

No. 4



# Annual Report 2013

**Institute of Geology  
Chinese Academy of Geological Sciences  
(CAGS)**





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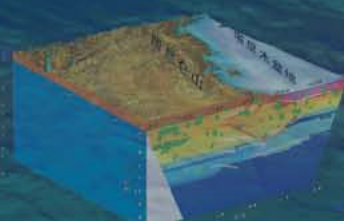
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38 亿年







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## Preface

The Institute of Geology, Chinese Academy of Geological Sciences (CAGS), is a national public scientific research institution and is mainly engaged in national fundamental, public, strategic and frontier geological survey and geoscientific research. Entering the new century, and in particular during the past 5 years, the Institute has made notable progress in scientific research, personnel training and international cooperation, with increasing cooperation and exchange activities, expanded fields of cooperation, abundant output of new research results, and an increased number of papers published in “Nature”, “Science” and other high-impact international scientific journals. In the light of this new situation and in order to publicize, in a timely manner, annual progress and achievements of the Institute to enhance its international reputation, an English version of the Institute’s Annual Report has been published since 2010.

Similar to the previous reports, the Annual Report 2013 includes the following 7 parts: (1) Introduction to the Institute of Geology, CAGS; (2) Ongoing Research Projects; (3) Research Achievements and Important Progresses; (4) International Cooperation and Academic Exchange; (5) Important Academic Activities in 2013; (6) Postgraduate Education; (7) Publications. In order to avoid confusion in the meaning of Chinese and foreign names, all family names in this Report are capitalized.

Finally, we express our sincere gratitude to colleagues of related research departments and centers of the Institute for their support and efforts in compiling this Report and providing related material – a written record of the hard work of the Institute’s scientific research personnel for the year 2013.

Editorial Board of  
the Annual Report (English Version) of the Institute of Geology,  
Chinese Academy of Geological Sciences  
13 March 2014





## 1. Brief Introduction to the Institute of Geology

The Institute of Geology, Chinese Academy of Geological Sciences (CAGS), was formally established in April 1956 but can be historically traced back to the former Central Geological Survey as early as the 1910s. As a national public scientific research institution, the Institute of Geology is an integral part of the national scientific and technological innovation system, providing technological support for national geoscientific research and investigation of geology and mineral resources. The Institute is mainly engaged in national, fundamental, public, and strategic geoscientific frontier research and basic geological survey. It is one of the important national research bases in the solid earth sciences, the application of earth science-related technologies, and the education of our best young geoscientists.

Since its establishment in the 1950s, the Institute has made considerable contributions to national economic growth by providing scientific and technological advice to major issues of social relevance such as resources, environmental protection, and large-scale construction projects. The Institute has also won recognition in theoretical advances in the geosciences by means of basic research in frontier disciplines. In the Institute, 17 geoscientists, such as Huang Jiqing, Xie Jiarong, Sun Yunzhu, Cheng Yuqi, Li Chunyu, etc., were elected Academicians of the Chinese Academy of Sciences (CAS) and the Chinese Academy of Engineering (CAE). With its competitive research team and remarkable scientific achievements, the Institute strives to enhance its domestic and international status in the geoscientific community.

The Institute currently has 243 staff members, including 6 Academicians, 68 Research Fellows, and 41 Associate Research Fellows. 148 researchers earned their doctoral degrees, and 29 earned their master degrees. Amongst the Senior Researchers there are 30 advisors of doctoral candidates and 23 advisors of master candidates.

By the end of 2013, the Institute had won 156 science and technology awards at national, provincial and ministerial levels, among which were 24 prizes of the National Science Conference Award, 15 prizes of the National Natural Science Award and the National Science and Technology Progress Award (2 first prizes, 9 second prizes, 3 third prizes and 1 fourth prize), 122 prizes of the Science and Technology Progress Award at the Provincial and Ministerial levels (13 first prizes, 41 second prizes, 53 third prizes and 13 fourth prizes). More than 2800 research papers and 110 monographs were published since 1981. Since 1991, 4 researchers of the Institute have won the Prize for Scientific and Technological Achievement and the Prize for Scientific and Technological Progress of the Ho Leung Ho Lee Foundation, 6 researchers have won the J. S. Lee Honorary Prize for Geoscience, and 4 researchers have won the National Science Fund for Distinguished Young Scholars.



Fig. 1. Main building of the Institute



## Organizational framework

The structure of the Institute is as follows:

### Administrative Departments

General Office  
Science and Technology Department  
Service and Security Department  
Financial Department  
Personnel and Education Department

### Research Divisions

Division of Regional Geology and Mapping  
Division of Tectonics  
Division of Stratigraphy and Paleontology  
Division of Metamorphic Rocks and Precambrian Geology  
Division of Igneous Rocks  
Laboratory of Continental Dynamics  
Laboratory of Isotope Geology  
Lithosphere Research Center  
Beijing SHRIMP Center  
Mineral and Energy Resources Center  
Three-dimensional Geological Survey and Research Center

### Key Laboratories

Key Laboratory of Isotope Geology, Ministry of Land and Resources  
Key Laboratory of Stratigraphy and Paleontology, Ministry of Land and Resources  
Key Laboratory of Earthprobe and Geodynamics, Ministry of Land and Resources

### National Research Centres

State Key Laboratory of Continental Tectonics and Dynamics  
Beijing SHRIMP Center

### Technical Support Organizations

Commission for the Geological Map of China (CGMC)  
Center for Stratigraphy and Paleontology, China Geological Survey

### Affiliated Academic Organizations

China Commission of International Continental Scientific Drilling  
Commission of Regional Geology and Mineralization, Geological Society of China  
Commission of Geological Mapping, Geological Society of China





Commission of Stratigraphy and Paleontology, Geological Society of China

Commission of Petrology, Geological Society of China

Commission of Isotope Geology, Geological Society of China

Commission of Metamorphism, Mineralogy and Geochemistry, Geological Society of China

### Peer-reviewed Publication

Acta Petrologica et Mineralogica

### Research Fields

Regional geology, mapping and related database construction

Regional and global tectonics

Origin and evolution of life, paleontological and stratigraphic correlation

Precambrian geology and early crustal evolution

Cenozoic geology and modern geological and ecological environments

Ultrahigh pressure metamorphism and metamorphic belts

Petrology, mineralogy, and earth materials science

Continental dynamics and mantle dynamics

Geological setting of mineralization and regional mineralization

Deep geophysical probing, lithospheric structure and geodynamics

Isotope geology theory, methods and applications

Quaternary geology and past global changes



## 2. Ongoing Research Projects

There were 165 ongoing research projects in the Institute in 2013 as listed below.

### 2.1 Projects funded by the National Natural Science Foundation of China

#### Key Projects:

No.	Chief Investigator	Project	Duration	E-mail address
1	HOU Zengqian	Himalayan Pb-Zn-Cu-Ag ore deposits along the eastern and northern margins of Tibet: Ore-forming system and mechanism	2010-2013	houzengqian@126.com
2	LIU Yongqing	Response of late Mesozoic biota evolution and environment to craton break-up of North China	2010-2013	Liuyongqing@cags.ac.cn
3	YANG Jingsui	Unusual minerals in ophiolitic mantle rocks and chromite and deep geological processes	2010-2013	yangjsui@cags.ac.cn
4	JIAN Ping	Geochemistry and chronology of ophiolites distributed in the eastern Junggar, Xinjiang, and central-south Mongolia	2011-2014	jianping@bjshrimp.cn
5	XU Zhiqin	Continental dynamics and resource effects of the Qinghai-Tibet Plateau	2013-2015	xzq@ccsd.cn
6	ZHANG Zeming	Metamorphism and tectonics of the eastern Himalayan orogen	2013-2017	zzm2111@sina.com

#### General Projects:

No.	Chief Investigator	Project	Duration	E-mail Address
1	DONG Chunyan	Some key geological problems in the early Precambrian Daqingshan area, Khondalite Belt, western North China Craton: SHRIMP geochronology and geochemistry	2011-2013	dongchunyan@sina.com
2	GUO Lei	Temporal constraints and mechanism of the late Mesozoic tectonic transition from contraction to extension in the Daqing Shan and iadjaent areas	2011-2013	guolei_cn@sina.com
3	LIANG Fenghua	Rheological character of mantle rocks from the Luobusha ophiolites, Tibet: Implication for the genetic mechanism of chromitites	2011-2013	Liangfenghua1026@gmail.com
4	LI Zhihong	Characters of Fe isotopes and ore-forming mechamism for Xuanlong type iron ore deposit	2011-2013	lizh1129@cags.ac.cn
5	YIN Chongyu	Restudy of the problematic fossil Tianzhushania from the early Ediacaran (Sinian) period	2011-2013	chongyuyin@cags.ac.cn
6	YOU Hailu	Dinosaurs and age-refinement of the Early Cretaceous Hekou Group in the Lanzhou Basin, Gansu Province	2011-2013	youhailu@gmail.com
7	TIAN Shugang	Carboniferous-Permian reefs and building conditions in eastern Inner-Mongolia	2011-2013	sgtian@cags.ac.cn
8	MENG Fancong	Genesis of jadeitite from the Polar Urals, Russia	2011-2013	mengfancong@yeah.net





9	REN Liudong	Metamorphic geology of the Mashan Complex and its comparison with the Prydz Belt of Antarctica	2011-2013	ldren@cags.ac.cn
10	ZHANG Yuxu	Tectonic setting and orefield structures of the Bayan Obo Ore Deposit	2011-2013	zhangyuxugeo@163.com
11	ZHANG Jianxin	Relationship between high-pressure granulite and ultrahigh pressure eclogite in collisional orogens and its geodynamic implications	2011-2013	zjx66@yeah.net
12	ZHAI Qingguo	Mafic dikes and the Gondwana northern margin breaking event in the Qiangtang area, Qinghaibet Plateau	2011-2013	zhaiqingguo@126.com
13	WANG Yanbin	Geochemical record of boron-enriched rocks, unusually rich in boron, from Larsemann Hills, East Antarctica	2011-2013	yanbinw@cags.ac.cn
14	ZENG Lingsen	The nature of Cenozoic crustal anatexis in the Namche Barwa Massif, Tibet, and tectonophysical implications	2011-2013	lzeng@163.com
15	HUANG Hao	Paleobiogeography of Permian fusulinids in the Baoshan Block, Yunnan, SW China	2012-2014	hh1936@163.com
16	CHEN Songyong	Genesis and tectonic implication of eclogites in the Songduo terrane, Lhasa, Tibet	2012-2014	chensongyong@163.com
17	HE Zhenyu	Petrogenesis of vast volcanic-intrusive complexes in the coastal Zhejiang-Fujian area: insights from case studies	2012-2014	ahhzy@163.com
18	LIU Jianfeng	Tectonic setting of Permian volcanic rocks from the southern segment of the Great Xing'an Range	2012-2014	wenjv@aliyun.com
19	YANG Hong	Genesis of barite in eclogite from the main-hole of the CCSD and its indication of fluid exsolution in a continental subduction zone	2012-2014	yang-pku@126.com
20	YONG Yong	Chronology and petrochemistry of the Yushu ophiolite	2012-2014	yongyy@139.com
21	ZHANG Lei	Genesis of the Shuangyashan Cenozoic basalt in Heilongjiang Province and its mantle origin	2012-2014	windprint@gmail.com
22	ZHENG Yuanchuan	Miocene mafic magmatism in the North Himalaya and its implications for the genesis of leucogranite	2012-2014	zheng_yc@126.com
23	LIU Yan	Xuebaoding leucogranites in northwestern Sichuan Province and their W-Sn-Be deposit forming mechanism	2012-2014	ly_0620@126.com
24	ZHANG Hongrui	Internal structure of reverse faults and their control on the formation of hydrothermal deposits in the shallow crust: A case study from the Domozhazhua Pb-Zn deposit, north-central Tibet	2012-2014	hongrui_1982@126.com
25	XIAO Lingling	Precambrian metamorphic evolution and tectonic implications of the Zuoquan metamorphic complex	2012-2014	xiaolingling11@cags.ac.cn
26	LIU Jianhui	Cenozoic uplift and exhumation history of the North Qinling Range: Constraints on the temporal and spatial evolution of Cenozoic intracontinental extension in the North Qinling Range-Weihe graben	2012-2014	liujianhui1999@163.com
27	SI Jialiang	Research on clay minerals and fluid-rock interaction along the surface rupture zone of the Wenchuan earthquake	2012-2014	yazhousi@126.com
28	XIANG Zhongjin	Source and tectonic setting of Silurian volcanism in the northern Daba Mountains, China: evidence from pyroclastic rocks	2012-2014	jing19851001@163.com
29	WANG Shixia	Characteristics of V-Ti magnetite deposits in the Panzhihua area and their genetic constraints	2012-2014	wangshixia83@163.com
30	XIONG Xiaosong	Moho variations and the shallow response from the Huayingshan to Xuefengshan tectonic belt in South China	2012-2014	benxung@126.com
31	HOU Hesheng	Shallow-deep structural relationships between the northern margin of the North China Craton and the southern margin of Xing'an-Mongolia orogenic belt revealed by deep seismic reflection profiling	2012-2014	hesheng.hou@126.com



32	TANG Feng	Evolution and biostratigraphic significance of typical Ediacaran macroscopic fossil assemblages in southern China	2012-2015	tangfeng@cags.ac.cn
33	LIU Pengju	Biostratigraphic division of acritarchs from the Ediacaran Doushantuo Formation in the Yangtze Gorges and their international correlation	2012-2015	pengju@cags.ac.cn
34	CHI Zhenqing	Study on the criteria for a Pleistocene-Pliocene division in the Nihewan Basin, Hebei Province	2012-2015	zqchi@263.net
35	DU Lilin	A 2.2-2.0 Ga geologic event in the Wutai and Zhanhuang areas, central North China craton and its tectonic features	2012-2015	dulilin7310@cags.ac.cn
36	WAN Yusheng	Formation and evolution of the Archean granite-greenstone belt in western Shandong: Geology, geochemistry and zircon dating	2012-2015	wanyusheng@bjshrimp.cn
37	YAN Zhen	Volcanism, sedimentation and tectonic setting of mineralization of the Caotangou Group in the western section of the North Qinling	2012-2015	yanzhen@mail.iggcas.ac.cn
38	ZHANG Jin	Provenance and deformation of Lower Paleozoic sediments along the southern and eastern margins of the Alax Block and their tectonic implications	2012-2015	zhangjinem@sina.com
39	SHI Yuruo	SHRIMP U-Pb dating of diagenetic xenotime in sedimentary rocks - case study of the Changzhougou Formation	2012-2015	shiyuruo@bjshrimp.cn
40	LI Qiusheng	A broadband seismic observation profile in northern North China to find traces of upper mantle structures of the Paleo-Asian Ocean	2012-2015	liqiusheng@cags.ac.cn
41	CHEN Shouming	Research on silicified acritarchs from the Ediacaran Doushantuo Formation at Shimen, Hunan, South China	2013-2015	shoumingchen@gmail.com
42	DONG Xin	Early Mesozoic metamorphism and tectonic significance of the Central and Eastern Lhasa terrane	2013-2015	dongxin5811935@163.com
43	XU Xiangzhen	Detailed FIB and TEM studies of unusual mineral inclusions in chromite and mantle peridotite from Kangjiaola of Tibet	2013-2015	xuxiangzhensjl@aliyun.com
44	YU Shengyao	Relationship between high-pressure granulite and adakitic rocks - a case study in the Dulan area, North Qaidam Mountains	2013-2015	yushengyao1211@tom.com
45	MENG En	Petrogenesis of the Changhai khondalite series in southeastern Liaoning Province, China and tectonic implications	2013-2015	mengen0416@126.com
46	LIU Dongliang	Paleomagnetic research on Cenozoic spatio-temporal variations of block rotations between the northeastern margin of Pamir and the southern margin of the southwestern Tianshan	2013-2015	pillar131@163.com
47	CAO Hui	A new technique for the study of orogenesis and the mechanism of porphyroblast formation: Application of electron backscatter diffraction on foliation inflection/intersection axes (FIA)	2013-2015	caohuicags@gmail.com
48	PAN Jiawei	Partitioning of strike-slip and uplift during late Quaternary deformation along the Ashikule Fault, the western segment of the Altyn Tagh Fault	2013-2015	43469518@qq.com
49	ZHAO Lei	Ages, characteristics and tectonic implications of ophiolites from the south of the Xiemisitai Mountain in the West Junggar, Xinjiang	2013-2015	jleiz@163.com
50	DONG Aiguo	Magnesium isotope characteristics and constraints on the genesis of magnesite deposits in eastern Liaoning Province, China	2013-2015	aiguo.dong@gmail.com
51	LI Shizhen	Isotopic fractionation of Zn and Cu in plants	2013-2015	shizhenli@cags.ac.cn
52	WANG Yue	Iron isotope fractionation during fluid exsolution of skarn-type deposit: a case study of polymetallic deposit in the Middle-Lower Yangtze valley	2013-2015	wyivy@aliyun.com
53	SONG Huixia	Petrogenesis of two periods of TTG gneiss in the Zhanhuang area, Hebei Province	2013-2015	huixiasong@cags.ac.cn





54	YIN Jiyuan	Geochronological and geochemical study of mafic-intermediate dikes in the West Junggar, NW China	2013-2015	yinjiyuan1983@163.com
55	XIE Hangqiang	Zirconology of metamorphic oceanic crust, a case study from the Heilongjiang Complex in the Mudanjiang area	2013-2015	rock@bjshrimp.cn
56	QU Chen	Detailed receiver function images of fine crustal structures in the Tarim basin	2013-2015	quchen760511@163.com
57	KUANG Hongwei	Taphonomy of a Cretaceous dinosaur in the Jiaolai basin and implications for paleoecology and paleogeography	2013-2015	kuanghw@126.com
58	LV Junchang	Study of Cretaceous dinosaurian faunas from Henan Province	2013-2016	lujc2008@126.com
59	JIN Xiaochi	Establishment and correlation of Permian biostratigraphic sequences in the Tengchong Block, western Yunnan	2013-2016	jinxchi@cags.ac.cn
60	MENG Fancong	Genetic mineralogy of eclogite from the East Kunlun Mountains, western China	2013-2016	mengfancong@yeah.net
61	ZHANG Jianxin	Early Precambrian crustal evolution of the western Alxa Block and constraints on the North China Craton	2013-2016	zjx66@yeah.net
62	QI Xuexiang	Identification of a Neoproterozoic magmatic belt in the Ailaoshan orogeny and its tectonic implications	2013-2016	qxuex2005@163.com
63	WANG Tao	Characteristics of rock assemblages and formation ages of the flysch mélange of the Bailongjiang Group in the western Qinling	2013-2016	real-wt@sohu.com
64	Chevalier Marie-Luce	Towards final agreement on the total slip-rate and location of the entire Karakorum Fault, western Tibet	2013-2016	mlchevalier@hotmail.com
65	LI Jinyi	Provenance of Silurian-Permian clastic rocks on the northwestern margin of the Tarim Basin and constraints on the closure time of the Paleozoic ocean in the Tianshan Mountains	2013-2016	jyli2003@126.com
66	ZENG Lingsen	Construction of large leucogranite plutons along the Himalayan orogenic belt and thermal effects	2013-2016	zls1970@gmail.com
67	SONG Yucai	Study of the large Chaqupacha Pb-Zn deposit in the Fenghuo Shan-Nangqian fold-and-thrust belt, Tibet	2013-2016	songyucai@gmail.com
68	YANG Zhiming	Sources of metal and sulfur in post-collisional porphyry Cu deposits: A case study of the Qulong copper deposit, Tibet	2013-2016	zm.yang@hotmail.com
69	ZHU Xiangkun	Genesis of the Shilu Iron Ore Deposits, Hainan	2013-2016	xiangkun@cags.ac.cn
70	HE Rizheng	Structure of the margin of the southward-subducted Asian mantle beneath northern Tibet and effects on continental collision	2013-2016	herizheng@cags.ac.cn
71	LU Zhanwu	Research on the structural attribute of strong seismic reflections in the crust of the southern Qiangtang terrane in the central Tibet	2013-2016	luzhanwu78@163.com
72	WANG Haiyan	Fine lithospheric structures and deep processes resulting from inland deformation in the Xuefeng Mountain tectonic zone	2013-2016	hyanwhy@126.com



