



Annual Report in 2010

Institute of Geology
Chinese Academy of Geological Sciences
(CAGS)





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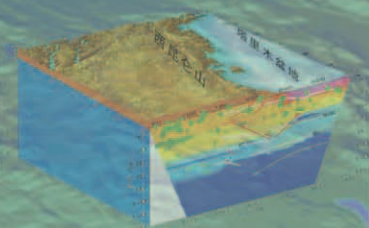
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Preface

The Institute of Geology was formally founded in 1956 and is affiliated to the Chinese Academy of Geological Sciences (CAGS) under the Ministry of Land and Resources of China (MLR). As a national public scientific research institution, the Institute of Geology is an integral part of the national scientific and technological innovation system and is mainly engaged in national fundamental, public, strategic and frontier geological survey and geoscientific research.

During the past over 50 years, the scientific research personnel of the Institute have focused on the frontiers of the geosciences and conducted fundamental geological survey and geoscientific research in line with the nation's development objectives. A batch of high-level research results have been achieved in resolving key geological problems restricting resources exploration, the introduction and development of new and high geoscientific technology, and the research on geoscientific theories. To date, the Institute has built itself into a comprehensive geoscientific research institution with a wide range of research fields, an optimized personnel structure and advanced equipment. The Institute has shaped research fields and directions competitive both at home and abroad in regional geology and geological mapping, tectonics, the origin and evolution of life, stratigraphy, Precambrian geology, ultrahigh pressure metamorphic geology, petrology, mineralogy, geochemistry and the Earth materials science, continental dynamics and mantle dynamics, metallogenic geological settings and regional metallogeny, lithospheric structure and geodynamics, isotopic geology etc. The Institute has become one of the important national bases for the fostering of high-level talents in the fields of geological survey and geoscientific research.

The Institute has attached great importance to international academic exchanges and cooperation and established friendly cooperation ties with over 50 scientific research institutions and universities in more than 20 countries and regions, including the United States, Russia, France, the UK, Germany, Republic of Korea, Japan etc. The research teams of the Institute have also kept long-standing and sound cooperation ties with dozens of international scientific research organizations, with over 20 experts from the Institute holding important posts in related international academic organizations. Four foreign experts have won the Chinese government's "Friendship Award" due to their long-term and outstanding cooperation with the Institute.

Entering the new century and in particular during the past 5 years, the Institute has gained notable progress in scientific research, personnel training and international cooperation, with more frequent cooperation and exchange activities, expanded cooperation fields, abundant output of new research results and increased number of papers published in "Nature", "Science" and other international academic journals. In 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 influence, it is decided that the English version of the Institute's annual report will be published since 2011.

The annual report includes the following 7 parts: (1) Introduction to the Institute of Geology, CAGS; (2) Ongoing Research Projects; (3) Research Achievements; (4) Cooperation and Exchange; (5) Important Academic Activities in 2010 and 2011; (6) Training and Education; (7) Publications.

Finally, we would like to express our sincere gratitude to the colleagues from related research departments and centers of the Institute for their great support and efforts of drafting and providing related materials during the compilation of the annual report – a written record of the hard work of the Institute's scientific research personnel for the year of 2010. Besides, we also would like to thank Ms. Li Wei for her efforts of translating related parts of the report.

The Editorial Board of
the Annual Report (English Version) of the Institute of Geology,



1.Introduction

Institute of Geology, Chinese Academy of Geological Sciences (CAGS) was formally founded in April 1956, whereas it can be historically traced back to the former Central Geological Survey as early as the 1910s. As a national public scientific research institution, Institute of Geology is an integral part of the national scientific and technological innovation system, providing technological support for the national geoscientific research and investigation of geology and mineral resources. The institute is mainly engaged in nationally, fundamentally, publically, strategically geoscientific frontier research and basically geological survey. It is one of the important national research bases of the solid earth sciences, the application of earth science-related technologies, and the fostering of high-level geoscientists.

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

At present, 203 staffs are there in the institute, including 6 academicians of CAS, 64 research fellows, and 45 associate research fellows. Among the staffs, 102 researchers earned the doctoral degree, and 19 earned the master degree. Among the senior researchers, there are 22 advisers of doctoral candidates and 44 advisers of master candidates.

By end of December of 2010, the institute has won 156 science and technology awards at national, provincial and ministerial levels, among which there are 24 prizes of the National Science Conference Award for the year of 1978, 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 prize). Since 1981, more than 2800 research papers and 110 monographs have been published. 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.



