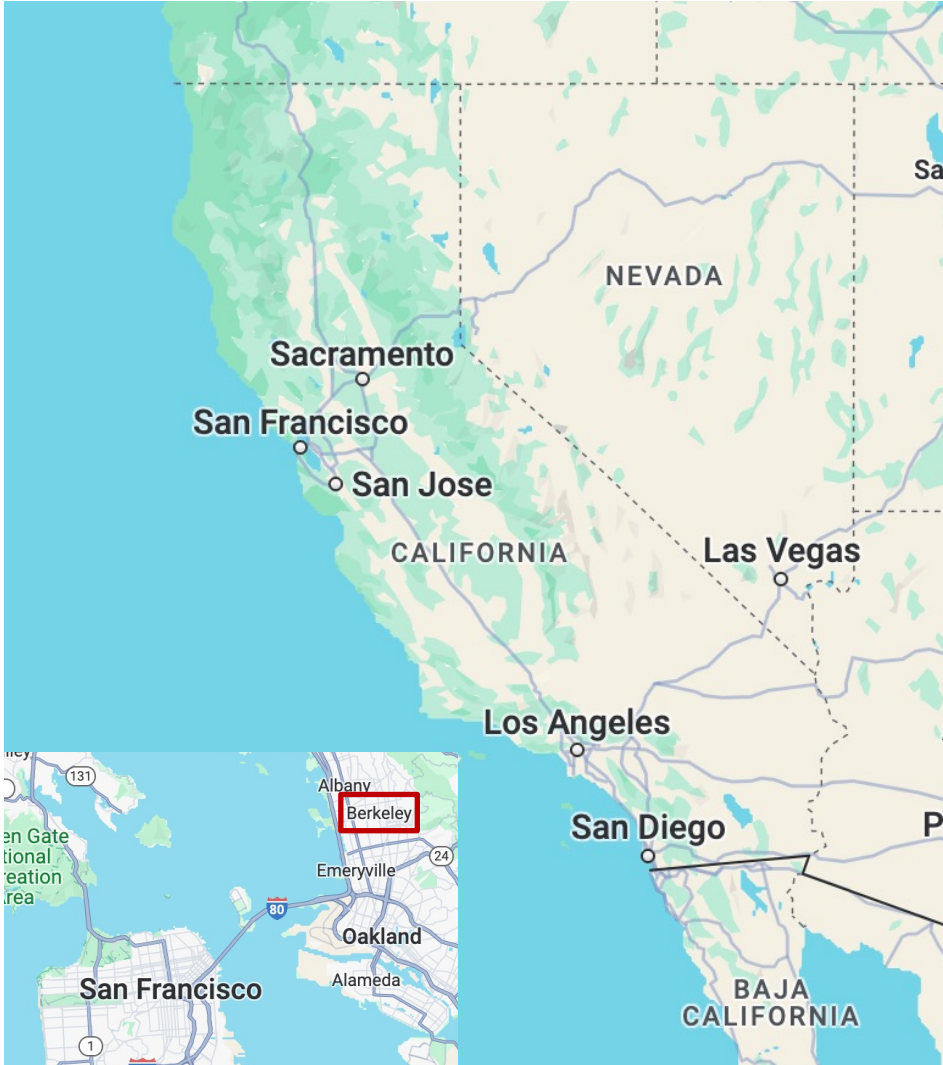
# **Experience Report at Lawrence Berkeley National Laboratory 2023/09/07-2024/04/10**



