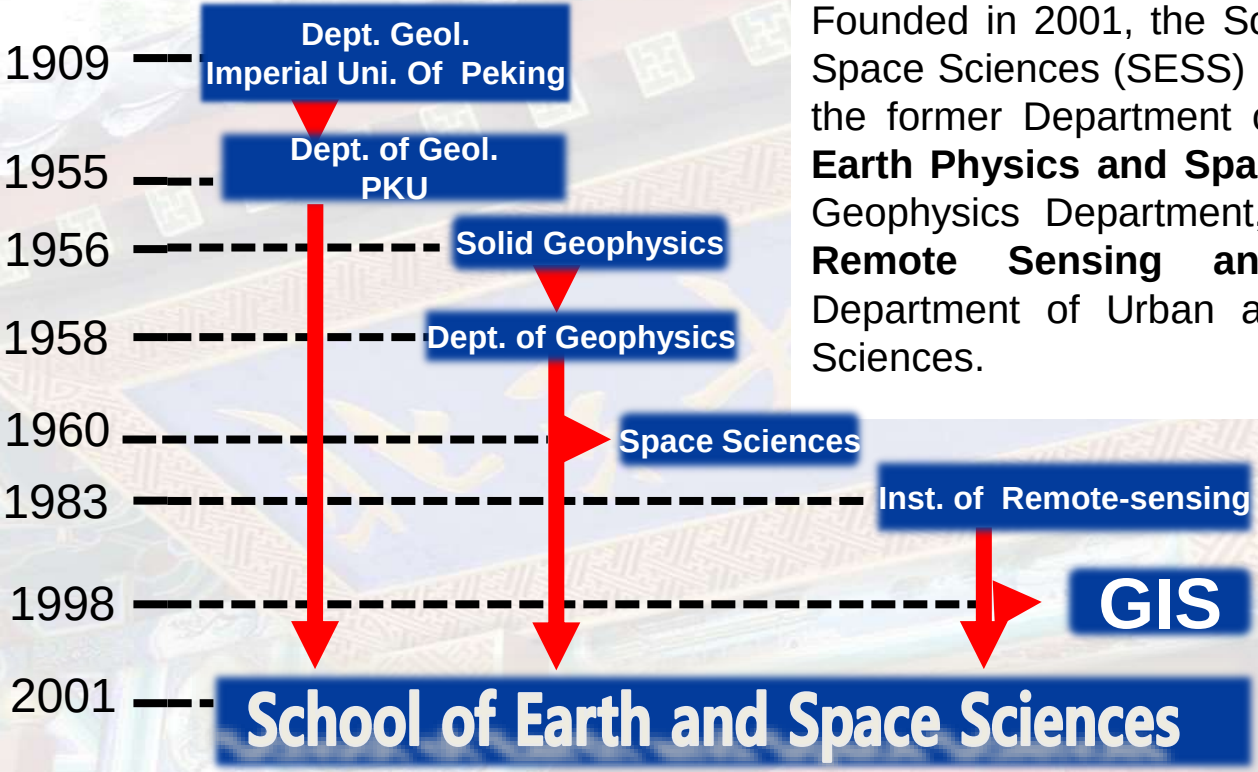
Peking University

School of Earth and Space Sciences, Peking University

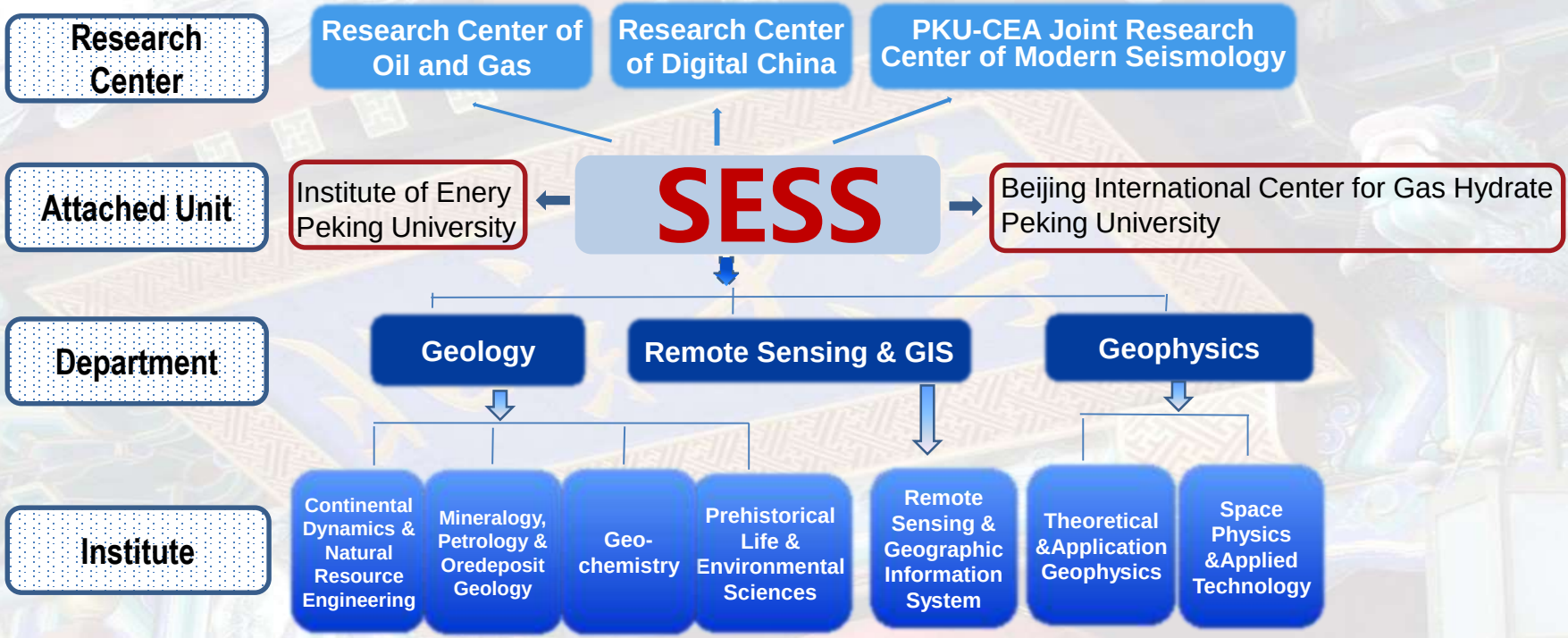
2025年5月12日

Brief History of SESS

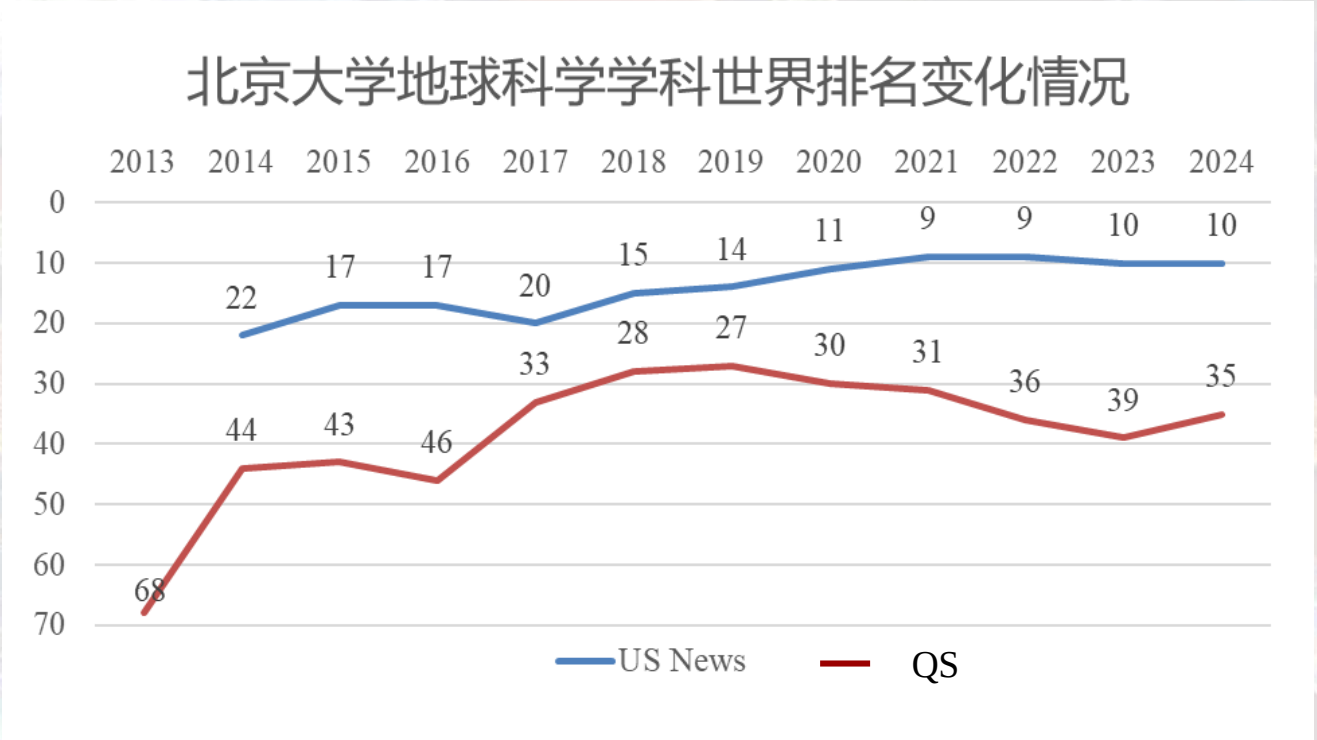


Founded in 2001, the School of Earth and Space Sciences (SESS) of PKU consists of the former Department of **Geology, Solid Earth Physics and