The main building of the Institute



Organizational framework

The structure of the Institute is as follows:

Administrative Divisions

General Office
Science and Technology Division
Service and Security Division
Financial Division

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 for Continental Dynamics
Laboratory of Isotope Geology
Lithosphere Research Center
Beijing SHRIMP Center
Mineral and Energy Resources Center

Key Laboratories

Key Laboratory for Continental Dynamics, Ministry of Land and Resources
Laboratory of Isotope Geology, Ministry of Land and Resources
Key Laboratory of Stratigraphy and Paleontology, CAGS
Key Laboratory of Earthprobe and Geodynamics, CAGS

Technological Support Organizations

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

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
Evolution and the origin 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



2. Ongoing Research Projects

The Institute had 93 ongoing research projects in 2010 which are listed below (new projects starting in 2011 are not included here).

2.1 Projects funded by the National Natural Science Foundation of China

Key Projects:

No.	Chief Investigator	Project	Duration	Email Address
1	GAO Rui	Lithospheric structure of the western Qinling orogenic belt and deep processes of crustal deformation along the northeastern margin of the Qinghai-Tibet Plateau	2009—2012	ruigao126@126.com
2	HOU Zengqian	Porphyry Cu deposits in continental settings, China: Geodynamics and genetic models	2008-2011	houzengqian@126.com
3	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
4	LIU Fulai	Dynamic process of differential subduction and exhumation of crustal slices in the Sulu-Dabie HP-UHP metamorphic terrane	2008-2011	lf0225@sina.com
5	LIU Yongqing	Response of late Mesozoic biota evolution and environment to craton break-up of North China	2010-2013	Liuyongqing@cags.ac.cn
6	WANG Tao	Mechanisms, timing and geodynamics of Mesozoic crustal thinning in the North China Craton	2008-2011	taowang@cags.ac.cn
7	XU Zhiqin	Continental dynamics and resource effects of the Qinghai-Tibet Plateau	2010-2012	xzq@ccsd.cn
8	YANG Jinghui	Unusual minerals in ophiolitic mantle rocks and chromite and deep geological processes	2010-2013	yangjinghui@yahoo.com.cn

General Projects:

No.	Chief Investigator	Project	Duration	Email Address
1	HE Rizheng	The deep structure under the central Qiangtang uplift and its tectonic relationship with two side basins	2008-2010	rizheng_cn@sina.com
2	HE Rizheng	Study on seismic structure and geodynamics of mantle-derived volcanic rocks in northern Tibet	2010-2012	rizheng_cn@sina.com
3	HE Zhengjun	Syntectonic sedimentary response of the Shangyi Basin in northwest Hebei during the late Jurassic	2009-2011	zhhecags@126.com
4	Ji Zhanzheng	Research on the stratigraphy and paleontology of the Coqen Basin in the Late permian to Early Jurassic	2008-2010	jizhansheng@vip.sina.com
5	JIN Xiaochi	Restoration, subdivision and correlation of middle-late Permian carbonate successions of the Baoshan Block, western Yunnan	2009-2011	jinxchi@cags.ac.cn
6	JIN Xiaochi	Fifth International Symposium of the International Geoscience Project IGCP 516	2010-2010	jinxchi@cags.ac.cn
7	LI Pengwu	Paleomagnetic study of the closure-time of the Paleo-Asian Ocean in central Inner Mongolia	2008-2010	lipengwu@cags.ac.cn
8	LI Qiuosheng	Active seismic intro-action studies on the basement structure of the Qiangtang Basin, Tibet Plateau	2009-2011	liqiuosheng@cags.ac.cn



