Jiaxin Zhang

(517) 599 – 0033 | zhang884@msu.edu

288 Farm Lane, Room 207, East Lansing, MI 48824

Education

Ph.D., Geological Sciences **May 2023**

College of Natural Sciences, Michigan State University, East Lansing, MI, USA

- Dissertation title: Thermochemical Heterogeneities and Dynamics in the Earth's Deep Mantle
- Cumulative GPA: 3.87/4.0
- Advisor: Dr. Allen K. McNamara
- Committee members: Drs. Min Chen, Susannah Dorfman, Kevin Mackey, Songqiao "Shawn" Wei

B.S., Geophysics **June 2016**

School of Earth and Space Sciences, University of Science and Technology of China, Hefei, China

- Thesis title: Imaging the Northeastern Geographic Boundary of the Pacific Large Low Shear Velocity Province
- Advisor: Dr. Daoyuan Sun

Research Interest

Mantle convection and its relationship to deep earth structures; Connection between surface observations and evolution of Earth's interior; slab deformation pattern in the lower mantle

Research Experience

Research Assistant **Aug. 2016 – Aug. 2022**

Department of Earth and Environmental Sciences, Michigan State University

Advisor: Dr. Allen McNamara

- Investigated the origin of seismic anisotropy at the base of mantle via high-resolution 3D spherical geodynamic calculations, in order to determine the relationship between the Earth's lowermost mantle flow pattern and slab deformation patterns.
- Explored how the cross-sectional shape of ULVZs provides information on the intrinsic viscosity of LLSVPs and ULVZs
- Developed the multi-composition thermochemical convection code and incorporated it into CitcomCU using ratio tracer method to facilitate composition-dependent viscosity. Performed high-resolution calculations to study how the intrinsic viscosity of LLSVPs and ULVZs affect the shape of ULVZs by the viscous coupling between LLSVPs and the background mantle.
- Investigated the long-term spatial stability of LLSVPs
  Performed thermochemical calculations using the code developed in the ULVZ project to study the influence of composite-dependent rheology on lateral spatial stability of LLSVPs.

Project Leader **May 2015 – June 2016**

National College Student Innovation Program, University of Science and Technology of China

Advisor: Dr. Daoyuan Sun

- Investigated the detailed velocity structure of Pacific Lower Mantle through multiple seismic phases analysis
  Did residual travel time analysis of ScS-S, SPdKS-SKS of Fiji-Tonga seismic data from USArray on northeastern Pacific LLSVP boundary, based on cross-correlation and multi-pathing techniques. Gained a detailed seismic velocity map of northeastern Pacific LLSVP through such method.

Teaching and Mentoring Experience

Graduate Mentor, Geodynamics Research Lab **Fall 2021 – Fall 2022**
Department of Earth and Environmental Sciences, Michigan State University

- Mentored 1 new graduate student on setting up HPCC environment and using coding tools.
- Explained the data structure recognized by ParaView software and helped the student with visualizing Geodynamic models using ParaView.

Grader, Solid Earth Geophysics and Geodynamics **Spring 2017, 2018, and 2022**
Department of Earth and Environmental Sciences, Michigan State University

- Scored homework of 5-25 undergraduate and graduate students.

Grader/Teaching Assistant, Numerical Tools in Earth and Environmental Sciences
Fall 2017; Spring 2021
Department of Earth and Environmental Sciences, Michigan State University

- Examined coding projects and graded course assignments of 15-20 undergraduate and graduate students.
- Taught students setting up coding environments for C programming on both Mac and PC.
- Tutored students with encoding numerical algorithms to solve mathematical problems and practical Earth-related problems, to enhance the coding skills of students.

Teaching Assistant, Geology of Human Environment Laboratory
Aug. 2019 – May 2020; Fall 2022
Center for Integrative Studies in General Science, Michigan State University

- Delivered 12 Geology lab lectures to 80 non-science major undergraduate students from 3 lab sections.
- Prepared and delivered 12 lecture-based lab activities including PowerPoint presentations and campus field trips, to enhance students' understanding of geological activities (e.g., water infiltration into the ground and water runoff) and concepts related to the development of scientific hypotheses (e.g., control variables) in general.
- Graded course assignments and held office hours to ensure students understand the course materials properly.
- Assisted students develop scientific hypothesis, design experiments with controlled variables, and draft proposals for scientific projects to improve students' scientific writing skills. Taught students making professional charts and tables that summarizes and analyzes the data and creating posters to present results, for the purpose of forming the analytical thinking habits of non-science major students.
- Organized the presentation and discussion of the students' proposed projects.