Space Physics** of the Geophysics Department, **the Institute of Remote Sensing and GIS** of the Department of Urban and Environmental Sciences.

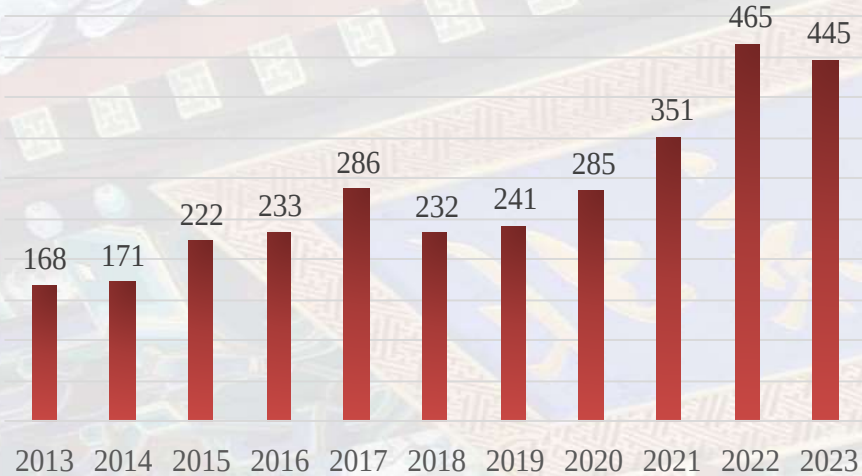
Organization Structure



The international rankings of Geoscience of PKU

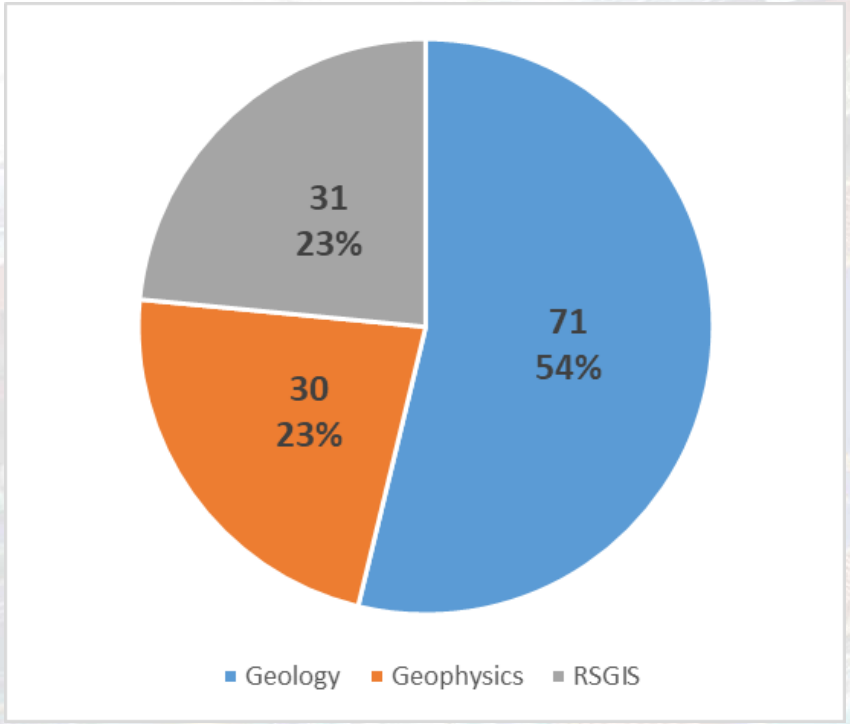


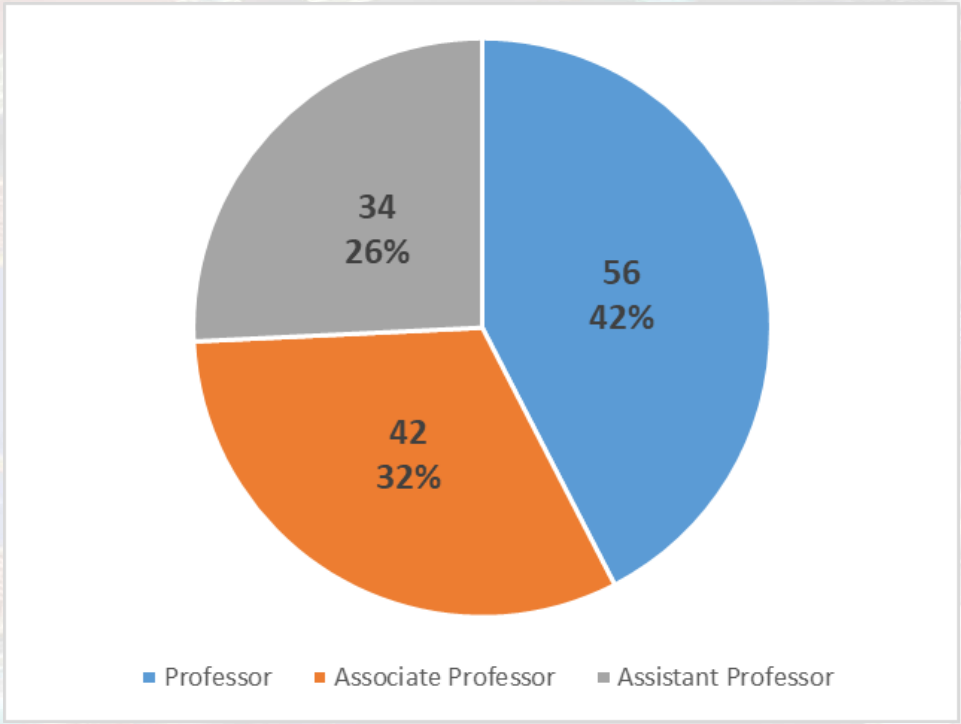
Publications (SCI papers)