9	LI Zhaoli	Helium isotope geochemistry of eclogite from oceanic or continental subduction	2010-2012	lizhaoli3@tom.com
10	LJU Pengjiu	Restudy of Metazoan fossils From Weng'an Biota of the Sinian Doushantuo Stage	2008-2010	pengjiu@cags.ac.cn
11	LU Zhanwu	Character of Moho reflections in the Luzong volcanic basin and implications for deep mineralization	2008-2010	luzhanwu78@163.com
12	LV Junchang	Study of dinosaur fauna in western Henan	2009-2011	lvjc2008@126.com
13	PAN Xiaofei	Genesis and formation of Bairendaba Ag-Pb-Zn deposits in Daxing'anling: Evidence from alteration, mineralization zoning and ore-forming fluids	2009-2011	pan_smile0551@sina.com
14	SHI Yuruo	Study on the chronology, tectonic setting, and magma genesis of granites in central Inner Mongolia and southern Mongolia	2008-2010	shiyuruo@bjahrimp.cn
15	TONG Ying	Temporal and special distributions and genesis of two stage alkaline granite in the margin of southern Altai and its tectonic implications	2008-2010	yingtong@cags.ac.cn
16	WANG Yanbin	Crustal evolution of the Larsemann Hills and adjacent areas, East Antarctica: U-Pb and Hf isotopic studies of zircons	2008-2010	yanbinw@cags.ac.cn
17	WANG Yong	Detailed study of Cenozoic strata from the western Kunlun Foreland Basin and its constraints on the timing of uplift of northwestern Qinghai-Tibet	2009-2011	wangyong@cags.ac.cn
18	XUE Huaimin	Bimodal metavolcanic rocks of the Suizhou Group exposed in the Suizhou-Zaoyang area, northern Hubei Province, and Neoproterozoic crust-mantle interaction along the northeastern margin of the Yangtze Craton	2008-2010	huaiminx@sina.com.cn
19	YAN Quanren	Ultramafic and mafic complexes exhumed by the Xianshuihe Fault: New insights into the timing and affinity of the basement in the Songpan-Ganzi Block	2009-2011	qryan@cags.ac.cn
20	YAN Zhen	Sedimentary provenance constraints on the Devonian paleotectonic setting of the East Qinling Mountains	2008-2010	yanzhen@mail.iggcas.ac.cn
21	YANG Zhiming	Gold enrichment mechanism during magmatic-hydrothermal processes at the Bilibie gold deposit in Mongolia: Constraints on the genesis of Au-rich porphyry copper deposits	2010-2012	cagzyzm@yahoo.com.cn
22	YUAN Chongxi	Research on fossil Mammals from the Lujiatun Area, western Liaoning Province and its relative strata	2010-2012	yuanchongxi@cags.ac.cn
23	ZHANG Jianxin	Lawsonite eclogite and associated rocks: Constraints on paleo-subduction zones in North Qilian and North Altyn Tagh	2008-2010	zjx66@yeah.net
24	ZHANG Yan	Study on (U-Th)/He dating	2008-2010	zhangyan@cags.ac.cn
25	ZHANG Zeming	Metamorphism and geodynamics of the northeastern Lhasa Terrane, Tibet	2010-2012	zzm2111@sina.com
26	ZHANG Zeming	Metamorphic fluids from the Namche Barwa Complex of the eastern Himalayan Syntaxis, southern Tibet, and their spatial and temporal evolution	2008-2010	zzm2111@sina.com
27	ZHENG Hongwei	3-D velocity structure of the crust and upper mantle in southeast China and geodynamic model	2010-2012	zhenghongwei004@sina.com
28	ZHOU Xiwen	Study on metamorphic evolution and anatexis of the khondalite series in the Helanshan region	2009-2011	xwzhou@cags.ac.cn
29	ZHU Xiangkun	Constraints of Fe and Mg isotopes on the origin of the Bayan Obo ore deposit, Inner Mongolia	2010-2012	xlzhu0824@gmail.com

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

No.	Chief Investigator	Project	Duration	Email Address
1	GAO Jinxi XU Jiren	Chinese continental scientific drilling: Long-term geophysical observations and research on the deep borehole	2009-2011	gaojinxi@cags.net.cn; xujiren@ccad.cn
2	HOU Zengqian	Systematic evaluation methods and their application to Cu, Pb-Zn and Ag	2006-2010	houzengqian@126.com