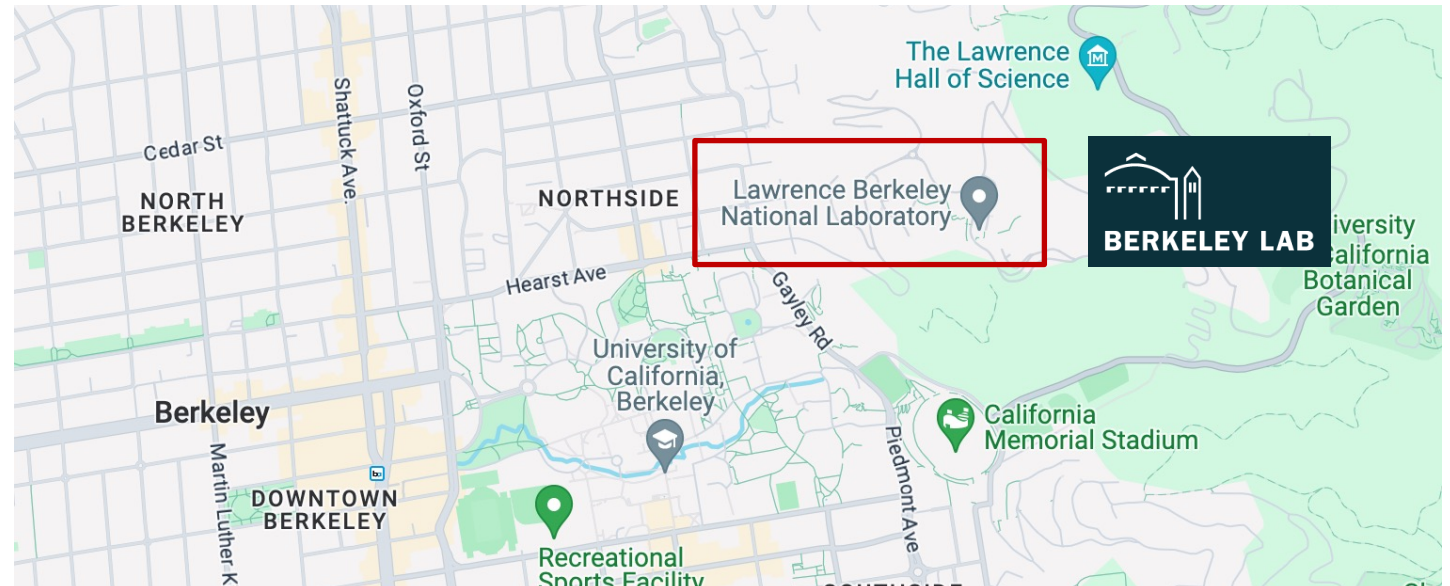
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**Jingyi Sun  
D3  
ITO-Mukuhira lab  
2024/07/09**

# Host institute



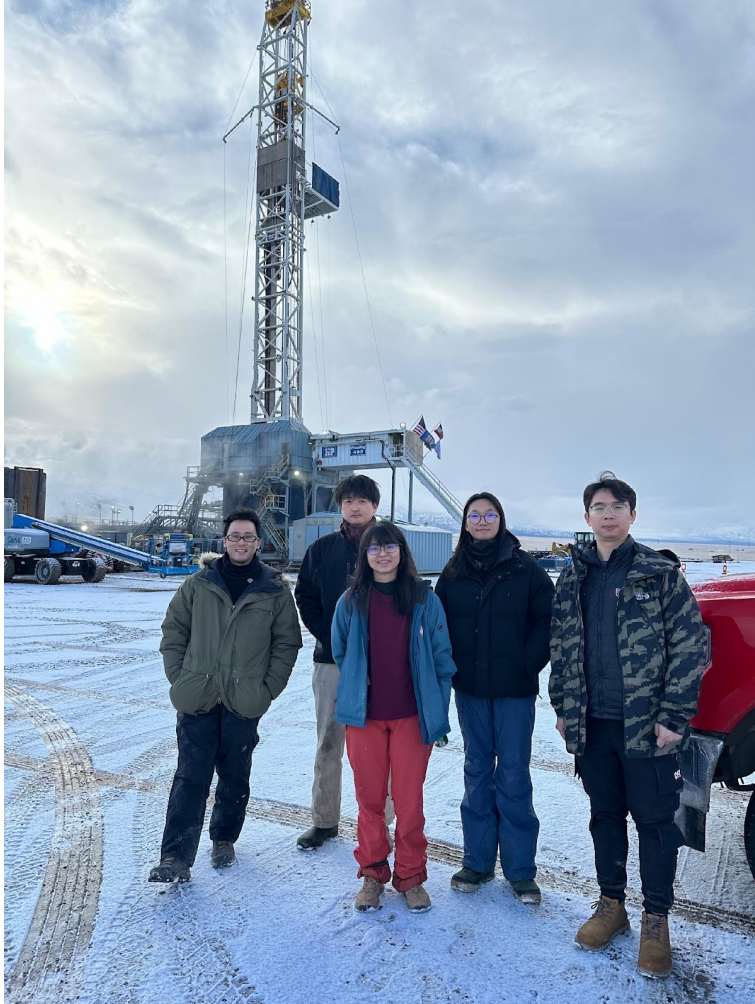
- **Institute** :Lawrence Berkeley National Laboratory (LBNL)
- U.S. Department of Energy lab in Berkeley, California, managed by the University of California. It conducts fundamental and applied research in energy, environment, materials, and biosciences.
- Berkeley Lab scientists have won fifteen Nobel prizes in physics and chemistry.
- Berkeley Lab is the leading laboratory in the United States for earth and environmental sciences.



