

STATE KEY  
LABORATORY  
OF MARINE GEOLOGY

2015  
ANNUAL REPORT

海洋地质  
国家重点实验室

2015  
年报

同濟大學  
TONGJI UNIVERSITY



## 实验室简介

同济大学海洋地质国家重点实验室成立于2006年。实验室以海洋及相邻陆区的环境演变与海底资源为总目标，以与国际接轨的深海基础研究为特色，以古海洋学与古环境、海洋沉积学、海洋岩石圈演化、油气资源勘探、海洋生物地球化学、海底过程与观测等为主要研究方向，重点开展西太平洋地球动力学与古环境演化研究。借助国际大洋钻探、国家长期海底科学观测等大型研究计划和平台，瞄准地球圈层系统和海陆相互作用中的重大科学问题，开展多时空尺度的基础研究，突出“地球系统科学”的理念，实现海洋与陆地结合，古代与现代结合，科学与技术结合的学科发展之路。实验室坚持国际化发展，依靠国内外的广泛合作和学科的交叉渗透，探索和发展海洋科学研究中的新思路、新途径和新方法。实验室将努力建设成为具有重要国际影响力的深海基础研究和创新性人才培养基地，同时担负起我国深海科学教育的社会责任，唤醒公众保护地球和海洋资源意识。

## Goal and Mission

The State Key Laboratory of Marine Geology at Tongji University was established in 2006 with the endorsement from the Ministry of Science and Technology, China (MOST). The Goal of the Laboratory is to investigate environmental changes and natural resources in global oceans and neighboring continental regions, with an emphasis on Asian marginal seas. By actively involving in international ocean drilling and submarine observatories, and other large international research programs, the Laboratory is committed to understanding the comprehensive earth system science and the interaction between ocean and Earth's other spheres at various spatial and temporal scales.

The Vision of the Laboratory is to maintain unparalleled depth and breadth of expertise in marine geology across a range of oceanographic research areas.

The Mission of the Laboratory is to advance the understanding of interplay between ocean and land through broad national and international collaborations for cross-disciplinary integrations and the application of advanced instruments and novel techniques. The Laboratory is dedicated to communicating the new knowledge to the public for the benefit of society, to training future generations of ocean scientists and engineers, and to expanding public awareness about the importance of the global ocean and its resources.

## 实验室学术委员会

主任：汪品先

副主任：苏纪兰、朱伟林

委员：杨文采、焦念志、丁抗、林间、郭正堂、赵美训、王东晓、蒋少涌、谢树成、崔维成、翦知湔、张传伦、周怀阳、刘志飞

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Director: Pin-xian Wang

Associate Director: Ji-lan Su, Wei-lin Zhu

Members: Wen-cai Yang, Lian-zhi Jiao, Kang Ding, Jian Lin, Zheng-tang Guo, Mei-xun Zhao, Dong-xiao Wang, Shao-yong Jiang, Shu-cheng Xie, Wei-cheng Cui, Zhi-min Jian, Chuan-lun Zhang, Huai-yang Zhou, Zhi-fei Liu

## 实验室领导班子

主任：刘志飞

副主任：杨守业、李春峰、秦顺生（2015.7-）

## Executive Committee

Director: Zhi-fei Liu

Deputy Directors: Shou-ye Yang, Chun-feng Li, Shun-sheng Qin



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# 大事记

## HEADLINES

### 一月 Jan.

1月19日，实验室承办“国家海底长期科学观测系统”重大科技基础设施建设方案工程专家咨询会。

On January 19th, the laboratory hosted an expert consultation meeting on the “National Submarine Long-term Scientific Observing System” major science and technology infrastructure construction project.

### 二月 Feb.

2月，实验室临港基地一期工程移交投入使用，总建筑面积16582平方米，总投资约1.8亿元。

In February, the first phase of the laboratory port project, with a total construction area of 16,582 square meters from a total investment of about 180 million, was handed over for use.

2月2-3日，实验室承办“南海深海过程演变”基金委重大研究计划2015年度学术研讨会。

On February 2-3, the laboratory hosted the 2015 annual academic seminar of the “South China Sea Deep Sea Process Evolution” Research Program.

### 五月 May

5月，实验室参与向国际大洋发现计划提交的IODP 878号建议书获得通过，被正式安排为IODP 367、368航次，计划在2017年2至6月实施，成为南海的第三次大洋钻探。

In May, the laboratory participated in the IODP 878 proposal and its submission to the International Ocean Discovery Program, which was officially scheduled as IODP Expeditions 367

and 368. It is planned to be implemented from February to June 2017, becoming the third ocean drilling in the South China Sea.

5月13-16日，实验室联合美国伍兹霍尔研究所在美国召开印度洋洋壳和地幔科学钻探讨论会。

On May 13-16, the laboratory teamed up with the US Woods Hole Institute to hold a seminar in the United States for scientific drilling of the Indian Ocean oceanic crust and mantle.

5月15-16日，实验室主办2015古地磁学国际研讨会。

On May 15-16, the laboratory hosted the 2015 International Symposium on Paleomagnetism.

5月16-24日，实验室开展深海探索馆“触摸深海——带深海生物回家”科技活动周主题活动。

From May 16-24, the laboratory carried out the theme activity of the Science and Technology Week of the Deep Sea Exploration Museum “Touching the Deep Sea - Bringing Deep Sea Biology to My Home”.

5月22日，实验室参加国家重点实验室国家评估答辩，最终获良好成绩。

On May 22, the laboratory participated in the national assessment of the State Key Laboratory and achieved good final results.

5月25-26日，实验室承办2015年中国政府海洋奖学金管理会议。

On May 25-26, the laboratory hosted the 2015 China Government Marine Scholarship Management Conference.

### 六月

#### June

6月22-24日，实验室承办大洋钻探计划IODP 344航次第二次航次后国际会议。

On June 22-24, the laboratory hosted the second post-cruise international conference of International Ocean Drilling Program (IODP) Expedition 344.

### 七月

#### July

7月27-28日，实验室承办“沉积学发展战略研究”项目“现代沉积过程”专题战略研讨会。

On July 27-28, the laboratory hosted a special strategy seminar on “Modern Sedimentation Process” of the “Sedimentary Development Strategy Research” project.

### 八月

#### Aug.

8月，田军教授入选2015年度国家杰出青年科学基金。

In August, Professor Jun Tian was selected as Distinguished Young Scholar for the 2015 National Science Fund.

8月27日-9月6日，实验室自主组织东海科考航次，开展海洋生物地球化学、水文观测、地质采样等多学科联合考察。

From August 27 to September 6, the laboratory independently organized the East China Sea scientific research voyage to carry out multidisciplinary joint investigations including marine biogeochemistry, hydrological observation and geological sampling.

8月25-26日，实验室联合广州海洋地质调查

局在广州召开南海载人深潜航次科学项目研讨会。

On August 25-26, the laboratory and the Guangzhou Marine Geological Survey held a seminar on the Nanhai Manned Deep Submarine Voyage Science Project in Guangzhou.

### 九月

#### Sep.

9月，实验室依托的同济大学海洋学科入选上海市“高峰学科”计划，加速推进高峰学科团队建设。

In September, the marine discipline of Tongji University, which was supported by the laboratory, was selected into the “peak discipline” program of Shanghai, and accelerated the construction of the peak discipline team.

9月，刘志飞教授获法国国家棕榈教育骑士勋章。

In September, Professor Zhifei Liu received the French National Palm Education Knight Medal.

9月28-30日，实验室承办国际大洋发现计划IODP 349航次第二次航次后国际会议。

On September 28-30, the laboratory hosted the second post-cruise international conference of the International Ocean Discovery Program (IODP) expedition 349.

### 十月

#### Oct.

10月5-10日，实验室组织近三十人参加在韩国举办的第8届亚洲海洋地质国际研讨会，并争取到2018年第9届大会将由实验室在上海主办。

On October 5-10, nearly 30 staff members from

## 大事记

### HEADLINES

the laboratory participated in the 8th International Symposium on Marine Geology in South Korea, which decided the 9th conference will be hosted by the laboratory in Shanghai in 2018.

10月12日, 实验室承办“南海深海过程演变”基金委重大研究计划2016年度项目评审会。

On October 12, the laboratory hosted the 2016 annual project review meeting of the “Nanhai Deep Sea Process Evolution” Research Project.

10月29-31日, 实验室在越南组织召开南海河流沉积物国际学术讨论会。

From October 29-31, the laboratory organized an international academic seminar on sediments in the South China Sea in Vietnam.

#### 04 十一月 Nov.

11月, 实验室古地磁分析室和大型装备“90MPa压力筒”通过验收。

In November, the laboratory paleomagnetic analysis facility and the large-scale equipment “90MPa pressure cylinder” passed the acceptance review.

11月6-7日, 实验室举办海洋地震方法与技术新进展学术研讨会。

On November 6-7, the laboratory held an academic seminar on new developments in marine seismic methods and technologies.

11月7日, 实验室举办气候变化的低纬驱动学术报告会。

On November 7, the laboratory held an academic report on low-latitude driving climate change.

11月21日, 实验室承办“南海深海过程演变”基金委重大研究计划“双鱼座”载人深潜航次科学项目专家评审会。

On November 21, the laboratory hosted the “Pisces” manned deep voyage science project expert review meeting of the “South China Sea Deep Sea Process Evolution” Research Project.

11月25-27日, 实验室在印度尼西亚组织召开巽他陆架科学钻探国家研讨会。

From November 25-27, the laboratory organized a national seminar on Sunda shelf scientific drilling in Indonesia.

#### 十二月 Dec.

12月4-5日, 实验室承办“南海深海过程演变”基金委重大研究计划“双鱼座”载人深潜航次技术方案讨论会。

On December 4-5, the laboratory hosted a seminar on the “Pisces” manned deep voyage technical plan for the “South China Sea Deep Sea Process Evolution” research project.

12月7日, 中国投资咨询公司专家组考察实验室临港基地, “国家海底长期科学观测系统”大科学工程落户实验室。

On December 7, the expert group of China Investment Consulting Co. Ltd. visited the laboratory’s Lingang port-based base, and the “National Submarine Long-term Scientific Observing System” large scientific project settled in the laboratory.

12月26-27日, 实验室召开2015年度学术年会。

From December 26-27, the laboratory held its 2015 annual academic meeting.



新进人员  
NEW MEMBERS



**贾国东** 教授  
Prof.  
Guo-dong Jia

中国地质大学博士 (1998)

中科院广州地球化学研究所研究员 (2000-2015)

研究兴趣:

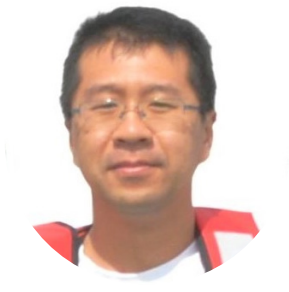
晚新生代以来的古海洋学、古气候学和环境演变科学等领域的科学问题

Ph. D: China University of Geosciences (1998)

Professor : Guangzhou Institute of Geochemistry, Chinese Academy of Sciences (2000-2015)

Research interest:

Paleoceanography, paleoclimatology and paleoenvironmental changes since Late Cenozoic



**张罗磊** 副教授  
Associate Prof.  
Luo-lei Zhang

同济大学大学博士 (2011)

日本东京大学地震研究所博士后研究员 (2014)

研究兴趣:

海洋地球物理学、地球电磁场与海洋电磁场理论和方法、海洋重磁与综合地球物理联合反演理论与方法、与海洋电磁相关的壳幔深部结构及海底资源

Ph. D: Tongji University (2011)

Post-doc: Earthquake Research Institute, University of Tokyo (2014)

Research interest:

Marine Geophysics, Marine Electromagnetic, Integrated Geophysical Exploration, Marine Tectonics



**谢伟** 副研究员  
Associate Researcher  
Wei Xie

华中科技大学博士 (2010)

同济大学博士后研究员 (2015)

研究兴趣: 微生物研究

Ph. D: Huazhong University of Science and Technology (2010)

Post-doc: Tongji University (2015)

Research interest:

Geomicrobiology

## 新进人员

## NEW MEMBERS



**马文涛** 副研究员

Associate Researcher  
Wen-tao Ma

同济大学博士 (2011)

同济大学博士后研究员 (2015)

研究兴趣:

古环境数值模拟

Ph. D: Tongji University (2011)

Post-doc: Tongji University (2015)

Research interest:

Paleoenvironmental numerical simulation

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**袁伟** 助理研究员

Assistant Researcher  
Wei Yuan

南京大学博士 (2012)

无锡石油地质研究所博士后研究员 (2015)

研究兴趣: 古地磁学

Ph. D: Nanjing University (2012)

Post-doc: Wuxi Institute of Petroleum Geology (2015)

Research interest:

Paleomagnetism

## 新增科研课题

## NEW RESEARCH PROJECTS

2015年度,实验室共承担的项目244个(纵向课题146项),合同经费计2.35亿。其中承担国家级项目77个,经费1.35亿,包括973项目1项,子课题5个;863项目2项,子课题1个;科技部国家重大专项子课题8个,国家自然科学基金重大研究计划子课题13个,杰青1个,面上项目31个,青年项目11个。本年度新增纵向科研课题52项,合同经费4171多万元,项目主要来源于国家自然科学基金委员会、科技部和上海市科委等。

In 2015, the laboratory was operating on a total of 244 scientific research projects (including 146 governmental projects), with a contract funding amount of RMB 2350 million. Among them, 77 are national-level projects with a funding amount of RMB 1350 million, including 1 "973" project, 8 National Key R&D projects, 1 National Science Fund for Distinguished Young Scholar, 13 Major Research Plan of the National Natural Science Foundation projects, 31 General Programs and 11 Youth Programs. The rest 52 "vertical" research projects attracted a contract funding of more than RMB 417 million. These projects were mainly supported by the National Natural Science Foundation of China, the Ministry of Science and Technology, the State Oceanic Administration, and the Shanghai Science and Technology Commission.