		deposits in the northern segment of the Sanjiang area in China		
3	HOU Zengqian	Continental convergence and metallogenesis south of the Tibet Plateau	2010-2015	houzengqian@126.com
4	Ji Qiang	Evolution and alteration of Cretaceous terrestrial biotas, and paleoclimatic variations	2006-2010	jirod@cags.ac.cn
5	JIANG Mei	Survey of a seismic reflection profile cross Mountain Longmen and interpretation of deep geological structures	2008-2011	mjmci@gmail.com
6	LI Haibing	Structure and tectonic evolution of the earthquake fault zones and the recurrence interval of large Earthquakes as part of the Wenchuan Earthquake Fault Scientific Drilling Project	2008-2011	lihaibing06@yahoo.com.cn
7	LI Haibing	Core documentation and scientific experiment/test	2008-2011	lihaibing06@yahoo.com.cn
8	LI Jinyi	Major fault systems and their disturbance on previous tectonic and metallogenic framework	2007-2011	jyli2003@126.com
9	LI Qiusheng	3D deep structure of Central and Eastern Asia	2008-2010	liqiusheng@cags.ac.cn
10	LIU Danyi	Research and development (R & D) of core technologies and key parts of the Secondary Ion Mass Spectrometer (SIMS)	2006-2010	liudanyi@bjshrimp.cn
11	LIU Danyi	Micro-scale and in-situ analytical methodology of light isotopes using SHRIMP IIe-MC and its model applications	2010-2012	liudanyi@bjshrimp.cn
12	LIU Danyi	SHRIMP zircon geochronology of Apollo lunar samples and lunar meteorites	2009-2011	liudanyi@bjshrimp.cn
13	SU Dechen	Information integration and data sharing in the Wenchuan Earthquake Fault Scientific Drilling Project	2008-2011	sudechen@gmail.com
14	WANG Zongqi	Studies on the geological setting of mineralization and evaluation of Pb-Zn, Ag, Cu and Au resources in the West Qinling Orogenic Belt	2006-2010	wzq@ccsd.org.cn
15	XU Zhiqin	Synthetical study on the tectonic background and earthquake mechanism of the Wenchuan earthquake	2008-2011	xzq@ccsd.cn
16	XU Zhiqin	Geological survey of the scientific drilling site selection for the Wenchuan Earthquake Scientific Drilling Project	2008-2011	xzq@ccsd.cn
17	YANG Wencai	VSP seismic profiles and construction of 3D velocity models at the drill site	2008-2011	yangwencai@ccsd.cn
18	YIN Chongyu	Research on standard sections and some global stratotype section and points (GSSPs) in China	2007-2010	chongyuyin@cags.net.cn
19	ZENG Lingsen	Geochemical nature and thermal history of the seismogenic zone for the 2008 Wenchuan Earthquake	2008-2011	changting1970@yahoo.com

2.3 Projects sponsored by China Geological Survey

No.	Chief Investigator	Project	Duration	Email Address
1	CHEN Wen	Preparation of reference materials for key isotopic measurements	2008-2010	chenwenf@vip.sina.com
2	CHI Zhenqing	Strategic research of the Geological Survey	2008-2010	zqchi@263.net
3	DING Xiaozhong	International Co-operation Mapping of 1:1 Million Geological Map (One Geology-China)	2009-2010	xiaozhongding@sina.com
4	GAO Jinxi JIN Xiaochi	Lithofacies and paleogeographic maps of China	2009-2011	jinxchi@cags.ac.cn
5	GAO Rui	Deep structure beneath the transition zone between mountain and basin, and a study of oil and gas prospect	2007-2009	ruigao126@126.com
6	GENG Yuansheng	Building up a stratigraphic structure in important mineralization provinces and belts, China	2009-2010	ya-geng@cags.ac.cn
7	GUO Xianpu	Coupled relationship between the eastern orogenic belt of the Qinghai-Tibet Plateau and the Sichuan Basin	2009-2010	guoxianpu@cags.ac.cn
8	HOU Zengqian	Genetic links between collisional processes and ore formation in the Tibetan collisional orogen	2009-2011	houzengqian@126.com
9	Ji Shu'an	Study on the checklist for national key protective fossils of China	2009-2010	jiahu_an@sina.com