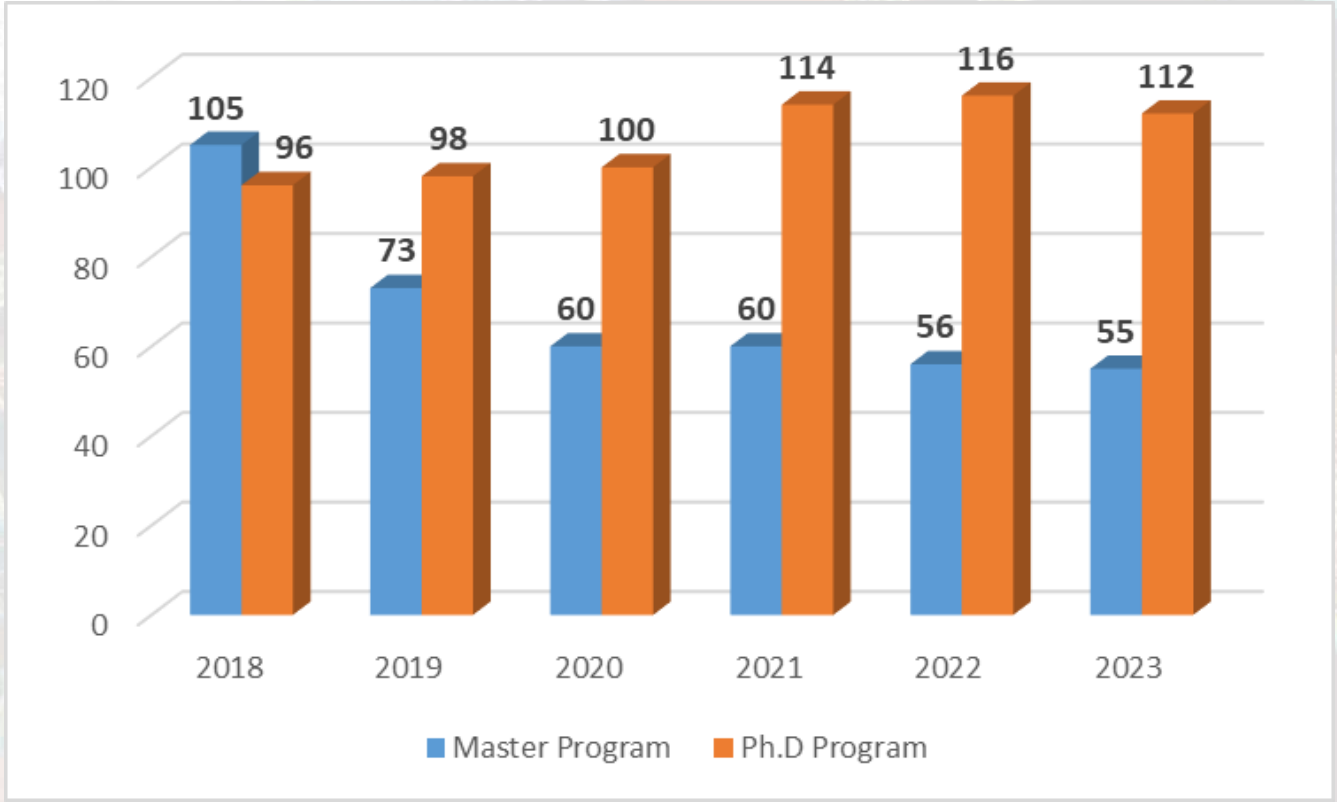
Funding (million yuan)

Faculty Profile





Numbers of graduate students



Enrollments of undergraduates

- ✓ Total number of the undergraduates per academic year fluctuated between **99** and **114** during the Reporting Period.
- ✓ Total number of the undergraduates is **380** at the present.

Institute of Continental Dynamics and Natural Resource Engineering

As part of the national science training base, the major of structural geology and Tectonics is national key discipline, which also is the fundamental research direction of the institute.

Professors

Director: Associate Prof. Zhang Bo
geozhangbo@pku.edu.cn

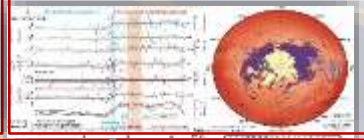
Our Majors: Structure-Tectonic-Rheology-Dynamic, Disaster and Environmental geology, Resource Engineering Geology, Basin Research, Rock Physics, Planet Geology and Tectonic Magnetism.

Our Faculties: the domestic and worldwide famous scientists as academic leaders, and middle-aged and young teachers with doctoral degree as the backbone. Among them, one is Academician of Chinese Academy of Sciences, one is Professor of Yangtze River Seminar, 11 are professors, 2 are associate professors, and 5 researchers.

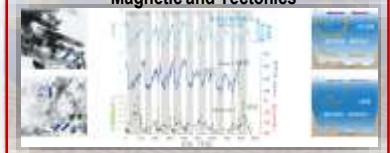
Our Specials:

Himalayan Tectonics

Basin Tectonics and Plio-Pleistocene climate



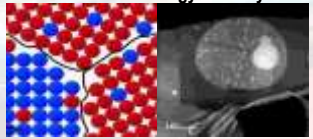
Magnetic and Tectonics



Dynamics of Earth and Planets

Deep Geothermal Energy Tectonics

Microstructure-Rheology-Microdynamics



Now, Our Students: 46 Doctoral candidates, 12 Postgraduate, 32 Undergraduate students studying in our Institute.