## 部分新增项目

## LIST OF SELECTED NEW PROJECTS

| 负责人<br>PI  | 项目名称<br>Project Title  | 经费(万元)<br>Budget (10K RMB) |
|--|--|----------------------------|
| <b>国家自然科学基金重大研究计划子课题</b><br><b>Major Research Plan of the National Natural Science Foundation of China</b> |  |                            |
| 翦知潜<br>Zhi-min Jian  | 南海晚新生代深水古海洋学变迁<br>Late Cenozoic deep-water paleo-oceanology changes in the South China Sea   | 280                        |
| 李春峰<br>Chun-feng Li  | 根据IODP349航次成果重构南海海盆的构造演化模式<br>Reconstruction of the tectonic evolution model of the South China Sea basin based on IODP expedition 349 | 300                        |
| 张传伦<br>Chuan-lun Zhang   | 南海碳循环与生物学储碳机制集成研究<br>Study on the integration of carbon cycle and biological carbon storage mechanism in the South China Sea           | 49.34                      |
| 赵西西<br>Xi-xi Zhao  | 南海深海记录与周边的地质对比研究<br>Comparative study on the geology of the South China Sea and the surrounding geology                                | 201.16                     |
| 周怀阳<br>Huai-yang Zhou  | 南海深海海底铁锰结核/结壳的成因和历史记录<br>Origin and history of iron-manganese nodules/crusts in the deep seabed of the South China Sea                 | 300                        |
| 宋海斌<br>Hai-bin Song  | 用地震海洋学方法研究海底喷泉<br>Studying the underwater fountain with seismic oceanography   | 109.16                     |

## 新增科研课题

## NEW RESEARCH PROJECTS

| <b>国家自然科学基金杰青项目</b><br><b>The NSFC Fund for Distinguished Young Scholars</b>                  |  |       |
|---|--|-------|
| 田军<br>Jun Tian  | 古海洋学<br>Paleoceanography   | 400   |
| <b>国家自然科学基金重点项目</b><br><b>Key Program of the National Natural Science Foundation</b>          |  |       |
| 张传伦<br>Chuan-lun Zhang  | 海洋自养古菌 (MGI) 和异养古菌 (MGII) 在南海碳循环过程中的相互作用及沉积记录<br>Key processes for the source to sink system of riverine sediments on the river-dominated continental shelf of the South China Sea         | 352   |
| 刘志飞<br>Zhi-fei Liu  | 南海中央海盆中新世以来深水沉积作用及其区域构造与环境演化意义<br>Deepwater sedimentation since the Miocene in the central basin of the South China Sea and its regional tectonic and environmental evolution significance | 352   |
| <b>国家自然科学基金专项项目</b><br><b>Joint Funds of National Natural Science Foundation of China</b>     |  |       |
| 杨风丽<br>Feng-li Yang   | 台湾海峡中 - 新生代张裂盆地形成机制及油气响应<br>The origin and evolution of the Taiwan Strait rift Basin in the late Mesozoic - Cenozoic and its oil and gas response  | 21.6  |
| <b>国家自然科学基金面上项目</b><br><b>General Program of National Natural Science Foundation of China</b> |  |       |
| 程昊<br>Hao Cheng   | Lu-Hf 地质年代学及其在低温高压变质岩中的应用<br>Lu-Hf geochronology and its promise and pitfalls of dating LT-HP metamorphic rocks  | 87    |
| 杨锴<br>Kai Yang  | 基于局部角度域扩展模型的非线性地震反演方法<br>Nonlinear seismic inversion based on model extension in the local angle domain  | 77    |
| 张艳伟<br>Yang-wei Zhang   | 中尺度涡对南海东北部深层湍流混合的影响<br>Influence of mesoscale eddies on the deepwater turbulent mixing in the South China Sea  | 93.6  |
| 宋海斌<br>Hai-bin Song   | 海底界面过程的地震海洋学研究<br>Study of seafloor processes by seismic oceanography methods  | 83.04 |
| 邵磊<br>Lei Shao  | 南海东部白垩 - 中新世构造演变及沉积响应<br>Tectonic evolution and sedimentary response during Cretaceous-Miocene in the eastern South China Sea  | 90    |

| <p style="text-align: center;"><b>国家自然科学基金青年项目</b></p> <p style="text-align: center;"><b>Youth Program of National Natural Science Foundation of China</b></p> |  |       |
|--|--|-------|
| 刘演<br>Yan Liu  | <p>宁绍平原中全新世气候 - 海平面波动与河姆渡文化演化的耦合研究</p> <p>An integrated study of mid-Holocene climate - sea level fluctuations and the evolution of Hemudu Neolithic culture on the Ningshao Plain</p>   | 28.64 |
| 赵峦啸<br>Luan-xiao Zhao  | <p>地震波在非均匀多孔介质分界面上的反射特征及其对储层刻画的启示</p> <p>Seismic reflections in heterogeneous poroelastic media and its implications for reservoir characterization</p>  | 23.12 |
| 张罗磊<br>Luo-lei Zhang   | <p>海底大地电磁数据处理和三维反演的关键技术</p> <p>The key technologies in the data processing and three-dimensional inversion for the ocean bottom magnetotelluric</p>  | 24    |
| 拜阳<br>Yang Bai   | <p>南海东北部内孤立波的地震海洋学研究</p> <p>Study of nonlinear internal solitary waves in the northeast South China Sea using seismic oceanography</p>   | 23.4  |
| 郭艳微<br>Yan-wei Guo   | <p>长江沉积物中元素 -Sr 同位素地球化学行为的模拟实验研究及环境意义</p> <p>Simulation experimental study of element and Srisotope geochemical behavior from Changiang River sediments and its environmental significances</p>  | 22.8  |
| 吴琼<br>Qiong Wu   | <p>浮游有孔虫钕同位素富集的控制因素及在重建洋流演化中的应用</p> <p>Neodymium isotopes association with planktonic foraminifera and its application in paleo-current reconstruction</p>   | 25    |
| 苏妮<br>Ni Su  | <p>铀系同位素探究末次冰盛期以来东亚大陆边缘的风化沉积记录</p> <p>Using U-series isotopes to study weathering and sedimentary processes in the East Asian continental margin since the Last Glacial Maximum</p>  | 24    |
| <p style="text-align: center;"><b>一般纵向项目</b></p> <p style="text-align: center;"><b>Other Governmental Projects</b></p>   |  |       |
| 蔡进功<br>Jin-gong Cai  | <p>东营凹陷不同类型泥页岩烃赋存特征研究</p> <p>Study on hydrocarbon occurrence characteristics of different types of shale in Dongying Sag</p>   | 305.5 |
| 杨守业<br>Shou-ye Yang  | <p>亚洲大陆边缘“源 - 汇”过程与陆海相互作用——东海及西北太平洋源 - 汇过程与陆海相互作用</p> <p>The “source-sink” process at the edge of the Asian continent interacts with land and sea - the source-sink process of the East China Sea and the Northwest Pacific and the interaction between land and sea</p> | 230   |

## 重点项目课题介绍

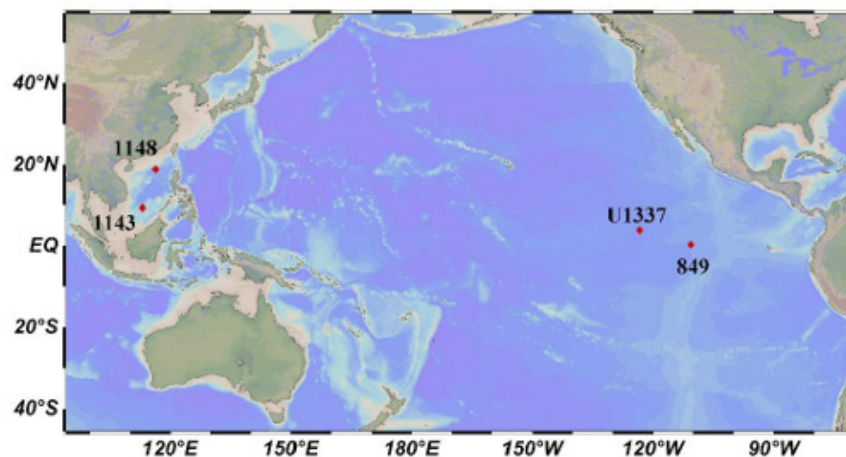
### Key project introduction

#### 1、古海洋学 Paleooceanography

国家自然科学基金杰青项目，2016–2020，项目负责人：田军

NSFC Distinguished Young Scholars, 2016–2020, Project Leader: Jun Tian

田军教授利用国际大洋钻探深海岩芯进行古海洋学研究，在南海和太平洋重建了最长、分辨率最高的有孔虫稳定氧、碳同位素和鱼石化石钕同位素记录，为南海及太平洋的深海沉积建立了 0–23 Ma 天文调谐的年代标尺，在此基础上研究晚新生代两极冰盖扩张对深部洋流的影响及其气候效应。发现中新世东南极冰盖和上新世北极冰盖的扩张均对南海及太平洋的深部洋流产生重大影响；表层和底层大洋碳储库自 23 Ma 来均长期变负，具有显著的 40 万年周期，在地球轨道斜率周期上呈现两种相位关系；尤其在中中新世，大洋表层和底层碳储库同步变化，与冰盖扩张紧密关联；晚新生代冰盖生长和洋流变化对东亚季风产生重要影响。受邀在国际古海洋学大会做报告，在 *Paleoceanography*、*EPSL* 等期刊发表论文 40 余篇，第 1 作者国际 SCI 论文 15 篇，SCI 引用近 500 次，是国际地层委员会新近纪分委会 22 名投票代表之一，是国际大洋发现计划科学评估组成员。



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Dr. Jun Tian has carried on paleoceanographic research based on deep sea sediment cores obtained by the International Ocean Drilling Program. He has analyzed and reconstructed the longest foraminiferal stable oxygen and carbon isotope as well as fish teeth Nd isotopic record in the South China Sea and the equatorial Pacific Ocean, and further established astronomically tuned timescales of the past 23 million years for the Pacific deep sea sediments. His scientific interest has been focused on the relationship between the polar ice sheet expansion and the deep ocean circulation changes and their climatic effects during the late Cenozoic. He has found that both the middle Miocene East Antarctic Ice Sheet Expansion and the late Pliocene Northern Hemisphere Ice Sheet Expansion caused significant changes in the deep ocean circulation of the SCS and the open Pacific; the upper and deep ocean carbon reservoirs have experienced long-term decreasing trend since 23 Ma and have significant 400-kyr cycles; especially during the middle Miocene, the upper and deep ocean carbon reservoirs had changed synchronously, showing close relationship with the polar ice sheet expansion; the polar ice sheet growth and ocean carbon reservoir change had exerted important influences on the East Asian monsoon climate. He was invited to give a speech for the eighth International Conference on Paleooceanography. He has published more than 40 papers in international SCI journals such as *Paleoceanography* and *EPSL* with nearly 500 times citations, among which 15 are first-authored. He is one of the 22 voting members of the Subcommittee on Neogene Stratigraphy, the International Commission on Stratigraphy (ICS), and also the member of the Science Evaluation Panel of the International Ocean Discovery Program (IODP).

#### 2、南海中央海盆中新世以来深水沉积作用及其区域构造与环境演化意义

Deepwater sedimentation since the Miocene in the central basin of the South China Sea and its regional tectonic and environmental evolution significance

国家自然科学基金重点项目，2016–2020，项目负责人：刘志飞

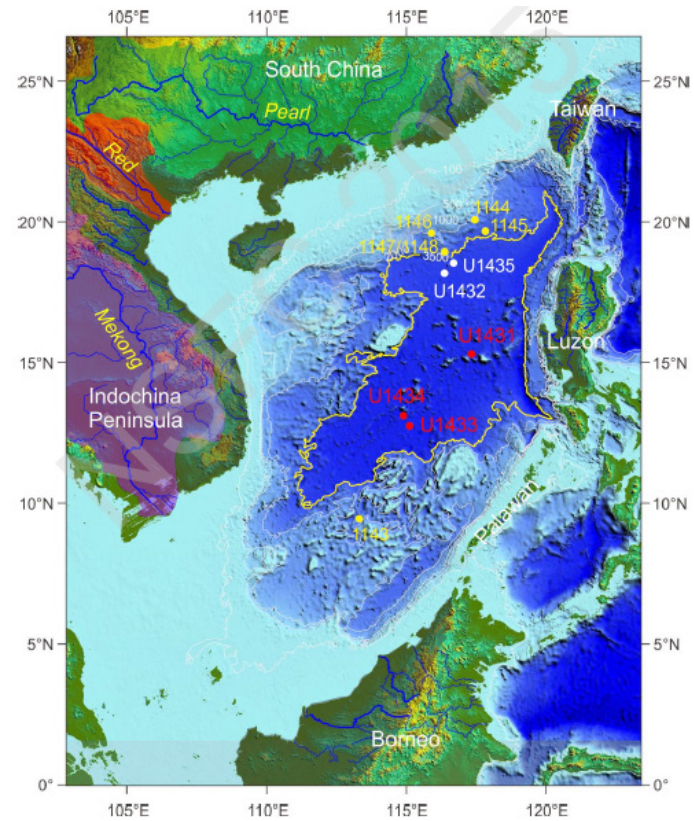
NSFC Key Program, 2016–2020, Leading PI: Zhi-fei Liu

国际大洋发现计划 IODP349 航次在南海中央海盆钻取洋壳基底之上完整的沉积层序，为南海深水沉积环境的长期演化研究带来绝佳机遇。项目选择中央海盆洋中脊附近 U1431、U1433 和 U1434 三个站位，通过运用微体生物年代地层学、全岩和粘土矿物学、主要和微量元素地球化学、钕和铈同位素地球化学、以及碎屑沉积颗粒激光粒度分析等实验测试方法，开展南海海盆自早中新世停止扩张以来深水沉积演化的详细研究，预期将揭示早中新世“大洋红层”远洋深水沉积、中晚中新世海底火山碎屑沉积、以及晚中新世以来深水浊流沉积等重要深水沉积作用的演化特征，恢复中央海盆不同时期陆源碎屑的物源区变迁，探索西太平洋底层环流格局演变、南海洋壳俯冲与吕宋海槛形成演化、以及海底火山活动和火山链形成等区域构造和环境演化历史。通过本项研究，有望促成南海深海演化过程中构造活动及其沉积响应的有机结合，对推动我国深海沉积学的学科发展具有重要意义。

## 重点项目课题介绍

### Key project introduction

The International Ocean Discovery Program (IODP) Expedition 349 successfully recovered complete sedimentary sequences above the oceanic crust base in the central basin of the South China Sea, providing an excellent opportunity to study the long-term deepwater sedimentary environment evolution of the South China Sea. Sites U1431, U1433, and U1434 nearby the mid-ridge in the central basin will be studied in this proposed project. Analytical methods including micropalaeontologic chronostratigraphy, bulk and clay mineralogy, major and trace elemental geochemistry, neodymium and strontium isotopic geochemistry, and laser grain size analysis of clastic sediment grains will be implied to study the deepwater sedimentary environment evolution since the cessation of South China Sea central basin spreading in early Miocene. Several significant deepwater sedimentation processes including pelagic deposits of oceanic red beds in early-middle Miocene, seafloor volcanoclastic sediments in middle-late Miocene, and deepwater turbidity deposits since late Miocene will be reconstructed. Provenance changes of terrigenous clastic materials during various geological periods will be determined. These results will be applied to reveal related regional tectonic and environmental evolution history, e.g., the bottom current circulation evolution in the western Pacific, the subduction of oceanic crust and formation of Luzon sill, and the seafloor volcanism and formation of volcanic chain in the South China Sea. The proposed project will greatly improve the combination of tectonic evolution and its sedimentary response of the deep-sea evolution of the South China Sea, and contribute to the development of deepwater sedimentology in China.



