Yanlan Hu

Graduate student in Geophysics

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EDUCATION

2021-2024 (expected)	Candidate for M.S. in Geophysics, University of Science and Technology of China, Hefei, China GPA: 4.07/4.3
2017-2021	B.S. in Geophysics, Zhejiang University, Hangzhou, China GPA: 3.79/4.0

RESEARCH INTERESTS

Seismic Monitoring	Seismic signal detection, location and classification
Earthquake Physics	Evolution and properties of foreshocks, mainshocks and aftershocks Fault zone structures
Machine Learning in Seismology	Seismic data mining by machine learning

HONORS & AWARDS

2023	Graduate Student Scholarship, First prize, USTC
2022	**Best Student Presentation Award**, *the 3th AI for Seismology Conference*, Qingdao, China
2022	Graduate Student Scholarship, First prize, USTC
2021	**Best Student Presentation Award**, *the 2021 Annual Meeting of Eastern-section of Seismological Society of America*, Virtual
2021	**Best Poster Award**, *the 7th International Symposium on Opto-electronic Sensor-based Monitoring in Geo-engineering*, Suzhou, China
2021	Graduate Student Scholarship, Second prize, USTC
2020	Shizhe-Suya Scholarship, School of Earth Sciences, Zhejiang University
2020	Provincial Government Scholarship, Zhejiang Provincial Government

RESEARCH EXPERIENCES

Fine-scale Aftershock Behaviors within the Complex Fault System of the 2019 M 7.1 Ridgecrest Earthquake[3] **2022.3 - present**

Advisor: Prof. Zefeng Li (USTC)

- Aimed at analyzing fine-scale fault behaviors in the complex multi-fault system of the 2019 M 7.1 Ridgecrest earthquake by separating different faults and the earthquakes they generate.
- Attributed aftershocks to 15 faults triggered in the 2019 M 7.1 Ridgecrest earthquake based on distances. Evaluated *b* values as well as aftershock releasing rates on individual faults.
- The range of *b* values for different faults is 0.8~1.1, indicating different fault property and stress state. Faults with higher Coulomb Failure Stress change (ΔCFS) have higher early aftershock rate. In a fine scale, the earliest aftershocks occur at areas with highest ΔCFS on individual faults, highlighting the main modulation of ΔCFS at early stage.

Unsupervised Deep Clustering of Seismic Signals in Dålk Glacier, Antarctica[1] **2022.1 - present**

Advisors: Prof. Zefeng Li (USTC)

Prof. Lei Fu (China University of Geosciences, Wuhan)

- Aimed at automatically clustering various seismic events in a glacier environment and helping monitoring glacier activities.
- Used an autoencoder to extract features and a Gaussian Mixture Model to classify seismic signals in Dålk Glacier, East Antarctica. Based on occurrence rates and waveform characteristics we explored the possible mechanisms behind different clusters.
- Identified five categories of seismic events associated with different glacier activities. Among them the active basal crevassing near the grounding line of Dålk Glacier is modulated by tide and could indicate potential weakness areas of the glacier.

Rapid Location of Outer-rise Earthquakes near Japan Trench: Waveform-based Inversion via Deep Learning **2021.10 - 2022.3**

Advisors: Prof. Zefeng Li (USTC)

Prof. Yunyi Qian (Southern University of Science and Technology of China)

- Rapid focus location estimation is vital to predicting tsunamis triggered by earthquakes as soon as possible. Due to the complex 3D topography and bathymetry around them, traditional methods cannot inverse the focus locations quickly and accurately but deep learning can.
- Constructed a CNN model to estimate hypocenter locations of outer-rise earthquakes near Japan Trench. Trained by modeled P and P-coda waveforms of thousands of outer-rise earthquakes on eight global stations.
- The CNN generally produced horizontal error <0.5 km and depth error <0.1 km, providing a means to rapidly evaluate the location of outer-rise earthquakes and potential tsunami hazards.

Consistency-promoting Seismic Phase Picking for DAS **2021.8 - 2022.2**

Advisor: Prof. Zefeng Li (USTC)

- Aimed at developing a phase picking workflow to pick consistent P and S picks on dense Distributed Acoustic Sensing (DAS) arrays.
- Used frequency-wavenumber filtering to remove traffic noise, adopted STA/LTA as the initial picking algorithm and RANdom SAmple Consensus (RANSAC) to ensure pick consistency across the array.
- Applied the workflow on the Ridgecrest DAS array and it performed generally well on M>1 events.

SKILLS

Programming languages: Python, MATLAB, and Shell scripting
Machine learning tools: PyTorch, Scikit-learn
Research code development: DAS phase picking, unsupervised clustering of seismic signals
Language: English(TOEFL IBT Total: 105, Reading 28, Listening 29, Speaking 23, Writing 25), Mandarin(native)

PUBLICATIONS

1. **Yanlan Hu**, Zefeng Li, Lei Fu, Xuying Liu. Environment-modulated glacial seismicity near Dålk Glacier in East Antarctica revealed by deep clustering, *JGR-Earth Surface*, in revision.
2. Xin Cui, **Yanlan Hu**, Shang Ma, Zefeng. Li, Guoming Liu, and Hui Huang. Bridging supervised and unsupervised learni-ng to build volcano-seismicity classifiers in Kilauea, Seismological Research Letters, under review.
3. **Yanlan Hu**, Zefeng Li. Fine-scale aftershock behaviors within the complex fault systems of the 2019 M 7.1 Ridgecrest Earthquake, in preparation.