# Host Supervisor



- **Supervisor: Dr. Nori Nakata**



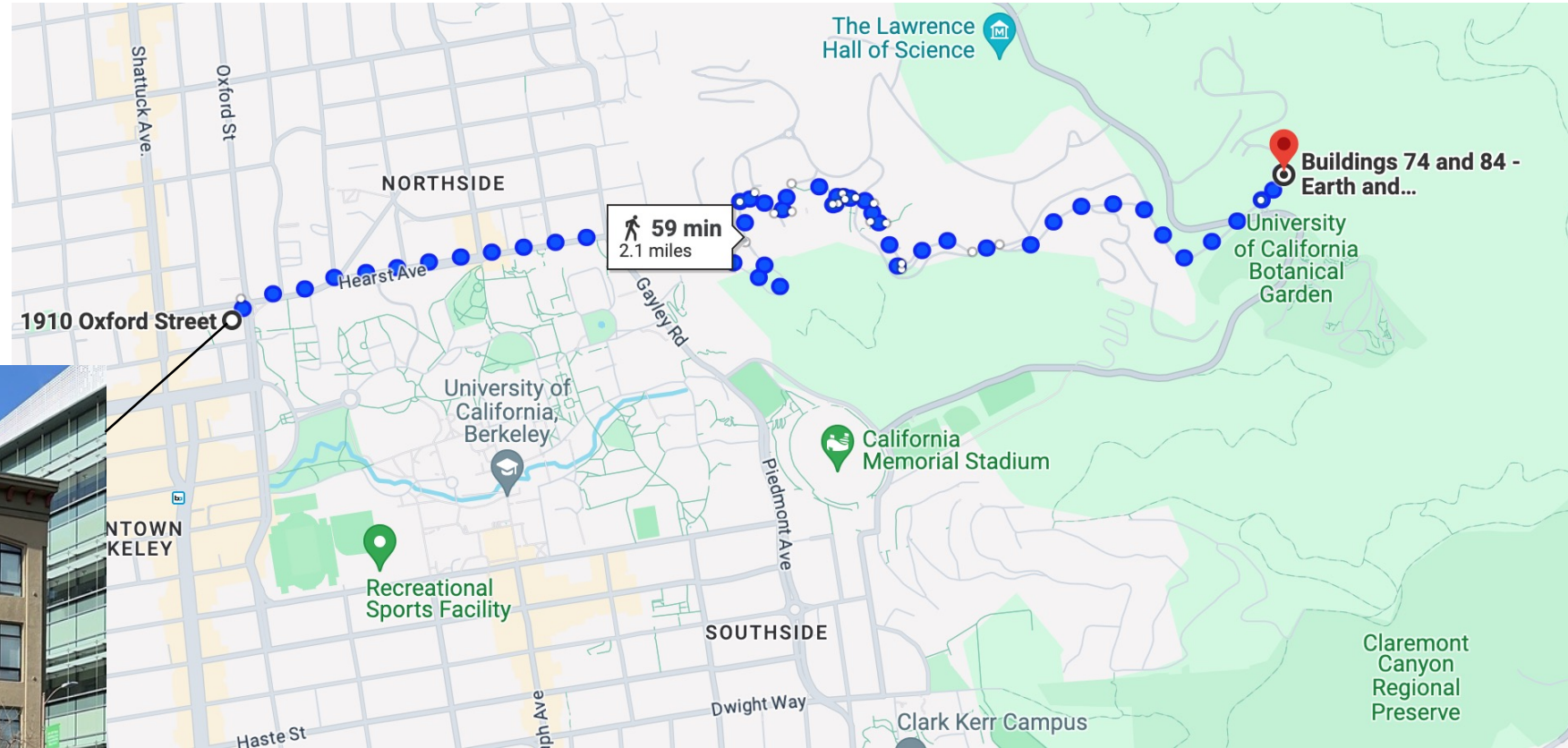
- **Research keywords:** Seismology, 3D/4D Seismic Imaging, Seismic Interferometry, Microseismic, Signal Processing, Wave Phenomena and so on.
- **Research connection:** My research supervisor, Dr. Yusuke Mukuhira, has been working with Dr. Mike Fehler and Dr. Nori Nakata on a project about microseismicity since 2017. The project is currently dedicated to the microseismic characterization of the Groningen gas field in the Netherlands. I subsequently joined this project to extend this method further for complementary detection of microseismic events and reservoir characterization.
- **Research Expectation:** Dr. Nori Nakata conducts more exploration-oriented studies. He believes my proposed method can also be applied to geophysics exploration beyond microseismic detection.