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### 3、海洋自养古菌（MGI）和异养古菌（MGII）在南海碳循环过程中的相互作用及沉积记录

#### Functions and interactions of MGI and MGII in carbon cycle and their geological record in the South China Sea

国家自然科学基金重点项目，2016–2020，项目负责人：张传伦

NSFC Key Program, 2016–2020, Leading PI: Chuan-lun Zhang

海洋古菌主要由自养古菌 Marine Group I (MGI) 和异养古菌 Marine Group II (MGII) 组成，二者被认为在全球海洋碳氮循环过程中起着重要作用。但是目前人们对二者的相互作用还不了解，而这种作用是如何响应全球气候和环境变化的更是知之甚少。本项目拟在物理海洋和沉积过程的宏观框架下，揭示南海北部 MGI 与 MGII 分布的变化规律、生理生化特征及其生物标记物在沉积物中的记录，并通过数学多元统计、生物信息学和标记物碳同位素等分析手段，探讨这两类古菌在现代和地质历史时期对海洋环境条件变化的响应过程，建立新的古海洋环境恢复的指标，为微型生物碳泵理论及评价其在长时间周期上海洋碳循环过程中的作用提供科学依据。

Marine archaea (water column) are dominated by Marine Group I (MGI) that is mainly autotrophic and Marine Group II (MGII) that is mainly heterotrophic; both are known to play important roles in global carbon and nitrogen cycles. However, little is known about how MGI and MGII may interact in biogeochemical processes in the ocean; what is even more poorly known is the geological record of such potential interactions that may respond to global climate change in earth history. The aim of this project is to understand the distribution patterns of MGI and MGII in the northern South China Sea, to characterize their physiological and biochemical properties in carbon metabolism, and to decipher their geological record in sediments. Furthermore, we will integrate statistics, bioinformation, and stable isotopes of lipid biomarkers to explore the underlying mechanisms of marine archaea responding to environmental changes in the ocean and establish new proxies for such changes in earth history. The outcome of this project will provide fundamental information in support of the proposed microbial carbon pump theory and evaluating its role in long term carbon cycles in the ocean.

古海洋和古环境

Paleoceanography and Paleoenvironment

The South China Sea Deep

Edited by Pinxian Wang, Qianyu Li, Minhan Dai. Deep Sea Research Part II, Volume 122, Pages 1-240

Introduction:

The South China Sea (SCS) has increasingly become a global focus in ocean research and hydrocarbon explorations. Over the last two decades, at least 17 international cruises including two ODP/IODP expeditions were conducted in the SCS, and more than 2000 exploratory wells were drilled (Wang et al., 2014a). While its sedimentary basins on the continental shelf and slope are explored for offshore resources, the deep basin below 3500 m in depth that overlies the basaltic oceanic crust preserves the key to understanding their formation and development. In order to better understand the life history and functional system of the marginal sea, a major research program "Deep Sea Processes and Evolution of the South China Sea", or "The South China Sea Deep" for short, was launched in January 2011 by the National Natural Science Foundation (NSFC) of China. This venture represents the first ever large-scale basic-research program in ocean science in the country (Wang, 2012).

The present special issue of Deep-Sea Research II primarily includes recent works on the sedimentology and biogeochemistry of the SCS founded through the program. The 19 papers presented in this special issue broadly fall into four categories: modern oceanography, cold seeps, paleoceanography and sedimentary geology.

Outlook:

With the 8-year program currently passing its midway mark, a number of new ventures are expected for the coming years. In Spring 2016, manned submersibles Pisces IV and V from the University of Hawaii will come to the SCS to join the program for underwater survey. In early 2017, two new IODP cruises are being planned to bring in the "JOIDES Resolution" to drill the continentocean transition zone in the SCS. Intending to promote international collaborations, an international working group was set up in 2014 toward closer correlation of geology between the deep basin and the surrounding islands and continents, and two field trips were organized to Sabah and Palawan in 2015. The SCS Deep program is expected to contribute more to both the research breakthrough and international cooperation in the region. Compared to the open ocean, a marginal sea is much more closely intertwined to the human society, so there is a pressing need for understanding of the scientific implications of the marginal sea especially its resources and environmental effects. The southern part of the SCS is located in the Western Pacific Warm Pool that gives rise to three major divergent atmospheric circulations, and hence acts as the center of the energy flow on the Earth's surface (Webster et al., 1998). The region of the southeast part of Asia, including the SCS, is the largest source of terrigenous suspended sediment supply to the global ocean. Thus, it functions as the global center of material flow (Milliman and Farnsworth, 2011; Summerfield and Hulton, 1994). This region is also labeled the "East Indies Triangle" marked by highest biodiversity both for its marine and terrestrial assemblages, and thus can be considered as the center of genetic flow on Earth (Briggs, 1999). Compared to other marginal basin, the SCS unquestionably enjoys a number of advantages in its life history studies. Moreover, the significance in reconstructing the history of the SCS goes far beyond the marginal sea itself. Located between continent and ocean, a marginal sea acts as an interface of sea-land interactions. The Cenozoic formation of marginal basins in the Western Pacific and the transition from active to passive margin was the most radical change in Asia-Pacific interactions. The development of the marginal basins has also helped to reorganize the ocean circulation, as well as the regional climate. Consequently, the SCS Deep Program is expected to lead to a series of breakthroughs in our understanding of the evolution not only of a marginal basin, but also of sea-land interaction in the Western Pacific region (Wang, 2012).

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古海洋和古环境

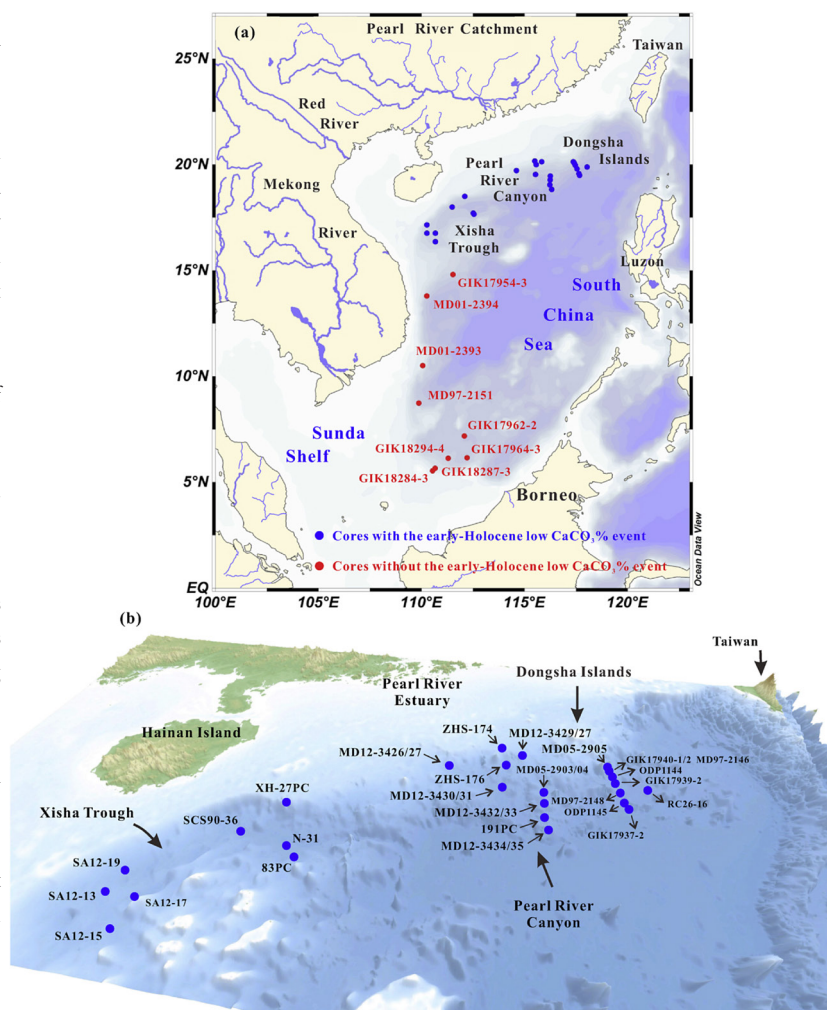
Paleoceanography and Paleoenvironment

**Early interglacial carbonate-dilution events in the South China Sea: Implications for strengthened typhoon activities over subtropical East Asia**

Huang E, Tian J, Qiao P, et al. Early interglacial carbonate-dilution events in the South China Sea: Implications for strengthened typhoon activities over subtropical East Asia. *Quaternary Science Reviews*, 2015, 125:61-77

Abstract:

A compilation of many late Quaternary marine sediment records from the northern South China Sea (SCS) continental slope confirms 15-50% reductions in sedimentary calcium carbonate concentrations between 11.0 and 8.5 ka BP in the early Holocene. This low carbonate% event occurred at a time when the regional sea level rose from -50 m to -10 m, which drowned large areas of continental shelves especially those near and within the Taiwan Strait. This event is associated with a significant increase in bulk sedimentation rates on the upper continental slope and the relative abundance of fine-grained detritus. Sediment provenance analyses suggest a dominant terrigenous input from Taiwan and a minor contribution from Luzon during the low carbonate% event, similar to the background terrigenous deposition in other periods of the Holocene. Two comparable low carbonate% events, respectively from the beginning of marine isotope stages 5.5 and 7.3, have also been recognized, pointing to similar causal factors. While carbonate dissolution and carbonate accumulation rate should not have been responsible, increased terrigenous input and dilution is considered as the main cause for the recurrent low carbonate% events in early interglacials. We further hypothesize that, during early interglacials, fluvial sediment discharge from Taiwan and Luzon intensified due to stronger typhoon activities, and massive fine-grained sediments from these two end members may have been transported to the northern SCS continental slope via surface and deep ocean currents. The conjecture of strengthened typhoon activities over East Asia during the early Holocene is supported by high ocean heat contents in the West Pacific Warm Pool area with the prevailing La Nina-like conditions.



The geographic locations of sediment cores discussed in this study. (a) Blue and red dots indicate cores with and without the early-Holocene low CaCO<sub>3</sub>% event, respectively. Light purple curves and patches on land denote modern river systems with relatively large discharge. (b) Distribution of sediment cores in three northern SCS regions: the Dongsha Islands area, the Pearl River Canyon and the Xisha Trough. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

古海洋和古环境

Paleoceanography and Paleoenvironment

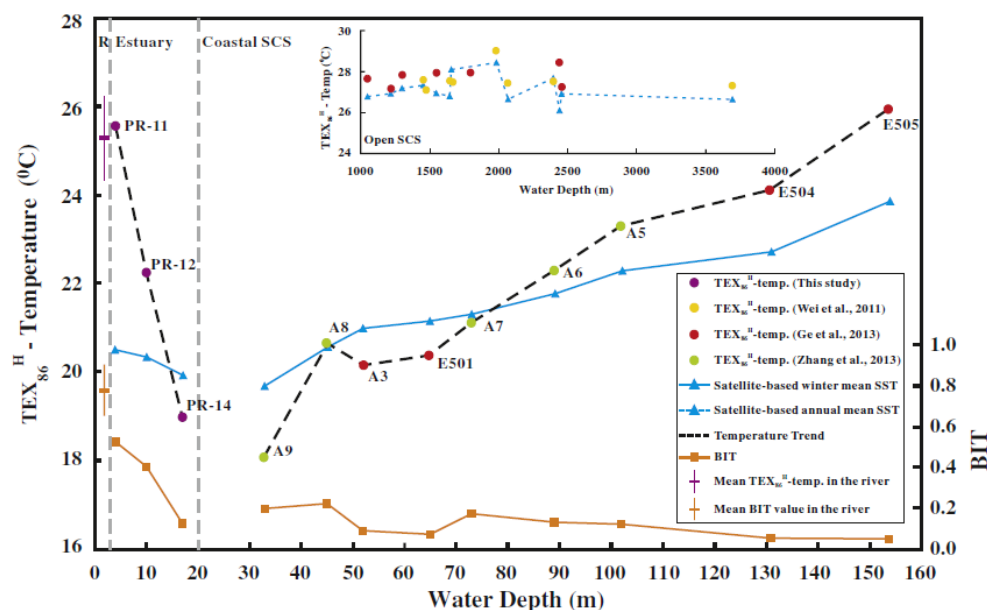
**Unusually low  $TEX_{86}$  values in the transitional zone between Pearl River estuary and coastal South China Sea: Impact of changing archaeal community composition**

Wang J X, Wei Y, Wang P, et al. Unusually low  $TEX_{86}$  values in the transitional zone between Pearl River estuary and coastal South China Sea: Impact of changing archaeal community composition. *Chemical Geology*, 2015, 402:18-29.