## 2.2 Projects funded by the Ministry of Science and Technology or the Ministry of Finance

No.	Chief Investigator	Project	Duration	E-mail address
1	WANG Tao	Superposition of the Mongol–Okhotsk plate tectonic regime on the Paleo-Asian ocean plate and its metallogenic systems	2013-2017	taowang@cags.ac.cn
2	SHI Yuruo	In-situ SHRIMP U-Pb dating of U-bearing accessory minerals (rutile and baddeleyite)	2013-2015	shiyuruo@bjshrimp.cn
3	WANG Yue	Fe isotopic trace study of terrestrial facies volcanic deposit metallogenesis	2013-2015	wyivy@aliyun.com
4	XU Zhiqin	Orogenic types and orogenic mechanism of China	2012-2014	xzq@ccsd.cn
5	LIU Dunyi	Research and development of new TOF-SIMS models for isotope geology	2011-2016	liudunyi@bjshrimp.cn
6	HOU Zengqian	Continental convergence and metallogenesis south of the Tibet Plateau	2011-2015	houzengqian@126.com
7	PAN Xiaofei	Metallogenic patterns and exploration models of the Jian-Dexing Cu-Mo polymetal belt	2011-2014	pan_smile0551@sina.com
8	YAN Zhen	Deep prospecting model, exploration technology, and integration and demonstration of porphyry Cu-Mo-Au deposits in the Shanyang-Zhashui ore concentration area, Shanxi Province	2011-2014	yanzhen@mail.iggcas.ac.cn
9	DING Xiaozhong	Geological records and maps of China and tectonic maps of Eurasia	2011-2016	xiaozhongding@sina.com
10	YANG Zhiming	Metallogenic patterns and exploration models for porphyry Cu deposits in post-collisional settings in China	2010-2013	zm.yang@hotmail.com
11	ZHU Xiangkun	Application of isotopic tools in the geosciences and preparation of reference materials for isotopic measurements	2010-2013	xkzhu0824@gmail.com
12	ZHANG Jianxin	Evolution and interaction between the Tarim block and surrounding orogenic systems	2010-2013	zjx66@yeah.net
13	ZHU Xiangkun	Application of isotopic tools in the geosciences and preparation of reference materials for isotopic measurements	2010-2013	xkzhu0824@gmail.com
14	ZHANG Jianxin	Evolution and interaction between the Tarim block and surrounding orogenic systems	2010-2013	zjx66@yeah.net
15	YANG Jingsui	Pilot research on scientific drilling and site-selection on the Luobusa chromite, Tibet	2010-2013	yangjsui@cags.ac.cn
16	XU Zhiqin	China continental scientific drilling and site-selection and drilling: experimental intergration research	2010-2013	xzq@ccsd.cn
17	WU Cailai, XUE Huimin	Pilot research on scientific drilling and site selection in the main mineralized area of eastern China	2010-2013	wucailai@hotmail.com huaiminx@sina.com.cn
18	ZHANG Zeming	Pilot research on scientific drilling and site-selection in the Laiyang basin, Shandong – the northern boundary of the Yangtze plate	2010-2013	zzm2111@sina.com
19	GAO Rui	Probing experiments by deep seismic reflection profiling and research into the structures of the crust	2010-2013	ruigao126@126.com
20	LU Zhanwu	Integration of exploration technology and comprehensive interpretation of the deep crust	2010-2013	luzhanwu78@163.com
21	LI Qiusheng	Broad-band seismic observation and crust-mantle velocity research	2010-2013	liqiusheng@cags.ac.cn
22	HE Rizheng	Multi-scale imaging techniques and research on crustal-mantle velocity and density structure of central and eastern Asia	2010-2013	herizheng@cags.ac.cn



## 2.3 Projects funded by China Geological Survey

No.	Chief Investigator	Project	Duration	E-mail address
1	CHEN Wen	Research on isotopic dating techniques of metal deposits	2013-2015	chenwenf@vip.sina.com
2	CHEN Huiming	Comparative study on sporopollen fossils in the Mesozoic basins of the southeastern margin of the Yangtze Block, South China	2013-2015	chuiming666@aliyun.com
3	CHI Zhenqing	Regional geology and marine geological survey standard development and revision	2013-2015	zqchi@263.net
4	HOU Zengqian	Orogenic processes and geological background of the middle-eastern Tibetan collision orogen	2013-2015	houzengqian@126.com
5	JIAN Ping	Petrological classification, SHRIMP zircon dating and tectonic setting of the Beishan ophiolites, NW China.	2011-2013	jianp-1021@263.net
6	JI Qiang	The Cretaceous dinosaur biota and paleogeography and taphonomy, of the Jiaolai basin, Shandong Province, eastern China	2011-2013	jirod@cags.ac.cn
7	JI Shaochen	Rheological and seismic properties of the lithosphere beneath the southeast Tibet plateau	2011-2013	scji@live.com
8	JI Shu'an	Late Paleozoic-Mesozoic terrestrial vertebrates, stratigraphy and paleogeography of western China	2011-2013	jishu_an@sina.com
9	JI Shu'an	Study of the checklist for national key fossils and protective techniques	2011-2013	jishu_an@sina.com
10	JI Zhansheng	Study of the paleogeography and paleogeological evolution of the western part of the Qinghai-Tibet Plateau during the late Permian-late Triassic.	2011-2013	jizhansheng@vip.sina.com
11	LI Haibing	Large scale active faults and their earthquake activities along the northern and eastern boundaries of the Tibetan Plateau	2011-2013	lihaibing06@yahoo.com.cn
12	LI Jinyi	Reconstruction of rifting and re-amalgamating processes of major continental blocks of China since the late Precambrian and their constraints on metallogenesis	2011-2013	jyli2003@126.com
13	LI Tingdong	Comprehensive integration of the Divisions of Geological Structure and Regional Geological Survey of China	2008-2015	litdong@163.com xiaozhongding@sina.com
14	LIU Fulai	Protolith age, metamorphism and partial melting of the khondalite series in the Sino-Korean and Yangtze cratons	2011-2013	lff0225@sina.com
15	LIU Fulai	Comparison of metamorphic basements between the western Yangtze block and the SE Tibetan Plateau	2011-2013	lff0225@sina.com
16	LIU Pengju	Systematic evolution and international correlation of Ediacaran biotas in China	2011-2013	pengju@cags.ac.cn
17	LIU Yan	Tectonic evolution of the Qiangtang terrane, central Tibet	2011-2013	yanliu0315@yahoo.com.cn
18	LIU Yanxue	Sedimentary evolution and tectonic background of the Permian basins in northern Xinjiang and Inner Mongolia	2011-2013	lyxue@sohu.com
19	LIU Yongqing	Sedimentation and granitic magmatisms and their constraints on mineralization in the Mingmeng orogen, northern China	2013-2015	Liuyongqing@cags.ac.cn
20	LU Minjie	Metallogenetic regularities and the advantages of mineral resources potential analysis in the Andean metallogenic belt, Latin America	2011-2013	luminjie55@yahoo.com.cn
21	LU Minjie	Integration and information platform construction of 3D geological mapping	2011-2013	luminjie55@yahoo.com.cn
22	MENG Fancong	Early Paleozoic plate tectonic system and orogenic geodynamics of the Central Orogen western segment (Kunlun)	2011-2013	mengfancong@yeah.net
23	QI Xuexiang	Evolution of a large tectonic belt in southeastern Tibet and implications for mineral resources	2011-2013	qxuex2005@163.com





24	REN Jishun	Marine and continental tectonics of China and adjacent areas	2013-2015	renjishun@cags.ac.cn
25	REN Jishun	Geological and tectonic maps of China and adjacent areas at a small scale	2013-2015	renjishun@cags.ac.cn
26	REN Liudong	Studies on the Pan-African geology, Proterozoic stratigraphy and Tethys Devonian-Triassic paleogeography of China and adjacent areas	2013-2015	ldren@cags.ac.cn
27	SU Dechen	Northeastern and eastern margins of the Tibetan Plateau and dynamics of its foreland basins	2011-2013	sudechen@163.com
28	WANG Jun	Study of deep processes and mineralization of the West Pacific continental margins	2011-2013	wj257@126.com
29	WANG Tao	Important magmatic events and relative mineralization	2013-2015	taowang@cags.ac.cn
30	WANG Tao	Spatial-temporal evolution of granitic magmatisms, mineralization and tectonic setting in northern China	2013-2015	taowang@cags.ac.cn
31	WANG Yanbin	Nature, genesis and mineral resources of the crust in Gondwana-related areas: East Antarctica and the Himalaya areas as examples	2011-2013	yanbinw@cags.ac.cn
32	WANG Yong	Establishment and detailed correlation of Quaternary standard stratigraphic columns in different structural units of China	2011-2013	wangyong@cags.ac.cn
33	WANG Yong	Lacustrine records of climate change in eastern China	2013-2015	wangyong@cags.ac.cn
34	WAN Yusheng	Identification and research on early Archean continental material in the North China Craton	2011-2013	wanyusheng@bjshrimp.cn
35	WU Cailai	Magmatism of Paleozoic-Mesozoic granites in the Central Orogenic Belt of China and its constraints on ore-forming processes	2011-2013	wucailai@yahoo.com
36	XIAO Xuchang	Tectonic evolution of ophiolite belts in China and implications for mineral resources	2013-2015	xxchng@public.bta.net.cn
37	XUE Huaimin	Magmatism and metallogenetic response to Neoproterozoic convergence and separation of crustal blocks along the southeastern margin of the Yangtze craton	2011-2013	huaiminx@sina.com.cn
38	XU Zhiqin	Collisional orogeny and dynamics of the Tibetan Plateau	2011-2013	xzq@ccsd.cn
39	XU Zhiqin	Tectonic framework of the Central Orogenic Belt, convergence between the NCB and SCB, and sythetic studies of CCSD cores	2011-2013	xzq@ccsd.cn
40	YANG Chonghui	Geological evolution and mineral resource response during some critical events in the Neoproterozoic of the North China Craton	2011-2013	chhyang@cags.ac.cn
41	YANG Jingsui	Geological setting and origin of ophiolites and chromitite in the Yarlung Zangbu suture	2011-2013	yangjingsui@yahoo.com.cn
42	YANG Jingsui	The Sumdo high pressure-ultrahigh pressure metamorphic belt in the Lhasa Block of the Qinghai-Tibetan plateau and Indosinian movement	2011-2013	yangjingsui@yahoo.com.cn
43	YANG Tiannan	Basic geological structure of China's Phanerozoic continental crust and ore-forming constraints	2011-2013	yangtn@cags.ac.cn
44	YANG Wencai	Location of deep oil and gas prospective areas in the Tarim basin	2011-2013	yangwencai@ccsd.cn
45	YAN Quanren	Study of paleo-tethyan orogenic processes and geological background of ore deposits in the southwestern segment of the Qingzhou-Hangzhou tectonic belt and adjacent regions, southwestern China	2013-2015	qryan@cags.ac.cn



46	YAN Zhen	Tectonic setting, plate regime and metallogenic background of the junction between the Qinling, Qilian and Kunlun orogenic belts, Chinese Central Orogenic Belt	2011-2013	yanzhen@mail.iggcas.ac.cn
47	YAO Jianxin	Paleozoic-Triassic sea facies stratigraphic division and correlation on the Yangtz platform	2011-2013	yaojianxin@gmail.com
48	YAO Jianxin	Perfection and correlation of the stratigraphic system of different regions	2011-2015	yaojianxin@gmail.com
49	YOU Guoqing	Tectonic subdivision of China and its application to the regional geology of China	2011-2013	youchina@126.com
50	YU Changqing	Geophysical survey in the eastern and southeastern Tibetan plateau	2011-2013	yucq@tom.com
51	ZENG Lingsen	Crustal anatexis along the Himalayan orogenic belt and its dynamic effects	2011-2013	changting1970@yahoo.com
52	ZHANG Jianxin	Accretion-collision orogeny and its geodynamics in the western segment of the Chinese Central Orogen (Altun-Qilian-Western Qinling)	2011-2013	zjx66@yeah.net
53	ZHANG Zeming	Metamorphism and tectonic evolution of the southern Tibetan Plateau	2011-2013	zzm2111@sina.com
54	ZHANG Zeming	Petrotectonic units and composite orogenic processes in the eastern Central China Orogen (East Qinling - Dabie - Sulu)	2011-2013	zzm2111@sina.com
55	ZHANG Jin	Geological survey and study on the metallogenic geological background and basic tectonic framework of the Tianshan-Xingmeng orogenic region	2013-2015	zhangjinem@sina.com
56	LIU Jianhui	Pan-African continental assembly and dispersal and geodynamic setting in northeastern China	2011-2013	Liujianhui999@163.com
57	ZHOU Xiwen	Basic geological structure of China's Precambrian continental crust and ore-forming constraints	2011-2013	xwzhou@cags.ac.cn
58	ZHU Xiangkun	Development and application of isotope tracers in Precambrian geology	2013-2015	xiangkun@cags.ac.cn
59	YU Changqing	Application of comprehensive geophysical techniques in deep geological surveys and 3D geological mapping	2012-2014	yucq@tom.com
60	GAO Rui	Deep crustal geological survey of the intersection zone between the Central Orogenic Belt and the North-South Tectonic Belt	2012-2014	ruigao126@126.com
61	LI Haibing	Deep geological survey of the Longmen Mountain tectonic zone	2012-2014	lihaibing06@yahoo.com.cn
62	GUAN Ye	Revised investigation standard for hydraulic, engineering and environmental geology	2012-2014	guanye@cags.ac.cn
63	SONG Yucai	Tectonic setting, metallogenesis and prospecting potential of the main mineral deposits in the central Tethyan area	2012-2014	song_yucai@yahoo.com.cn
64	YU Changqing	Exploration of gas hydrates in the Qilian Mountains and adjacent areas	2012-2014	yucq@tom.com
65	YAN Zhen	Evaluation of selected exploration areas of copper-polymetallic deposits in Tamazula-Manzanillo of Jalisco, Mexico	2012-2013	yanzhen@mail.iggcas.ac.cn



### 3. Research Achievements and Important Progresses

#### 3.1 Results of completed Natural Science Foundation projects in 2013

##### **Continental dynamics and significance for resources in the Qinghai-Tibet Plateau (Project leader: XU Zhiqin)**

This project is based on the theory of continental dynamics and focuses on the tectonic evolution of the Tibetan plateau as an “orogenic plateau”, including major terrane boundaries and kinematics of the southern Tibetan plateau, the evolution of the Paleo-Tethyan tectonic system, the nature and evolutions of the metamorphic basement, the crustal syntaxis in the Himalaya orogeny since the India-Asia collision, the orogenic mechanism of the Great Himalaya, the escape mechanism of crustal flow in southeastern Tibet, etc. During these systematic investigations we continued to reconstruct the tectonic framework of the Tibetan plateau and India/Asia collision processes. The deep continental structure, mantle dynamics and the surface-interior relationship were well discussed and provide scientific implications for mineralization and mineral resources in the Tibetan Plateau. During the first three years of this project, we fulfilled the scientific goals and all tasks, and achieved a series of innovative results as follows: (1) The study and integration of terrain boundaries, deformation systems, Paleo-Tethys evolution, HP-UHP metamorphism, large strike-slip fault systems, as well as the tectonics of the India/Asia collision provided several new constraints and evidences for the theory of the Tibet plateau as an “Orogenic Plateau” as proposed by our team in 2007. (2) Our discovery of diamonds and specific mantle minerals in six ultramafic rock complexes along the Yalung-Tsangbo ophiolitic belt, led to a model whereby ophiolites may form in the deep mantle, and we proposed a new class of “ophiolites-type diamonds”. (3) The Songdo Paleotethys HP-UHP eclogites in the central Lhasa terrain, 650 and 190 Ma old HP granulitic rocks in the southern Lhasa terrane, 230 Ma HP granulitic rocks in the southeastern margin of the Tibet plateau, and >40 Ma old garnet pyroxenites in the Namche Barwa Syntaxis were discovered and dated. (4) Multi-phase Precambrian tectono-thermal events in crystalline rocks of southeastern Tibet occurred at 2550-2450 Ma, ~1800 Ma, 1000-800 Ma, and 700-450 Ma, and can be compared with those of southern Tibet, thus indicating an affinity between the southern and southeastern basement of the Tibetan Plateau. (5) A new 3D extrusion kinematic model for the Great Himalaya terrane was proposed and is based on the discovery of an E-W striking orogen-parallel Miocene (27-10 Ma) detachment zone. A dynamic model of escape tectonics was constructed, including multi-level detachments and multiple strike-slip faults in the SE Tibetan Plateau that formed from the middle Eocene to early Miocene. 60 research papers were published during 2010-2012, including 48 SCI-listed papers. We were awarded the second prize of a National Natural Science Award, trained 51 graduate students, and gave presentations at both national and international conferences, including 31 invited talks.