# Accommodation and transportation

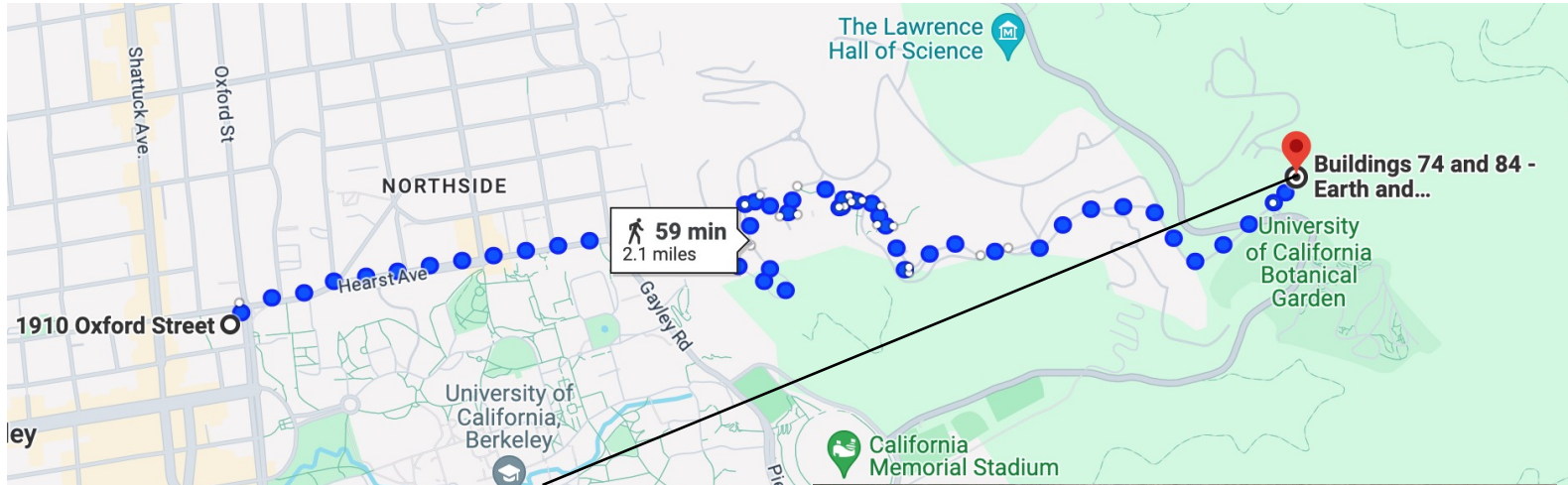


**Apartment: across the street from University of California Berkeley.  
( few seconds to UCB)**





# Accommodation and transportation



## Shuttle bus (lab member only)



## Badge card

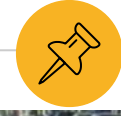


Identification and access to the lab





# Life and expenses



- Mostly sunny days