10	JI Shaochen	Rheology of the lithosphere and verification of the channel-flow model in the eastern and southeastern Tibetan Plateau	2009-2010	xucp77@yahoo.cn
11	JI Zhansheng	Study on the Lower-Middle Triassic Paleontology and stratigraphic correlation of the South Qiangtang basin	2009-2010	jizhansheng@vip.sina.com
12	JI Qiang	Definitions and reference sections for the Devonian-Carboniferous boundary of different facies in China	2009-2010	jirrod@cags.ac.cn
13	JIANG Mei	The tomography of the Qinghai-Tibet Plateau and its crust-mantle structure	2009-2010	mjmeij@gmail.com
14	LI Haibing	Research on active tectonics in the western Himalayan Syntaxis	2009-2010	lihaibing06@yahoo.com.cn
15	LI Jinyi	Systematic investigations and research on the major tectonic framework of the Xin'an-Mongolian Orogenic Belt	2010-2012	jyli2003@126.com
16	LI Jinyi	Active history of Major faults of northern China and adjacent regions and their disturbance on the previous tectonic and metallogenic framework	2006-2010	jyli2003@126.com
17	LI Jinyi	Accretional orogenic processes, continental growth of northern China and constraints on metallogenesis	2007-2010	jyli2003@126.com
18	LI Tingdong	Comprehensive integration of the Divisions of Geological Structure and Regional Geological Survey of China	2008-2015	ltdong@163.com xiaozhongding@sina.com
19	LIU Fulai	Genetic mechanism of high-pressure granulites in the Shandong Peninsula, southeastern Sino-Korean craton	2008-2010	lfl0225@sina.com
20	LIU Pengju	Study on chronostratigraphy of the Meso- to Neoproterozoic and subdivision of the Ediacaran	2009-2010	pengju@cags.ac.cn
21	LIU Yongqing	A survey on Mesozoic basins and energy resources in the Xingmeng Orogen	2010-2012	Liyongqing@cags.ac.cn
22	MENG Fancong	Plate system of the Qimantage orogen and constraints on magmatism and metallogeny	2009-2010	mengfancong@yeah.net
23	QI Xuexiang	Large-scale strike-slip shearing in the Ailaoshan-Jingshajiang orogeny, southeastern Tibet-Qinghai Plateau, and constraints on mineralization	2009-2010	qxuex2005@163.com
24	REN Jishun	Research on the geodynamic evolution of the Three Tectonic Domains in Asia	2006-2010	renjishun@cags.ac.cn
25	REN Jishun	Compilation and research for the Geological Map of Asia (1:5,000,000)	2003-2010	renjishun@cags.ac.cn
26	SHEN Qihan	Compilation and research for the Metamorphic Map of China (1:5,000,000)	2008-2011	huxiasong@cags.ac.cn
27	WAN Yusheng	Early Precambrian events in China: Continental growth and mineralization	2007-2010	wanyusheng@bjshrimp.cn
28	WANG Tao	Comparative study of granitoid magmatism and setting of mineralization in major orogens of China and adjacent areas	2006-2010	taowang@cags.ac.cn
29	WANG Tao	Study and mapping of Mesozoic granitoids in Asia	2010-2012	taowang@cags.ac.cn
30	WANG Yong	Climatic changes along the monsoon margin of eastern China since the last interglacial	2010-2012	wangyong@cags.ac.cn
31	WANG Yong	Environmental changes on the central Mongolia Plateau since 20 ka	2009-2010	wangyong@cags.ac.cn
32	WU Cailai	Granitic magmatism and metallogeny in the northeastern Qinghai-Tibet Plateau	2009-2010	wucailai@ccsd.cn
33	XIAO Xuchang	Tectonic environment of main ophiolites in the western region of China	2009-2011	xxchang@public.bta.net.cn
34	XIAO Xuchang	Sino-Pakistan cooperation - Investigation for mineral resources in the West Kunlun	2006-2010	xxchang@public.bta.net.cn
35	XU Zhiqin	Continental dynamics and mineralization of the Tibetan Plateau	2008-2010	xzq@ccsd.cn
36	XU Zhiqin	Formation and dynamical mechanism of the eastern Himalayan Syntaxis	2009-2010	xzq@ccsd.cn
37	XUE Huaimin	Dynamic mechanism of the upheaval processes and resource response of the continental lithosphere of eastern China in the Mesozoic	2007-2010	huaiminx@sina.com.cn



38	YAN Quanren	Depositional sequences in the Mesozoic basins on the eastern margin of the Yangtze Block, South China: Their response to tectono-thermal and metallogenic events	2010-2012	qryan@cags.ac.cn
39	YAN Zhen	Study on the tectonic environment of mineralization in the conjunctive area of the Qinling, Qilian and Kunlun orogenic belts	2009-2010	yanzhen@mail.iggcas.ac.cn
40	YANG Chonghui	Correlation of key strata in China and Asia	2006-2010	chhyang@cags.ac.cn
41	YANG Jingsui	Formation and evolution of the Tethys suture zone in the southern part of the Tibetan Plateau	2009-2010	yangjingsui@yahoo.com.cn
42	YANG Jingsui	Kinematics of the giant Central Composite Orogenic Belt of China	2007-2010	yangjingsui@yahoo.com.cn
43	YANG Tianan	Large-scale thrusts and Pb-Zn metallogeny in the Tuotuohe-Yushu area, north-central Tibet	2008-2010	yangtn@cags.ac.cn
44	YU Changqing	Special processing of deep reflection seismic data and multi-scale Wavelet analysis of gravity and the magnetic field	2009-2010	yucq@tom.com
45	ZENG Lingsen	Magmatism and lithospheric dynamics in southern Tibet since the Cenozoic	2009-2010	changting1970@yahoo.com
46	ZHANG Jianxin	Multi-orogeny and metallogenesis in the northern Tibetan Plateau	2009-2010	zjx66@yeah.net
47	ZHANG Zeming	Tectonic evolution of the metamorphic basement of southern Tibet	2009-2010	zzm2111@sina.com
48	ZHU Xiangkun	Environmental conditions recorded by Precambrian banded iron formations	2009-2010	xkzhu0824@gmail.com

Note: The first name of these chief investigators is family name.