Grader, Geodynamics **Spring 2019**
Department of Earth and Environmental Sciences, Michigan State University

- Evaluated homework mostly consisting of analytical problems of 10-15 senior level undergraduate and graduate students.

Employment

Seismic Data Processor Intern **Jan. – Feb. 2015**
China National Petroleum Corporation

- Trained to use commercial software to process and analyze near-surface seismic exploration data.
- Contributed to summarizing multiple processing methods such as cross-correlation, stacking and migration of seismic data and write them into a user guide for the company internal usage.

Conference Presentations

Oral presentations

Zhang, J. and McNamara, A. K., Influence of composition-dependent viscosity on the lateral spatial and morphologic stability of primordial thermochemical piles in the Earth's lower mantle. Oral presentation in *NC GSA 2023*. NC-GSA, 2023.

Zhang, J. and McNamara, A. K., Investigating how composition-dependent rheology controls the lateral spatial stability of LLSVPs in the lower mantle. Oral presentation in *AGU Fall Meeting 2022*. AGU, 2022.

Zhang, J. and McNamara, A. K., Investigating how the cross-sectional shape of ULVZs provides information on the intrinsic viscosity of LLSVPs and ULVZs. Oral presentation in *AGU Fall Meeting 2020*. AGU, 2020.

Zhang, J. and McNamara, A. K., Investigating different patterns of slab deformation in the lower mantle. Oral presentation in *CGU-CSSS-CIG-CSAFM-ESSA Joint Meeting 2018*. Niagara Falls, Ontario, Canada, 2018.

Zhang, J. and McNamara, A. K., Investigating Different Patterns of Slab Deformation in the Lower Mantle. Oral presentation in *AGU Fall Meeting* 2017. AGU, 2017.

Poster presentations

Zhang, J. and McNamara, A. K., Influence of composition-dependent viscosity on the lateral spatial and morphologic stability of primordial thermochemical piles in the Earth's lower mantle. Poster presentation in *Gordon Research Conference – Interior of the Earth 2023*. Gordon Research Conference Interior of the Earth, 2023.

Zhang, J. and McNamara, A. K., Investigating how composition-dependent rheology controls the lateral spatial stability of LLSVPs in the lower mantle. Poster presentation in *AGU Fall Meeting 2021*. AGU, 2021.

Zhang, J. and McNamara, A. K., Slab strength and trench length influence lowermost mantle flow directions. Poster presentation in *AGU Fall Meeting 2018*. AGU, 2018.

Skills

- **Research**: Mantle convection modeling (2D and 3D, isothermal and thermochemical), HPC, Parallel computing
- **Programming**: C, Python, Bash, Linux system operation, Perl, and HTML

- **Graphic Software**: ParaView, Inkscape, GMT
- **Language**: Chinese (native), English (fluent)

Awards and Honors

Department of Earth and Environmental Sciences Excellence in Teaching award, MSU	2023
Department of Earth and Environmental Sciences Spring travel award, MSU	2023
Department of Earth and Environmental Sciences Fall travel award, MSU	2022
Department of Earth and Environmental Sciences Fall travel award, MSU	2021
AGU Fall Meeting travel grant, virtual online meeting	2020
Department of Earth and Environmental Sciences Fall travel award, MSU	2018
CIG travel award, Niagara Falls	2018
Department of Earth and Environmental Sciences Spring travel award, MSU	2018
AGU Fall Meeting travel grant, New Orleans	2017
Department of Earth and Environmental Sciences travel award, MSU	2017
Geological Sciences Alumni Fellowship, MSU	2016
Award of the Completion of National College Student Innovation Program, USTC	2016
Outstanding Scholarship, USTC	2014
Yuan Yang Estate Agency Scholarship, USTC	2013
Outstanding Freshman Scholarship, USTC	2012

(Here, MSU is the abbreviation of Michigan State University, and USTC stands for University of Science and Technology of China)

Publications

[3] **Zhang, J.** and McNamara, A. K., Investigating how composition-dependent rheology controls the lateral spatial stability of LLSVPs in the lower mantle. (Manuscript in Final preparation; target journal: Earth and Planetary Science Letters)

[2] **Zhang, J.** and McNamara, A. K., ULVZ cross-sectional shapes give clue to the origin and intrinsic rheological nature of themselves and LLSVPs. (Manuscript under internal review, near submission; target journal: Nature GeoScience)

[1] **Zhang, J.** and McNamara, A. K., Slab strength and trench length influence lowermost mantle lateral directional flow patterns. (manuscript in Final preparation; target journal: Journal of Geophysical Research: Solid Earth)

Abstracts

[10] **Zhang, J.** and McNamara, A. K., Investigating how composition-dependent rheology controls the lateral spatial stability of LLSVPs in the lower mantle. Oral presentation in *AGU Fall Meeting 2022.* AGU, 2022.