##### **Constraints from Fe and Mg isotopes on the origin of the Bayan Obo ore deposit, Inner Mongolia (Project leader: ZHU Xiangkun)**

Mg and Fe isotopes were employed to constrain the origin of the Bayan Obo REE-Nb-Fe polymetallic ore deposit. Following the establishment and improvement of techniques for high-precision measurements of Mg and Fe isotopes in REE-Nb-Fe-Mn enriched samples, a systematic study on Mg and Fe isotopes of Bayan Obo iron ores, H8 dolomite marble and related igneous and sedimentary rocks was carried out. The results show that the most of H8 dolomite marble has Mg isotope compositions similar to those of igneous rocks, but distinct from those of sedimentary





carbonates. The  $\delta^{56}\text{Fe}$  values of fine-grained iron ores and H8 dolomite marble cluster around 0, consistent with those of igneous rocks, but rather different from those of sedimentary iron ores. Fe isotope fractionation between magnetite and dolomite is limited, indicating that the deposit was formed during high-temperature processes. The Mg and Fe isotope study demonstrates that the formation of the Bayan Obo ore deposit was dominated by magmatic processes. Finally, the ore-forming epoch and episodes of REE mineralization and Sr, Nd, C, O isotopes were studied. All taken together, a metallogenic model for the Bayan Obo ore deposit is presented.

### **3-D velocity structure of the crust and upper mantle in southeast China and geodynamic model (Project leader: ZHENG Hongwei)**

The upper mantle structure of southeastern China is important to understand deformation and mantle dynamic processes associated with the interaction of the Eurasian plate with the Philippine Sea (PHS) slab. We determined the detailed three-dimensional P-wave velocity ( $V_p$ ) structure of the crust and upper mantle down to 400 km depth beneath southeastern China by applying teleseismic tomography to 6,869 high-quality P-wave arrival times. The data were collected from the original seismograms of 635 teleseismic events recorded by 65 broadband stations deployed in southeastern China. Our images show that the high- $V_p$  PHS slab subducts towards the north along the Ryukyu Trench at a latitude of about  $24^\circ\text{N}$  and extends down to a depth of 350 km and even more. High- $V_p$  anomalies were imaged in the upper mantle beneath central and southern Taiwan, representing the subducted Eurasian plate. The break-off Eurasian plate subducting eastwards at a steep angle is revealed beneath central Taiwan at depths in the upper mantle to 400 km, and the continuous Eurasian plate beneath South Taiwan is mainly imaged from the Moho down to 400 km depth. A torn mantle window within the Eurasian continent beneath central and northern Taiwan was created by the northward motion of the Philippine Sea plate and reflects the upwelling path of the asthenosphere. The tomographic images also show that the low- $V_p$  anomalies are widely distributed beneath the coastal areas of Mainland China and the Taiwan Strait. The structure of the crust and upper mantle suggests that mountain building processes in the central part of Taiwan can mainly be attributed to the subduction-collision tectonics at the boundary between the Eurasian continental lithosphere and the subducting oceanic lithosphere of the PHS slab.

### **Research on fossil mammals from the Lujiatun area, western Liaoning Province, and its relative strata (Project leader: YUAN Chongxi)**

The Mesozoic Yanliao and Jehol Biota are famous of having yielded rich and exquisite fossil vertebrates, invertebrates, and plants. Recently, many taxa of late Jurassic to early Cretaceous primitive mammals were discovered from the Lujiatun and Linglongta areas of western Liaoning. After detailed field work during the past three years, funded by the NSFC, we now have some important new discoveries of several taxa of primitive mammals: *Gobiconodon luoi*, *Maothierium asiaticus*, and *Juramaia sinensis*. The discoveries and study of these fossils not only fill gaps in the record of Mesozoic mammals but are also of great value for the study of the phylogeny, behavior, living environment and other aspects of Mesozoic mammals. In addition, they also provide important information on the study of the origin, evolution and inter-relationship of primitive mammals.





## **Gold enrichment mechanism during magmatic-hydrothermal processes at the Bilihe gold deposit in Inner Mongolia: Constraints on the genesis of Au-rich porphyry copper deposits (Project leader: YANG Zhiming)**

The Bilihe deposit, located in Inner Mongolia, was originally thought to be a porphyry-type or epithermal deposit. Following three years of detailed study, we established that most gold in the deposit occurs as trails or clusters in dendritic quartz phenocryst. The Au grains in trails or clusters are typically polygonal (8~10 sides) or sub-spherical. Occasionally they occur in shape of hexagon, droplet or necking columns, suggesting a magmatic origination. For verifying the Au melt hypothesis, we carried out extensive work on: (1) formation condition of dendritic quartz phenocrysts, and (2) the relationship between gold trails and/or clusters and dendritic quartz phenocrysts. The results indicate that: (1) in cases of Au grains in trails, the grain occurs exactly at the point where several sectors meet if only one Au grain was exposed on the surface of the thin section; and (2) if several grains were exposed on the surface in one trail, these Au grains are typically present where the CL-gray band is the narrowest. Reconstruction of the crystals by the software SHAPE indicates that the gold grains exposed exactly lie on 'a' or 'b' axes of beta quartz, and thus we have reason to speculate that the formation of gold trails and clusters occurred during growth of quartz. The titanium-in-quartz geothermometer and melt inclusion heating experiments further suggest that the formation of dendritic quartz occurred at a temperature  $>800$  °C. Therefore, most of gold grains in the deposit are really gold melt inclusions, and thus the deposit is magmatic-type rather than porphyry-type or epithermal, which allows for tracing the Au behavior at a late magmatic stage. In an intermediately-oxidized, Cl-free and S-poor rhyodacite melt such as the Au mineralization-related magma at Bilihe, Au is incompatible, and fractional crystallization of magma would result in Au enrichment in the residual melt. Au precipitation at Bilihe was caused by a sudden decrease in temperature. The abundant occurrence of Au melt inclusions at Bilihe indicates that gold-bearing magmas could lose their gold content at a late stage, even they were not sequestered by crystallizing phases, which would influence the gold content of a subsequently formed magmatic-hydrothermal deposit. Additionally, our detailed geochemical study indicates that mineralization-related quartz diorite porphyries are intermediately oxidized and belong to the ilmenite-series, whereas the post-ore granite porphyries are magnetite-series. The quartz dioritic porphyries were produced by partial melting of slab fluid-metasomatized enriched mantle, coupled with the assimilation of crustal material of the Bainaimiao Group and late Ordovician-Silurian subduction-related plutons. In contrast, the granite porphyries were formed by partial melting of subduction-modified lower crust. Assimilation of crustal material of the Bainaimiao Group played a key role in the formation of the Au-only deposit at Bilihe.

## **Seismological observations and geochemical analysis: A study of the eruption mechanism of volcanic rocks in northern Tibet (Project leader: HE Rizheng)**

As a result of strong crust-mantle interaction, Neogene and even younger high- to ultra-high potassic lavas are widely distributed in NW Tibet. The project aims to investigate the cause of volcanic eruptions in northern Tibet through geophysical observations and geochemical analysis of these volcanic rocks.

(1) We have deployed 103 broadband seismic observation stations during the last 5 years, mainly within a cross-section along longitude  $88.5^{\circ}\text{E}$ , from  $32^{\circ}\text{N}$  to  $38^{\circ}\text{N}$ , and this went through a region of volcanic rocks in northern





Tibet. (2) We also determined a detailed three-dimensional structure of the crust and upper mantle from P-wave velocities down to 200 km depth beneath central Tibet by applying teleseismic tomography to 38,146 high-quality P-wave arrival times from the original seismograms of 2178 teleseismic events that were recorded at temporary broadband seismic stations of INDEPTH-III, 2008TITAN, and 2010TITAN. Our results show that the anomalous low P-wave velocity suggesting a magma chamber for these lavas is not more than 130 km deep, and this agrees well with geochemical evidence. (3) Fortunately, xenoliths found in trachytic rocks still preserve two end-member stages of magmatic evolution during lava eruption and probably represent mantle-sourced products of magmatic crystallization. This directly demonstrates that the uppermost mantle has participated in massive crust-mantle magmatism.

### **Lithospheric structure of the western Qinling orogenic belt and deep processes of crustal deformation along the northeastern margin of the Qinghai-Tibet Plateau (Project leader: GAO Rui)**

The western Qinling Orogenic Belt is located on the northeastern margin of the Tibetan Plateau and is an excellent natural laboratory to study the dynamic processes for the formation and evolution of continental lithosphere. Compositional and structural variations in both lateral and vertical directions in the lithosphere across this orogenic belt are a key to understand the processes responsible for a progressive decrease in crustal thickness towards the eastern or northeastern margin of the Tibetan Plateau. Tectonically, the western Qinling Orogenic belt is situated within a critical tectonic zone that links the Qilian orogenic belt to the west, with the Qingling orogenic belt to the east and the north-south tectonic zone to the south, which has been a focus of several recent studies. Economically, the interior and adjacent basins of the western Qingling orogenic belt are considered as potential targets for future oil and gas exploration. Therefore, knowledge of the fine-scale lithospheric structure and the nature of the basin and range transition should play a key role in assessing the true potential of important resources. In this project, we applied new techniques of deep seismic reflection profiling that revealed the fine-scale structure and composition of the lithosphere of the western Qingling orogenic belt. In conjunction with surface geology as well as geochemical and geochronological constrains, we integrated and interpreted lithospheric processes responsible for the intensive deformation of the northeastern margin of the Tibetan Plateau, and we evaluated the effects of tectonic deformation on the formation and preservation of natural oil and gas reserves within this orogenic belt and adjacent basins.

### **Metamorphism and geodynamics of the southeastern Lhasa Terrane, Tibet (Project leader: ZHANG Zeming)**

The Lhasa terrane, located in the southern part of the Tibetan Plateau, is the key to reconstruct the formation and evolution of the Tibetan Plateau and Tethyan Ocean. This project undertook an investigation into the petrology, geochemistry and geochronology of metamorphic rocks from the eastern Lhasa terrane. Neoproterozoic and Mesozoic-Cenozoic high-pressure metamorphic belts were found in the central part of the Lhasa terrane. Cretaceous charnockites and Devonian granites were found in the southern part of the Lhasa terrane. A component of the lower crust of the Gangdese magmatic arc was revealed. The spatial and temporal evolution of metamorphism of the Lhasa terrane and a tectonic model were established. These results provide a new insight into the formation and evolution of the Tibetan Plateau and the Tethyan Ocean.







## **Helium isotope geochemistry of eclogites resulting from oceanic or continental subduction (Project leader: LI Zhaoli)**

The helium isotopic composition of each layer of the earth has its characteristic isotopic ratios, and these ratios show significant differences. As a result, helium isotopes, as a tracer, are more sensitive than other isotopes. (1) This research reviewed the helium isotopic geochemistry of HP-UHP eclogite-facies metamorphic rocks. (2) This research selected eclogites, sampled in the Chinese Continental Scientific Drilling (CCSD) main hole as representing continental subduction eclogite, and selected eclogite samples from the Lhasa terrane as representing ocean subduction eclogite. (3) Our research suggests that helium in the Lhasa eclogites has a mixed crust-mantle source. (4) He isotopes from the eclogite can act as a sensitive tracer in recording the geochemical information of the subduction environment. (5) The formation of eclogite in the Lhasa Terrane may be related to activity in the deep mantle.

## **3.2 Results of completed National Key Basic Research and Development Projects**

### **Chinese continental scientific drilling: Long-term geophysical observations and research on the deep borehole (Project Leaders: GAO Jinxi and XU Jiren)**

Borehole seismology and long term geophysical observations in deep boreholes is a new high-tech project in the 21st century and is very significant for the development of geoscience studies. Borehole observations are beneficial to investigate effects on the Earth's surface related to geophysical observations and can improve the ratio of signal to noise in the heavily ambient noise, specifically concerning rapid industrialization and urbanization today. Borehole data may be widely applied in environment protection, resource evaluation and earthquake disaster prevention and mitigation. Great achievements are expected.

The Donghai Long Term Observatory in Jiangsu Province, Chinese Continental Science Drilling (CCSD), Ministry of Land and Resources of China, near the Tanlu Fault in eastern China has been in operation since 2011, based on the investigation and pilot experiments of the borehole for many years. The Donghai Borehole Observatory is the first noiseless multi-geophysical observatory in China and the deepest in the world at present. The deep borehole observatory is significant for the study of deep continental processes.

The instruments were installed at four different levels, namely at 4050 m, 2545.5 m, 1559.5 m and 544.5 m within the inner main hole of the CCSD in August 2011. Two sets of three-component seismometers with frequencies of 4.5 Hz and 15 Hz were installed at each level. The borehole seismometers collected data for two years. The results show that the data quality from the deep borehole is superior to those of conventional ground seismic stations. Microearthquakes with magnitude 0 that occurred in the vicinity of the borehole were well recorded. The results show that deep borehole observation is a superior way to restrain the noise in geophysical observations.

In future we shall investigate the amplitude properties of seismic waves in different rock layers, e.g., effects of amplification ratio in different rock layers by wave spectral analyses. The seismic data from microearthquakes observed by the deep borehole seismographs will be used for the study of tectonics and dynamics near the Tanlu Fault. The expected results will enrich our knowledge of crustal processes and will benefit resource prospecting, environmental protection and earthquake prediction.





## **Sanjiang Tethyan multiple orogeny and metallogenesis (Project Leader: YANG Tiannan)**

The Sanjiang orogenic belt, southwestern China, is located on the northeastern margin of the Tibetan Plateau and provides an excellent natural laboratory for studying the dynamics of continent-ocean subduction and continent-continent collision. This orogenic belt is also rich in mineral resources and is thus an ideal region to study the relationship between orogenesis and base metal mineralization. The Geological Survey Project “Cenozoic collision-related deformation and zinc-lead multiple metallogenesis in the Sanjiang orogenic belt, southwest China” aims to (1) reveal multiple orogenic processes, and (2) understand the tectonic background of metallogenesis in the Sanjiang belt, focusing on the dynamics of the Himalayan tectonic evolution and its relationship with metallogenesis. The scientific goal is to construct a new metallogenetic theory for the complicated Sanjiang orogenic belt by synthesizing tectonic, structural, and ore-geological data. During the past three years we evaluated previously published data and undertook field studies including: (1) detailed field observations and measurements along three transects across the Lanping basin; (2) detailed mapping of three metal deposit regions, the total area of which is larger than 60 square kilometers; (3) a large amount of new geochronological, thermochronological, and geochemical data was acquired. The field observations, measurements and new data were partly published in international journals such as *Gondwana Research* (2013). The main progress includes: (1) a Cenozoic volcanic horizon with a zircon U/Pb age of 35 Ma and intercalated in the Yunlong Formation was identified for the first time; (2) a detailed study of deformational structures that resulted from continent-continent collision provides the basis for a new collision model; (3) we tried to reconstruct the Upper Triassic stratigraphic column along the eastern margin of the Lanping basin, providing critical insights into low-temperature epigenetic hydrothermal deposits within sedimentary rocks; (4) we found many new issues on regional geology, tectonics, and mineralization, that will be further studied in future.

### **3.3 Results of China Geological Survey Projects completed in 2013**

#### **Comprehensive investigation and study on basic tectonic framework of the Xingmeng orogenic belt (Project Leader: LI Jinyi)**

The project carried out investigations and studies on tectonics of the Tangshan-Dongwuqi geological corridor, late Paleozoic magmatic activity in the central Jilin Province and the northern margin of North China craton, tectonics of the peripheral area of Alxa, and Middle Paleozoic magmatic activity on the northern margin of the Tarim Basin, as well as a comprehensive study of the tectonic framework and tectonic evolution in northern China and adjacent regions. Many new data on tectonic characteristics, rock compositions and geological ages of the main geological units were obtained. A tectonic profile across the ophiolitic *mélange* located in the Shale Hill east of Kedan Mountain was surveyed; a revision of the timing of some geologic bodies such as the Hongqiyingsi Group of Hongqiyingsi Township of Chongli County, was completed; a new interpretation has been proposed that the Alxa-Dunhuang block constitutes an independent ancient continent south of the Paleo-Asian Ocean that coexisted with the North China and Tarim ancient continents during the Paleozoic Era, and a new tectonic framework for this area has also been proposed. Based on a comprehensive study of new and previously available data, using the concept of the continental evolution, a Map of the Tectonic Framework of the Tangshan-Dongwuqi Geological Corridor (at a scale of 1:500,000), a Map of the Tectonic Framework of Northern China and Adjacent Regions (at a scale of 1:5,000,000) and a Map of the Tectonic Division of Northern China and Adjacent Regions (at a scale of 1:10,000,000) (Figs. 1-3) were compiled. This project passed its assessment with excellent results in June 2013.



## Synthesis on the genetic relationship between granite evolution and mineralization of the Tianshan—Xingmeng orogenic belt (Project Leader: WANG Tao)

We redefined and re-established the chronological framework of granitoid magmatism in the Tianshan—Xingmeng orogenic belt, southern Central Asian Orogenic Belt. According to the spatio-temporal distribution and magmatic association of granitoids with different ages, we defined the tectonic setting of their formation, which forms the basis for discussion on granite evolution and regional mineralization. We assessed the sources of granitoids in different areas by isotopic mapping, which provides valuable data and a study case for conducting research on the composition and structure of the deep continental crust. We also compiled a digital spatio-temporal map of granitoids in the Tianshan-Xingmeng orogenic belt, especially revealing the evolutionary pattern of early Paleozoic, late Paleozoic, early Mesozoic and late Mesozoic granites. This provides a new basis for defining the regional tectonic evolution and mineralization setting.

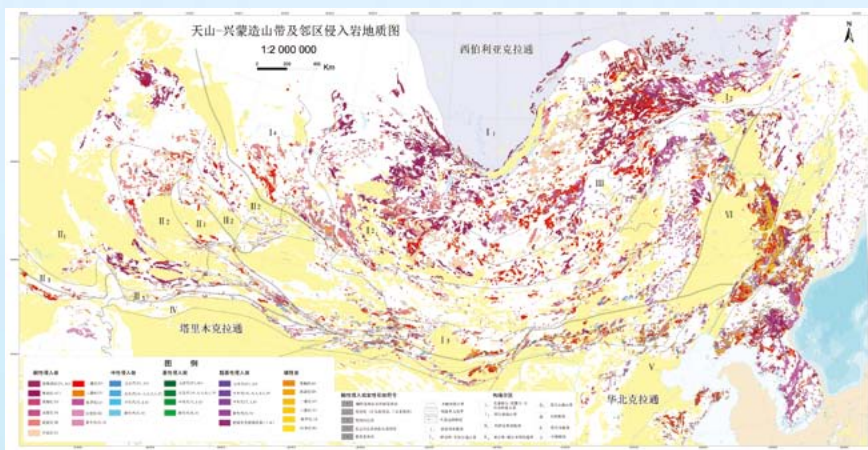


Fig. 3.3.1 Digital map of granitoids in the Tianshan—Xingmeng orogenic belt, southern Central Asian Orogenic Belt.