- Beautiful sunset
- Good ecology





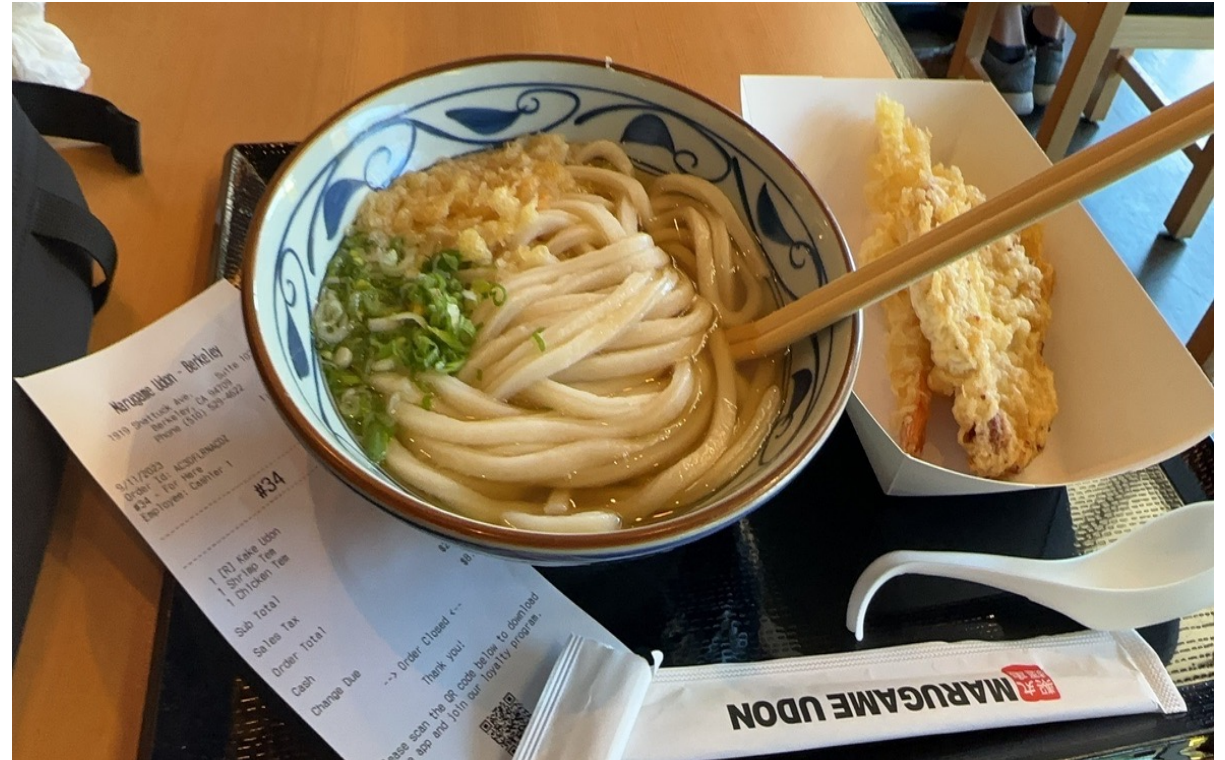
# Life and expenses



- Expensive!



**Rent** (share with a girl; Total rent \$3500/month) :  
**\$1750/month = ¥272878/month**



**Kake Udon: \$15 = ¥2300**

# Research

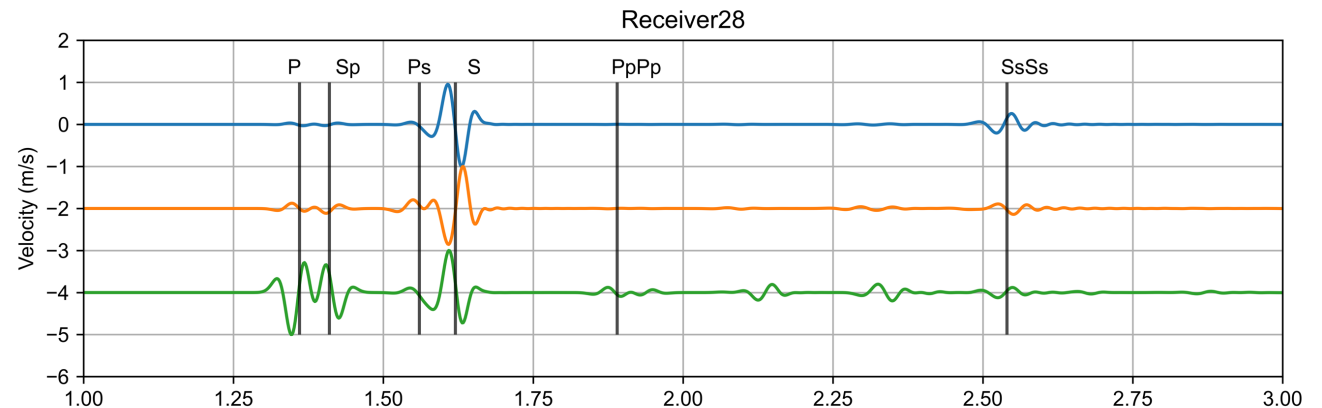
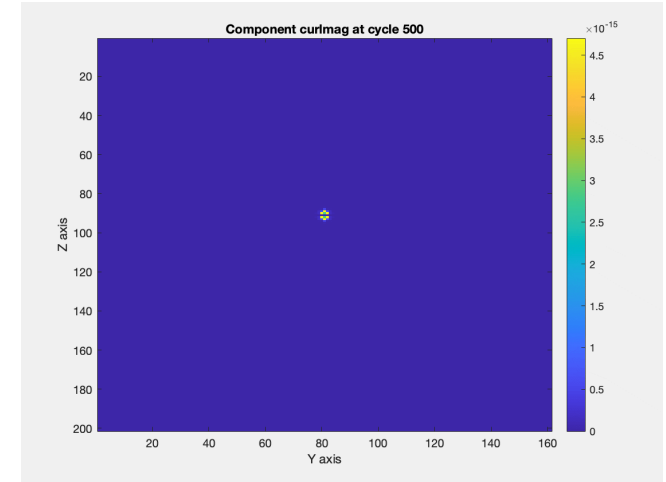
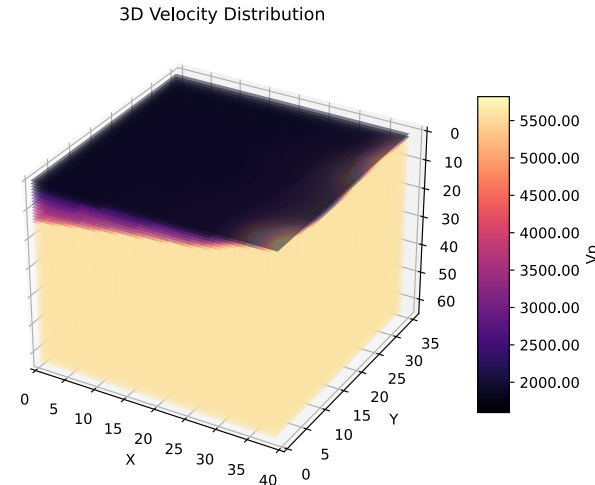