Abstract:

$TEX_{86}$ , calculated based on the distribution of isoprenoid glycerol dialkyl glycerol tetraethers (GDGTs), is used worldwide for paleotemperature reconstruction in marine and lacustrine environments. Recently, however, increasing evidence showed that  $TEX_{86}$  could be affected by multiple environmental variables. In this study,  $TEX_{86}$  was calculated for core and polar GDGTs obtained from water column and surface sediments in the lower Pearl River and its estuary. Together with previously published core GDGT data from the coastal and open South China Sea (SCS), a comparison was made between  $TEX_{86}$ -derived and satellite-based surface water temperature, which showed a  $TEX_{86}$ -temperature minimum that is considerably lower than winter satellite temperature in the transitional zone between the Pearl River estuary and the coastal SCS.  $TEX_{86}$  showed significantly positive correlation with GDGT-2 and GDGT-3 in this transitional zone, indicating that they are the primary compounds for the  $TEX_{86}$  bias toward cooler temperature. Lipid and molecular DNA data both indicate that the variation in archaeal community composition rather than water depth or seasonality is likely the crucial factor causing the deviation of  $TEX_{86}$  in the transitional area. Our study has implications for studies in ancient continental margins where unusually low  $TEX_{86}$  temperatures may be observed in the geological record.

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The discrepancy between  $TEX_{86}$  temperature estimates (circles with station names) and satellite-based WST/SST (triangle) in the sediments from the transitional zone. The transitional zone is defined as an area from the PR estuary to the coastal SCS. The inset figure is  $TEX_{86}$  temperatures from core-top sediments in the open South China Sea plotted against water depth. The horizontal purple bar represents the mean value of  $TEX_{86}$  temperatures in the surface sediments of the lower Pearl River (R); the vertical purple bar represents the range of  $TEX_{86}$  temperatures in the surface sediments of the lower Pearl River. BIT index (Branched and Isoprenoid Tetraether index) was proposed to evaluate terrestrial soil organic matter contribution to oceanic settings (Hopmans et al., 2004). The BIT data in the lower Pearl River (mean value, yellow bar) and the Pearl River estuary (yellow square) are from Zhang et al. (2012); those in the coastal sea (yellow square) are from Zhang et al. (2013) and Ge et al. (2013).

古海洋和古环境

Paleoceanography and Paleoenvironment

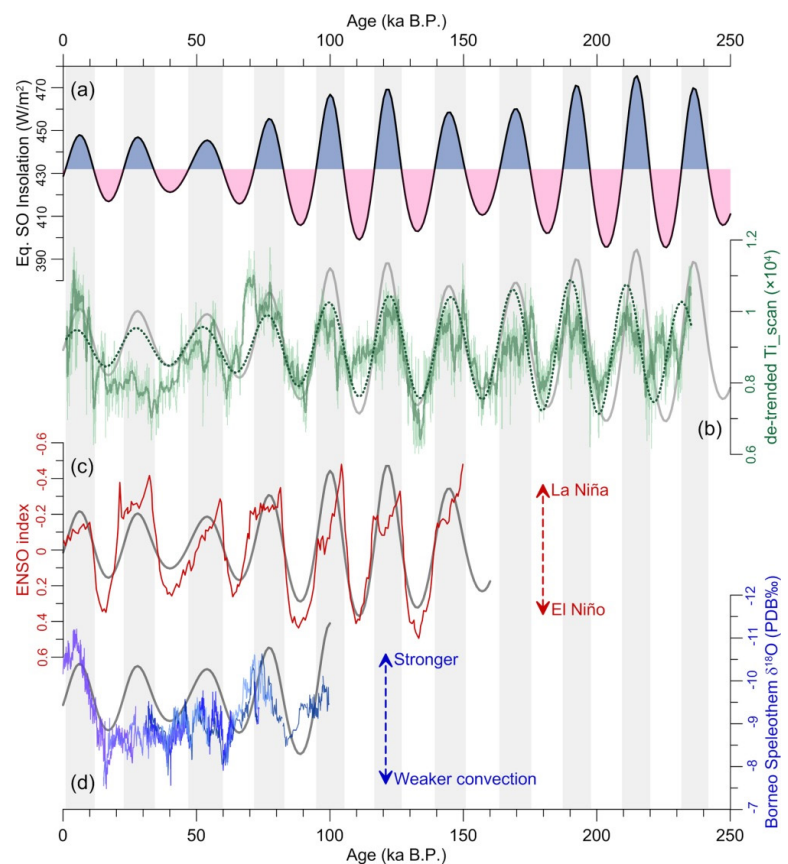
**Precessional changes in the western equatorial Pacific Hydroclimate: A 240 kyr marine record from the Halmahera Sea, East Indonesia**

Dang H, Jian Z, Kissel C, et al. Precessional changes in the western equatorial Pacific Hydroclimate: A 240 kyr marine record from the Halmahera Sea, East Indonesia. *Geochemistry Geophysics Geosystems*. 2015, 16(1): 148-164.

Abstract:

Within the precession band, an interhemispheric antiphase pattern in the tropical hydroclimate is supported by many paleorecords, and optimally explained by the forcing of precessional insolation change. However, scenarios within the western equatorial Pacific (WEP), which plays the role of the ascending center of atmospheric convection, remain poorly determined. In this study, a marine sediment core from the Halmahera Sea, East Indonesia, was analyzed with high-resolution XRF scanning, quantitative discrete XRF, and ICP-AES/MS measurements. The terrigenous fractions in this core are constrained by their trace elemental characteristics to be locally sourced from Halmahera Island, and hence reflect variations in the local riverine runoff and precipitation. On this basis, a continuous record of precipitation changes of the western equatorial Pacific was reconstructed with multidecadal resolution over the last ~240 ka, using an age model established by the correlation between an adjusted ice volume model and benthic  $\delta^{18}\text{O}$  constrained by  $^{14}\text{C}$  dating. The records of terrigenous input show a dominant ~23 kyr periodicity with a  $90^\circ \sim 100^\circ$  phase lag to the boreal summer (i.e., in-phase with the boreal autumn) insolation change. This pattern can be explained by the variability in the convective activity over the WEP, which might be primarily controlled by precessional changes in the El Niño and Southern Oscillation (ENSO) system. A dynamic linkage is implied between the precessional variations in the convective activity in the WEP and the East Asian and Australia-Indonesian summer monsoons (EASM and AISM), in the sense of their distinct stable phase relationship to precession.

Precessional variations in hydroclimate of the western equatorial Pacific. (a) September - October insolation change at the Equator [Laskar et al., 2004]. (b) detrended  $Ti_{scan}$  in MD10 - 3340. (c) ENSO index of Clement and Cane [1999]. (d)  $\delta^{18}\text{O}$  of Northern Borneo speleothem [Partin et al., 2007; Carolin et al., 2013].

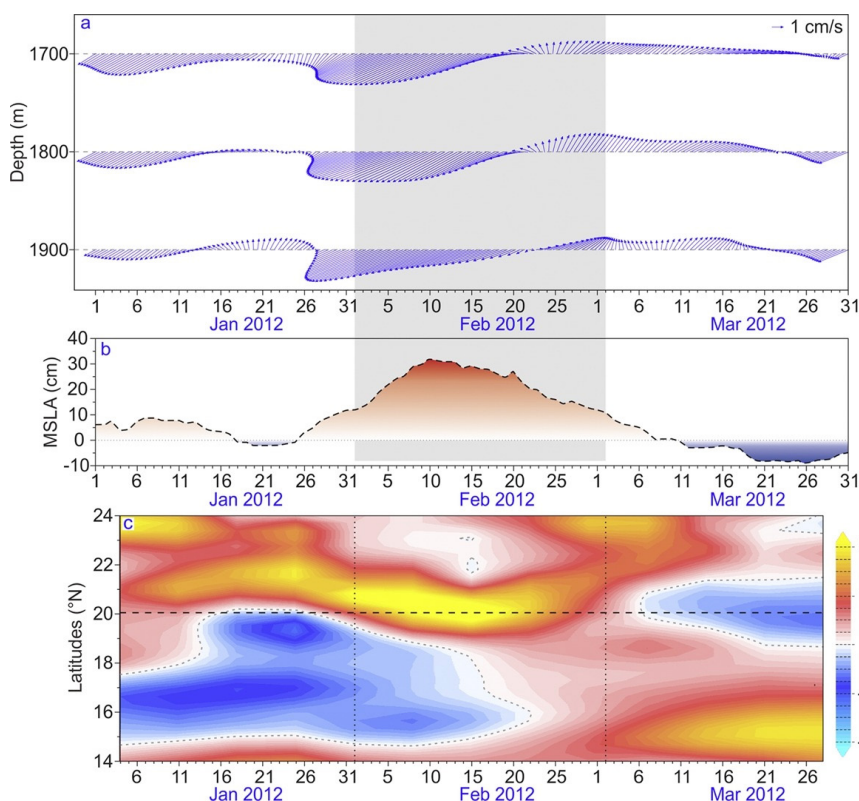


**In situ observation of contour currents in the northern South China Sea: Applications for deepwater sediment transport**

Zhao Y, Liu Z, Zhang Y, et al. *In situ, observation of contour currents in the northern South China Sea: Applications for deepwater sediment transport. Earth & Planetary Science Letters, 2015, 430:477-485.*

Abstract:

Deepwater currents and related suspended sediment concentration were obtained by an Acoustic Doppler Current Profiler (ADCP) mooring system in the northern South China Sea from September 2011 to May 2013 to characterize the occurrence of contour currents and to evaluate their sediment transport capacity. Magnitude of the current velocity generally varied in the range of 0 – 2 cm/s, with a dominant flow direction of ~250° (southwestward). The observed contour current, defined as the along-slope component of the deepwater currents, has a tunnel-like vertical structure with the largest velocity occurring in the middle of the “tunnel” and decreasing outwards. Both the magnitude and the depth range of the maximum velocity display evident inter-seasonal variations, with the strongest velocity in summer and the weakest in spring, while the thickness of the contour currents was the highest in winter and the lowest in spring. We also found that passing-through of the deep-reaching mesoscale eddies significantly affected the magnitude and direction of the contour currents. The suspended sediment concentration (SSC) estimated from echo intensities of the ADCP is the highest at the near-bottom (>400 μg/L) and decreases upwards to <10 μg/L at water depth shallower than 1750 m. High SSC is mostly observed during periods of low magnitude of the contour currents, suggesting resuspension of sediment from the seafloor is not the major controlling factor of these high-SSC events. Our observation also suggests that the major role that contour currents play is to transport sediment from the sources through keeping sediment suspended above the lower continental slope of the South China Sea.



Correlation between passage of the anticyclonic eddy (grey bar) and velocity of the bottom currents in the period from January to March 2012. (a) Vector plots of sub-inertial currents at 1700, 1800, and 1900 m water depth, respectively. Modulus and direction of the vectors indicate the magnitude of the velocity and the direction of the currents. (b) The satellite-derived MSLA during January to March 2012 showing passage of the anticyclonic eddy (grey bar); (c) Hovmöller diagram at 117.4 ° E showing the latitudinal variation of MSLA (in centimeter) from January to March 2012. The dotted curve indicate the 0-cm contour of MSLA. The dashed line shows the latitude of Station TJ-A-1.

海洋沉积

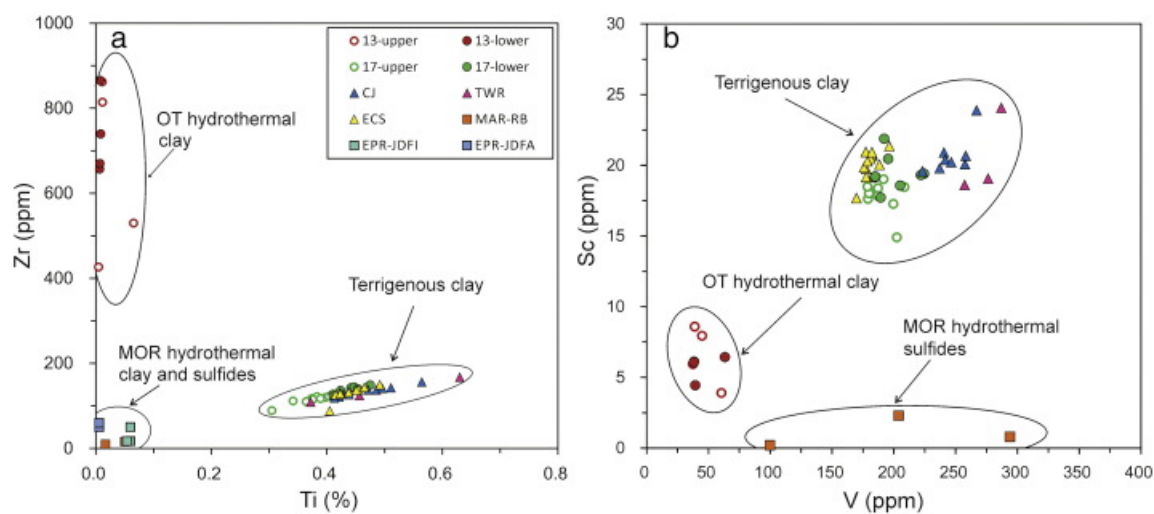
Marine Sedimentology

**Discriminating hydrothermal and terrigenous clays in the Okinawa Trough, East China Sea: Evidences from mineralogy and geochemistry**

Shao H, Yang S, Wang Q, et al. Discriminating hydrothermal and terrigenous clays in the Okinawa Trough, East China Sea: Evidences from mineralogy and geochemistry. *Chemical Geology*, 2015, 398:85-96.