## Synthetic research on the evolution and energy potential of major Mesozoic sedimentary basins in the Xingmeng Orogenic Belt (Project Leader: LIU Yongqing)

We divided the Mesozoic sedimentary basins of the research area into five phases of evolution, summarized and analyzed the sedimentary characteristics, evolutionary patterns and tectonic setting and dynamic mechanism of these basins (or basin group) during different phases. Two large-scale early Mesozoic (T2-3-J1-2) continental sedimentary basins i.e., the Junggar-Turpan Basin and the Ordos –North China Basin, were identified in the research area and their geodynamic setting was discussed. There is a large vertebrate fauna, dominated by dinosaurs, in the East Asia region in the late Mesozoic, and in middle and late Jurassic period the research area had an ideal paleoecological environment which was favorable for the living and propagation of vertebrates.



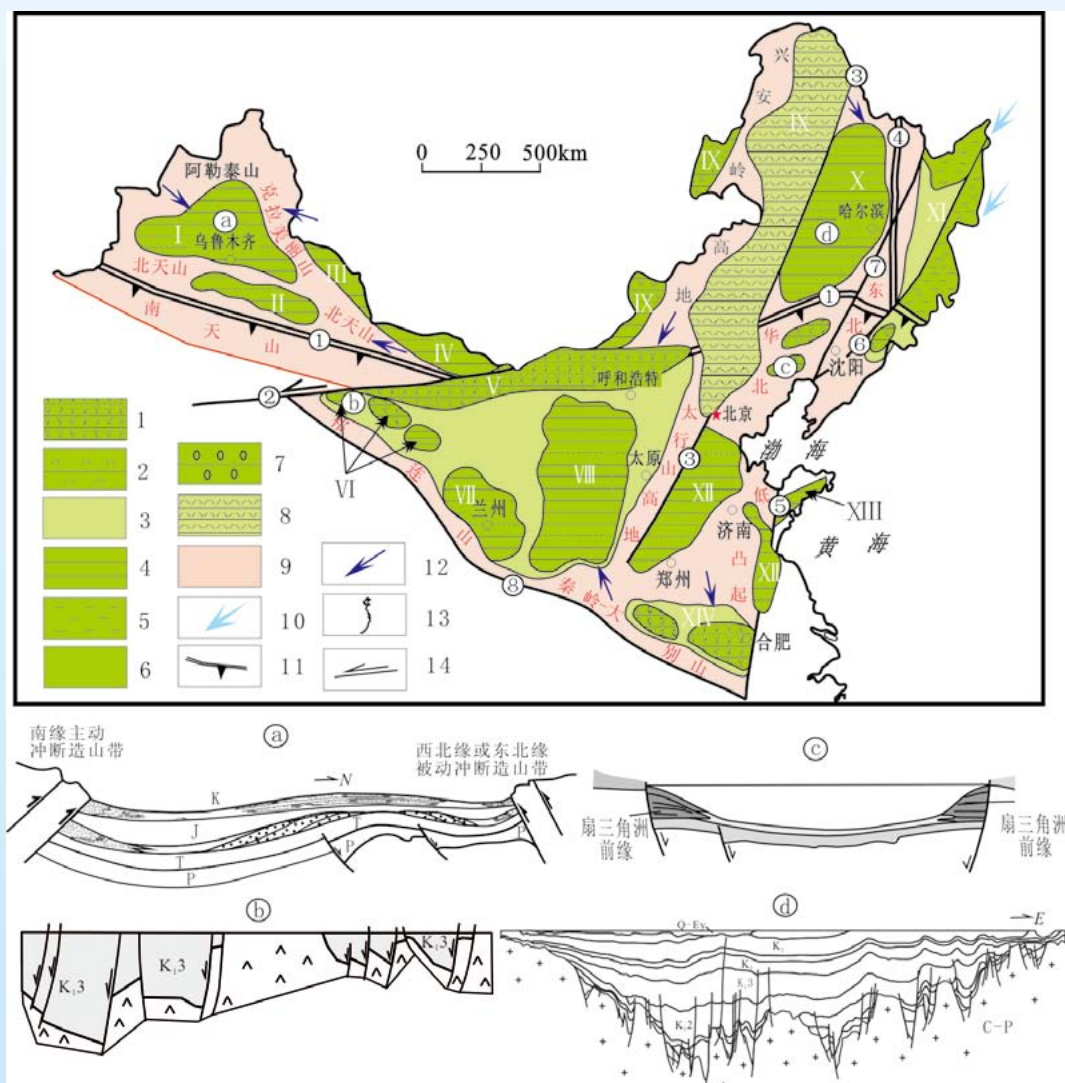


Fig. 3.3.2 Early Cretaceous paleogeography and structure of sedimentary basins in the DMOB and nearby areas.

## Development of Nd and Pb isotopic reference material (Project Leader: TANG Suohan)

The development of Nd isotopic reference standard material was completed, including selection, homogeneity and stability tests. A multi-laboratory (11 laboratories) collaborative analysis scheme was adopted in the certification procedure. The value for the  $^{143}\text{Nd}/^{144}\text{Nd}$  ratio of the reference standard material was certified, and an assessment of the uncertainty was performed. Besides, the Nd isotopic reference material was used as a primary national reference material. The development of standard material for the Pb isotopic ratio in basalt and pyrite was basically completed, including sampling and selection and homogeneity tests of basalt and pyrite, and Pb isotope determination of some basalt and pyrite samples were made. The newly certified Nd standard solution was used to calibrate the instrument and to verify the analytical quality in Nd isotope measurements, and may also find its use in inter-laboratory data comparisons.



Fig. 3.3.3-5 Nd and Pb isotopic reference material.

### Research on processing methods of deep seismic reflection data and multi-scale wavelet analysis of the gravity-magnetic potential field (Project Leader: YU Changqing)

We completed the following assignments: research on processing methods of deep seismic reflection data based on x2 distribution control, research on methods of multi-scale wavelet analysis of gravity-magnetic potential field data based on wavelet transform theory. We completed the process method of x2 distribution control of deep seismic reflection data and software for multi-scale wavelet analysis of heavy gravity and magnetic potential field data resolution. This software was tested by a third party and we obtained the software copyright registration certificate; gravity observation and seismic reflection data of the Tarim basin and seismic observations from the Songliao basin were analyzed and studied by the above research methods and software respectively.

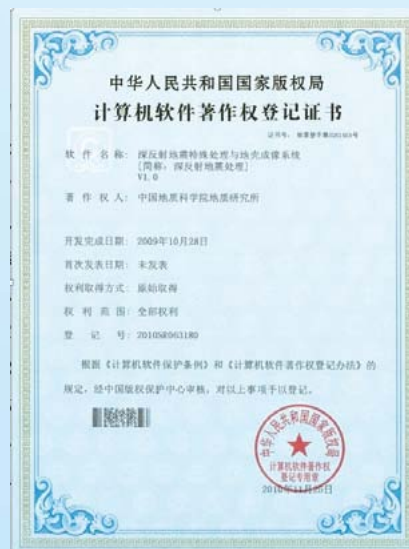


Fig. 3.3.6 Software copyright registration certificate

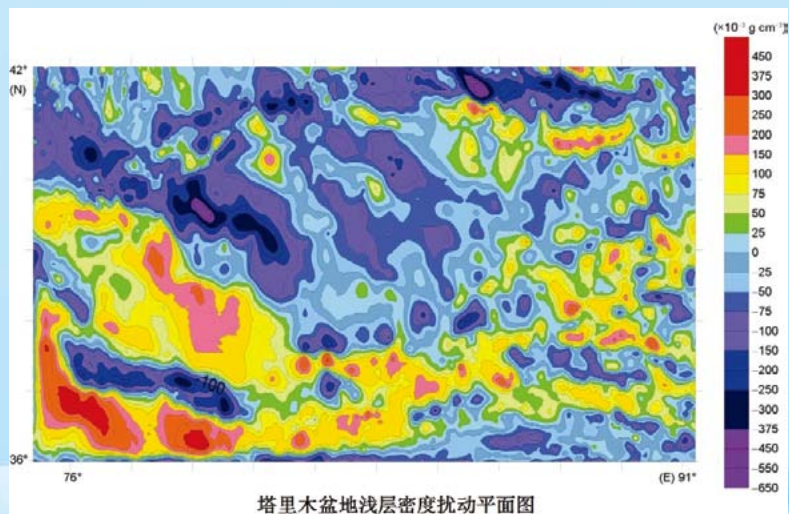


Fig. 3.3.7 The density disturbance map of shallow layers in Tarim Basin



## Application of isotope thermochronology on the uplift history of the Tianshan Mountains (Project Leader: CHEN Wen)

Micro-sample (U-Th)/He isotopic dating experimental conditions were optimized. A petrogeochemical study of late Paleozoic intrusive rock from the Hongyuntan area, East Tianshan Mountains, indicates that the intrusive rock formed during ocean crust subduction. Using biotite Ar-Ar dating as well as zircon and apatite (U-Th)/He dating, we established the thermal evolution of intrusive rock in the same area and proposed a periodic uplift history for the East Tianshan Mountains. These mountains experienced overall slow uplift and cooling and experienced tectonic uplift during dozens of millions of years after rock emplacement, followed by slow erosion and stabilization. The uplift rate has increased dramatically since the Eocene, which led to extensive unroofing.

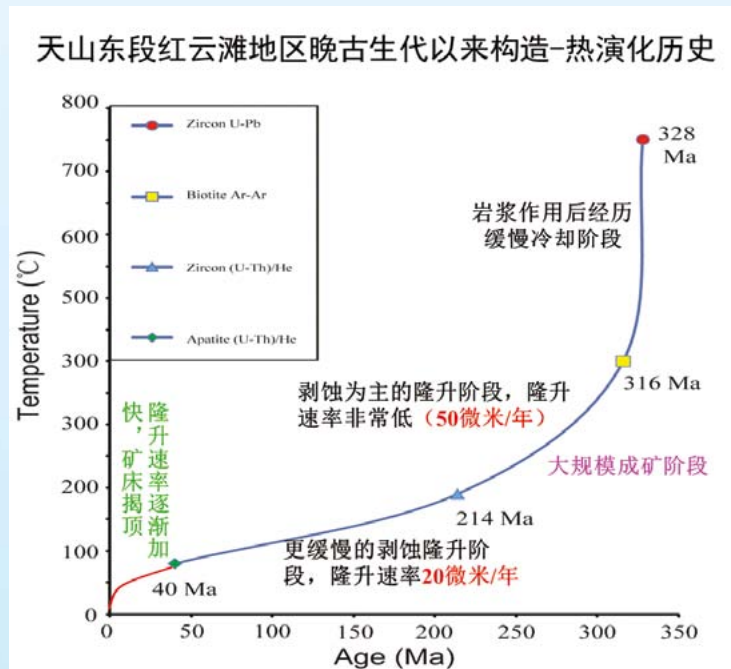


Fig. 3.3.8 Thermal evolution of late Paleozoic intrusive rocks in the Hongyuntan area, East Tianshan Mountains.

## Preparation of reference materials for Ar-Ar dating of Paleozoic mica samples (Project Leader: CHEN Wen)

Through the study of field geology, petrology, mineralogy, chemical composition and Ar-Ar dating, the muscovite sample TG1104 was determined as Paleozoic Reference Material for the Ar-Ar dating method. Several kilograms of high-purity muscovite were separated from sample TG1104 in cooperation with several mineral processing laboratories and were divided into 150 small packages. A large number of Ar-Ar dating experiments, homogeneity tests and tests using the smallest possible weight showed that muscovite sample TG1104 is an ideal reference material for Ar-Ar dating.

TG1104白云母样品Ar-Ar年龄均匀性检验结果		
测定次数 (n)		20
端值	最小值	350
	最大值	357.4
组间平均值		353.8
标准偏差		1.72
相对标准偏差%		0.49%
极差		7.4
组内平方和		10.880
组间平方和		15.428
$F_{0.05} (19, 20)$	计算值	1.49
	临界值	2.08

Fig.3.3.9 Ar-Ar dating of muscovite sample TG1104.



## Climate change since the last interglacial in Asia monsoon marginal areas in eastern China (Project Leader: WANG Yong)

A systematic chronological research was conducted for the Jiufangtai section at the lower reaches of the Salawusu River basin, and a highly accurate stratigraphic framework for the Quaternary was erected. The main lithostratigraphic units of the section were divided into: Holocene series - Dishagouwan Fm (2 ka BP to present), Dagouwan Fm (2~11 ka BP); Upper Pleistocene - Chengchuan Fm (72~11 ka BP), upper part of Middle Pleistocene - Upper Pleistocene Salawusu Fm (72~152 ka BP); Middle Pleistocene Lishi Fm (152~207 ka BP).

A multi-proxy approach for the Jiufangtai section in Salawusu was performed to reconstruct the last interglacial paleo-environmental change. Based on the multi-proxy data set and the regional data, the climatic and environmental changes since the last interglacial period in Salawusu can be divided into five stages: MIS5 (72~152 ka BP), semi humid-semiarid conditions with mild climate. MIS4 (54~72 ka BP), winter monsoon rapidly reinforced, the desert belt moved southward and the overall climate was cold and dry. MIS3 (38~54 ka BP), the summer monsoon became stronger and relevant precipitation increased. MIS2 (11~28 ka BP), relative fluctuations of climate are apparent through the interaction of winter and summer monsoons; generally, the climatic features were dry and cool. MIS1 (11 ka BP to present), relatively arid climate conditions, but there were humid subsections during the intermediate stage of the period.

The results show that the climate was relatively moist in monsoon marginal regions during the middle - late period of the MIS3 stage, but the moisture level did not exceed that of the Holocene period. During the MIS2 stage, the monsoon marginal regions (Jilantai salt lake, Salawusu and Wulagai) generally developed aeolian sand, which reveals that the climate was extremely dry and cold during the LGM period.

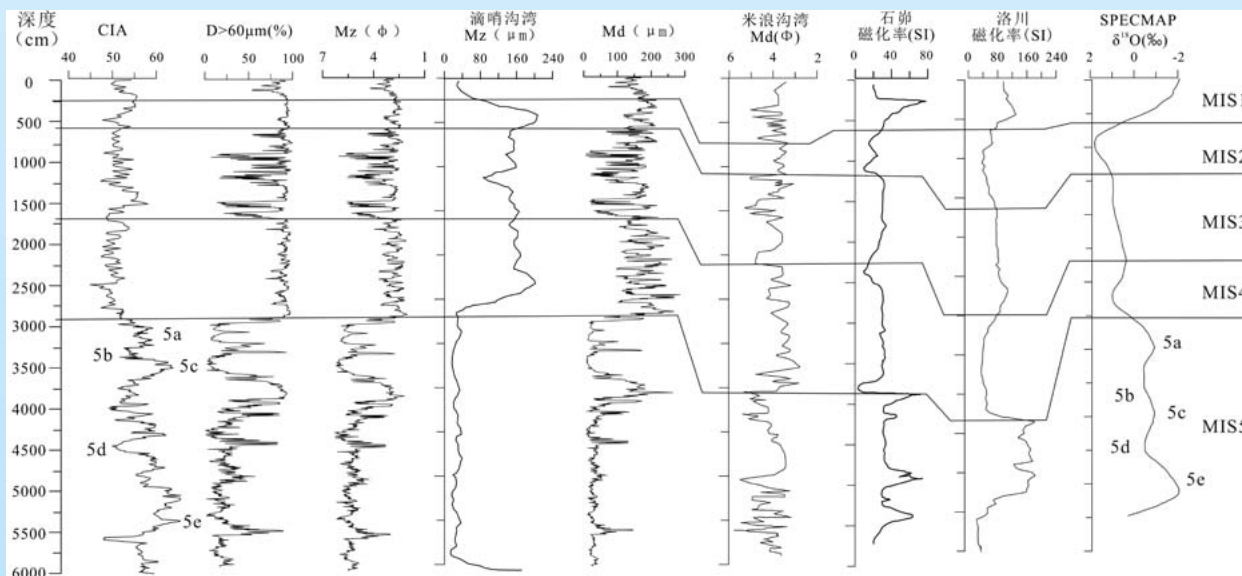


Fig.3.3.10 The last interglacial paleo-environmental change of the Jiufangtai section in Salawusu.

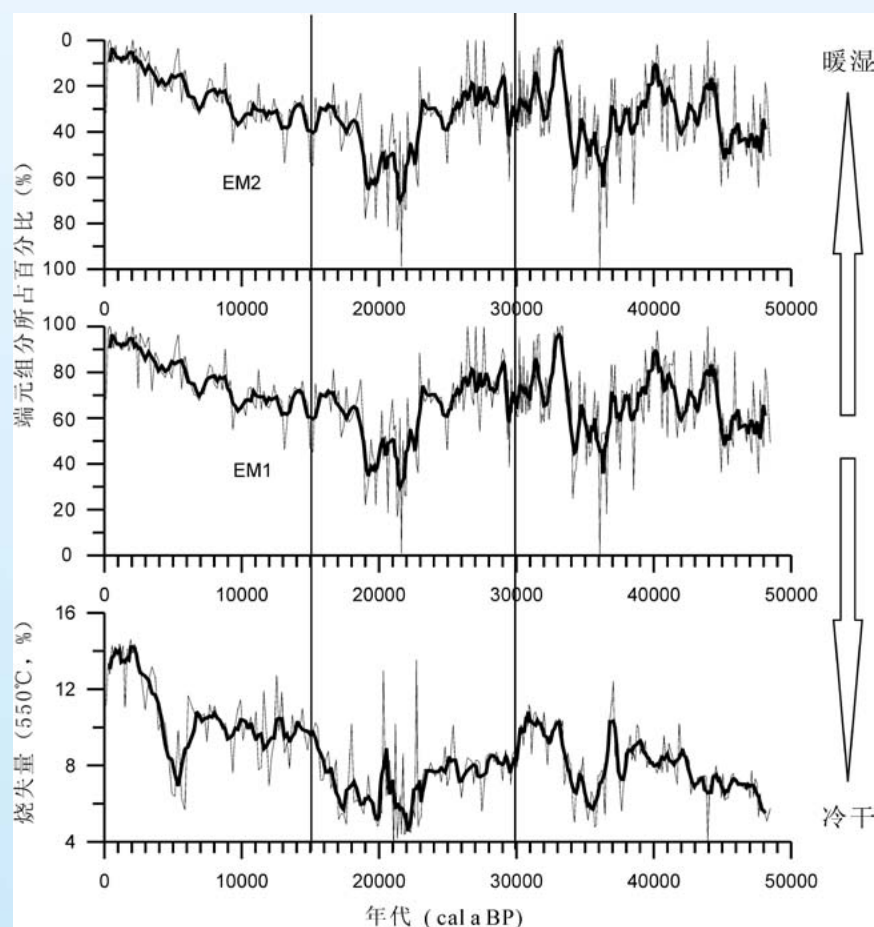


Fig.3.3.11 Climatic and environmental changes reflected by the Wulagai lake sediments.