## Topics

- Single station hypocenter location  
Inverse hypocenters using travel time and incidence angles of difference seismic phase
- Low-frequency earthquakes detection
- Small earthquake magnitude estimation

## Target

- Submit to the journal  
S. Jingyi, N. Nakata, Y. Mukuhira and T. Ito.  
Single-station multi-wave phase detection and hypocenter inversion, *in prep.*

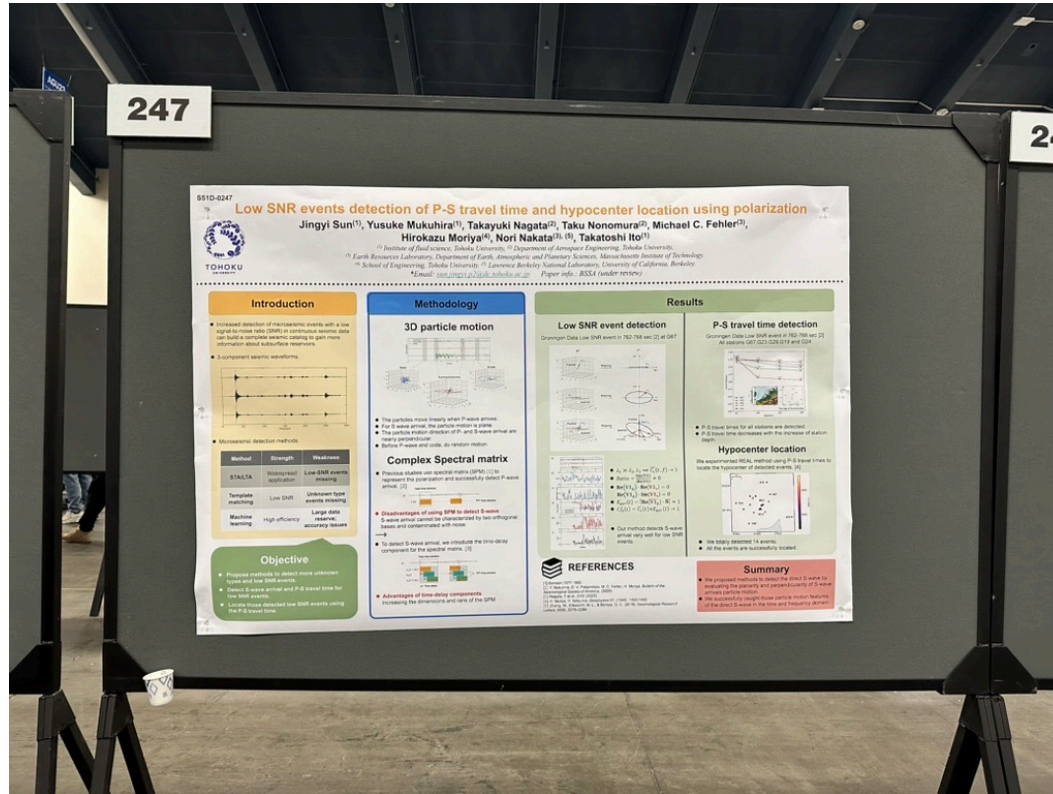




# Conference



- American Geophysical Union (AGU23)
- Presentation topic:  
Low SNR events detection of P-S travel time and hypocenter location using polarization