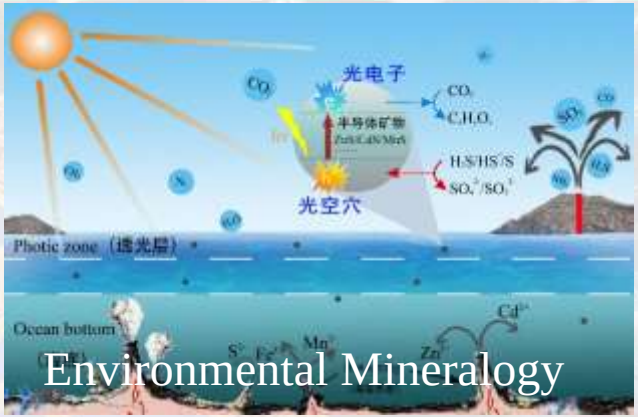
Visitors

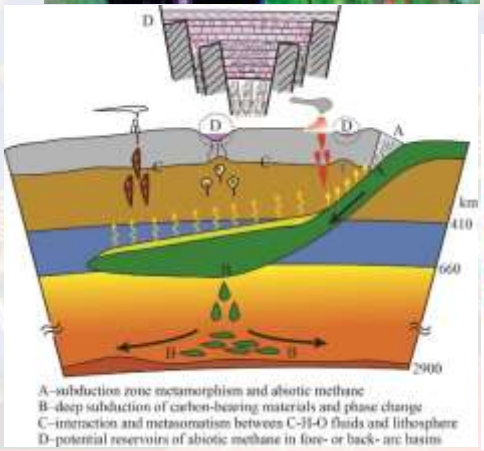
Please visiting:
https://sess.pku.edu.cn/info/1003/1022.htm

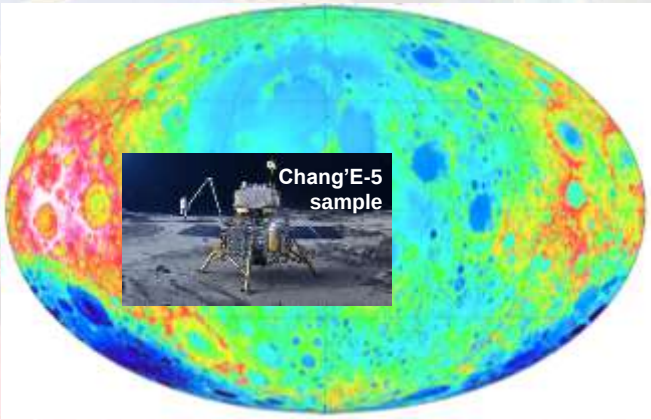
Institute of Mineralogy, Petrology & Ore Deposit Geology

Director: WEI Chunjing

Members (20):
ZHANG Lifei, CHEN Yanjing LU Anhuai, SONG Shuguang, LAI Yong, QIN Shan, XU Cheng, WU Chaodong, CHUAN Xiuyun, WANG Changqiu, TIAN Wei, LI Yang, LI Wenbo, DONG Lin, LI Yan, LIU Pingping, ZHANG Lijuan, LV Zeng, ……







Institute of Prehistorical Life and Environmental Sciences (IPE)

Director: JIANG Dayong

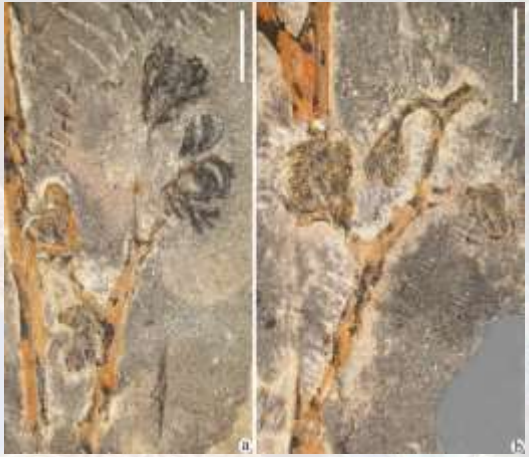
Members (12):

JIANG Dayong, ZHOU Zhonghe, SUN Yuanlin, LIU Jianbo, WANG Deming, SHEN Bing, HUANG Baoqi, SUN Zuoyu, XUE Jinzhuang, LI Mingsong, SHEN Jiaheng, DU Jianghui

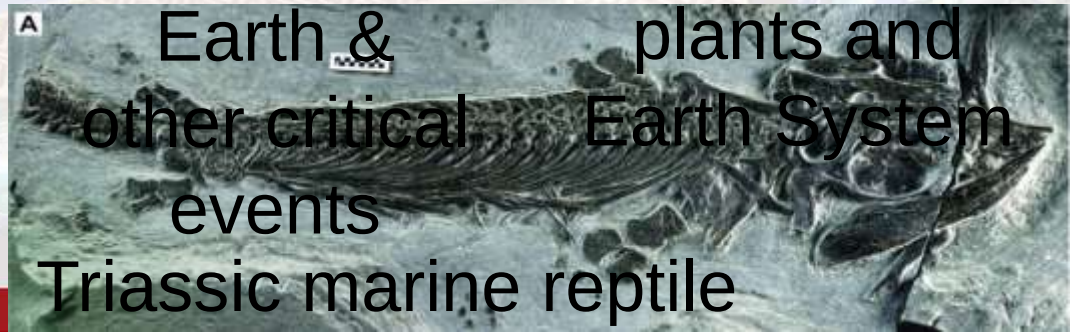
Main directions of study:

1. Sedimentology, geobiology, and palaeoceanography
2. Paleozoic floras and faunas
3. Mesozoic vertebrates

Snowball Earth & other critical events



Paleozoic plants and Earth System



Triassic marine reptile

Institute of Geochemistry

Director: *ZHU Yongfeng*

Members (12):

ZHENG Yongfei, TANG Ming, LIU Xi, HAO Ruixia, SUN Qiang, LI Qiugen, LIU Qiong, ZHANG Guibin, WANG Jiuyuan, Huang Dongang, LI Shuning, CHEN Mimi……

Main directions of study:

Chemical Geodynamics; Isotope Geochemistry; Biochemistry; Experimental Geochemistry; Ore forming processes ……

Nu perspective

Delta

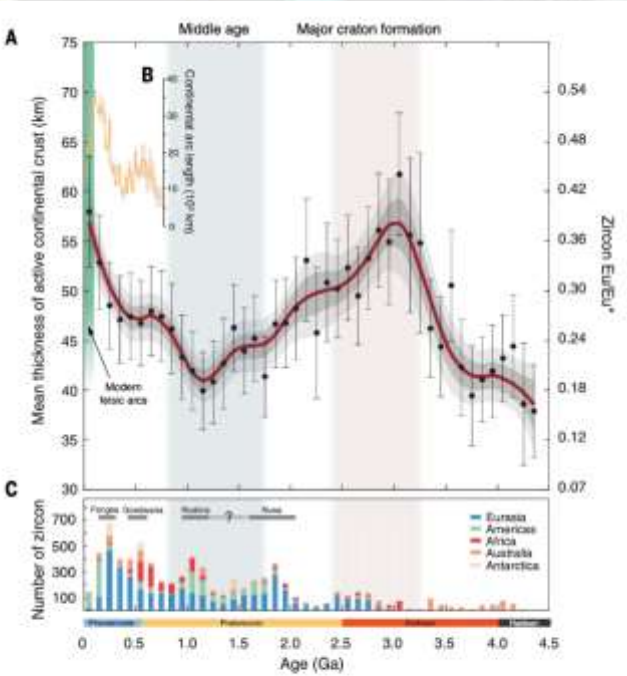


Fig. 1. Reconstructed thickness of active continental crust over Earth's history. (**A**) Reconstruction based on >14,000 analyses of detrital zircons from around the globe (*10*). Data are plotted as binned averages (bin size, 100 million years), with error bars indicating ± 2 SEM. A smoothed trend bracketed by 68 and 95% confidence intervals is shown by the red curve with shaded envelopes. We take