### 3.4 Other important progresses

#### **New constraints on crustal structure and Moho topography in Central Tibet as revealed by SinoProbe deep seismic reflection profiling (GAO Rui, CHEN Chen, LU Zhanwu, Larry D. BROWN, XIONG Xiaosong, LI Wenhui and DENG Gong )**

SinoProbe deep seismic reflection profiles conducted from the northern Lhasa terrane to the Qiangtang terrane imaged the fine crustal structure beneath central Tibet. The Moho depth varies from 75.1 km beneath the northernmost Lhasa terrane to 68.9 km beneath the southernmost Qiangtang terrane. There is a 6.2 km sharp Moho offset across the Bangong-Nujiang Suture (BNS). Within 25 km to the north of the BNS, the Moho rises smoothly to 62.6 km.

A distinct Moho reflector lies at 62.6–67.3 km beneath the Qiangtang terrane. A north-dipping series of reflection packages in the mid- to lower crust may mark subduction of the Lhasa terrane beneath the Qiangtang terrane.

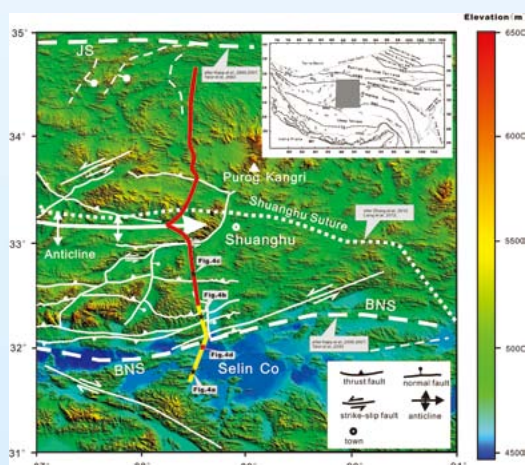


Fig.3.4.1 Location map of the deep seismic reflection profile in Central Tibet

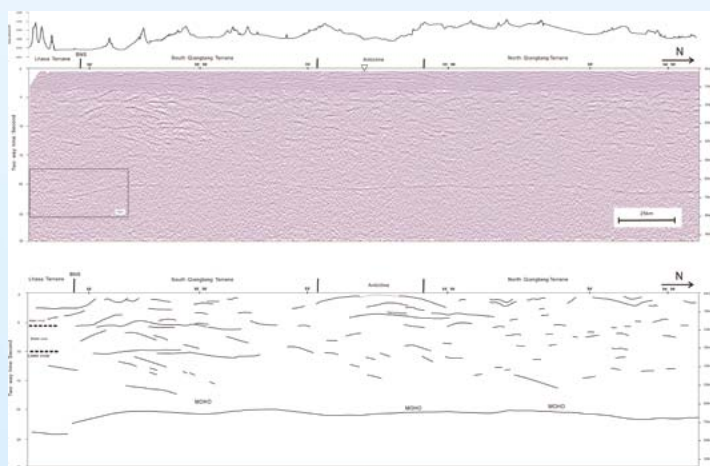


Fig.3.4.2 Migrated seismic section and interpreted lines for Sinoprobe deep seismic reflection beneath BNS and Qiangtang terrane

## Discovery of a new Late Jurassic multituberculate mammal from western Liaoning, China (YUAN Chongxi, JI Qiang, MENG Qingjin, Alan R. TABRUM and LUO Zhexi)

Multituberculates were successful herbivorous mammals and were more diverse and numerically abundant than any other mammal group in Mesozoic ecosystems. The clade also developed diverse locomotor adaptations in the Cretaceous and Paleogene. We report a new fossil skeleton from the Late Jurassic of China that belongs to the most basal multituberculate family, which is hereby named as a new taxon--*Rugosodon eurasiaticus*. The dental features of this new Jurassic multituberculate show omnivorous adaptation, and its well-preserved skeleton sheds light on ancestral skeletal features of all multituberculates, especially the highly mobile joints of the ankle, crucial for later evolutionary success of multituberculates in the Cretaceous and Paleogene.

## Great progress was achieved in the “China-Russia-Mongolia-Kazakhstan-Republic of Korea” International Cooperative Projects during the past decade.

First, the Atlas of Geological Maps of Northern-Central-Eastern Asia and Adjacent Areas at 1: 2.5 Million was published, including the Geological Map of Northern-Central-Eastern Asia and Adjacent Areas, the Metallogenic Map of Energy Resources in Northern-Central-Eastern Asia and Adjacent Areas (Oil, Gas and Coal), the Tectonic Map of Northern-Central-Eastern Asia and Adjacent Areas, and the Mineragenic Map of Central Asia and Adjacent Areas. This is the first intercontinental atlas at 1: 2.5 Million.

Second, with the mapping work of the five participating countries, a large metallogenic belt in northern China along the China-Mongolia border has been confirmed, right up to the Qinghai-Tibet metallogenic belt and Sanjiang metallogenic belt.



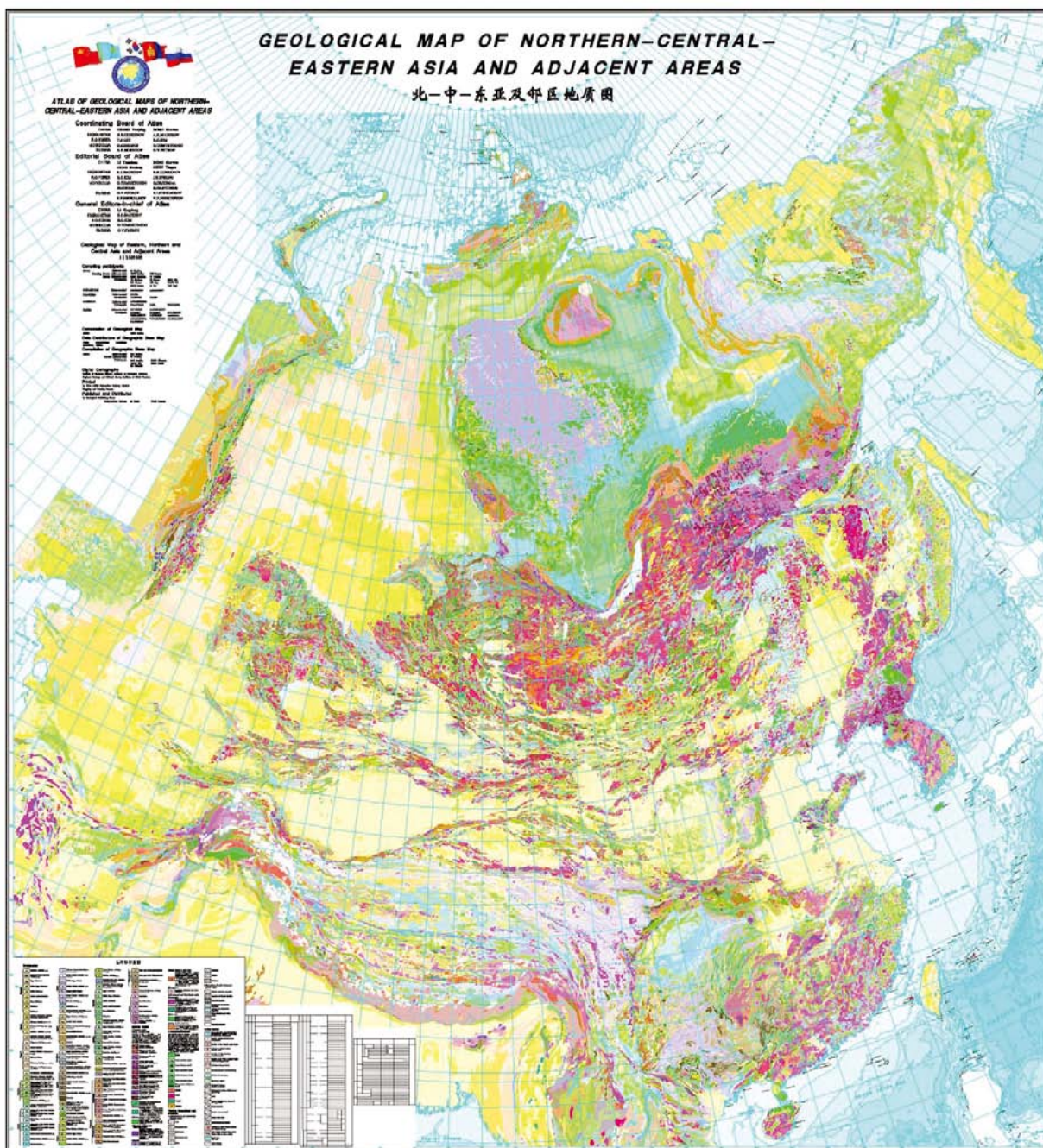


Fig.3.4.3 Geological map of northern-central-eastern Asia and adjacent areas



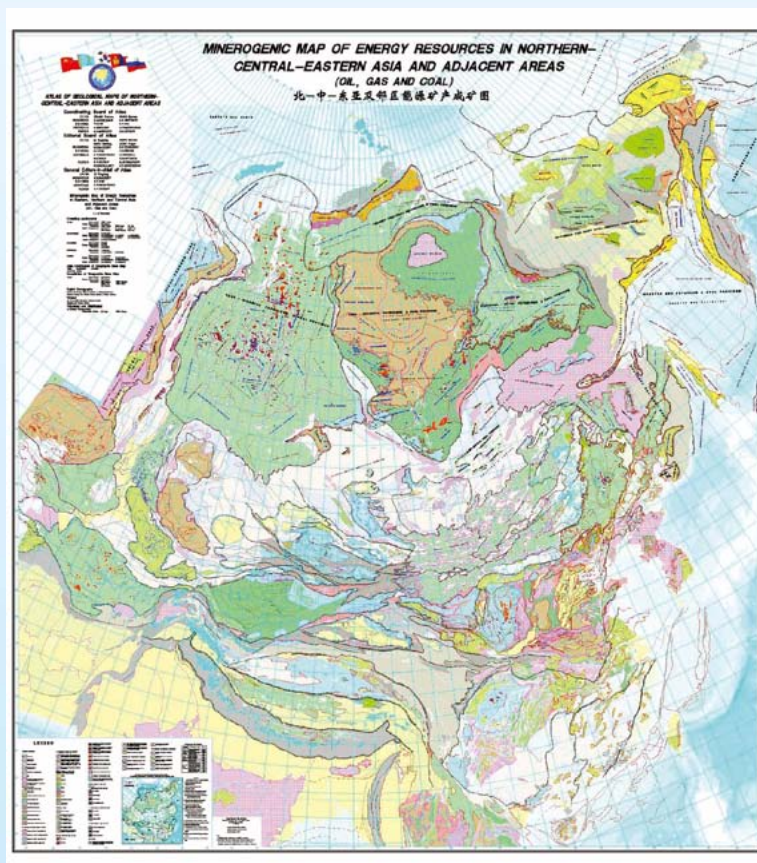
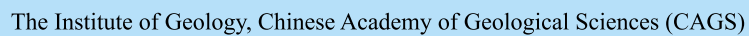


Fig.3.4.4 Metallogenic Map of Energy Resources in Northern-Central-Eastern Asia and Adjacent Areas (Oil, Gas and Coal)

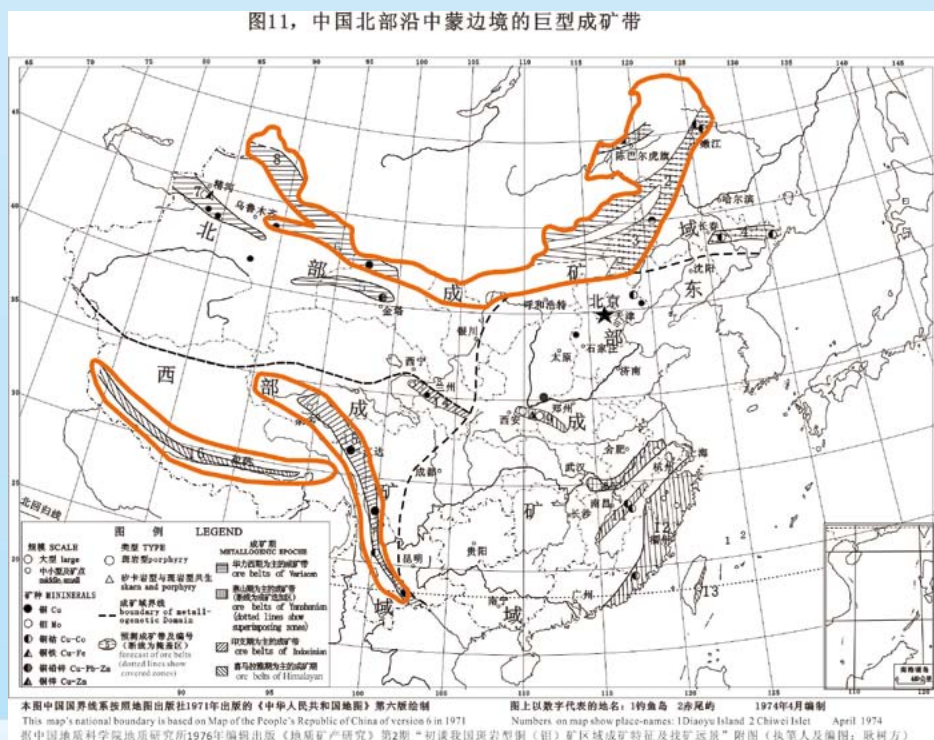


Fig.3.4.5 Large metallogenic belt in northern China along the China-Mongolia border



## Publication of the 1:5M International Asian Geological Map

The 1:5M International Asian Geological Map (IGMA5000) which is sponsored by China Geological Survey, undertaken by the Institute of Geology, and coordinated by Academician REN Jishun along with nearly 100 scientists from 20 countries working jointly, has been published by Geological Publishing House in October, 2013.

The IGMA5000 is published as a 2.6m×2.9m map in two editions: Chinese and English. The IGMA5000 is the latest and the most up-to-date Asian geological map with the most complete data. It is the first map that fully reflects the geology of Asian continent and adjacent ocean of CGMW; it is also the first map complied following international standards of CGMW and IUGS; moreover, it is the first map that has dimensional database on the ArcGIS platform and complied with the computer-assisted mapping techniques.

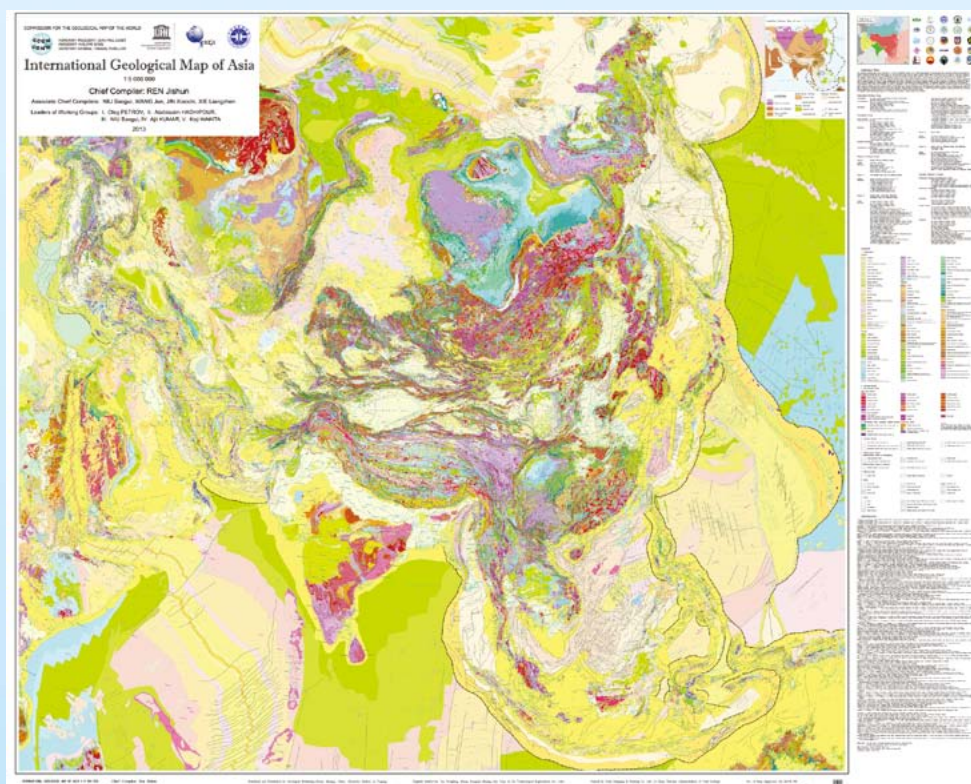


Fig. 3.4.6 The 1:5M International Asia Geological Map

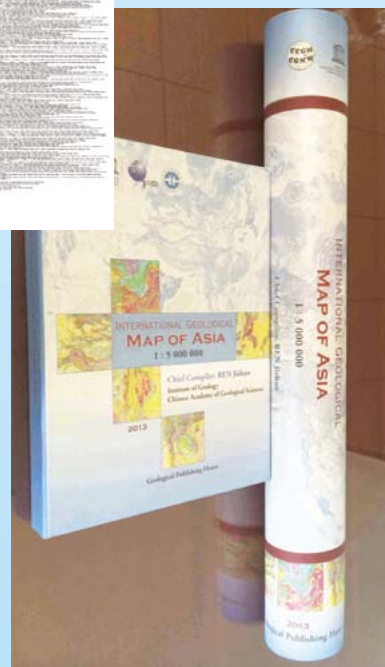


Fig. 3.4.7 The published IGMA5000





### **3.5 Important scientific rewards**

#### **One project won the first grade award of the Ministry of Land and Resources, China:**

The 3D lithospheric structure of China ( LI Tingdong, YUAN Xuecheng, XIAO Qinghui, GENG Shufang, FAN Benxian, GAO Rui, XIAO Xuchang, YANG Wencai et al. )

#### **Two projects won the first grade award of China Geological Survey:**

Comparison of the spatio-temporal evolution of granitoids in major orogens in China and Asia (WANG Tao, TONG Ying, HONG Dawei, WU Cailai, WANG Xiaoxia et al.)