Abstract:

The Okinawa Trough (OT) in the East Asian continental margin is characterized by thick terrigenous sediment and ubiquitous volcanic – hydrothermal activities. In this study, the clays collected during IODP Expedition 331 to the middle OT (Iheya North Knoll) were analyzed for mineralogical and geochemical compositions. By comparing with the clays from the East China Sea shelf and surrounding rivers, we examine different clay origins. The hydrothermal field in the mid-OT is dominated by Mg-rich chlorite, while the recharge zone has clay mineral assemblages similar to the shelf and rivers, showing high content of illite, subordinate chlorite and kaolinite and scarce smectite. Compared to the terrigenous clays, the hydrothermal clays in the OT have high concentrations of Mg, Mn and Zr but low Fe, Na, K, Ca, Ba, Sr, P, Sc and Ti, while the hydrothermal clays in the mid-ocean ridge are relatively enriched in Fe and V and depleted in Al, Mg, Zr, Sc and Ti. Different fractionation patterns of rare earth elements also register in the terrigenous and hydrothermal clays, diagnostic of variable clay origins. We infer that the OT hydrothermal clay was primarily formed by the chemical alteration of detrital sediments subject to the hydrothermal fluids. The remarkably different compositions of hydrothermal clays between the sediment-rich back arc basin like OT and the sediment-starved ocean ridge suggest different physical and chemical processes of hydrothermal fluids and fluid – rock/sediment reactions under various geologic settings.



Plots of Ti vs. Zr, and V vs. Sc in the bulk clay samples of different origins. MAR-RB: rainbow hydrothermal field in the mid-Atlantic Ridge.

海洋有机生物地球化学  
Marine Organic Biogeochemistry

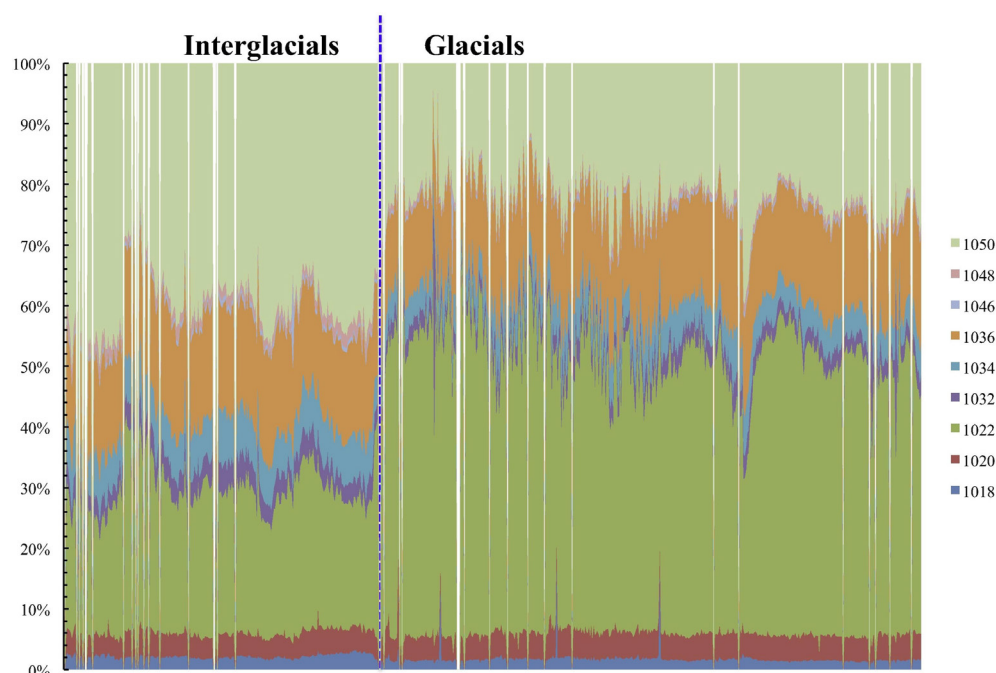
**Glacial–interglacial contrast in MBT/CBT proxies in the South China Sea: Implications for marine production of branched GDGTs and continental teleconnection**

*Dong L, Li Q, Li L, et al. Glacial – interglacial contrast in MBT/CBT proxies in the South China Sea: Implications for marine production of branched GDGTs and continental teleconnection. Organic Geochemistry, 2015, 79:74-82.*

Abstract:

Two proxies derived from branched glycerol dialkyl glycerol tetraethers (br GDGTs), the methylation index of branched tetraethers (MBT) and the cyclization ratio of branched tetraethers (CBT), are often used to reconstruct paleo mean annual air temperature (MAAT) and soil pH based on the premise that br GDGTs in the marine environment are mainly of terrigenous origin. However, mounting evidence indicates that br GDGTs can be produced in situ in oceanic settings, which may affect MAAT reconstruction and the use of other related paleoenvironmental proxies. We have determined br GDGT distributions in a sedimentary core (MD05-2896/7) from the southern South China Sea, which provided high resolution profiles of MBT and CBT indices as well as the branched and isoprenoid tetraether (BIT) index. BIT varied systematically with glacial – interglacial cycles, reaching much lower (< 0.1) values during the interglacial periods (MIS 1 and MIS 5) than during the glacial periods (MIS 2, MIS 3, MIS 4 and MIS 6). MBT/CBT-derived temperature showed, on the other hand, lower values during the interglacial periods but higher values during glacial periods. We hypothesize that the lower MBT/CBT-derived temperature during interglacial periods reflects bottom water temperature registered via br GDGTs produced under marine conditions, whereas the higher MBT/CBT derived temperature during glacial periods reflects terrestrial MAAT because of the overwhelming input of br GDGTs from land when the sea level was low. Similarly, the CBT-derived soil pH appeared to have been overprinted by marine br GDGT production during interglacial periods but responded to precipitation on land during glacial periods, showing patterns similar to, or as a positive response to, the southern hemispheric climate oscillation due to teleconnection. Our results demonstrate an unprecedented pattern of MBT/CBT variation constrained by glacial – interglacial cycles in the South China Sea. Under this constraint, MBT/CBT revealed deep water production of br GDGTs during interglacial periods and recorded changes in paleohydrology on land during glacial periods, providing a new perspective for paleoclimate studies using organic proxies.

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Comparison of br GDGT composition between interglacial periods (MIS 1 and MIS 5) and glacial periods (MIS 2, MIS3, MIS4 and MIS 6), based on data from core MD05-2896/7.

油气地质与地球物理

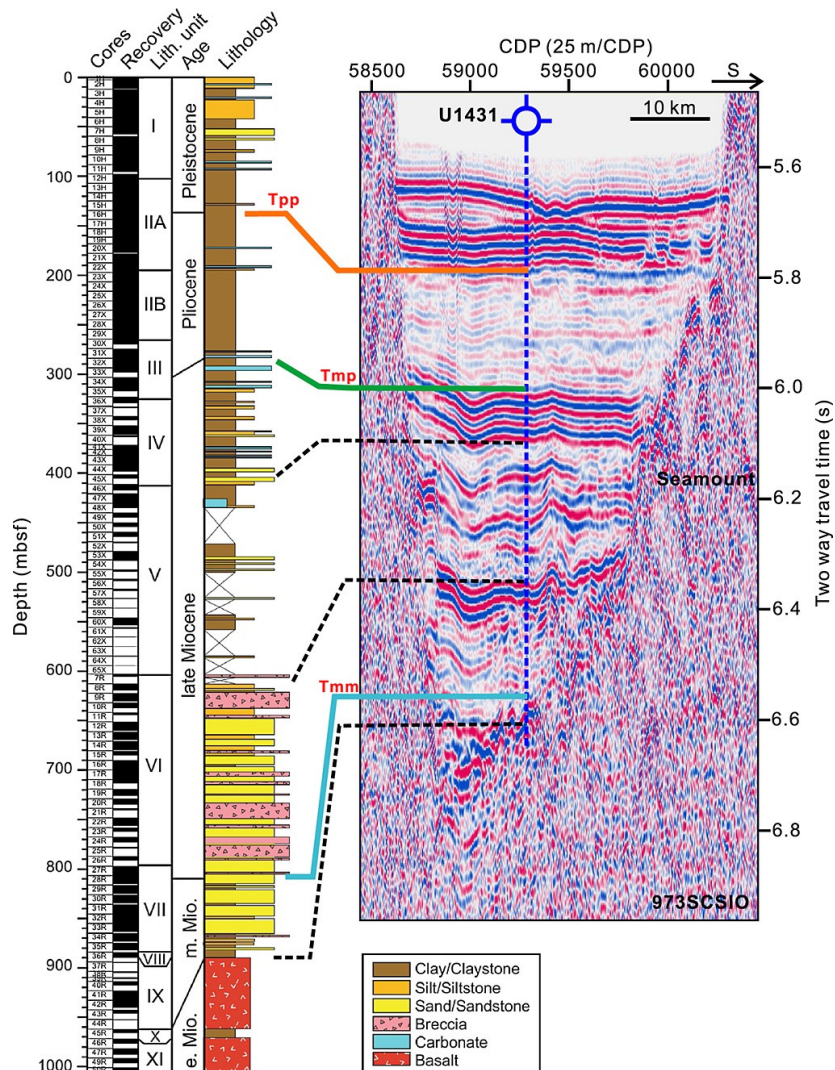
Petroleum Geology and Geophysics

Seismic stratigraphy of the central South China Sea basin and implications for neotectonics

Li C, Li J, Ding W, et al. Seismic stratigraphy of the central South China Sea basin and implications for neotectonics. *Journal of Geophysical Research Solid Earth*, 2015, 120(3):1377-1399.

Abstract:

Coring/logging data and physical property measurements from International Ocean Discovery Program Expedition 349 are integrated with, and correlated to, reflection seismic data to map seismic sequence boundaries and facies of the central basin and neighboring regions of the South China Sea. First-order sequence boundaries are interpreted, which are Oligocene/Miocene, middle Miocene/late Miocene, Miocene/Pliocene, and Pliocene/Pleistocene boundaries. A characteristic early Pleistocene strong reflector is also identified, which marks the top of extensive carbonate-rich deposition in the southern East and Southwest Subbasins. The fossil spreading ridge and the boundary between the East and Southwest Subbasins acted as major sedimentary barriers, across which seismic facies changes sharply and cannot be easily correlated. The sharp seismic facies change along the Miocene-Pliocene boundary indicates that a dramatic regional tectonostratigraphic event occurred at about 5 Ma, coeval with the onsets of uplift of Taiwan and accelerated subsidence and transgression in the northern margin. The depocenter or the area of the highest sedimentation rate switched from the northern East Subbasin during the Miocene to the Southwest Subbasin and the area close to the fossil ridge in the southern East Subbasin in the Pleistocene. The most active faulting and vertical uplifting now occur in the southern East Subbasin, caused most likely by the active and fastest subduction/obduction in the southern segment of the Manila Trench and the collision between the northeast Palawan and the Luzon arc. Timing of magmatic intrusions and seamounts constrained by seismic stratigraphy in the central basin varies and does not show temporal pulsing in their activities.



Calibration of seismic horizons from recovered lithostratigraphy at Site U1431 in the East Subbasin. CDP = common depth point.

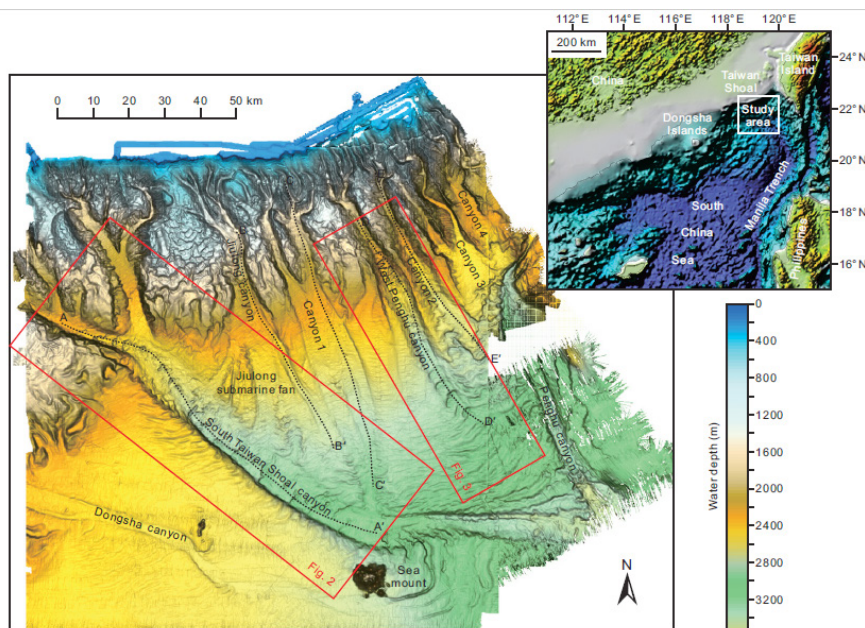
**Cyclic steps along the South Taiwan Shoal and West Penghu submarine canyons on the northeastern continental slope of the South China Sea**

Zhong G, Cartigny M J B, Kuang Z, et al. Cyclic steps along the South Taiwan Shoal and West Penghu submarine canyons on the northeastern continental slope of the South China Sea. *Geological Society of America Bulletin*, 2015, 127(5-6):804-824.

