Diandian Peng

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EDUCATION

Ph.D. in Geology, University of Illinois at Urbana-Champaign (UIUC) May 2022

Thesis: *Quantifying slab evolution and mantle flow using global subduction models with data assimilation.* Committee: Lijun Liu, Jay Bass, Patricia Gregg, William Guenthner

M.S. in Geophysics, University of Science and Technology of China (USTC) June 2017

Thesis: *Geodynamic modeling of the evolution around the southeastern Tibetan Plateau.*

B.S., School of the Gifted Young, USTC June 2014

Thesis: *A preliminary dynamical simulation for the evolution of the Tibetan Plateau.*

PROFESSIONAL EXPERIENCE

Postdoctoral Scholar, Scripps Institution of Oceanography, UCSD June 2022 – current

- Studying Tonga subduction zone with mantle convection models
- Modeling the formation of Large Low-Shear Velocity Provinces and mantle plumes
- Investigating plume-slab interaction processes and their geological implications

Graduate Research Assistant, UIUC 2017 – 2022

- Developed global and regional mantle convection models with data-assimilation
- Investigated the formation of special slabs and their influences on the surface
- Studied the seismic anisotropy and slab material migration following mantle flow

Graduate Research Assistant, USTC 2014 – 2017

- Studied the uplift of Tibetan Plateau and its steep boundaries
- Analyzed the crustal channel flow with analytical and numerical methods

Undergraduate Research Assistant, USTC 2013 – 2014

- Explored the evolution of Tibetan Plateau using numerical models
- Studied the thermal structure of continental lithosphere with heat flow data

RESEARCH INTERESTS

- Developing and applying innovative numerical modeling techniques.
- Investigating the interactions between mantle dynamics and tectonic plates.
- Exploring the diverse range of subduction processes and their mechanisms.
- Investigating the formation, evolution, and dynamics of Large Low-Shear Velocity Provinces and mantle plumes.
- Studying the interactions between plumes and slabs, as well as the associated lithospheric deformation and associated volcanisms.
- Analyzing geophysical, geochemical and geological data to constrain mantle dynamics and lithospheric structures.

PUBLICATIONS

Peer reviewed journal articles

[13] **Peng, D.** and Stegman, D.R., 2024. Modeling subduction with extremely fast trench retreat. *Journal of Geophysical Research: Solid Earth.* [pdf]

[12] **Peng, D.** and Stegman, D.R., 2024. Geodynamic evolution of the Lau basin. *Geophysical Research Letters*. [pdf]

[11] Li, Y. *, Liu, L., Li, S., **Peng, D.**, Cao, Z. and Li, X., 2024. Cenozoic India-Asia collision driven by mantle dragging the cratonic root. *Nature Communications*. [pdf]

[10] Xue, T., **Peng, D.**, Liu, K.H., Obrist-Farner, J., Locmelis, M., Gao, S.S. and Liu, L., 2023. Ongoing fragmentation of the subducting Cocos slab, Central America. *Geology*. [pdf]

[9] Li, Y. *, Liu, L., **Peng, D.,** Dong, H. and Li, S., 2023. Evaluating tomotectonic plate reconstructions using geodynamic models with data assimilation, the case for North America. *Earth-Science Reviews*. [pdf]

[8] Wang, Y., Cao, Z., Peng, L., Liu, L., Chen, L., Lundstrom, C., **Peng, D.** and Yang, X., 2023. Secular craton evolution due to cyclic deformation of underlying dense mantle lithosphere. *Nature Geoscience*. [pdf]

[7] **Peng, D.** and Liu, L., 2023. Importance of global spherical geometry to model slab dynamics and evolution in models with data assimilation. *Earth-Science Reviews*. [pdf]

[6] Liu, Y. *, Liu, L., Li, Y. *, **Peng, D.,** Wu, Z., Cao, Z., Li, S. and Du, Q., 2022. Global back-arc extension due to trench-parallel mid-ocean ridge subduction. *Earth and Planetary Science Letters*. [pdf]

[5] **Peng, D.** and Liu, L., 2022. Quantifying slab sinking rates using global geodynamic models with data-assimilation. *Earth-Science Reviews*. [pdf]