Metamorphism and tectonic evolution of the Lhasa terrane, South Tibet (ZHANG Zeming and DONG Xin)

#### **Two projects won the second grade award of China Geological Survey:**

Tectonic setting of Triassic igneous-sedimentary rocks in the junction between the Qinling, Qilian and Kunlun Orogenic Belts and Lajishan ophiolites and Hualong Complex in the South Qilian terrane (YAN Zhen, WANG Tao, GUO Xianqing, and LI Jiliang)

Early Paleozoic polyphase orogenesis of the Qilian-Altun orogenic belt in northern Tibet (ZHANG Jianxin, YU Shengyao, and MENG Fancong)

#### **Two research projects were recognized as “Ten Great Scientific Achievements of the Chinese Academy of Geological Sciences in 2013”:**

#### **Rank 5:Key progress achieved in compilation and research of Mesozoic granitoids and related intrusions map of Asia (WANG Tao, ZAHNG Lei, GUO Lei et al.)**

Funded by the CGS, MOST, and NSFC projects, the research group lead by Prof. Wang Tao, Dr. Zhang Lei and Dr. Guo Lei, undertook comprehensive research on Mesozoic granitoids in China and adjacent areas. First, the group recognized many Mesozoic plutons and systematically summarized the spatial and temporal distribution, evolution, and source characteristic of early Mesozoic granitoids in Central Asia and the China Central Orogenic Belt and redefined the distribution of late Mesozoic granitoids in NE Asia. Second, they discussed the relationship between magma evolution and tectonic settings for the Mesozoic granitoids of Asia and proposed preliminary tectonic settings and a framework of continental convergence and divergence for these rocks. Third, a digital profile-driven map of Mesozoic granitoids of Asia was compiled. These contributions to the Mesozoic granitoids of Asia by Chinese





researchers are of great significance for exploring the tectonic evolution and metallogenic settings of Asia in the Mesozoic. Some results were published in 2013 in high-impact international journals, including Earth Science Reviews, American Journal of Science, and Lithos.

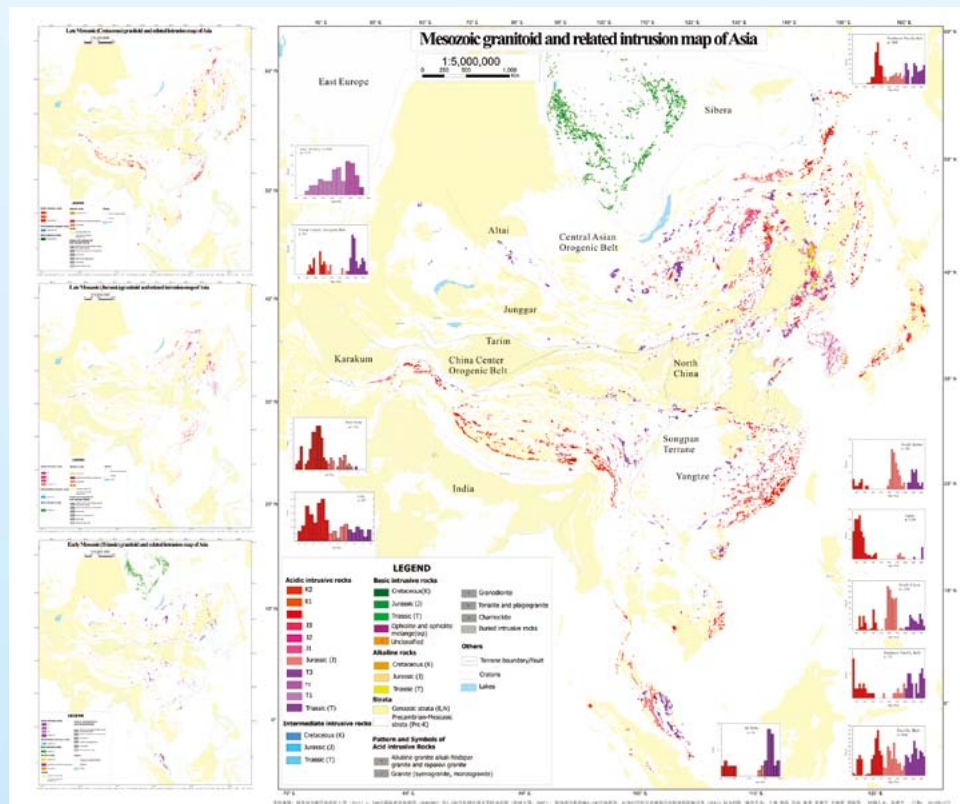


Fig 3.5.1 Mesozoic granitoids and related intrusion map of Asia

## Rank 8: Earliest known multituberculate mammal of the Jurassic from Liaoning, China (YUAN ChongXi, JI Qiang, MENG QingJin, Alan R. TABRUM, and LUO ZheXi)

Funded by the Ministry of Science and Technology of China (Project 973), the Ministry of Land Resources of China, the Science and Technology Commission of Beijing Government, and by the United States National Science Foundation and the University of Chicago, the team of Professor JI Qiang discovered a new fossil mammal from 160 million year old beds in Jianchang County of Liaoning Province of China.

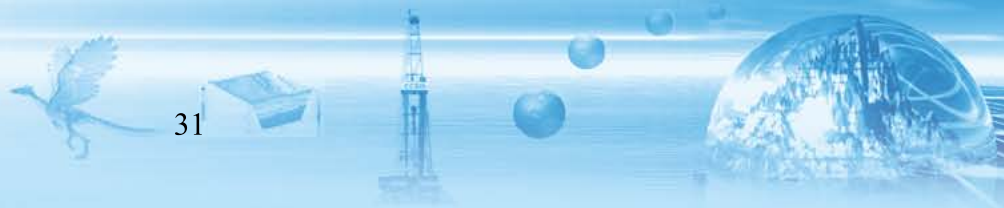
The new mammal is named *Rugosodon eurasiaticus* after the rugose teeth ornamented by numerous tiny ridges and grooves and pits, indicating that it was an omnivore that fed on leaves and seeds of ferns and gymnosperm plants, plus worms and insects. Its ankle bones are surprisingly mobile and flexible, suggesting that *Rugosodon* was a fast-running and agile mammal. It is also very important that *Rugosodon* is the earliest-known skeletal fossil of the multituberculates, and through its study paleontologists can trace the evolutionary origins of the versatile and diverse locomotor adaptations of later multituberculates that include tree climbers, ground runners, and digging mammals living underground. This fossil helps to shed light on the earliest evolution of multituberculates, a major group of



extinct mammals that lived in the Mesozoic of dinosaurs and ultimately survived the mass extinction that wiped out dinosaurs 65 million years ago.



Fig 3.5.2 Ecological reconstruction of *Rugosodon eurasiatricus*







## 4. International Cooperation and Academic Exchange

### 4.1 Attendance at international conferences

#### **XU Zhiqin and colleagues attended the General Assembly 2013 of the European Geosciences Union (EGU) in Vienna, Austria**

Academician XU Zhiqin and her team (Researchers YANG Jingsui, CUI Junwen, HE Bizhu, Dr. CAO Hui, Dr. CAI Zhihui, Dr. LI Huaqi and Dr. LI Yuan) attended the EGU General Assembly 2013 held in Vienna, Austria, during April 7-12, 2013. After the assembly, invited by Professor J.-P. BURG, XU Zhiqin and her team visited the Swiss Federal Institute of Technology, Zurich, Switzerland, during April 13-16, 2013.



Fig. 4.1.1 XU Zhiqin giving an oral presentation at the assembly



Fig. 4.1.2 YANG Jingsui giving an oral presentation at the assembly

#### **GAO Rui and LI Qiusheng attended the 2013 Annual Meeting of the Seismological Society of America (SSA) in Salt Lake City, USA**

Invited by Prof. G. Randy KELLER of the University of Oklahoma, and by Professor Z.-G. PENG of the Georgia Institute of Technology, Researchers GAO Rui and LI Qiusheng visited the two universities respectively in April 2013, and conducted cooperative research there. During this time, GAO Rui and LI Qiusheng also attended the 2013 Annual Meeting of SSA held on April 17-19, in Salt Lake City, Utah. They delivered an oral presentation entitled “Crustal structure of the SW Margin of the Ordos Block from Wide Angle Seismic Data” at the session.

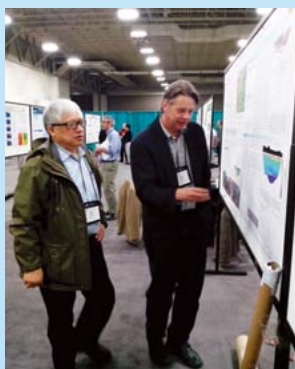


Fig. 4.1.3 GAO Rui (left) talking with Prof. Thomas M. HEARN (right) of the New Mexico State University at the 2013 Annual Meeting of SSA



Fig. 4.1.4 LI Qiusheng (middle) introducing Sinoprobe-02 progress at the Georgia Institute of Technology



## LI Haibing and colleagues attended the 2013 Taiwan Geosciences Assembly (Taoyuan, Taiwan)

Invited by Professor SONG Shengrong of the Department of Geosciences of National Taiwan University and Dr. SONG Yanfang of National Synchrotron Radiation Research Center (NSRRC), Researcher LI Haibing, Associate Researcher SI Jialiang and Dr. WANG Huan attended the 2013 Taiwan Geosciences Assembly held on May 13-17, 2013, in Taoyuan, Taiwan. After the meeting, they visited the NSRRC and participated in a field excursion to the Penghu Area.

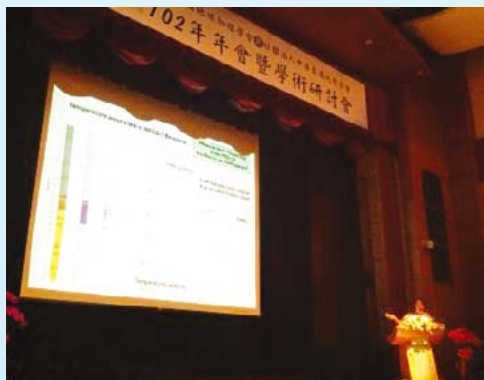


Fig. 4.1.5 LI Haibing giving an oral presentation at the assembly



Fig. 4.1.6 SI Jialiang giving an oral presentation at National Taiwan University

## JIN Xiaochi and HUANG Hao attended the 1<sup>st</sup> International Congress on Stratigraphy (STRATI 2013) (Lisbon, Portugal)

Invited by Professor Rogerio Bordalo DA ROCHA of the Universidade Nova de Lisboa, Researcher JIN Xiaochi and Dr. HUANG Hao attended STRATI 2013 held on July 1-7 in Lisbon, Portugal. They delivered oral presentations entitled “Permo-Carboniferous successions of the Tengchong Block, western Yunnan, China: Status and problems” and “Paleoclimatic implications of Permian fusulinids and carbonates from the Baoshan Block, SW China” respectively. They also participated in a field excursion to the Lusitanian basin before and after the congress.



Fig. 4.1.8. Field trip to Macico Calcario Estremenho



Fig. 4.1.7 STRATI 2013





## HOU Zengqian and colleagues attended the 12<sup>th</sup> Biennial Meeting of the Society for Geology Applied to Mineral Deposits (SGA) in Uppsala, Sweden

Researcher HOU Zengqian and his team (Associate Researcher SONG Yucai, Assistant Researchers ZHANG Hongrui and LIU Yingchao) attended the 12<sup>th</sup> Biennial Meeting of SGA held in Uppsala, Sweden, during August 12-15, 2013. They organized Session 3.10 “Metallogenesis of collisional orogens in the Tethyside domain”. In addition, they held the third Workshop of their IGCP/SIDA 600 project.



Fig. 4.1.9. Session 3.10 organized by HOU Zengqian's team

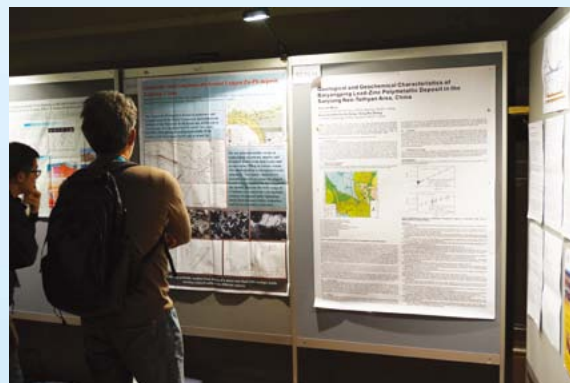


Fig. 4.1.10 Poster presentation at the meeting

## JI Qiang and LV Junchang attended the inaugural meeting of the Asia Dinosaur Association in Fukui-ken, Japan

The inaugural meeting of the Asia Dinosaur Association was held on July 12, 2013, in Fukui-ken, Japan. Researchers JI Qiang and LV Junchang attended the meeting, during which JI Qiang was elected Secretary General of the First Council of the Association, and LV Junchang was elected Deputy Secretary General. After the meeting, JI Qiang, together with Dr. Rinchen Barsbold of Mongolia and Dr. Yoichi Azuma of Japan launched a press conference.



Fig. 4.1.11. Inaugural meeting of the Asia Dinosaur Association



Fig. 4.1.12 JI Qiang answering questions at the press conference







## **LIU Yongqing and colleagues attended the 1<sup>st</sup> International Paleogeography Conference in Beijing, China**

On September 14-17, 2013, Researcher LIU Yongqing and his team attended the 1<sup>st</sup> International Paleogeography Conference in Beijing, China. They delivered two oral presentations: “Mesozoic Basins and Palaeogeography of North China” and “Taphonomy of Late Cretaceous Dinosaur Fossils in Zhucheng, Eastern Shandong, China”.



Fig. 4.1.13 the 1st International Paleogeography Conference



Fig. 4.1.14 Researcher KUANG Hongwei giving an oral presentation at the conference

## **JIN Xiaochi attended the 2<sup>nd</sup> International Symposium of IGCP-Project 589: Development of the Asian Tethyan Realm: Genesis, process and outcomes in Boracay, Philippines**

The 2<sup>nd</sup> International Symposium of IGCP-Project 589: Development of the Asian Tethyan Realm: Genesis, process and outcomes was held at Boracay, Philippines, on November 4-5, 2013. Researcher JIN Xiaochi hosted the opening ceremony and delivered an oral presentation entitled “Permo-Carboniferous successions of the Tengchong Block, Western Yunnan, China: Status and problems” at the session. He also participated in a field excursion to the Panay area of the Philippines after the symposium.



Fig. 4.1.15 JIN Xiaochi hosting the opening ceremony



Fig. 4.1.16 JIN Xiaochi displaying the new 1:5 Million International Asian Geological Map (IGMA5000)





## 4.2 Foreign visits by members of the Institute

### XU Xiangzhen visited the Institut de Physique du Globe de Paris (Paris, France)

Invited by the Institut de Physique du Globe de Paris, France, Associate Researcher XU Xiangzhen visited the institute and worked there with Researcher Pierre CARTIGNY for a one-and-a-half-month period of cooperative research (from March 15 to April 29, 2013).



Fig. 4.2.1 The “Nicolet 6700 Magna IR FTIR” equipment.



Fig. 4.2.2 XU Xiangzhen working with Pierre CARTIGNY.

### LU Minjie and colleagues conducted geological investigations in Peru and Argentina

Researcher LV Minjie, Deputy Director of the Institute, headed a six-member delegation (Researcher WANG Jun included) conducting geological investigations in Peru and Argentina, during March 22 to April 12, 2013, and studying typical mineral deposits of the two countries.



Fig. 4.2.3 At Don Javier (a copper mine) of Peru



Fig. 4.2.4 At Mina Pan de Azucar (a silver mine) of Argentina





## CAO Hui conducted cooperative research in the Netherlands and France

During April 17-22, 2013, Dr. CAO Hui visited the Tectonophysical Modeling Laboratories of the University of Amsterdam and Utrecht University, Netherlands, for cooperative research; and conducted fieldwork in the Alps of France.

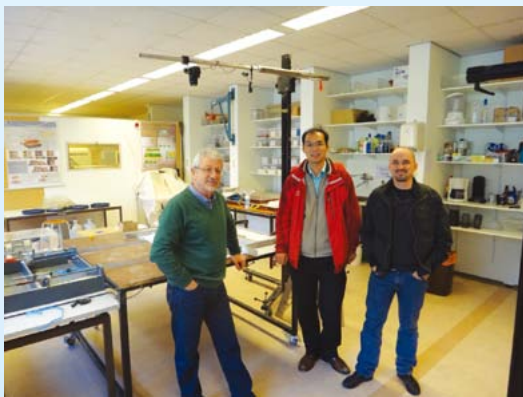


Fig. 4.2.5 CAO Hui(middle) visiting the Tectonophysical Modeling Laboratory of Utrecht University



Fig. 4.2.6 Field work in the Alps

## LI Haibing and colleagues visited the Université de Lyon and the Institut de Physique du Globe de Strasbourg, France

Invited by Prof. Philippe Herve LELOUP of the Université de Lyon and Prof. Jerome VAN DER WOERD of the Institut de Physique du Globe de Strasbourg, Researcher LI Haibing, Associate Researcher LIU Dongliang, Dr. PAN Jiawei and Dr. Marie-Luce CHEVALIER visited the two institutions and worked there for a 45-day period of cooperative research from March 31 to May 14, 2013. During their visit at the Institut de Physique du Globe de Strasbourg, LI Haibing delivered an oral presentation entitled “Overview and results of the Wenchuan Earthquake Fault Scientific Drilling (WFSD) project”.



Fig. 4.2.7 LI Haibing (right) giving an oral presentation at the Institut de Physique du Globe de Strasbourg

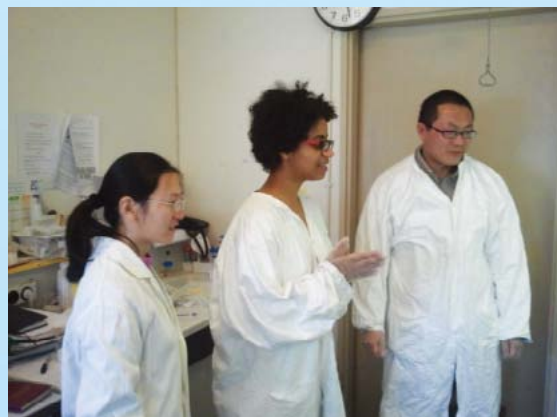
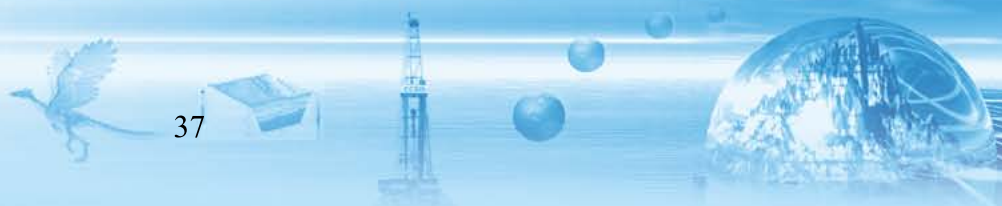


Fig. 4.2.8 PAN Jiawei (right) working in the laboratory of the Institut de Physique du Globe de Strasbourg







## LI Haibing and WANG Huan visited GFZ-Potsdam, Germany

Invited by Prof. Christoph JANSSEN of GFZ-Potsdam (Helmholtz-Centre Potsdam - German Research Centre for Geosciences), Researcher LI Haibing and Dr. WANG Huan visited the center, doing experiments with Wenchuan Earthquake samples, during April 29 to May 6, 2013.