[9] **Zhang, J.** and McNamara, A. K., Investigating how composition-dependent rheology controls the lateral spatial stability of LLSVPs in the lower mantle. Poster presentation in *AGU Fall Meeting 2021.* AGU, 2021.

[8] **Zhang, J.** and McNamara, A. K., Investigating how the cross-sectional shape of ULVZs provides information on the intrinsic viscosity of LLSVPs and ULVZs. Oral presentation in MSU *2021 Earth and Environmental Sciences Student Symposium*. Dept. Earth and Environmental Sciences, Michigan State University, East Lansing, Michigan, 2021.

[7] **Zhang, J.** and McNamara, A. K., Investigating how the cross-sectional shape of ULVZs provides information on the intrinsic viscosity of LLSVPs and ULVZs. Oral presentation in *AGU Fall Meeting 2020*. AGU, 2020.

[6] **Zhang, J.**, Evolution of thermochemical piles. Oral presentation in MSU *2020 Earth and Environmental Sciences Student Symposium*. Dept. Earth and Environmental Sciences, Michigan State University, East Lansing, Michigan, 2020.
[5] **Zhang, J.** and McNamara, A. K., Slab strength and trench length influence lowermost mantle flow directions. Oral presentation in MSU *2019 Earth and Environmental Sciences Student Symposium*. Dept. Earth and Environmental Sciences, Michigan State University, East Lansing, Michigan, 2019.
[4] **Zhang, J.** and McNamara, A. K., Slab strength and trench length influence lowermost mantle flow directions. Poster presentation in *AGU Fall Meeting 2018*. AGU, 2018.
[3] **Zhang, J.** and McNamara, A. K., Investigating different patterns of slab deformation in the lower mantle. Oral presentation in *CGU-CSSS-CIG-CSAFM-ESSA Joint Meeting 2018*. Niagara Falls, Ontario, Canada, 2018.
[2] **Zhang, J.** and McNamara, A. K., Investigating Different Patterns of Slab Deformation in the Lower Mantle. Oral presentation in MSU *2018 Earth and Environmental Sciences Student Symposium*. Dept. Earth and Environmental Sciences, Michigan State University, East Lansing, Michigan, 2018.
[1] **Zhang, J.** and McNamara, A. K., Investigating Different Patterns of Slab Deformation in the Lower Mantle. Oral presentation in *AGU Fall Meeting* 2017. AGU, 2017.

Service/Leadership

Volunteer, Girl's Math and Science Day, East Lansing, MI May 2023

- Will demonstrate my research to middle school students and assist them participating in hands-on workshops on various topics in math and science. This activity aims to intrigue middle school girls' interests in science and math.

Co-convener, session T31 in 2023 NC-GSA meeting, Grand Rapids, MI May 2023

- Will prepare and plan for the meeting, including recruiting abstracts, coordinating oral and poster sessions, and hosting the meetings.

Volunteer, Michigan Science Olympiad, East Lansing, MI April 2023

- Assisted high school students taking the "Codebuster" competition of Michigan Science Olympiad. Timed, handed out, and collected tests.

Organizer, Journal Club, Geophysics labs, Michigan State University Spring 2018

- Coordinated weekly paper discussions.

Team Leader, Investigation Team of land use in Rural Areas, University of Science and Technology of China July 2013

- Led 30 undergraduate students to conduct a one-week investigation in the form of a survey on water conservancy conditions and rural land transfer in Dangtu, a small village in Anhui, China. The investigation enhanced researchers' understanding of the status of land use in rural areas.
- Led the preparation for and participated in the delivery of a one-day lecture series on meteorological disasters and scientific reactions to such hazards to local high school students. The lectures enhanced the students' knowledge to react to the hazards and triggered their interest in Earth Science.