

HANXIAO WU

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EDUCATION

Stony Brook University

Aug. 2021 - Present

Ph.D. candidate in geophysics
advisor: Dr. Weisen Shen

University of Science and Technology of China

Sep. 2014 - Jul. 2021

Geophysics Master in 2021, BA in 2018
advisor: Dr. Huajian Yao

RESEARCH INTEREST

Subsurface seismic imaging

- Ambient noise tomography & Joint inversion.
- Developing new seismic/geophysical techniques to get better subsurface seismic structures. (**Project 1 & 2**)

Quantitative Inference of Other Properties from Seismic Data

- Investigating the relationship between seismic properties and key geophysical/geochemical properties of the Earth's interior: (partial) melting, chemical composition, thermal structure. (**Project 2 & 3**)

FIELD EXPERIENCE

South Pole, Antarctica

Dec. 2024 - Present

- Installing and recovering ~340 seismic nodes (SmartSolo and FairField) near the south pole area, with the furthest site ~240 km from the pole.
- Servicing 9 seismic broadband stations and installing one special broadband station integrated with a GPS system.
- Contributing to the design of the nodal array.

Kenya, Africa

Mar. 2024 - Apr. 2024

- Installing ~80 seismic nodes (SmartSolo) in the Turkana Basin
- Contributing to the design of the nodal array.

PROJECT

1. Incorporating H-k stacking with surface wave & RF joint inversion

Completed, Published [1]

- *Motivation:* H-k stacking provides robust constraints on V_p/V_s and crustal thickness but depends on a preassumed V_s , while surface wave and RF joint inversion yields detailed V_s structure and crustal thickness but typically assumes a fixed V_p/V_s ratio.
- *Contribution:* By combining these methods, the approach simultaneously resolves V_p/V_s , V_s structure, and crustal thickness without pre-assumptions, significantly reducing trade-offs and improving model accuracy.

2.Enhancing Depth-Resolution of Vp/Vs through Rayleigh Wave H/V Ratio and Local Amplification Data

Completed

- *Motivation:* In the previous approach, Vp/Vs was constrained primarily by RF waveforms, providing no depth resolution for Vp/Vs. This project addressed this limitation by utilizing data types with depth-sensitive Vp/Vs properties.
- *Contribution:* Introducing the Rayleigh wave H/V ratio and local amplification measurements, which exhibit depth-dependent sensitivity to Vp/Vs, into the inversion process. Developed an improved framework capable of resolving 2-layer Vp/Vs structures in the crust.

3.Quantifying Partial Melting in the Lower Crust of Western U.S. Using Seismic Observations and Thermodynamic Modeling

Ongoing

- *Motivation:* Observations of anomalously high lower crust Vp/Vs ratios (>1.9), relatively low Vs, elevated Moho temperatures, and high surface heat fluxes indicate potential partial melting in the lower crust. However, the extent of partial melting remains unclear.
- *Contribution:* Integrating seismic results with thermodynamic modeling using *Perple_X* to constrain the fraction of partial melt in these regions quantitatively. We used thermodynamic calculations to link the observed seismic properties (Vp/Vs and Vs) to mineralogical and melt-related changes in the crust.

4.Side Projects

- Africa fieldwork
- Antarctica fieldwork and data analysis (Receiver function analysis, ambient noise tomography...)
- Glacial and subglacial structure and their seasonal and long-term variations in polar regions
- Joint inversion of surface wave and RF data [2]; Crustal anisotropy. (during Master's degree)

PUBLICATION

- [1] H. Wu, S. Sui, and W. Shen, "Incorporating h-k stacking with monte carlo joint inversion of multiple seismic observables: A case study for the northwestern u.s.," *Journal of Geophysical Research: Solid Earth*, vol. 129, no. 7, 2024. DOI: <https://doi.org/10.1029/2023JB027952>. [Online]. Available: <https://agupubs.onlinelibrary.wiley.com/doi/abs/10.1029/2023JB027952>.
- [2] Y. Yang, H. Yao, H. Wu, P. Zhang, and M. Wang, "A new crustal shear-velocity model in south-west china from joint seismological inversion and its implications for regional crustal dynamics," *Geophysical Journal International*, vol. 220, no. 2, pp. 1379–1393, Nov. 2019, ISSN: 0956-540X. DOI: 10.1093/gji/ggz514. [Online]. Available: <https://doi.org/10.1093/gji/ggz514>.

DATA ANALYTICS SKILLS

Programming Languages
Software & Tools

Python, Bash, Fortran, C/C++, MATLAB
SAC, GMT, LaTeX