Tang *et al.*, *Science* **371**, 728–731 (2021)

Institute of Theoretical and Applied Geophysics (ITAG)

https://www.geophy.pku.edu.cn/

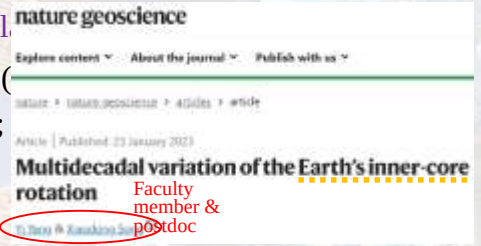
- First established in 1956. **Faculty**: 8 + 4 + 4 (full + assoc. + assist.);

  Staff: 4 engineers

- **Research Fields:** (1) Seismology; (2) Physics of Earth Interior; (3) Earthquake Physics; (4) Geodynamics; (5) Geoelectrmagnetism; (6) Exploration Geophysics; (7) AI Applications; (8) Pl

- **Members (16):** **ZHAO**, Li (**Director**, 1,2); **GE**, Zengxi (1,8); **HUANG**, Qinghua (5); **HU**, Tianyue (
  MA, Jianwei (6,7); **NING**, Jieyuan (4); **SONG**, Xiaodong (1,2,4); **WANG**, Teng (3);
  WANG, Yanbin (1,8); **XUE**, Lian (3); **YUE**, Han (3); **ZHANG**, Haiming (1);
  ZHANG, Yong (3); **ZHAO**, Zeyu (6); **ZHOU**, Shiyong (3).

- **International Collaborations:** Signed MOUs for collaboration with
  JAPAN: Earthquake Research Institute (ERI), University of Tokyo
  GERMANY: Ludwig-Maximilians-Universität München (LMU)
  RUSSIA: Institute of Physics of the Earth, Russian Academy of Sciences



Institute of Space Physics & Applied Technology

Director: ZONG Qiugang

Members (15):

CHEN Hongfei, FU Suiyan, HE Jianseng, JIAO Weixin, TIAN Hui, TU Chuanyi, XIE Lun, WANG Linghua, WANG Yongfu, WANG Shan, YUE Chao, YU Xiangqian, ZHOU Xuzhi, ZHANG Donghe, ZOU Hong.

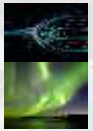
Research Fields

Solar & Heliospheric Physics

Solar eruption events can affect human high-tech activities. This field mainly studies solar atmospheric physics, solar wind physics, heliospheric high-energy particle physics, the interaction between the heliosphere and the interstellar medium, and the origin and propagation of solar storms.

Planetary Science

Planetary science is an important discipline that requires the intersection of multiple frontier disciplines, and can generate significant discoveries and promote technological progress. This direction involves research in the characteristics, dynamics, and evolutionary processes of the major family members of the solar system (planets, dwarf planets, moons, asteroids, and comets)



Magnetospheric Physics

The energy input by the solar wind into the Earth's magnetosphere is transmitted, converted, and released in different magnetospheric regions, producing phenomena such as magnetic storms, substorms, and high-energy particle storms. This direction involves research in magnetospheric physics and space weather, covering aspects such as radiation belts, magnetotail, magnetospheric substorms, ring currents during geomagnetic storms, magnetic reconnection, and wave-particle interactions.

Ionospheric Physics

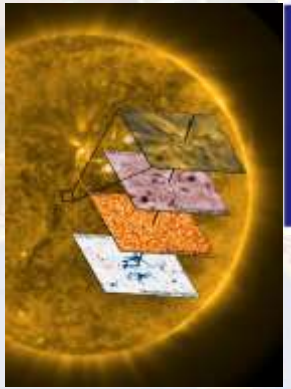
The ionosphere refracts, reflects, scatters, and absorbs radio waves, severely affecting shortwave communication, navigation, positioning, and time synchronization. This direction mainly studies the characteristics of the ionosphere at mid and low latitudes, ionospheric instability and irregular structures, and the coupling between the ionosphere and the magnetosphere, thermosphere, and mesosphere.

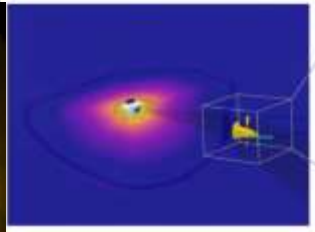
Space Weather

Space weather can affect the performance and reliability of space and ground-based technical systems, endangering human life and health. This direction involves research in the state of the solar surface, solar wind, magnetosphere, ionosphere, and thermosphere at a moment or over a short period of time.

Space Exploration

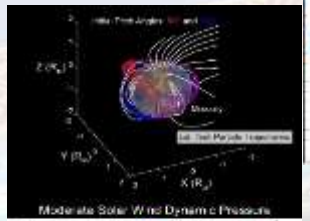
This direction is dedicated to improving the space exploration technology, serving space physics research, and studying the space particle radiation effects on spacecraft based on radiation monitoring data. Our particle and magnetic field instruments have been integrated with multiple satellite mission(e.g., Fengyun, MSS,Weiming).

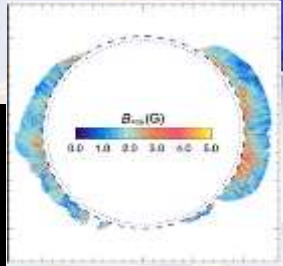




Jiansen He and colleagues revealed a new mechanism involving the nonlinear interaction between outward Alfven waves and accompanying coherent anomalous disturbances (Yang et al., **Nature Communications**, 2023)

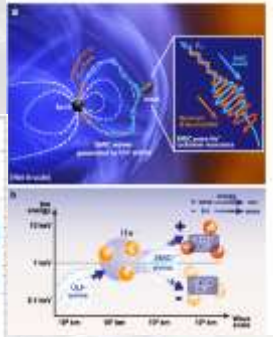
Tian and Samanta found that magnetic reconnection can generate solar spicules and heat corona.(Samanta et al., **Science**, 2019)





Measured the global magnetic field of the solar corona for the first time (Yang et al., **Science,** 2020)

Professor Zong's team provide conclusive evidence for the presence of ring currents in the magnetosphere of Mercury, ending a puzzle that has persisted for over half a century (Zhao et al., **Nature Communications**, 2022).



Professor Zong's team propose that the cross-scale wave-particle interactions can lead to rapid energy transport from macroscopic to microscopic scales in the space and astrophysical plasma environments. This finding help us better understanding the universal plasma heating and acceleration process (Liu et al., **Nature Communications**, 2022)

Institute of Remote Sensing & Geographic Information Systems (遥感与地理信息系统研究所)

Faculty & Research Divisions (36)

Division #1:
Remote Sensing Science

Division #2:
Earth and Space Informatics

Research Highlights

① LiDAR technology and ecology applications

② Social Sensing and Urban Informatics

③ Quantitative remote sensing and Polarized Remote Sensing

Attached Institute of Energy

Jin Zhijun
Academician
Dean

- **Institute of Energy** is an independent research institute affiliated with Peking University.
- The institute addresses **significant strategic and technological issues** that hinder energy fundamental research and industry development.
- It aims to become an **internationally renowned energy institute** for energy technology & policy research and dissemination.