Abstract:

Large-scale step-like features within the South Taiwan Shoal and West Penghu submarine canyons on the northeastern continental slope of the South China Sea are investigated by integrating high-resolution multibeam bathymetric data and multichannel seismic profiles. These step-like features, ranging from 1.2 to 10.0 km in wavelength and 5.4 – 80.9 m in wave height, are mostly interpreted as cyclic steps formed by turbidity currents flowing through the canyons, based on their characteristic step-like morphology, in-train alignment, large wavelengths and aspect ratios (ratio of wavelength to wave height), and typical upstream-sloping backset bedding, among others. A train of 19 continuous steps delineated along the thalweg of the South Taiwan Shoal canyon measures up to 100 km and may be the longest ever reported. Nine short trains of scours identified on a terrace of the South Taiwan Shoal canyon are oriented parallel to the distributaries draining over the terrace and roughly perpendicular to the main canyon thalweg, indicating a complicated flow pattern within the canyon valley. Two trains of scours separated by an intracanyon high in the steeper middle reach of the West Penghu canyon are interpreted as transitional bed forms between antidunes and cyclic steps, which develop downstream into a train of five net-depositional cyclic steps with typical backset bedding in the gentler-sloping lower reach of the canyon. Average slope gradients for the canyon reaches with cyclic steps range from 0.26° to 1.24°. Along each thalweg step train, a slope break is identified to separate the net-erosional cyclic steps in the steeper upstream segment from the net-depositional ones in the gentler downstream segment. Rough estimations indicate that the paleoflows are 100 to 300 m thick with maximum velocities of up to 10 m s<sup>-1</sup>. The estimated flow depths match well with those inferred from geomorphologic analysis. Estimated paleodischarges of ~7 – 23 × 10<sup>5</sup> m<sup>3</sup> s<sup>-1</sup> are equivalent to ten times the discharge of the modern Amazon River.

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Multibeam bathymetric map showing the morphologic characteristics of the canyons and surrounding features on the northeastern slope of the South China Sea. The unnamed canyons are numbered canyons 1 – 4 from west to east. Insert shows the location of the study area in the northeastern South China Sea margin (Data source: ETOPO2v2 Global Gridded 2 min database, National Geophysical Data Center, National Oceanic and Atmospheric Administration, <http://www.ngdc.noaa.gov/mgg/global/etopo2.html>).



油气地质与地球物理

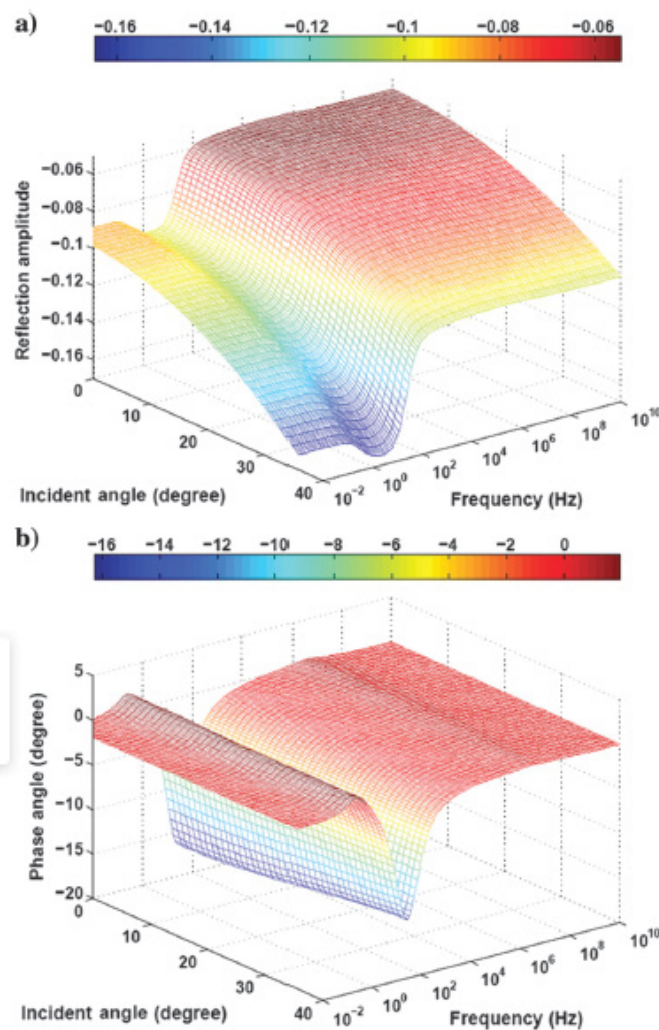
Petroleum Geology and Geophysics

**Seismic reflection dispersion due to wave-induced fluid flow in heterogeneous reservoir rocks**

Zhao LX, Han DH, Yao QL, et al. *Seismic reflection dispersion due to wave-induced fluid flow in heterogeneous reservoir rocks. Geophysics, 2015, 80(3): D221-D235.*

Abstract:

We have investigated the impact of wave-induced fluid flow, including Biot flow and mesoscopic flow, on the signatures of seismic reflectivity in heterogeneous reservoir rocks. We have incorporated the dynamic poroelastic responses of mesoscopic flow into the classical Biot theory. The resulting effective Biot media could capture the characteristics of velocity dispersion and wave attenuation in heterogeneous poroelastic media. On the basis of this effective Biot media, an approach was developed to compute the poroelastic reflection at arbitrary angles and frequencies from the boundary of two heterogeneous porous media. The computed poroelastic reflections not only depended on the elastic properties' contrast and incident angle, but also relied on the fluid mobility and observational frequency. For a typical sand-shale reflector, with the given rock and fluid properties, we found that the effect of mesoscopic flow causes Pwave reflection amplitude variations with the frequency being as high as 40% and a maximum phase shift as high as 16° at the seismic exploration frequency band. In addition, it was found that the amplitude variation with offset intercept and the gradient at the poroelastic interface were impacted by the mesoscopic flow and had a decreasing trend with frequency. Therefore, ignoring the impact of mesoscopic flow could possibly lead to uncertainty in seismic imaging as well as quantitative interpretation of reservoir properties. In comparison, the Biot flow induced seismic dispersion effect, which occurred at a very high frequency range, was almost negligible.



(a) Reflection amplitude and (b) phase variation of the fast PP wave as a function of frequency and incidence angle. Here, phase variation indicates the deviation of the phase in the poroelastic reflection from the constant phase in the elastic reflection.

## 大洋岩石圈演化 Ocean Lithospheric Evolution

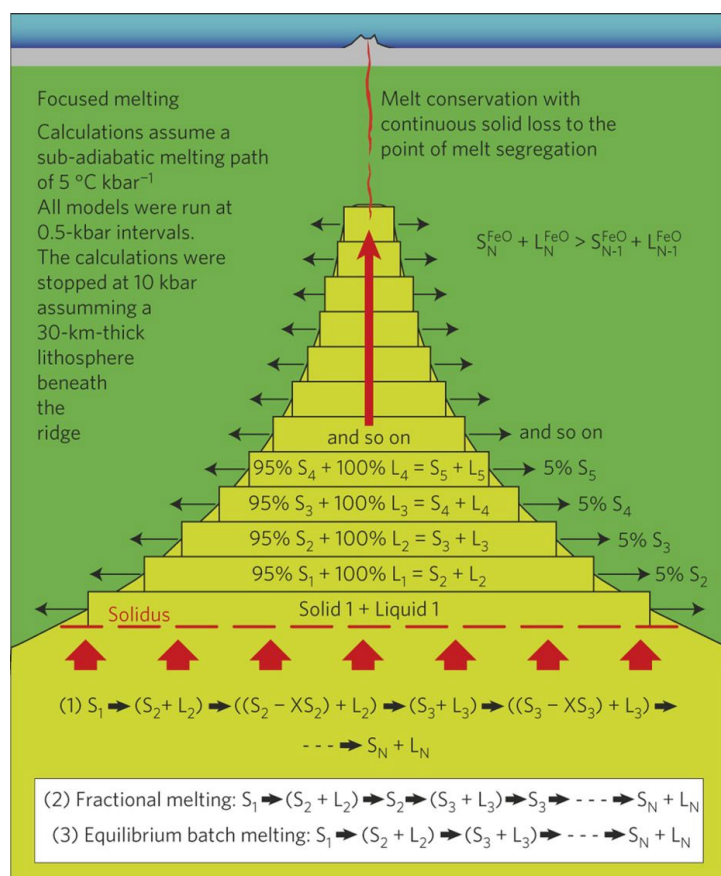
### Ocean rises are products of variable mantle composition, temperature and focused melting

Dick H J B, Zhou H. Ocean rises are products of variable mantle composition, temperature and focused melting. *Nature Geoscience*, 2015, 8(1): 68-74.

Abstract:

Ocean ridges, where Earth's tectonic plates are pulled apart, range from more than 5-km depth in the Arctic to 750 m above sea level in Iceland. This huge relief is generally attributed to mantle plumes underlying mantle hotspots—areas of voluminous volcanism marked by ocean islands. The plumes are thought to feed the mantle beneath adjacent ocean ridges. This process results in thickened crust and ridge elevation to form ocean rises. The composition of mid-ocean ridge basalt, a direct function of mantle composition and temperature, varies systematically along ocean rises, but in a unique way for each different rise. Here we use thermodynamic calculations of melt-evolution pathways to show that variations in both mantle temperature and source composition are required to explain the chemical make-up of rise basalts. Thus, lateral gradients in mantle temperature cannot be uniquely determined from basalt chemistry, and ocean rises can be supported by chemically buoyant mantle or by robust mantle plumes. Our calculations also indicate that melt is conserved and focused by percolative flow towards the overlying ridge, progressively interacting with the mantle to shallow depth. We conclude that most mantle melting occurs by an overlooked mechanism, focused melting, whereas fractional melting is a secondary process that is important largely at shallow depth.

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Focused-melting model. Light green, asthenosphere; dark green, lithosphere; grey, crust; S, solid; L, melt. Melt velocity > mantle velocity. The model is calculated in steps to approximate reactive flow. As shown by equation (1), at each step the solid – liquid equilibrium is calculated, then 5% of the solid is removed and a new bulk composition calculated to begin the next step with 100% liquid retention. Transit effects through the lithosphere are not included in the model. Equations for fractional and equilibrium batch melting are shown in the inset for comparison.

## 大洋岩石圈演化 Ocean Lithospheric Evolution

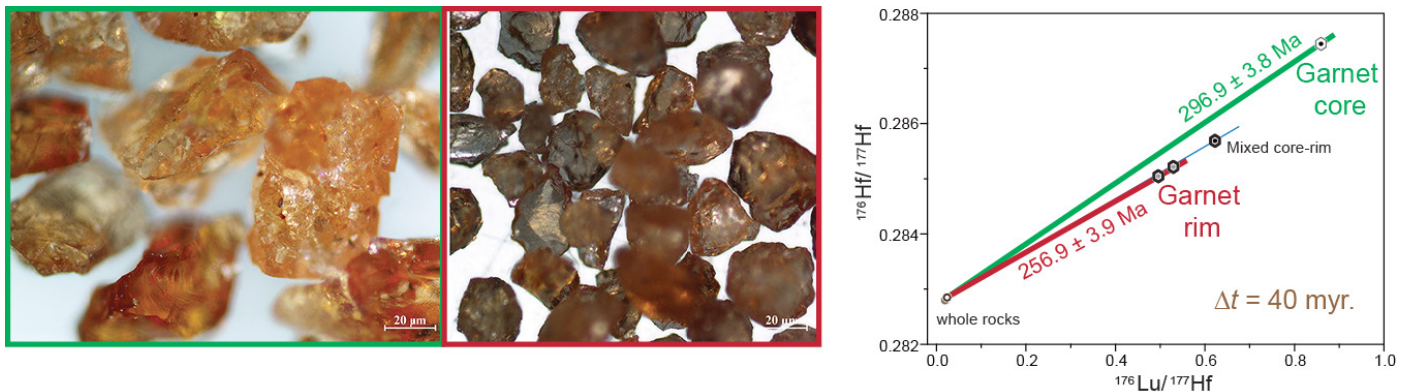
### Protracted garnet growth in high-P eclogite: constraints from multiple geochronology and P-T pseudosection

Cheng, H., Cao, D.D., *Protracted garnet growth in high-P eclogite: constraints from multiple geochronology and P - T pseudosection. Journal of Metamorphic Geology, 2015, 33: 613-632.*

Abstract:

Understanding convergent margin processes requires determination of the onset of subduction, the number and polarity of subduction zones, and the duration of subduction zone metamorphism. Garnet growth and intracrystalline zonation can be used to constrain the timing, duration, and kinetics of tectonometamorphic processes. An eclogite from the Huwan shear zone in the Hong'an orogen was investigated with combined pseudosection analysis and multiple geochronology. The pseudosection analysis illustrates that garnet growth is continuous and along an early near isothermal trajectory followed by a near isobaric heating path from 1.9 GPa/500 °C to 2.4 GPa/575 °C and subsequent near isothermal decompression.  $^{40}\text{Ar}/^{39}\text{Ar}$  dating of amphibole inclusion in garnet from the eclogite yielded age of  $310 \pm 5$  Ma, which is consistent with the U - Pb age of  $305 \pm 3$  Ma for the metamorphic zircons within uncertainty. Garnet core and rim material that produced Lu - Hf ages of  $296.9 \pm 3.8$  Ma and  $256.9 \pm 3.9$  Ma, the latter is consistent with its Sm - Nd age of  $254.3 \pm 4.6$  Ma for the same aliquots. Similarly limited zircon U - Pb ages of c. 257 Ma were obtained in zircon rims with garnet inclusion. These ages were interpreted to bracket the period of garnet growth and the difference of up to ~40 Ma is best explained by protracted garnet growth. We propose that the rocks represent detachment of part of the downgoing slab and remained free of significant compression/decompression or heating/cooling closing to the subduction channel, most likely underplated the mantle wedge, for a long time. These rocks were incorporated into the following subduction channel due to the successive entry of the buoyant materials, and exhumed at some time later than c. 254 Ma. The increasing observations of protracted garnet growth and long-lived subduction in various orogens worldwide demand more sophisticated geodynamic models.