[4] **Peng, D.,** Liu, L. and Wang, Y., 2021. A newly discovered Late-Cretaceous East Asian flat slab explains its unique lithospheric structure and tectonics. *Journal of Geophysical Research: Solid Earth*. [pdf]

[3] **Peng, D.,** Liu, L., Hu, J., Li, S. and Liu, Y. *, 2021. Formation of East Asian stagnant slabs due to a pressure-driven Cenozoic mantle wind following Mesozoic subduction. *Geophysical Research Letters*. [pdf]

[2] Liu, L., **Peng, D.,** Liu, L., Chen, L., Li, S., Wang, Y., Cao, Z. and Feng, M., 2021. East Asian lithospheric evolution dictated by multistage Mesozoic flat-slab subduction. *Earth-Science Reviews*. [pdf]

[1] **Peng, D.** and Leng, W., 2017. Analytical and numerical simulations of uplift processes at the Tibet-Sichuan boundary. *Earthquake Science*. [pdf]

Preprint articles

[1] Suo, Y., Dong, H., Liu, L., **Peng, D.,** Li, Y. *, Liu, J., Dai, L., Cao, X. and Li, S., 2022. Landward mantle flow associated with the Pacific subduction system opened the South China Sea. [link]

Submitted articles

[1] Zhu, T., **Peng, D.** and Liu, L. Effect factors of the Pacific plate subduction towards and under the Changbaishan volcanic province since the Cenozoic: Insights from geodynamic modeling based on data assimilation. *Under review in Tectonophysics.*

Articles in preparation

[2] **Peng, D.**, Stegman, D., Day, J., Parnell-Turner, R., Liu, L. and Wang, Y. Distal volcanisms across the Indian Ocean and origin of the Capricorn Plate caused by a hidden mantle plume.

[1] **Peng, D.**, Liu, L., Li, Y. and Wang, Y. Continental lithospheric structure controls the Cenozoic uplift of western US.

Books

[1] Li, S., Zhu, J., Cao, X. Liu, L., Zhou, J., and **Peng, D.,** 2023. *Atlas of global mantle microplates with tomographic images*. Science Press (Beijing). ISBN: 9787030752086. (Selected as one of the "Outstanding Marine Science and Technology Books for 2024" by the Chinese Society for Oceanography.)

* Students mentored

HONORS AND AWARDS

Cecil H. and Ida M. Green Postdoc Fellowship (UCSD)	2022
Bluestem Fellowship (UIUC)	2017
Graduate Student First-class Academic Scholarship (USTC)	2014, 2015, 2016
Outstanding Student Paper Award (CGU)	2015
National Encouragement Scholarship (USTC)	2013
Outstanding Student Scholarship (USTC)	2013
Outstanding Freshman Scholarship (USTC)	2010

GRANTS

Simulating slab-plume interaction with realistic mantle convection models. PI: Dave Stegman

Awarded 170520 SUs (9.55 million core-hours) on TACC Frontera. 2023

Awarded 225000 SUs (12.6 million core-hours) on TACC Frontera. 2022

***DP** contributed to the scientific justification, usage plan, writing the proposal, and executed the work on Frontera.*

UCSD IGPP Green Scholar Award. $138k. PI: Diandian Peng 2022 – 2024

CONFERENCE ABSTRACTS

Li, Y. *, Liu, L. and **Peng, D.,** 2022, December. What drives the post-collisional northward Indian motion?. In *AGU Fall Meeting Abstracts*

Peng, D., Liu, L., Chen, L. and Li, S., 2021, East Asian lithospheric evolution in response to west Pacific subduction since 100 Ma, In *AGU Fall Meeting Abstracts.*

Peng, D. and Liu, L., 2021, Quantifying horizontal vs vertical motions of subducted slabs using global geodynamic models with data-assimilation, In *AGU Fall Meeting Abstracts.*

Liu, L., **Peng, D.,** Liu, L., Li, Y. * and Chen, L., 2021, A new geodynamic framework for the evolution from intraplate orogeny to continental extension, In *AGU Fall Meeting Abstracts.*

Li, Y. *, **Peng, D.,** Cao, Z. and Liu, L., 2021, Continental-scale converging mantle flow beneath Eurasia and America, from model to observation, In *AGU Fall Meeting Abstracts.*

Liu, L., Zhou, Q. and **Peng, D.,** 2021, Cenozoic topographic evolution of western-central US, In *GSA Annual Meeting.*