31 full-time employees
14 dual-appointed professors
4 adjunct academicians
6 adjunct professors
14 specially appointed researchers

State Key Laboratory

Peking University Ordos Energy Research Institute

Energy Strategy and Policy

Shale Oil and Gas Exploration and Development

Energy Digitization

Geothermal Energy

CCS/CCUS

Hydrogen

Attached Beijing International Center for Gas Hydrate,Peking University

Director: LU Hailong

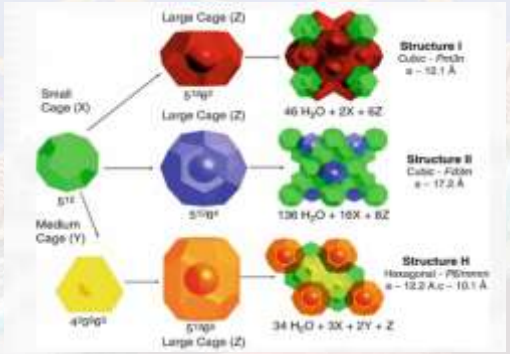
Members:

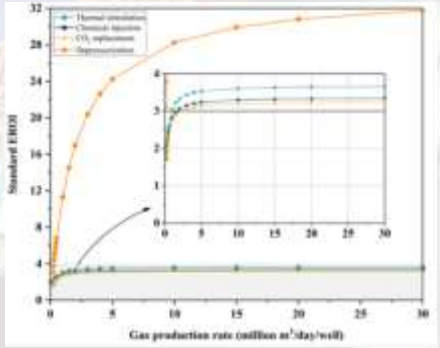
HE Tao, ZHANG Min, YANG Hailin, GU Lijuan,

HE Xiangge， ZHAN Linsen, YU Shan, WANG Lei,

FAN Xinxin ……

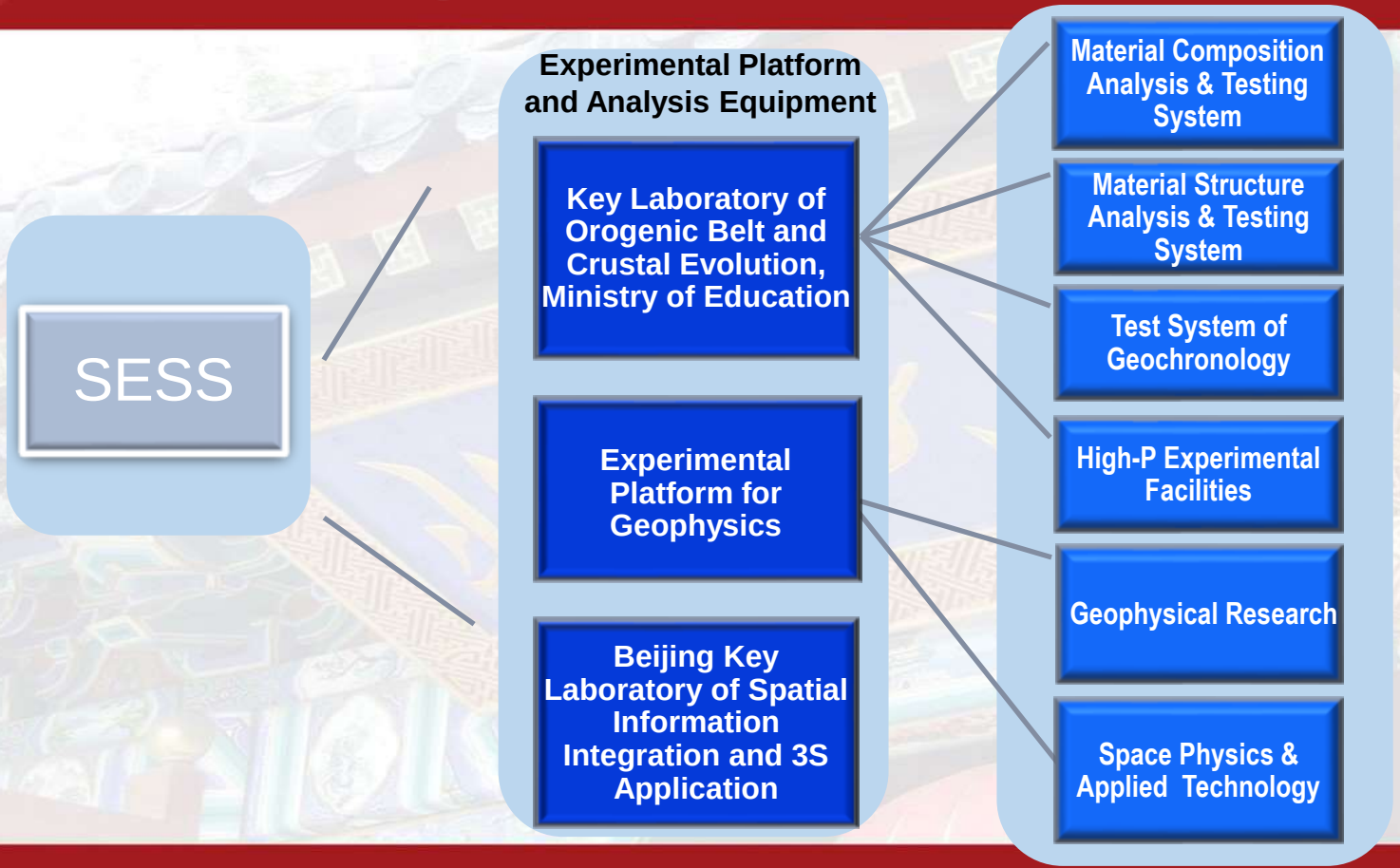
Main directions of





Professor Lu Hailong has confirmed for the first time the existence of H-type hydrates in nature. Lu et al., 2007 Complex gas hydrate from the Cascadia margin Nature 445, 303-306

Laboratory


SESS
Experimental Platform and Analysis Equipment
Key Laboratory of Orogenic Belt and Crustal Evolution, Ministry of Education
Experimental Platform for Geophysics
Beijing Key Laboratory of Spatial Information Integration and 3S Application
Material Composition Analysis & Testing System
Material Structure Analysis & Testing System
Test System of Geochronology
High-P Experimental Facilities
Geophysical Research
Space Physics & Applied Technology

Material Composition Analysis and Testing System

Microprobe (JEOL 8230）

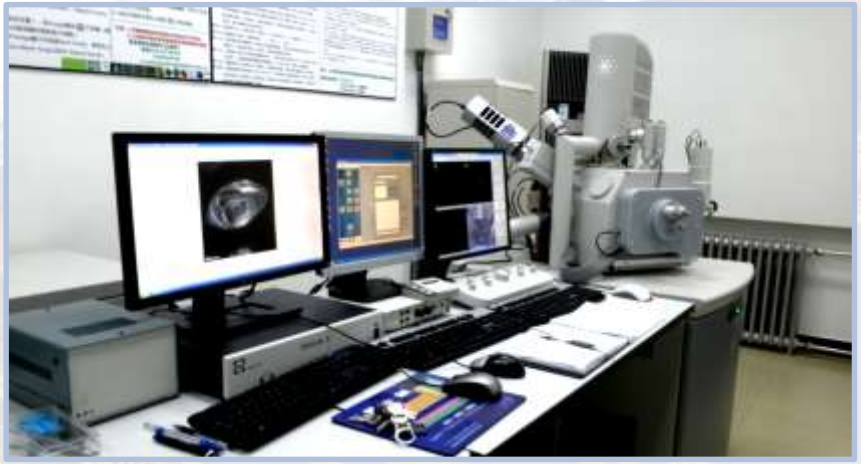
Agilent 7500ce/cs

Test System of Geochronology

La-ICP-ms
(Agilent 7500)