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Lu - Hf isochron plots for garnet separated garnet porphyroblasts with distinct optical contrasts.

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发明专利

Invention Patents

2015 年度共授权四项发明专利，其中一项发明专利，三项实用新型专利。

In 2015, a total of 4 invention patents were granted, among which three have already achieved technology transfer.

| 发明专利<br>Patent   | 发明人（按顺序）<br>Inventor (in order)  | 发明类型<br>Type          | 专利号<br>Patent No. |
|--|--|-----------------------|-------------------|
| 水下原位阴离子分析仪<br>Underwater anion analyzer  | 彭晓彤, 周怀阳, 吴正伟, 等<br>Xiaotong Peng, Huaiyang Zhou,<br>Zhengwei Wu, etc          | 发明专利<br>Patent        | ZL201210098316.x  |
| 一种环工作面电磁法电缆<br>转接器<br>Ring working surface<br>electromagnetic cable adapter          | 王明明, 吴健生, 刘耀徽, 耿德祥<br>Mingming Wang, Jiansheng Wu,<br>Yaohui Liu, Dexiang Geng | 实用新型<br>Utility model | ZL201420617908.2  |
| 一种可控纵横波激发系统<br>Controllable longitudinal and<br>transverse wave excitation<br>system | 蒋婉聪, 谢志飞, 吴健生<br>Wanchong Jiang, Zhifei Xie, Jiansheng<br>Wu                   | 实用新型<br>Utility model | ZL2015220401522.2 |
| 一种沉积物水分真空抽提<br>装置<br>Sediment moisture vacuum<br>extraction device                   | 杨承帆, 杨守业<br>Chengfan Yang, Shouye Yang   | 实用新型<br>Utility model | ZL2015220491077.3 |

## 交流与合作

### Academic Exchange and Cooperation

#### IODP344、349 航次后学术研讨会

#### IODP Expedition 344、349 Postcruise Meeting

6.22-24 和 9.28-30 连续两次在上海召开 IODP349 航次后学术研讨会。

During Jun 22-24 and September 28-30, two consecutive post-cruise meetings of the IODP expedition 344、349 were held in Shanghai.



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11 月，海洋与地球科学学院四十周年院庆系列活动举行。同济海洋学科前身是 1975 年创建的海洋地质系，四十年来快速发展，已经成为在国内外具有较高影响力的海洋科研和教育、人才培养基地。

In November, the 40th Anniversary Celebration of the School of Ocean and Earth Science was held. The predecessor of Marine discipline in Tongji University was the Marine Geology Department established in 1975. It has developed rapidly in the past 40 years and has become a marine research and education and talent training base with high influence at home and abroad.



#### 院庆学术活动

#### Academic Celebration

海洋地震方法与技术新进展学术讨论会 (11.6-7)  
Academic Symposium on New Progress in Marine Seismic Methods and Technologies (November 6-7)

#### 海洋与地球科学学院建设四十周年 庆祝活动

#### Celebration of the 40th Anniversary of the School of Ocean and Earth Science



#### “双鱼座”载人深潜航次科学项目 专家评审会

#### "Pisces" manned deep voyage science project expert review meeting

11 月 21 日，实验室于上海承办“南海深海过程演变”基金委重大研究计划“双鱼座”载人深潜航次科学项目专家评审会。

On November 21, the laboratory hosted an expert review meeting of the “Pisces” manned deep voyage science project for the “South China Sea Deep Sea Process Evolution” Research Project in Shanghai.





**“双鱼座”载人深潜航次技术方案讨论会**  
**"Pisces" manned deep voyage technical solution seminar**

12月4-5日，实验室于上海承办“南海深海过程演变”基金委重大研究计划“双鱼座”载人深潜航次技术方案讨论会。

December 4-5, the laboratory hosted a seminar on the “Pisces” manned deep voyage technical plan for the “South China Sea Deep Sea Process Evolution” Research Project in Shanghai.



**“现代沉积过程”专题战略研讨会**  
**"Modern Sedimentation Process" Special Strategy Seminar**

根据王成善和彭平安两位院士承担的中国科学院学部学科发展战略研究项目《沉积学发展战略研究》要求，“现代沉积过程”专题由高抒和刘志飞负责召集。7.27-28 在上海召开第三次战略研讨会，继续研讨中国现代沉积过程的研究思路和目标，凝练学科重大研究方向。

According to the requirements of the research on the development strategy of sedimentology of the discipline of the Chinese Academy of Sciences under the supervision of Academician Chengshan Wang and Pingan Peng, the theme topic of "modern sedimentary process" was convened by Shu Gao and Zhifei Liu. On July 27-28, the third strategic seminar was held in Shanghai to continue to study the research ideas and objectives of the modern sedimentary process in China, and to consolidate the major research directions of the discipline.



## 交流与合作

### Academic Exchange and Cooperation

#### “南海深部过程演变”学术研讨会 Academic Seminar on “Deep Process Evolution in the South China Sea”

2月2-3日“南海深部过程演变”学术研讨会在上海召开。

February 2-3, the symposium on "Deep Process Evolution in the South China Sea" was held in Shanghai.



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#### 海底结核 / 结壳学术讲习班 Submarine tuberculosis/crustation academic workshop

James R. Hein 教授将应邀于6月3日至4日来访并举办海底结核 / 结壳学术讲习班，本讲座面向国内所有对海底矿产资源尤其是铁锰结核结壳感兴趣的人。它主要包含结壳和结核的两块内容，涵盖了其地球化学、矿物学特征，控矿因素，矿产资源分布，古海洋学研究。作为铁锰结核结壳研究的先驱和集大成者之一，Hein 教授还将为我们阐释该领域研究的历史与最新进展。最后，他还会对海底铁锰结核结壳的现有采矿模式进行介绍。

Professor James R. Hein was invited to visit and held a submarine tuberculosis/crustation academic workshop from June 3rd to 4th. This lecture is aimed at those in China who are interested in seabed mineral resources, especially iron-manganese crusts. It mainly contains two parts of crusts and tuberculosis, covering their geochemistry, mineralogical characteristics, ore-controlling factors, distribution of mineral resources, and paleoceanographic research. As one of the pioneers and masters of iron-manganese tuberculosis crust research,

Professor Hein will also explain the history and latest developments in this field. Finally, he will also introduce the existing mining model of seabed ferromanganese tuberculosis.

#### 第四届“全国优秀大学生暑期学校” The 4th "National Excellent College Summer School"

7月22日上午，2015年第四届“全国优秀大学生暑期学校”开学典礼在海洋楼一楼报告厅举行。海洋学院教学院长于鹏教授、学院党委副书记林梅老师以及学院两个学科系主任许长海老师、程玖兵老师出席了本届开学典礼。本届暑期学校经选拔后共招收了来自中国海洋大学、中国地质大学、厦门大学、吉林大学、西北大学等高校的32名本科三年级学生，在我院进行了为期2天的参观、交流和学习活动。

On the morning of July 22, the opening ceremony of the 4th "National Excellent College Summer School" in 2015 was held in the lecture hall on the first floor of the Ocean Building. Prof. Peng Yu, the deputy head of the school (Education), and Mei Lin, the deputy secretary of the Party Committee of the school, and the directors of the two disciplines, Profs. Changhai Xu and Haobing Cheng, attended the opening ceremony. A total of 32 undergraduate students from China Ocean University, China University of Geosciences, Xiamen University, Jilin University, Northwest University and other universities were selection to be enrolled for this summer school, and they had a two-day visit, exchange and Learning activity hosted by our school.



### Academic Exchange and Cooperation

#### 专家来访

#### Visitors

本年度，实验室申请出国境人数约 80 人次，引入专家学者来访 68 人次；国际留学生在读 7 人次。

In the current year, the number of applicants applying for overseas visits was about 80, and 68 experts and scholars came from overseas. We also had 7 international students studying full-time here.

● 1 月 25 日，加拿大卡尔加里大学肯·巴克 (Ken Barker) 教授、辛迪·格雷厄姆 (Cindy Graham) 助理教授来访，探讨 2+2 本科生双学位项目，促进双方联合培养本科生。

On January 25, Professor Ken Barker of the University of Calgary, Canada, and Assistant Professor Cindy Graham visited the 2+2 undergraduate dual degree program to promote joint training of undergraduates.

● 3 月 27 日，夏威夷大学副校长布莱恩·泰勒 (Brian Taylor) 教授来访，探讨深潜器制造及深海探测事宜。

On March 27, Professor Brian Taylor, Vice President of the University of Hawaii, visited to discuss the manufacture of deep submersibles and deep sea exploration.



● 5 月 27 日，西班牙米格尔·埃尔南德斯·德埃爾切大学微生物专家弗朗斯克·瑞德乔·瓦勒教授来访，探讨南海和地中海关于古菌研究的合作事宜。

On May 27, Prof. Francisco Rodriguez-Valera, a microbiologist of Universidad Miguel Hernández in Spain, visited to discuss cooperation on South China Sea and Mediterranean archaeal research.

● 6 月 3 日，美国地质调查局詹姆斯·海因教授来访并举办海底结核 / 结壳学术讲习班。

On June 3, Professor James R. Hein of the US Geological Survey visited and hosted a submarine tuberculosis/crustation academic workshop.

● 10 月 24 日，美国俄亥俄州立大学列昂尼德·波里亚克教授来访，开展北冰洋古环境研究的专题讲座。

On October 24, Professor Leonid Polyak of the Ohio State University visited and gave a lecture on the Arctic Ocean paleoenvironmental research.

● 11 月 5 日，意大利那不勒斯-费德里克二世大学班德图·德·瑞教授、斯法诺·阿本斯教授和埃珍妮·图若教授来访，就进一步推进研究生交换及科研合作等事宜展开讨论。

On November 5, Professor Benedetto de Vivo, Professor Stefano Albanese and Eugenio Turco of Naples-Federico II University visited and discussed the issues of further promotion of postgraduate exchange and scientific research cooperation.

● 12 月 9 日，法国驻华大使馆科技参赞皮埃尔·莱蒙德先生、法国驻上海总领事馆科技领事菲德瑞·布列塔先生来访海洋学院，促进双方的进一步交流合作。

## 交流与合作

### Academic Exchange and Cooperation

On December 9, Mr. Pierre Lemonde, Scientific Counselor of the French Embassy in China, and Mr. Frédéric Bretar, Consul General of the Consulate General of France in Shanghai visited the school to promote further exchanges and cooperation.



● 澳洲国立大学（ANU）于际民博士受聘海洋高等研究院讲座研究员。

Dr. Jimin Yu of Australian National University (ANU) was employed as a lecture researcher at the Institute of Advanced Marine Research.



## 2015 年度开放课题资助清单

## 2015 open project funding list

| 课题编号<br>Project No. | 项目名称<br>Project title   | 负责人<br>Principal         | 职称<br>Title                        | 单位<br>Institution   |
|---------------------|---|--------------------------|------------------------------------|---|
| MGK1501             | 中中新世中国南海与赤道太平洋碳循环与洋流变化的关系研究<br>Study on the relationship between the carbon cycle and ocean currents in the South China Sea and the equatorial Pacific in the Middle Miocene                              | 于际民<br>Jimin Yu          | 讲师<br>Lecturer                     | 澳大利亚国立大学<br>Australian National University  |
| MGK1502             | 关于参加 2015 年夏季长江口 - 东海陆家公共航次并进行低氧区域和混合研究的申请<br>Application for participation in the low-oxygen area and mixed research in the Yangtze River Estuary-East Sea Lujia Public expedition in the summer of 2015 | 王展坤<br>Zhankun Wang      | Assi.Res.<br>Scientist             | 美国德克萨斯农工大学<br>Texas A&M University  |
| MGK1503             | 墨西哥湾天然气水合物沉积物中陆源有机物的生物降解<br>Biodegradation of terrestrial organic matter in natural gas hydrate deposits in the Gulf of Mexico  | 李芯芯<br>Xinxin Li         | 博士后<br>Postdoctor                  | 美国德克萨斯农工大学<br>Texas A&M University  |
| MGK1504             | 伴随同化方法在长江口邻近海区悬浮泥沙输运问题中的应用<br>Application of Assimilation Method in Suspended Sediment Transport in the Adjacent Sea Area of the Changjiang Estuary   | 张继才<br>Jicai Zhang       | 副教授<br>Associate Professor         | 浙江大学海洋学院物理海洋研究所   |
| MGK1505             | 南海海底扩张的年代与过程: 周缘地块中新世古地磁制约<br>Age and Process of Submarine Expansion in the South China Sea: Mesozoic Paleomagnetic Restriction in Peripheral Blocks  | 李学森<br>Xuesen Li         | 教授<br>Professor                    | 桂林理工大学地球科学学院 School of Earth Sciences, Guilin University of Technology                            |
| MGK1506             | 利用重磁震联合反演研究南海典型区域洋陆转换带地球物理特征<br>Geophysical characteristics of the continental-continental transition zone in the typical area of the South China Sea using gravity-magnetic-seismic joint inversion      | 陈晓<br>Xiao Chen          | 讲师<br>Lecturer                     | 东华理工大学核工程与地球物理学院 School of Nuclear Engineering and Geophysics, East China Institute of Technology |
| MGK1507             | Provenance and Degradability of Particulate and Dissolved Organic Matter in the Intertidal Sediment of the Yangtze River Estuary  | 林玉诗<br>Yushi Lin         | Assistant professor                | 台湾中山大学<br>Zhongshan University, Taiwan  |
| MGK1508             | 东海内陆架潮流场特征模型构建及其对海底观测系统选址与服役的影响<br>Construction of tidal field feature model of inland shelf in the East China Sea and its influence on site selection and service of submarine observation system        | 吕超<br>Chao Lv            | 讲师<br>Lecturer                     | 上海海洋大学 Shanghai Ocean University  |
| MGK1509             | Probing Organo-Mineral Interactions in the South China Sea  | Thomas Michael Blattmann | 博士研究生<br>Doctoral student          | Institute of Geology ETH Zurich   |
| MGK1510             | 复杂地层中电磁和声波问题逆散射和成像的高阶迭代波恩近似算法研究<br>High-order iterative Bonn approximation algorithm for inverse scattering and imaging of electromagnetic and acoustic wave problems in complex formations               | 吴语茂<br>Yumao Wu          | 副研究员<br>Associate researcher       | 复旦大学 Fudan University   |
| MGK1511             | Preservation characteristics of crenarchaeol as a marine biomarker in the deep sea sediments from IODP349 Site U1433, South China Sea   | 包锐<br>Rui Bao            | Research assistant (PhD candidate) | Swiss Federal Institute of Technology Zurich (ETH Zürich)   |
| MGK1512             | Understanding magmatic processes in the South China Sea region as recorded in deep sea sediments  | Kelsie Dadd              | 副教授<br>Associate Professor         | Macquarie University, Australia   |