Peng, D., Liu, L., Chen, L. and Li, S., 2020, December. Late-Cretaceous Izanagi flat subduction below East Asia and tectonic responses. In *AGU Fall Meeting Abstracts.*

Liu, L., **Peng, D.,** Wang, Y. and Hu, J., 2020, December. Differences and similarities of lithosphere deformation during flat-slab subduction and plume underplating. In *AGU Fall Meeting Abstracts.*

Peng, D., Liu, L., Liu, Y. *, Hu, J. and Li, S., 2019, December. Formation of East Asian stagnant slabs due to a westward Cenozoic mantle wind. In *AGU Fall Meeting Abstracts.*

Liu, L., Hu, J., Zhou, Q., Liu, Y. and **Peng, D.,** 2019, December. Formation of slab tears controls Earth's major silicic volcanisms. In *AGU Fall Meeting Abstracts.*

Peng, D., Liu, L. and Hu, J., 2018, December. Understanding subduction dynamics in the Southwest Pacific. In *AGU Fall Meeting Abstracts.*

Peng, D. and Leng, W., 2016, December. Analytical and numerical simulation of uplift at the Tibet-Sichuan boundary. In *AGU Fall Meeting Abstracts.*

* Students mentored

FIELDWORKS

R/V Thomas G. Tompson cruise in the South Pacific Ocean — Nov – Dec 2023

- *Successfully installed and deployed Ocean Bottom Seismometers (OBS) near the Lau Basin and Samoa Hotspot to collect seismic data for geophysical research.*
- *Conducted dredging operations near the Samoa Hotspot and Cook Islands to obtain rock samples for geochemical and petrological analysis.*
- *Performed precise cutting, classification, and detailed description of rock samples.*

Field work in Baraboo (WI, US) — 2021

Field work in Kentland and Williamsport (IN, US) — 2019

Field work in Sugar Creek (IN, US) — 2017

Field work in Chaohu (Anhui, China) — 2014

TEACHING AND MENTORING

Mentoring experience at UIUC

Mentored two students under the supervision of Prof. Lijun Liu.

Yiming Liu (Visiting graduate student at UIUC)

Guided research led to a publication in Earth and Planetary Science Letters.

Yanchong Li (Graduate student at UIUC)

Guided research led to two publications in Earth-Science Reviews and Nature Communications.

Teaching experience at UIUC

Spring 2021: GEOL 104 — Geology of the National Parks

Role: Grade homework and provide feedback

Fall 2018, Fall 2020: GEOL 117 — The Oceans

Role: Grade homework and provide feedback

Teaching experience at USTC

Fall 2016: Introduction to Earth Science

Role: Grade homework, provide feedback and answer questions

SERVICES

Department colloquium coordinator (UIUC, Fall 2018)

Reviewer for *Geoscience Letters, Geophysical Research Letters, Geology, G-Cubed, Scientific Reports*

BLOG POSTS

Why do some slabs stagnate? *EGU Blogs*. [link]

INVITED TALKS

- Nanjing University. Applications of mantle convection models across diverse subduction zones and insights into overriding plate deformation. 2024
- Southern University of Scientific and Technology. Studying subduction zone dynamics using numerical models with different dimensions. 2024
- Chinese University of Hong Kong. Studying circum-Pacific subduction zones with geodynamic models. 2023
- Scripps Institution of Oceanography. IGPP Seminar Series. 2023

ACADEMIC REFERENCES

Prof. Dave Stegman
Institute of Geophysics and Planetary Physics
Scripps Institution of Oceanography
UC San Diego
Email: dstegman@ucsd.edu
Phone: +1(858)822-0767

Prof. Ross Parnell-Turner
Institute of Geophysics and Planetary Physics
Scripps Institution of Oceanography
UC San Diego
Email: rparnellturner@ucsd.edu
Phone: +1(508)524-9119

Prof. Songqiao Wei
Department of Earth and Environmental Sciences
Michigan State University
Email: swei@msu.edu
Phone: +1(517)355-3961

Prof. James Day
Institute of Geophysics and Planetary Physics
Scripps Institution of Oceanography
UC San Diego
Email: jmdday@ucsd.edu
Phone: +1(858)534-5431