MC-La-ICP-ms
(Nu Plasma 2)

Material Structure Analysis and Testing System



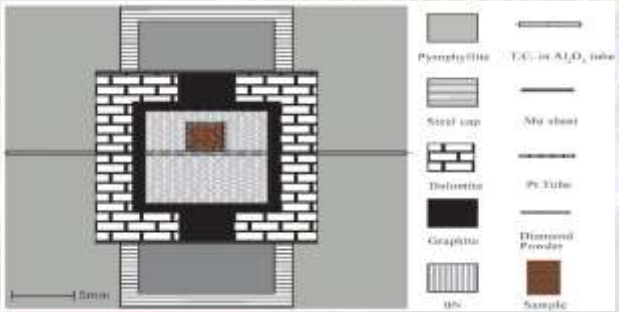
EBSD-CL-EDS

Raman analyses

X-ray diffraction (BD-80)

HP-HT experimental equipments

实验设备： **Six-sided top large cavity pressure machine**



Sino-Russian Earth Science Center

- 北京大学与莫斯科大学中俄地球科学中心建设

April 15, 2024, Lomonosov Moscow state University

北京大学
PEKING UNIVERSITY

Collaboration Proposals

- Sino-Russian Earth Science Center (pending)
- School of Earth and Space Sciences
- Institute of Energy
- MOE Key Laboratory of Orogenic Belts and Crustal Evolution

@Peking University

(1) Scientific Research

- Joint Fieldwork / Expeditions in CHN and RUS
- Access to key Laboratory Instrument / Equipment
- Share raw samples for Joint Researches
- Joint Research on specified fields of (1) (2) (3) (4)

(2) Personnel Training/Education

- Joint Education on Graduate / Postgraduate Students
- Joint Teaching Fieldworks & Co-establishment of Field Station
- Postdoctoral Fellowship & Young Scientist Internship

(3) Academic Exchange

- Joint Conference / Seminar in CHN and RUS
- Mutual Visit for Lecture / Experiment / Communication
- Promotion for International Mega-Science Projects in Earth Sciences
- Dual-employment of Talent Scientists in CHN and RUS

(1) Scientific Research

- Joint Fieldwork / Expeditions in CHN and RUS
- Access to key Laboratory Instrument / Equipment
- Share raw samples for Joint Researches
- Joint Research on specified fields of (1) (2) (3) (4)

Fieldwork / Excursion: Based on mutual interests, provide guideline and logistics

Access to Facilities: (MC)LA-ICP-MS, EPMA, TIMA-SEM, K-Ar Dating, XRD, *SIMS, ……

Sample Share: based on joint research, data share, co-authorship for publication

Proposed Topics:

(1) Geosphere interaction and its impact on energy and mineral resources of North China and Far East Russia

e.g. Central Asian Orogenic Belt, East Asia-West Pacific subduction system, clean energy deposit, Scientific drilling, ……

(2) Integrated Earth system expedition in North Asia of mid-to-high latitude

e.g. Eco-geosystem of NorthEast China – FarEast Russia, Norh China – Mongolia – E Siberia, W.China – Altay – W.Siberia, ……

(3) Climate change of Northern Hemisphere and rational response

e.g. Extreme weather in the mid-to-high Eurasia, interaction hydrosphere-atmosphere-lithosphere, ……

(4) Space and planetary exploration

e.g. heliospheric physics, space physics and exploration tech, planetary geology, astrobiology, ……

……

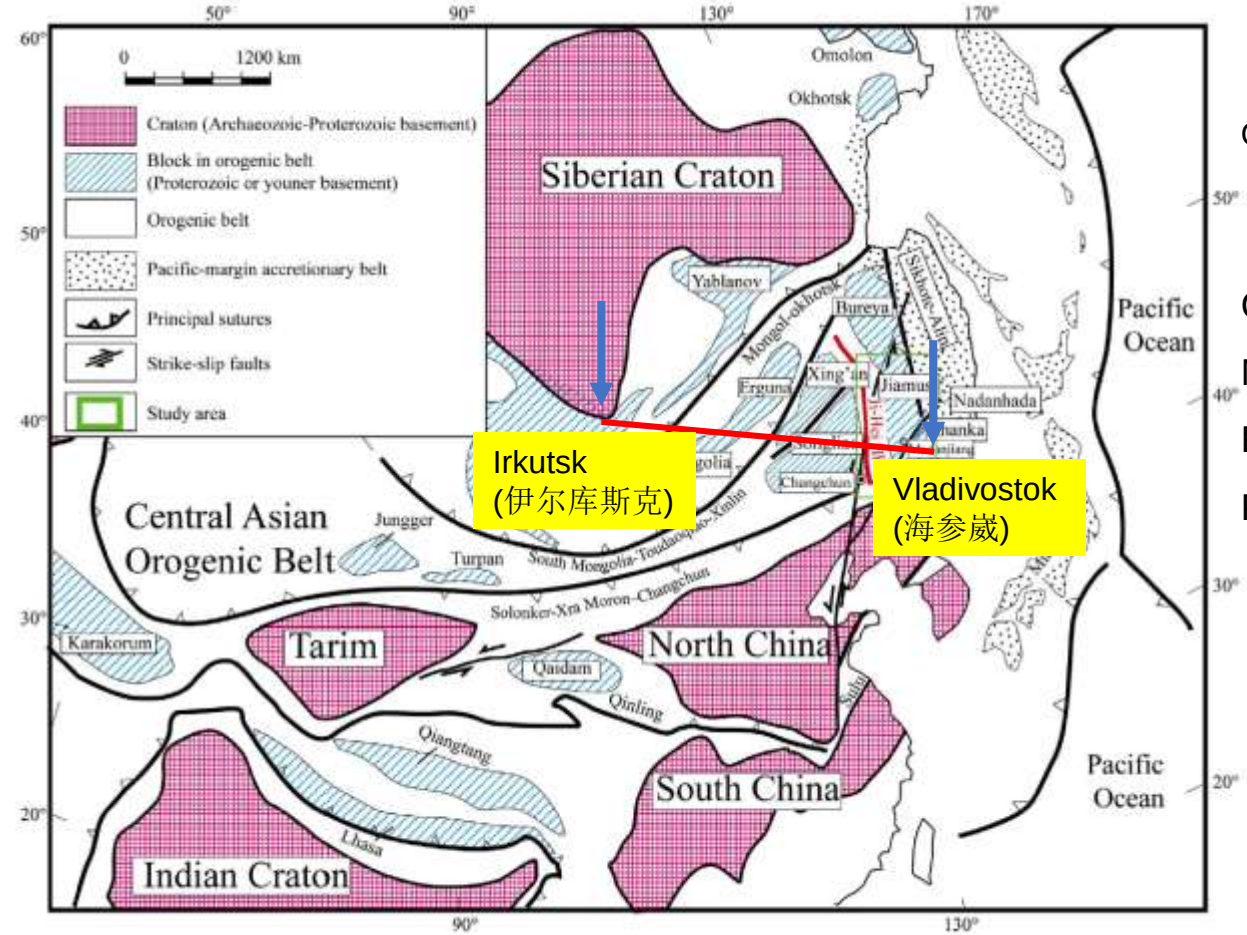


Fig. 1. Tectonic map showing the main subdivisions of central and eastern Asia and location of the study area (modified from Zhou et al., 2009, 2014).