Poster presentation



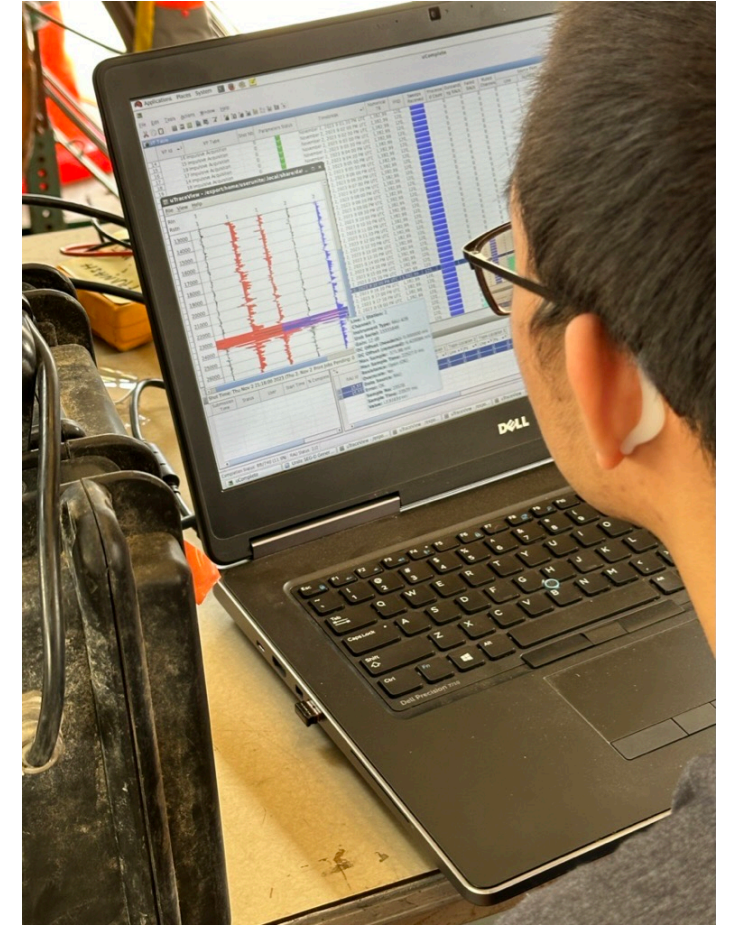
Geology stickers



# Field work -- Pre-test



- Test signal receiving distance





# Field work -- Pre-test



- Test signal receiving distance

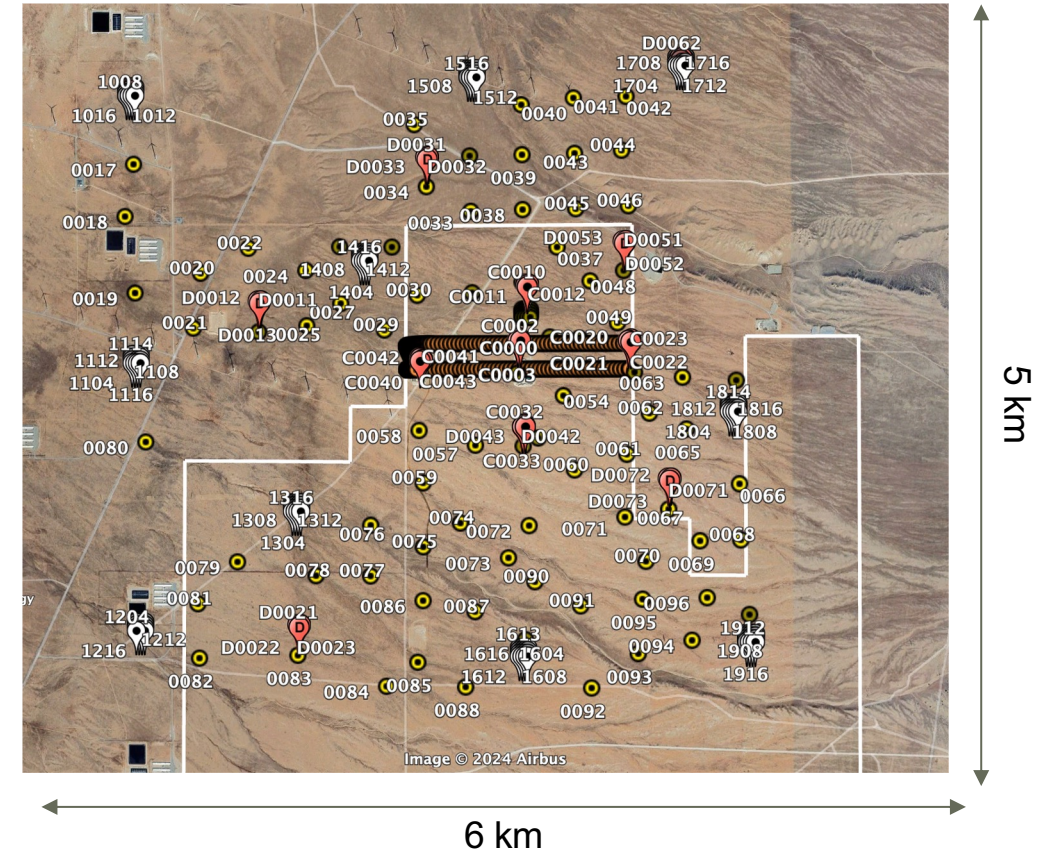




# Field work -- Real



- **Site: Milford, Utah**
- **Project purpose: Design and deploy geophones, then collect and analyze data.**



**Total 500 geophones**



# Field work -- Real



- Site: Milford, Utah
- Project purpose: Design and **deploy geophones**, then collect and analyze data.



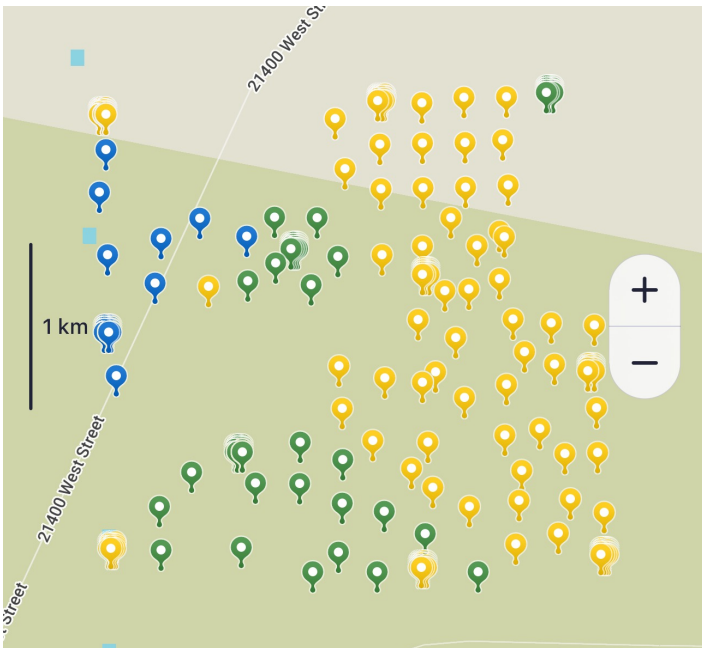
- Find all the station and dig holes
- Deploy geophones



# Field work -- Real



- Site: Milford, Utah
- Project purpose: Design and **deploy geophones**, then collect and analyze data.



- I worked with another lab member to complete the deployment of nearly 400 geophones.
- Finished the last one!!!



# Feeling



## **Before departure ----- Nervous**

- Initially, I felt nervous as I faced an unknown environment and challenges, feeling both uneasy and expectant.

## **After arrival and stay ----- Enjoy!!!**

- Berkeley Lab is full of academic atmosphere.
- I especially like to walk on the Berkeley Hill after getting off work and enjoy the beautiful scenery of the Bay Area.
- I participated in several geophysical research projects, which improved my theoretical knowledge and allowed me to master advanced software tools.
- I attended meetings where I had the opportunity to present my research findings and engage with many distinguished scholars.
- I participated in field experiments, which improved my practical skills and deepened my understanding of seismic data collection and processing.



**Thank you for the support of  
IFS-GCORE, GP-RSS, PRSP**