Fig. 4.2.9 LI Haibing working in the laboratory of GFZ



Fig. 4.2.10 LI Haibing exchanging ideas with Prof. Christoph Janssen

## FAN Runlong and LI Ning visited Curtin University, Perth, Australia

FAN Runlong and LI Ning of the Beijing SHRIMP Center visited the SHRIMP facilities at Curtin University, Perth, Australia, during 23-30 May 2013. The main purpose of their visit was to upgrade the SHRIMP Remote Operation System (SROS) for a new server that was installed on the Curtin SHRIMP B in 2007. Cooperation between the Beijing SHRIMP Center and Curtin University on SROS has existed for more than 6 years, and more than 10,000 hours of SHRIMP remote measurements have been done successfully.



Fig. 4.2.11 FAN Runlong working in the SHRIMP Laboratory of Curtin University

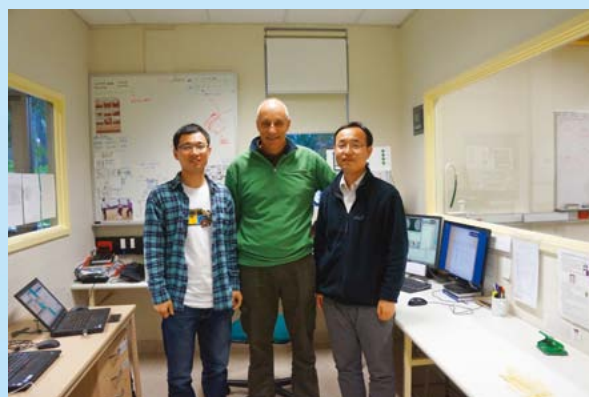


Fig. 4.2.12 Group photo of FAN Runlong and LI Ning with the technician (middle) of the SHRIMP Laboratory of Curtin University



## HOU Zengqian and colleagues conducted field work in Iran

Invited by Prof. Mehraj AGHAZADEH of Payam Noor University, Tehran, Iran, a delegation headed by Researcher HOU Zengqian (Researcher YANG Tiannan, Associate Researchers YANG Zhiming and SONG Yucai, Assistant Researchers ZHANG Hongrui and LIU Yingchao included) conducted field work in Iran during June 12 to July 3, 2013.



Fig. 4.2.13 HOU Zengqian working at Ahar of Iran



Fig. 4.2.14 Group photo during the field trip

## TONG Ying and colleagues participated in a joint field trip to the eastern region of Mongolia

Invited by Academician O. TOMURTOGOO, Director of the Mongolia Institute of Geology and Mineral Resources, Associate Researcher TONG Ying, Researcher WANG Tao, Assistant Researcher GUO Lei, and Drs. YANG Qidi and SHI Xingjun participated in a joint field trip to the eastern region of Mongolia during June 29 to July 26, 2013.



Fig. 4.2.15 Discussion before the field trip



Fig. 4.2.16 During the field trip







## GUAN Ye and LU Zhanwu visited Sercel in Nantes, France

During 7-18 July 2013, Researchers GUAN Ye and LU Zhanwu visited Sercel (CGG's Equipment division) located in Nantes, France, for technical exchanges on seismic reflection equipment.



Fig. 4.2.17 Equipment training at Sercel

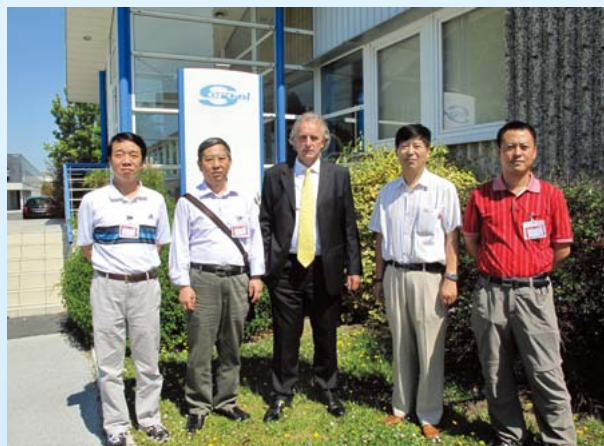


Fig. 4.2.18 Group photo at Sercel

## REN Liudong, LIU Yanxue and YOU Guoqing participated in a joint field excursion in Mongolia

Supported by their international cooperation project “3D Geological structures and Metallogeny of North, Central and Eastern Asia”, Researchers REN Liudong, LIU Yanxue and YOU Guoqing participated in a joint field excursion in Mongolia, organized by geologists from China, Mongolia, Russia and South Korea, during 6-13 September 2013.



Fig. 4.2.19 Discussions during the field trip

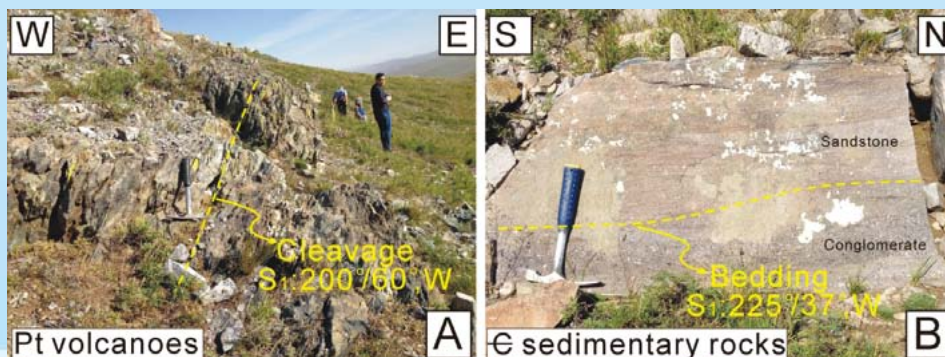


Fig. 4.2.20 Deformation and lithological characteristics of the Darhan and Buuraltai Groups





## **JI Qiang presented lectures at National Taiwan University, Taiwan, China**

Invited by Prof. SONG Shengrong of National Taiwan University (NTU), Researcher JI Qiang visited this university to present lectures and conduct cooperative research during 18 May to 29 June and 16 September to 12 October 2013.

## **TONG Ying conducted cooperative research at the University of Nevada in Las Vegas, Nevada, USA**

Invited by Prof. Michael WELL of the University of Nevada-Las Vegas (UNLV), Associate Researcher TONG Ying visited this university for a 4-month period of cooperative research, during 18 December 2012 to 16 April 2013. During his stay at UNLV, he delivered an oral presentation entitled “Tracing the closure of the Paleo-Asian Ocean during the Permian: Evidence from post-collisional granites”.



Fig. 4.2.21 TONG Ying giving an oral presentation at UNLV

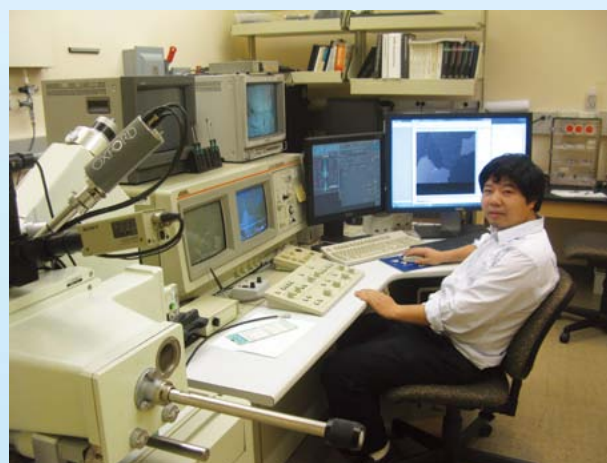


Fig. 4.2.22 TONG Ying working at the Laboratory of UNLV

## **LI Yuan conducted cooperative research at Uppsala University in Uppsala, Sweden**

Invited by Prof. David G. GEE of Uppsala University, Dr. LI Yuan visited this university at the end of February 2013 and conducted an 8-month period of cooperative research there.

### **4.3 Academic Visitors**

#### **Visit of Santa Man RAI from Tribhuvan University, Nepal**

Invited by Academician XU Zhiqin, Prof. Santa Man RAI of Tribhuvan University, Nepal visited the Institute of Geology during 22 February to 12 March 2013, to conduct cooperative research with XU Zhiqin's team. During his stay here, he delivered two oral presentations on “Introduction to the geology of Nepal” and “Origin and cooling history of the Paleoproterozoic metamorphic sequence, eastern Nepal Lesser Himalaya”.





## **Visit of William L GRIFFIN from Macquarie University, Australia**

Invited by Researcher YANG Jingsui, Prof. William L GRIFFIN of Macquarie University, Sydney, Australia visited the Institute of Geology. On 7 May 2013 he delivered an oral presentation entitled “The origin of Archean SCLM and its diamonds”.

## **Visit of W D. CUNNINGHAM from Eastern Connecticut State University, USA, and Rowan E. VERNON from Leicester University, UK**

In order to achieve the general objectives of his Natural Science Foundation Project “The provenance and deformation of lower Paleozoic sediments along the southern and eastern margin of the Alax Block and their tectonic implication”, Researcher ZHANG Jin invited Dr. W Dickson CUNNINGHAM of the Environmental Earth Science Department, Eastern Connecticut State University, USA, and Dr. Rowan Emma VERNON of the Department of Geology, Leicester University, UK, to conduct field work along the eastern margin of the Alashan and Yumen areas of Gansu Province, China, during 30 May10 to July 2013.



Fig. 4.3.1 Dr. W Dickson Cunningham on the field trip



Fig. 4.3.2 Dr. Rowan Emma Vernon on the field trip

## **Visit of Bor-ming JAHN from National Taiwan University**

World famous geochemist, bearer of the Knighthood of the French Ministry of National Education, Honorary Professor of the Beijing SHRIMP Centre and the Institute of Geology, Prof. Bor-ming JAHN visited the Beijing SHRIMP Centre for collaborative research in June 2013. During his stay, Prof. JAHN also completed 2.5 days of dating on the first BJ SHRIMP that was recently moved to the new laboratory building of the Beijing SHRIMP Centre in the Zhong Guan Cun Life Science Park.

## **Visit of Igor POSPELOV, Secretary General of the CGMW, Subcommittee for Tectonic Maps**

Invited by the research team of the project “National Oil-Gas Geological Research and Mapping”, the Russian tectonician Igor POSPELOV, Secretary General of the CGMW Subcommittee for Tectonic Maps, visited the Institute of Geology for academic exchanges during 22-26 July 2013. He delivered an oral presentation entitled “Tectonics of Central, Northern and Eastern Asia (Explanatory Note to the Tectonic map of the Central, Northern and Eastern Asia)”.





## Visit of Nicholas Stanley BELSHAW from Oxford University, UK

Invited by Researcher ZHU Xiangkun, Dr. Nicholas Stanley BELSHAW of Oxford University, UK, visited the Institute of Geology twice, on 21-27 June and 21-27 September 2013, for academic exchanges. He visited the Laboratory of Isotope Geology, Ministry of Land and Resources of China. Accompanied by ZHU Xiangkun, Dr. BELSHAW also attended the “10<sup>th</sup> National Workshop on Isotope Geochronology and Isotope Geochemistry” held in Tianjin.

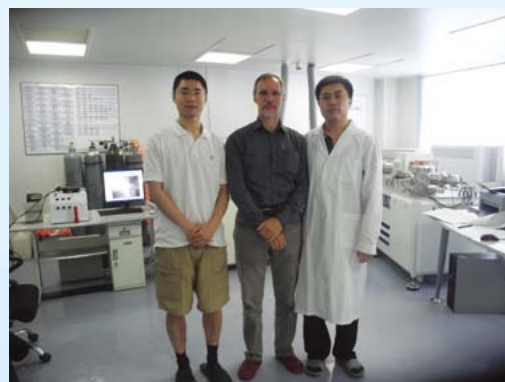


Fig. 4.3.3 Group photo at the Laboratory of Isotope Geology

## Visit of P. H. LELOUP from Université Lyon 1, France

Invited by Researcher LI Haibing, Prof. P. H. LELOUP from Université Lyon 1, France, visited the Institute of Geology. On 30 October 2013 he delivered an oral presentation entitled “Constraining the rate of deformation in ductile shear zones” in the meeting room of the State Key Laboratory of Continental Tectonics and Dynamics.

## Visit of Steve CLEMENT from Canada

The internationally-known Canadian specialist on ion optical design, Dr. Steve CLEMENT, visited the Beijing SHRIMP Centre for 3 months in April, August and October 2013. The main purpose of his visit was about the design of the time-of-flight (TOF) analyzer that is one of the key cooperative projects under the Specially-Funded Programme on National Key Scientific Instruments and Equipment Development “New models of TOF-SIMS for Isotope Geology”.



Fig. 4.3.4 Dr. Steve Clement giving an oral presentation

## Visit of Ewa KRZEMINSKA and colleagues from the Polish Geological Institute– National Research Institute (PGI-NRI), Poland

According to a Memorandum of Understanding (MOU) subscribed jointly by the China Geological Survey and the Polish Geological Institute – National Research Institute (PGI-NRI), 3 Polish technicians visited the Beijing SHRIMP Centre during 15-22 October 2013 to receive a one-week-training on SHRIMP geochronology and analytical techniques.







## Visit of David LEACH from USGS, Denver, CO, USA

Invited by Associate Researcher SONG Yucai, Dr. David LEACH, former researcher of the U.S. Geological Survey, who is now an honorary professor of the Institute of Geology, conducted fieldwork in western Yunnan Province, China during 4-17 November 2013, together with SONG Yucai and several students.



Fig. 4.3.5 Dr. David Leach (third from left) on a field trip

## Visit of Antonio CASTRO DORADO from the University of Huelva, Spain

Prof. Antonio CASTRO DORADO from the University of Huelva, Spain, was appointed as Honorary Professor of the Institute of Geology on 15 April 2013. After the appointment ceremony, Prof. Antonio Castro Dorado delivered an oral presentation entitled “Silicic plumes and relamination: A new concept for understanding magmatism in large crustal areas and crustal growth at active margins”.



Fig. 4.3.6 Prof. Antonio CASTRO giving an oral presentation.

## Visit of Simon KLEMPERER from Stanford University, California, USA

Based on their long-term cooperation, Prof. Simon KLEMPERER from Stanford University visited the Lithosphere Research Center of the Institute of Geology in September 2013. Researcher GAO Rui, Director of the Center and Sinoprobe-02 Project Leader, and his team, together with Dr. BAI Zhiming of the Institute of Geology and Geophysics, Chinese Academy of Sciences, met Prof. KLEMPERER and exchanged ideas on related issues concerning their cooperative research.

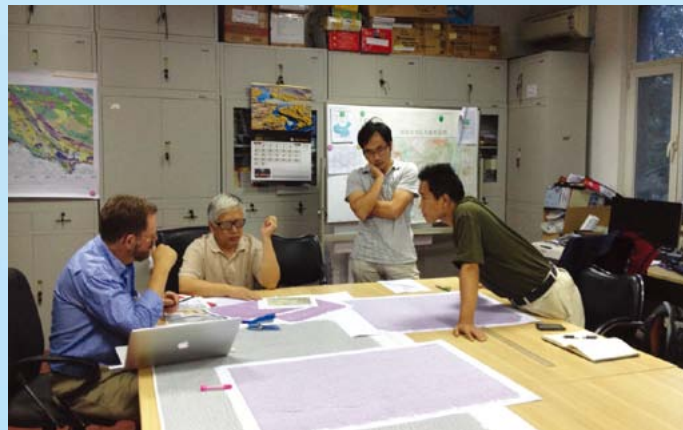


Fig. 4.3.7 Prof. Simon KLEMPERER (first from left), GAO Rui (second from left) and two other colleagues discussing scientific issues



## Visit of Gray DELANEY, Ryan MORELLI and Victor ZHANG from Saskatchewan Geological Survey, Canada

On 28 October 2013, Dr. Gray DELANEY, Chief Geologist of the Saskatchewan Geological Survey, Canada, and two other experts (Dr. Ryan MORELLI, expert on the Precambrian, and Dr. Victor ZHANG), accompanied by the Directors of the Department of Basic Geological Survey of China Geological Survey, visited the Research Center of 3D Geological Survey of the Institute of Geology. They discussed future cooperation on 3D geological modeling.



Fig. 4.3.8 Visitors listening to the introduction of the center's progress

## Visits of foreign delegations to the new laboratory of the Beijing SHRIMP Center

On 4 January 2013, Academician Alexander KHANCHUK, Director of the Far-East Division of the Russian Academy of Sciences (RAS), headed a four-member delegation to visit the new laboratory in the Zhong-guan-cun Life Science Park. Researcher LIU Dunyi, Director of the Center, met the delegation.

On 5 September 2013, Mr. Ian TAYLOR, Deputy Director-General of the Geological Survey of Western Australia, accompanied by his counterpart of China Geological Survey, visited the new laboratory. Researcher LIU Dunyi met the delegation and discussed future cooperation with them.

On 6 October 2013, more than 150 attendees of the International Meeting on Precambrian Evolution and Deep Exploration of the Lithosphere visited the new laboratory of the Beijing SHRIMP Center.

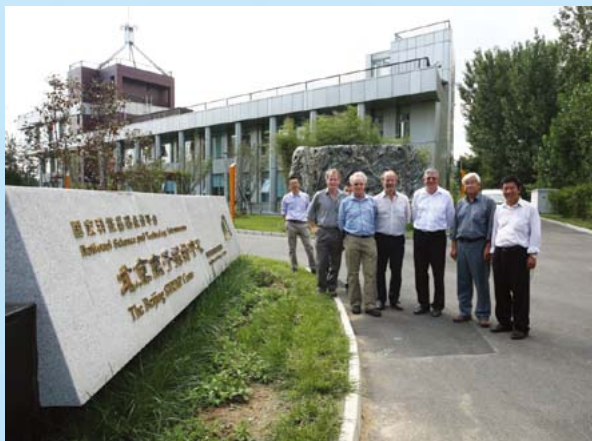


Fig. 4.3.9 Group photo of foreign visitors and LIU Dunyi (second from right)



Fig. 4.3.10 Foreign visitors visiting the SHRIMP Lab at the new base







Fig. 4.3.11 Visitors listening to the introduction of the center's progress







## 5. Important Academic Activities in 2013

### 5.1 International conferences and field excursions organized and held by the Institute

#### 3<sup>rd</sup> Workshop of the IGCP/SIDA-600 project “Metallogenesis of Collisional Orogens in the Tethyside Domain”

Approved at the 39<sup>th</sup> Session of the IGCP Scientific Board on 16–19 February 2011, the IGCP/SIDA-600 Project (2011-2014) is jointly funded by UNESCO and the Swedish International Development Cooperation Agency (SIDA). With Researcher HOU Zengqian, Director-General of Institute of Geology as the principal proposer, this is the second IGCP Project in the field of ore deposits with a Chinese geoscientist as the principal leader. The first and second workshops were held in 2011 and 2012, respectively.