Geological cross section from Vladivostok to Irkutsk：

Central Asian Orogenic Belt (CAOB):

Mongolian-Okhotsk orogens

Paleo-Asian orogens

Paleo-Pacific Orogens

(2) Personnel Training/Education

- Joint Education on Graduate / Postgraduate Students
- Joint Teaching Fieldworks & Co-establishment of Field Station
- Postdoctoral Fellowship & Young Scientist Internship

Education: Joint Bachelor – Master - Ph.D programs, two-supervisors, mutual recognition of academic credits, ……

e.g. 3 years in CHN/RUS, 2 years in RUS/CHN

Fieldwork Practices: Joint geological practices on the basis of current courses
Co-establishment or renovation Fieldwork Base Station

e.g. General geological practices, specialized topics (UHPM, Superdrill field, Orogenic Belt, Ore deposite, LIPs, ……)

Scholarship: Post-doctors (2-4 years), Intern on Laboratory or Fieldwork or Numerical modeling

(3) Academic Exchange

- Joint Conference / Seminar in CHN and RUS
- Mutual Visit for Lecture / Experiment / Communication
- Promotion for International Mega-Science Projects in Earth Sciences
- Dual-employment of Talent Scientists in CHN and RUS

Conferences/Seminars: Invitation for both sides

ANOUNCEMENT: planned in July 2025,
First China-Russia Seminar on Geology and Energy Resources
(in preparation)

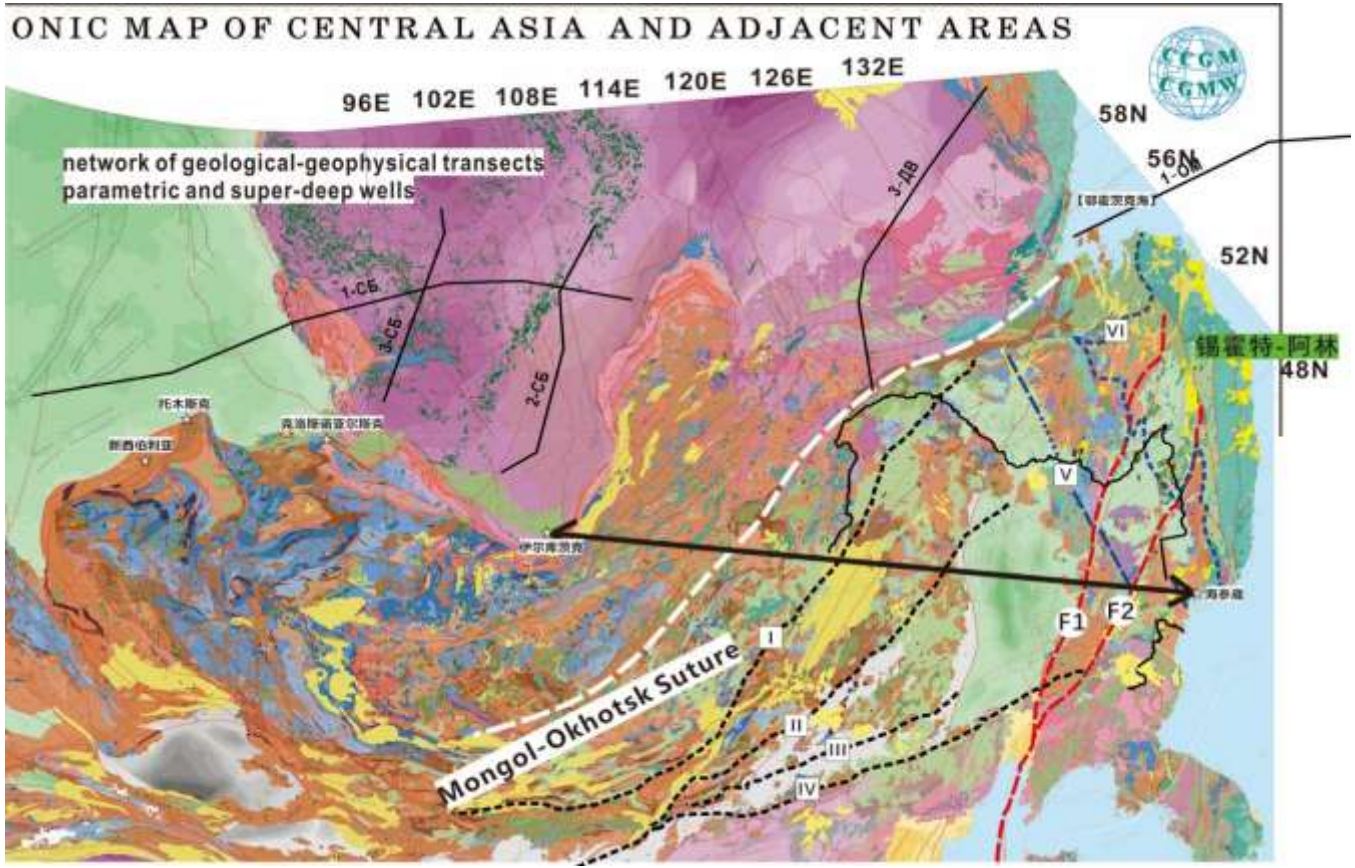
Mutual Visit: Give courses / lectures for university students (1-3 months), perform analyses at Labs, ……

Promotion for Projects: Conceptualization, Ideas, Workforces, Start-up capital

Dual-employment: Open position in Researcher, Lecturer, Engineer, Specialist

e.g. full-time position for > 10 months, or part-time 3-6 months at PKU


You are welcome to SESS,
Peking University, China


ONIC MAP OF CENTRAL ASIA AND ADJACENT AREAS
96E
102E
108E
114E
120E
126E
132E
58N
56N
52N
48N
network of geological-geophysical transects
parametric and super-deep wells
1-СБ
3-СБ
2-СБ
3-ДВ
1-ОА
VI
V
锡霍特-阿林
F1
F2
I
II
III
IV
Mongol-Okhotsk Suture

2.1 主要研究方向

中俄地球科学中心将通过优势互补，聚焦多圈层相互作用与资源能源效应、地表生态环境与可持续发展、气候变化及应对、空间与行星科学探测等地球科学前沿科学问题及资源开发、生态保护等“卡脖子”问题，开展联合攻关，打造以我为主、立足欧亚、放眼全球的地球科学创新高地。

The China-Russia Earth Science Center will, through complementary advantages, focus on cutting-edge scientific issues in earth science such as multi-sphere interaction and resource and energy effects, surface ecological environment and sustainable development, climate change and response, and space and planetary scientific exploration, as well as "bottleneck" problems such as resource development and ecological protection, and carry out joint research and development. Build a highland of earth science innovation that takes us as the lead, is based in Europe and Asia, and looks to the world.