## 交流与合作

### Academic Exchange and Cooperation

#### 周五论坛

#### Friday forum

2015年周五学术报告邀请海内外相关领域专家围绕实验室主要研究方向,面向全体师生共举办13场报告,促进了双方的学术交流,加强国际合作。

The Friday academic report series in 2015 invited experts from relevant fields at home and abroad to focus on the main research directions of the laboratory, and held 13 reports to promote academic exchanges and international cooperation.

| 报告人<br>Reporter                   | 报告题目<br>Topic   | 报告人单位<br>Institution   |
|-----------------------------------|---|--|
| Ben Kneller                       | Long run-out turbidity currents   | University of Aberdeen   |
| 高金耀<br>Jinyao Gao                 | 我国极地海洋地球物理研究和进展<br>Research and development of polar ocean geophysics in China  | 国家海洋局二所<br>Second Institute of Oceanography  |
| Selvaraj<br>Kandasamy             | Distinguishing Terrestrial Organic Carbon in Marginal and Deep Marine Environments of Northern South China Sea  | 厦门大学<br>Xiamen University  |
| 曾洪流<br>Hongliu Zeng               | 地震沉积学的理论基础、基本方法及应用前景<br>Theoretical basis, basic methods and application prospects of seismic sedimentology   | 美国德克萨斯大学<br>University of Texas  |
| 肖湘<br>Xiang Xiao                  | 极端生命过程与生物地球化学循环<br>Extreme life process and biogeochemical cycle  | 上海交通大学<br>Shanghai Jiaotong University   |
| Hodaka<br>Kawahata                | Ocean acidification in response to the increase of atmospheric carbon dioxide concentration - in future and in the past   | 东京大学<br>The University of Tokyo  |
| 黄奇瑜<br>Qiyu Huang                 | 构造和沉积的结合—海岸山脉活跃弧陆碰撞期弧前盆地同变形动态沉积的时空演化<br>Combination of tectonic and sedimentary--the spatial-temporal evolution of the same-deformation dynamic deposition of the pre-arc basin and the active arc-coastal collision period | 中科院广州地化所 / 台湾成功大学<br>Guangzhou Institute of Geochemistry, Chinese Academy of Sciences / Taiwan University of Success |
| Robert Coe                        | What happens during geomagnetic reversal?   | University of California Santa Cruz  |
| Francisco<br>Rodriguez-<br>Valera | 海洋古菌的基因组学研究<br>Genomics study of marine archaea   | Universidad Miguel Hernández,<br>Spain   |
| Gabriel<br>Bowen                  | Paleogene Hyperthermals, Global Change, and Biogeochemical Feedbacks  | 犹他大学<br>University of Utah   |
| Kei<br>Yoshimura                  | New era of using stable water isotopes for climate sciences: advance in modeling and assimilation   | 东京大学<br>The University of Tokyo  |
| Christophe<br>Colin               | $\epsilon$ Nd from deep-sea sediments and sea water: Implications for North Atlantic intermediate and deep-water hydrology at different time scales   | University Paris-Sud   |
| Leonid Polyak                     | New developments in the Arctic Ocean glacial history: The Arctic Ice Sheet revisited  | Ohio State University  |

### 留学生奖学金

#### International Student Scholarship

2015 年度，在中国政府奖学金和中国政府海洋奖学金的资助下，3 名来巴基斯坦、越南、莫桑比克的留学生开始在本实验室攻读研究生学位。实验室目前留学生人数为 12 人，9 人攻读博士学位，3 人攻读硕士学位。

Under the auspices of the Chinese Government Scholarship and the Chinese Government's Ocean Fellowship, 3 international students from Pakistan, Vietnam and Mozambique began to pursue graduate degrees in this laboratory in 2015. At present, there are 12 international students studying in the laboratory, 9 of whom are for a doctorate and 3 for a master degree.

### 海洋地质奖学金

#### Marine Geological Scholarship

为鼓励学生努力学习，帮助学生成长成才，海洋地质国家重点实验室设立“海洋地质”奖学金。奖学金针对全院学生，本科生、研究生均可申请。2016 年，共有 6 名学生获得了“海洋地质”奖学金，其中本科生 4 人，研究生 2 人。

In order to encourage students to study hard and help them grow into talents, the State Key Laboratory of Marine Geology has established a “Marine Geology” scholarship available to all undergraduate and graduate students in the school. In 2016, 6 students won the scholarship, including 4 undergraduate and 2 graduate students.



### 学生教育

#### Student Education

##### 暑期学校 Summer School

实验室每年举行“全国优秀大学生暑期学校”，2015 年，实验室招收来自全国 17 所高校的优秀学员共计 32 人，2016 年研究生招生过程中已推免录取其中 7 人。

Each year, the laboratory holds the National Summer Student Program for Outstanding Undergraduate Students, which is conducted in various forms such as visits to deep sea science museums and key laboratories, subject introductions, professional tests, and interviews and exchanges, in order to strengthen the understanding of outstanding university students about lab-related disciplines and scientific research progress in our laboratory. The program has attracted more and more outstanding national undergraduates to apply for marine graduate studies in the lab. Since 2012, four summer schools have been successfully held. In 2015, the laboratory accepted 32 outstanding students from 17 domestic universities to participate in the program. In the course of the graduate enrollment process for 2016, 7 students who were program participants were pre-admitted.

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### 研究生学术论坛

#### Graduate Academic Forum

##### 博思论坛 Booz Forum

2015 年 5 月及 12 月，实验室举办了两次研究生论坛。

In May and December of 2015, the laboratories held two postgraduate forums. The Booz Forum provided a platform for graduate students to exchange academic knowledge, display scientific research results, broaden their academic horizons, inspire enthusiasm for academic innovation and devotion to research.

## 科普教育

### Popular Science Education

依托海洋地质国家重点实验室的强大科学研究背景，在上海市科委、杨浦区科委和同济大学科技处的大力支持下，实验室建有的“深海探索馆” I-III 期全年面向社会开放，普及海洋科学知识、展示深海科技的新进展。其中同济大学深海科学科普教育基地科普馆二期工程 - 深海探索馆，集中展示深海科学领域前沿发现、最新科技，面向广大高校师生、中小學生以及市民普及深海知识。

2015 年共接待海内外参观者超过 34762 人次，策划大型科普活动 10 余场，亲子科普互动 40 多场，与上海市二十几家小学开展科普讲座和兴趣课堂。

Bases on the strong scientific research background of State Key Laboratory of Marine Geology, and supports from the Science and Technology Commission of Shanghai Science and Technology Commission, Yangpu District Science and Technology Commission and Tongji University Science and Technology Department. The "Deep Sea Exploration Hall" phases I-III built in the laboratory was open to the public throughout the year, popularizing marine scientific knowledge and demonstrating new advances in deep-sea science and technology. Deepsea Exploration Pavilion is the second platform of marine public education at Tongji Univ., demonstrating the forefront of marine science and the latest marine technology, aiming to promote marine-science public education.

In 2015, more than 34,762 visitors from home and abroad attended the exhibition, and more than 10 Large-scale popular science activities, and over 40 parent-child science interaction programs were held. The lab also helped set up the interactive science workshops and popular science course in more than 20 primary and secondary schools. We have achieved an ideal science education goal through the new media, publishing science books and science peripheral products.

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## 分析室

### Laboratories

#### 新开放分析室

#### Newly Open Analysis Labs

2015 年实验室陆续开放了古地磁分析室。

In 2015, the Paleomagnetism Lab is open.

古地磁分析室主要功能是针对海洋岩芯样品、陆地样品的剩磁和磁学参数测试。

Paleomagnetism Lab was established in Lingang Base in 2015 as a facility added s to the State Key Laboratory of Marine Geology, Tongji University. It includes advanced equipment for residual magnetism measurement and demagnetization, as well as conventional rock magnetism measuring instruments.



## 基本情况

### General Information

至2015年底,实验室共有固定人员66人,其中专职科研人员50人,实验和工程技术人员13人,以及行政管理人员3人。目前实验室在读硕士生133人,博士生113人。

实验室在2015年度的人才引进和培养上有较大突破,取得了丰硕的成果。杨守业入选教育部“长江学者奖励计划”特聘教授、田军获得国家自然科学基金杰出青年基金以及刘忠方入选中组部“青年千人计划”。同时引进了贾国东教授、于际民讲座研究员等。贾国东教授在运用生物地球化学方法对海陆环境代用指标的现代过程和古代沉积记录等方面开展了比较有特色的研究工作,擅长解决晚新生代以来的古海洋学、古气候学和环境演变科学等领域的科学问题,他的加盟,将大大推进实验室在有机地球化学方向的研究。此外,青年学者张罗磊、谢伟等博士入职,以及吴琼等4位博士后加入海洋科学/地球物理学博士后流动站,显著提高了实验室的学术研究活力。

为促进国际交流与合作,吸引优秀外国留学生攻读海洋与地球科学学院相关研究生专业的学历和学位,由重点实验室出资设立了外国留学生奖助金,用于资助攻读学位的外国留学生。2015年度获得资助的留学生共有11人,其中博士9人,硕士3人,分别来自越南、莫桑比克、巴基斯坦、马来西亚、泰国、法国等。

实验室还积极支持本学科的研究生出国短期学术交流。这些研究生通过国外的学习交流,不仅取得了较好的科研数据,还锻炼和培养了独立科研和国际学术交流能力,进一步促进本实验室的人才培养和队伍建设。

实验室每年举办大学生暑期学校,通过深海科普馆与重点实验室参观、学科介绍、专业测试、面试交流等多种形式开展,加强各高校优秀在校大学生对实验室相关学科及科研状况的了解,吸引更多全国优秀本科毕业生报考海洋研究生。

学位授予方面,目前设有2个博士点,4个硕士点。以重点实验室研究人员为第一导师,2015年毕业博士研究生为26人,毕业硕士研究生为51人。

By the end of 2015, the laboratory had a total of 66 staff member, including 50 full-time researchers, 13 analytical and engineering supporting staff, and 3 administrative staff. There were 113 master students and 133 doctoral students.

The laboratory made major breakthroughs in the introduction and cultivation of talents in 2015 and achieved fruitful results. Prof. Shou-ye Yang was awarded the “Cheung Kong Scholar”, Prof. Jun Tian was awarded the “NSFC-Distinguished Young Scholar”, and Prof. Fang-zhong Liu was awarded the “Thousand Youth Talents” professor of CCCPC. Professor Guo-dong Jia and Professor Ji-min Yu from Australia as visiting lecturer were introduced during the year. Professor Guo-dong Jia mainly focuses on scientific issues in the area of paleoceanography, paleoclimatology and environmental evolution since Late Cenozoic. His joining will greatly advance research on the direction of organic geochemical in the laboratory. Young scholars Dr Luo-lei Zhang, Dr Wei Xie and others took up their positions, and four postdoctoral fellows including Qiong Wu also joined the postdoctoral station for marine science/geophysics, which helps significantly improve the vitality of academic research in the laboratory.

To promote international exchanges and cooperation and attract outstanding foreign students to study diplomas and degrees related to postgraduate majors of the School of Ocean and Earth Sciences, the key laboratory established foreign students' scholarships fund for foreign students studying for degrees. In 2015, 11 international students received the funding, including 9 doctors and 3 masters students from Vietnam, Mozambique, Pakistan, Malaysia, Thailand and France respectively.

The laboratory also actively supports short-term academic exchanges for postgraduate students going abroad. These graduate students have obtained good scientific research data, and cultivated independent scientific research and international academic exchange capabilities through foreign learning experiences, further promoting the laboratory's personnel training and team building program.

Each year, the laboratory organized summer schools for students to visit the deep-sea popular science museums and key lab facilities. Through subject introduction, professional testing, interviews, and other forms of communication to help the outstanding university students in various domestic universities and colleges to better understand the various disciplines and current scientific research statuses in order to attract more outstanding undergraduates to apply for marine graduate studies in our lab.

For degree conferment, the lab currently hosts 2 doctoral programs and 4 master programs. Taking the key laboratory researchers as the first mentor, 26 students were awarded the doctoral degree and 51 students the master degree in 2015.

## 人员情况

### Staff

#### 新近入选的人才计划

#### New Talent Plan



杨守业入选教育部“长江学者奖励计划”特聘教授  
Cheung Kong Scholar: Shou-ye Yang



田军获得国家自然科学基金杰出青年基金  
NSFC-Distinguished Young Scholar: Jun Tian



刘忠方入选中组部“青年千人计划”  
“Thousand Youth Talents” professor of CCCPC:  
Zhong-fang Liu



刘玉柱获第六届刘光鼎地球物理青年科学技术奖  
The sixth Liu Guang Ding's geophysical young  
science and Technology Award: Yu-zhu Liu



杨风丽获海洋工程科学技术奖一等奖  
First prize in Marine Engineering Science and  
Technology Award: Feng-li Yang

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