GUANGPU YI

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EDUCATION

University of Science and Technology of China, Hefei, China   2021 - 2024

M.S. in Solid Geophysics, GPA: 4.01/4.30   (expected)

Advisor: Wei Leng

University of Science and Technology of China, Hefei, China   2017 - 2021

B.S. in Geophysics, GPA: 3.08/4.30

RESEARCH INTERESTS

Earth System

Plate tectonics, mantle convection, Earth's deep interior, early Earth geodynamics, etc.

Comparative Planetology

Formation and evolution of terrestrial bodies, planetary environments, impacts, etc.

RESEARCH EXPERIENCES

3D Numerical Modeling: Slab Tearing During Fossil Ridge Subduction   2023 - Present

Supervisor: Prof. Wei Leng (USTC)

▶ Aimed at investigating into slab morphology beneath North Sumatra, constraining the existence and detailed structure of previously proposed rupture: is there slab folding, vertical tearing, or a slab window?

▶ Conducted 3D thermo-mechanical simulations of fossil ridge subduction, in which inactive spreading centers and transform faults are set according to Wharton Fossil Ridge (WFR) and the Investigator Fracture Zone (IFZ).

▶ Found that oceanic plate with fossil ridge that died 30 Ma is hard to break off at its spreading centers during subduction, and vertical tearing happens late when the slab detachs as a whole.

Dynamics of Slab Tearing Caused by Trench's Dramatic Retreat and Bending   2022 - Present

Supervisor: Prof. Wei Leng (USTC)

▶ Aimed to explore the process of slab tearing in a geodynamic context where the trench has experienced dramatic retreat and bending, which may contribute to the subducting slab's lateral tension.

▶ Performed a series of 3D finite-element models of strongly-bended-trench subduction, in which we varied the trench geometry, the initial friction coefficient, the age, and the velocity of the oceanic plate.

▶ Suggested that a strongly curved trench can cause tension and thinning of the subducting slab, and that vertical tearing happens where the orientation of the trench changes by ∼60° in ∼200 km. The process is mainly controlled by the trench geometry and can be widely observed in regions like Mariana, North Caribbean, and the Sunda Strait.

Deep Earth's Thermal Evolution Constrained by Geodynamo's Power Requirements 2019 - 2021

Supervisor: Prof. Jinshui Huang (USTC), Partner: Cichao Xie (USTC)

▸ Gained a basic understanding of self-excited homopolar geodynamo demonstrated by Siemens (1867) and Larmor (1919), in which the magnetic field of either sign can be sustained equally well after the seed field is removed.

▸ Modified the calculation for variation of magnetic Reynolds number with core's heat flow based on mixing length theory and magnetostrophic regime theory following Stevenson (2003). The results still supported the conclusion that the criterion for a dynamo may not differ greatly from the criterion for core's thermal convection.

▸ Re-estimated the thermal history of deep Earth based on the power requirements for the geodynamo with newly constrained core-mantle boundary heat flow of 5-13 TW, which implied lower mantle's cooling from ∼3100 K to ∼2600 K after inner core's formation at ∼1 Ga, following Buffett (2002) and Lay et al. (2008).

CONFERENCE ABSTRACTS

Yi, G. & Leng, W., 2023, Slab tearing beneath Sumatra: Insights from 3D numerical modeling, 2023 Annual Meeting of International Professionals for the Advancement of Chinese Earth Sciences (IPACES), Hefei, China 🔗 Poster

Yi, G. & Leng, W., 2023, Exploring the Sumatra slab structure using 3D numerical modeling, 2023 Annual Meeting of Chinese Geoscience Union (CGU), Zhuhai, China 🔗 Abstract 🔗 PowerPoint

PROFESSIONAL SKILLS

Geodynamic Software: Citcom (a finite element code designed to solve mantle convection problems)
Programming Languages: C, MATLAB, Python, Fortran, IDL, Bash
Languages: English (TOEFL iBT 103: Reading 28, Listening 28, Speaking 23, Writing 24), Mandarin (native)
Others: Generic Mapping Tools (GMT), GPlates, Paraview, LaTeX, HTML, Adobe (Ps, Pr, Ai)

HONORS & AWARDS

Scholarship for Postgraduate Studies	2021, 2022, 2023
Honorary Volunteer in the Science and Technology Week Activity	2019, 2022
Outstanding Student Scholarship	2020
Outstanding Individual in the Summer Social Practice Activity	2019
Outstanding Freshman Scholarship	2017