The 3<sup>rd</sup> Workshop of IGCP/SIDA 600 project “Metallogenesis of Collisional Orogens in the East Tethyside Domain” was organized by HOU Zengqian and his working team and was held on 12 August 2013 in Uppsala, Sweden. Fourteen delegates from China, America, Australia, Canada and Iran attended the workshop. They discussed publication of project results, in-depth collaborative research, the next step of the project work, etc., and reached a consensus on these issues.



Fig. 5.1.1. Discussion at the Workshop



Fig. 5.1.2. HOU Zengqian giving an oral presentation.

#### IPRCC 2013 Short Course on “Structural geology and applications to tectonic and mineral deposit studies” and post-course field excursion

The IPRCC Short Course in 2013 on “Structural geology and applications to tectonic and mineral deposit studies” and a post-course field excursion were held successfully in Beijing from 3-6 October 2013. Three world-famous specialists on structural geology, Professor LIN Shoufa from University of Waterloo, Ontario, Canada, Professor Cornelis Willem PASSCHIER from University of Mainz, Germany, and Professor Laurent GODIN from Queen’s University, Kingston, Canada, were invited as lecturers to introduce basic principles of structural geology as well as their application to tectonic and mineral deposit studies. More than 120 post-graduate students and young geologists from all over China participated in the course.





Fig. 5.1.3. Prof. Cornelis Willem PASSCHIER giving a lecture



Fig. 5.1.4. Prof. Laurent GODIN giving a lecture

## International Meeting on Precambrian Evolution and Deep Exploration of the Lithosphere

The Beijing SHRIMP Center, in association with the International Precambrian Research Center of China and SinoProbe, Deep Exploration in China, organized an international meeting on “Precambrian Evolution and Deep Exploration of the Continental Lithosphere” that was held on 7-9 October 2013 in the Loong Palace Hotel and Resort, Changping, Beijing. The meeting was to celebrate the opening of the new SHRIMP Laboratory Building in the Life Science Park of Beijing and to commemorate 30 years of collaborative Precambrian Research in China that began in 1983 with a now famous international meeting held in Beijing at the Temple of the Sleeping Buddha.

The meeting was attended by more than 150 participants, including 50 foreign scientists from Australia, Canada, Cuba, France, Germany, Great Britain, India, Poland, Russia, Spain, Switzerland, and the USA and began in the evening of 6 October with an icebreaker party and buffet dinner held in the lobby of the new SHRIMP Laboratory. During this reception Prof. LIU Dunyi, Director of the SHRIMP Lab, gave a presentation of 10 years of scientific achievements of the Center, and he highlighted some of the developments and spectacular results. Prof. WANG Xiaolie, Vice-President of CAGS, gave a welcoming address and emphasized the importance of basic research in geology. The evening resulted in animated discussions between delegates, and there were a few participants who had already attended the Precambrian meeting 30 years ago and exchanged memories.

The scientific contributions were organized in several thematic sessions and a poster session, each chaired by a Chinese and foreign scientist. The conference once again showed the high level of geoscience research in China as exemplified by geological, isotopic and geophysical data. However it became apparent that in spite of considerable progress during the last 30 years in understanding Precambrian crustal evolution, many problems already discussed for decades remain unresolved such as when plate tectonics began on Earth, whether the Hadean mantle was already depleted or not, how Archean grey gneiss terranes formed and evolved, and whether continental crust was periodically assembled in supercontinents.

The meeting was followed by a 4-day excursion to the Anshan area where the oldest rocks of the Asian continent are exposed. This trip, led by Prof. WAN Yusheng and his collaborators of the Beijing SHRIMP Center, examined 3.8 to 2.9 Ga old granitoid assemblages that demonstrated the complexity of this terrane as exposed in key exposures. Many new field observations and isotopic data of WAN's research team were summarized in an excellent and comprehensive field guidebook. The discussions arising from these observations were similar to those during the meeting and underlined the difficulties in deciphering the early crustal history from only a few isolated outcrops.







Fig. 5.1.5 LIU Dunyi giving an opening address



Fig. 5.1.6 Attendees at the meeting

## 5.2 Other academic activities

### The 44<sup>th</sup> Earth Day: Pupils from Beijing Zhanlanlu Primary School visited the Research Center of 3D Geological Survey of the Institute of Geology

On 22 April 2013, more than 50 pupils from Beijing Zhanlanlu Primary School visited the Research Center of 3D Geological Survey, Institute of Geology, under the guidance of their school teachers and the Directors of Science and Technology Sections of Chinese Academy of Geological Sciences and the Institute of Geology.

Researcher GUAN Ye, Director of the Center, carefully introduced the knowledge of 3D geological survey and led the pupils to experience 3D videos, which intrigued their strong interests in geology. This was the 44<sup>th</sup> Earth Day. The Research Center of 3D Geological Survey has been open to the public and achieved good social recognition.



Fig. 5.2.1 GUAN Ye introducing the 3D geological survey to the pupils



Fig. 5.2.2 Pupils watching 3D videos







## Beijing SHRIMP Center moved to its new base in the Zhong-guan-cun Life Science Park

From February 2013, eight engineers and scientists from Australian Scientific Instruments Pty. Ltd (ASI) in Canberra, Australia, visited the Beijing SHRIMP Centre to help moving and installing of the two BJ SHRIMP instruments.

The entire job was completed in early June and the two SHRIMP instruments in the Beijing SHRIMP New Lab (located at No.21-1, West Circuit, Zhong-guan-cun Life Science Park, Chang-ping, Beijing 102206, China) were operating successfully on 11 June 2013. After the acceptance, the Centre and the SHRIMP instruments were re-opened to the public for dating and stable isotope measurements.



Fig. 5.2.3 The first SHRIMP instrument being debugged at the new base

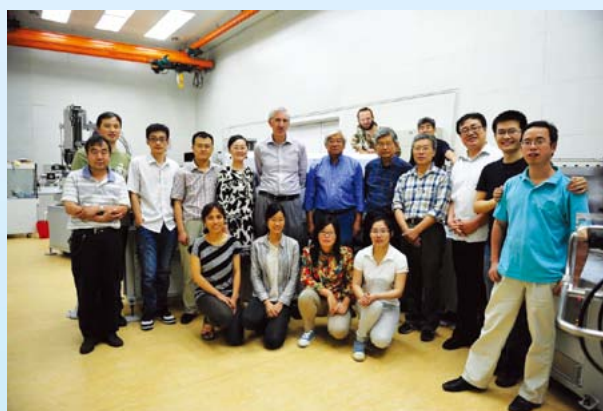
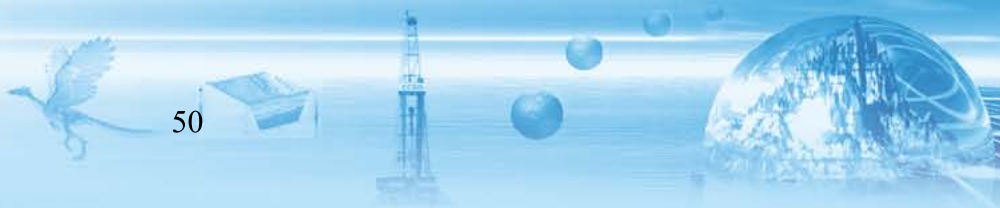


Fig. 5.2.4 Group photo taken after acceptance of the two SHRIMP instruments





## 6. Postgraduate Education

### 6.1 Postgraduate advisors

There were 80 postgraduate students in the Institute in 2013, including 39 doctoral and 41 master's degree candidates. The Institute had 15 new candidates for the doctoral degree and 17 for the master degree. The number of postgraduate students has doubled. Detailed information on the 30 professorial advisors of doctoral students and 23 advisors of master students is listed below.

Advisors of doctoral students			
No.	Name	Speciality	E-mail address
1	SHEN Qihan	Early Precambrian geology and metamorphic methodology	huixiasong@cags.ac.cn
2	XIAO Xuchang	Tectonic geology, ophiolites, and HP metamorphic belts	xxchnng@public.bta.net.cn
3	XU Zhiqin	Micro- and macrotectonics and geodynamics	xzq@ccsd.cn
4	REN Jishun	Geotectonics and global tectonics	renjishun@cags.ac.cn
5	YANG Wencai	Geophysics	yangwencai@ccsd.org.cn
6	LI Tingdong	Regional geology	litdong@163.com
7	HOU Zengqian	Regional metallogeny	houzengqian@126.com
8	LIU Dunyi	Isotope geochronology and isotope geochemistry	liudunyi@bjshrimp.cn
9	YANG Jingsui	Petrology	yangjingsui@yahoo.com.cn
10	GAO Rui	Deep geophysical probing, lithospheric structure, and geodynamics	gaorui@cags.ac.cn
11	YAO Jianxin	Conodont fauna and stratigraphy	yaojianxin@gmail.com
12	JI Qiang	Mesozoic paleontology	jirod@cags.ac.cn
13	WANG Tao	Tectonics and magmatic geology	taowang@cags.net.cn
14	LI Jinyi	Tectonics	jyli2003@126.com
15	CHEN Wen	Isotope geochronology	chenwenf@vip.sina.com
16	ZHU Xiangkun	Isotope geochronology	xkzhu0824@gmail.com
17	WU Cailai	Regional igneous petrology and agrogeology	wucailai@126.com
18	WAN Yusheng	SHRIMP geochronology, isotope geochemistry, and early Precambrian geology	wanyusheng@bjshrimp.cn
19	JIN Xiaochi	Biostratigraphy, sedimentology and paleogeography	jinxchi@cags.ac.cn
20	LIU Fulai	UHP metamorphic belts and isotope geochronology	lf10225@sina.com
21	ZHANG Jianxin	Metamorphism and orogenic deformation	zjx66@yeah.net
22	ZHANG Zeming	Paleontology and metamorphic geology	zzm2111@sina.com
23	LI Haibing	Active tectonics and tectonic geomorphology	lihaibing06@yahoo.com.cn
24	ZENG Lingsen	Petrology, geochemistry and tectonics	changting1970@yahoo.com
25	JIAN Ping	Isotope geochronology	jianping_510@aliyun.com
26	YAN Zhen	Structural geology	yanzhen@mail.iggcas.ac.cn
27	LIU Pengju	Paleontology and stratigraphy	pengju@cags.ac.cn
28	YANG Tiannan	Tectonics	yangtn@cags.ac.cn
29	MENG Fancong	Igneous petrology	mengfancong@yeah.net
30	LV Junchang	Mesozoic reptiles (dinosaurs and pterosaurs) and biostratigraphy	Lujc2008@126.com



Advisors of Master students			
No.	Name	Speciality	E-mail address
1	QIU Xiaoping	Petrology	qiuxping@cags.ac.cn
2	SONG Biao	SHRIMP geochronology	songbiao@cags.ac.cn
3	DING Xiaozhong	Regional geological mapping and GIS application	Xiaozhongding@sina.com
4	LIU Yan	Petrology	yanliu0315@yahoo.com.cn
5	LIU Yongqing	Sedimentology	liuyongqing@cags.ac.cn
6	JI Shu'an	Mesozoic reptiles (including birds) and biostratigraphy	jishu_an@sina.com
7	LI Qiusheng	Geophysics	liqiusheng@cags.ac.cn
8	ZHOU Xiwen	Metamorphic geology	xwzhou@cags.ac.cn
9	REN Liudong	Metamorphism and Antarctic geology	ldren@cags.ac.cn
10	WANG Yong	Quaternary geology	wangyong@cags.ac.cn
11	WANG Yanbin	Isotopic dating and geological structures	wangyanbin@bjshrimp.cn
12	XUE Huaimin	Petrology	huaiminx@sina.com
13	QI Xuexiang	Tectonics and mineral deposits	qxuex2005@163.com
14	YANG Chonghui	Metamorphic geology	chhyang@cags.ac.cn
15	ZHANG Jin	Tectonics	zhangjinem@sina.com
16	JI Zhansheng	Paleontology and stratigraphy	jizhansheng@vip.sina.com
17	HE Rizheng	Geophysics	herizheng@cags.ac.cn
18	SHI Yuruo	Isotope geochronology	shiyuruo@bjshrimp.cn
19	YU Changqing	Geophysical Prospecting and Information Technology	yucq@tom.com
20	YANG Zhiming	Petrology	zm.yang@hotmail.com
21	LIU Jianhui	Tectonics	liujianhui1999@163.com
22	ZHAI Qingguo	Tectonics	zhaiqingguo@126.com
23	HE Bizhu	Mineral resources investigation and exploration	hebizhu@vip.sina.com

## 6.2 Educational activities and news

### Thirteen graduate students were awarded diplomas at the 2013 graduation ceremony

Eight doctoral and five postgraduate students completed their studies and obtained their degrees. WEI Xuefang and SONG Bo won the CHENG Yuqi Excellent Graduate Award; LI Jianhua received the CHENG Yuqi Excellent Thesis Award; GONG Jianghua, SUN Jingbo and SONG Bo were awarded the academic “Outstanding Graduate” honor, and six additional graduate students received the academic “excellent student” honorary title. JIANG Xiaojun was awarded “excellent graduate student” by the Beijing Education Department.

MENG Fancong, LIU Pengju, LV Junchang and YANG Tiannan were promoted to advisors of doctoral candidates, YU Changqing, YANG Zhiming, LIU Jianhui, ZHAI Qingguo and HE Bizhu were approved to be advisors of Master's candidates by the Degree Assessing Committee of CAGS.



Fig. 6.2.1 Graduation ceremony of the 2013 postgraduate students





## 7. Publications

### 7.1 English language publications:

- Bao Peisheng, Su Li, Wang Jun, Zhai Qingguo. 2013. Study on the tectonic setting for the ophiolites in Xigaze, Tibet. *Acta Geologica Sinica (English Edition)*, 87: 395-425.
- Cai Zhihui, Cao Hui. 2013. The formation mechanism of garnet porphyroblast in quartz schist, Namche Barwa. *Journal of Nepal Geological Society*, 46: 57-68.
- Cui Junwen, Lin Weiren, Wang Lianjie, Gao Lu, Huang Yao, Wan Weig, Sun Dongsheng, Li Zongfan, Zhou Chunjing, Qian Huashan, Peng Hua, Xia Kemei, Li Ke. 2013. Determination of three-dimensional in situ stresses by anelastic strain recovery in Wenchuan Earthquake Fault Scientific Drilling Project Hole-1 (WFSD-1). *Tectonophysics*, in press.
- Dong Jin, Gao Rui, Wang Yong, Zhang Shihong, Yap Peiyi, Chi Zhenqing, Zhao Zhili. 2013. Magnetic fabric study of late Holocene sediments in Huangqihai Lake, Inner Mongolia and its sedimentary significance. *Acta Geologica Sinica (English Edition)*, 87: 186-196.
- Du Lilin, Yang Chonghui, Wang Wei, Ren Liudong, Wan Yusheng, Wu Jiashan, Zhao Lei, Song Huixia, Geng Yuansheng, Hou Kejun. 2013. Paleoproterozoic rifting of the North China Craton: Geochemical and zircon Hf isotopic evidence from the 2137 Ma Huangjinshan A-type granite porphyry in the Wutain area. *Journal of Asian Earth Sciences*, 72: 190-202.
- Gao Linzhi, Ding Xiaozhong, Yin Chongyu, Zhang Chuanheng and Fronk R. Ettensohn. 2013. Qingbaikouan and Cryogenian in South China: Constraints by SHRIMP Zircon U-Pb dating. *Acta Geologica Sinica (English Edition)*, 87: 1540-1553.
- Gao L.E., Zeng L.S., Hou K.J., Tang S.H., Xie K.J., Hu G.Y., Wang L. 2013. Episodic crustal anatexis and the formation of Paiku composite leucogranitic pluton in the Malashan Gneiss Dome, Southern Tibet. *Chinese Science Bulletin*, 58: 3546-3563
- Gao Rui, Hou Hesheng, Cai Xunyu, James H. Knapp, He Rizheng, J Liu inkai, Xiong Xiaosong, Guan Ye, Li Wenhui, Zeng Lingsen and Steven W. Roecker. 2013. Fine crustal structure beneath the junction of the southwest Tianshan and Tarim Basin, NW China. *Lithosphere*, 5: 382-392.
- Gao Rui, Chen Chen, Lu Zhanwu, Larry D. Brown, Xiong Xiaosong, Li Wenhui, Deng Gong. 2013. New constraints on crustal structure and Moho topography in Central Tibet revealed by SinoProbe deep seismic reflection profiling. *Tectonophysics*, 606: 160-170.
- Gao Rui, Wang Haiyan, Yin An, Dong Shuwen, Kuang Zhaoyang, Sndrew V. Zuza, Li Wenhui, Xiong Xiaosong. 2013. Tectonic development of the northeastern Tibetan Plateau as constrained by high-resolution deep seismic-reflection data. *Lithosphere*, 5: 555-574.
- Guo Caiqing, Yao Jianxin, Wu Pengcheng, Li Chengsen. 2013. Early Miocene mosses from Weichang, North China and their environmental significance. *Acta Geologica Sinica*, 87: 801-812.
- Guo Xiaoyu, Gao Rui, G. Randy Keller, Xu Xiao, Wang Haiyan, Li Wenhui. 2013. Imaging the crustal structure beneath the eastern Tibetan Plateau and implications for the uplift of the Longmen Shan range. *Earth and Planetary Science Letters*, 379: 72-80.
- He Z.Y., Zhang Z.M., Zong K.Q., Dong X.. 2013. Paleoproterozoic crustal evolution of the Tarim Craton: constrained by zircon U-Pb and Hf isotopes of meta-igneous rocks from Korla and Dunhuang. *Journal of Asian Earth Sciences*, 78: 54-70.
- Jia Jianliang, Achim Bechtel, Liu Zhaojun, Susanne A.I. Strobl, Sun Pingchang, Reinhard F. Sachsenhofer. 2013. Oil shale formation in the Upper Cretaceous Nenjiang Formation of the Songliao Basin (NE China): implications from



- organic and inorganic geochemical analyses *International Journal of Coal Geology*, 113: 11-26.
- Jia Jianliang, Liu Zhaojun, Achim Bechtel, Susanne A. I. Strobl, Sun Pingchang. 2013. Tectonic and climate control of oil shale deposition in the Upper Cretaceous Qingshankou Formation (Songliao Basin, NE China). *International Journal of Earth Sciences*, 102: 1717-1734.
- Jian Ping, Alfred Kröner, Bor-ming Jahn, Liu Dunyi, Zhang Wei, Shi Yuruo, Ma Huadong. 2013. Zircon ages of metamorphic and magmatic rocks within peridotite-bearing mélanges: Crucial time constraints on early Carboniferous extensional tectonics in the Chinese Tianshan. *Lithos*, 172-173: 243-266.
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