2.4 Introduction to major programs and projects

Chinese Government-funded earth science program: Wenchuan Earthquake Fault Scientific Drilling project (WFSD) (LI Haibing et al.)

The Wenchuan Earthquake Fault Scientific Drilling (WFSD) is a rapid response project to study this great earthquake and its continuing aftershocks. This project will drill five boreholes to depths of 600 to 3000 m along the Wenchuan earthquake fault zone. Three boreholes will be situated at the maximum displacement locations along the Yingxiu-Beichuan fault with a 270 km surface co-seismic surface rupture zone and on the Anxian-Guanxian fault with an 80 km co-seismic surface rupture zone that developed during the Wenchuan earthquake.

The scientific goal of the WFSD project is through various analyses of rock samples from the boreholes, on-line fluid geochemical monitoring, and borehole geophysical logging of five boreholes (600-3000 m) to obtain more information including the following five aspects: 1) determine the composition, texture and structure of the fault zones; 2) reconstruct the physical and chemical properties of the fault zones (including frictional factors, fluid pressure, stress intensity, permeability, seismic wave, etc.) during the earthquake energy budget and rupture processes; 3) improve our understanding of the transpressional behavior of this fault zone; 4) provide key information for forecasting, prediction, and early warning of future large earthquakes; 5) instruments for long-term monitoring will be installed in the boreholes after drilling.

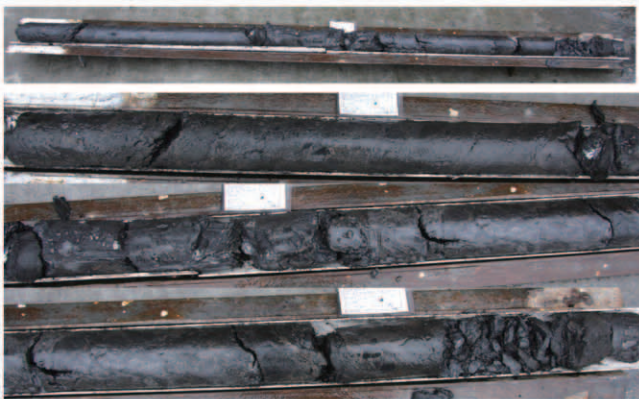


Fig.2.1a Fresh gouges from WFSD-1 Cores

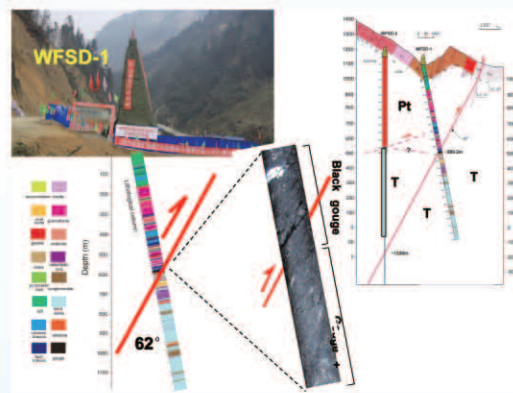


Fig.2.1b Wenchuan earthquake fault plane (for Yingxiu-Beichuan fault) is suggested to dip at an angle of about 62°

SinoProbe-05: Selecting continental scientific drill sites and experimenting with drilling technologies (YANG Jingsui and SinoProbe-05 Team)

The project “Selecting Continental Scientific Drilling Sites and Experimenting with Drilling Technologies” is a new endeavor at scientific drilling and is the fifth project (SinoProbe-5) under the Chinese Deep Exploration Technology and Experimentation Plan. This project will focus on seven critical tectonic and mineral resources regions, including the Jinchuan Cu-Ni sulfide deposits in Gansu, the Luobusa chromitite deposits in Tibet, the Tengchong volcano-thermal tectonic zone in Yunnan, the boundary of the North China and South China Blocks in the Laiyang Basin of Shandong, the Yudu-Ganxian polymetallic deposits in South China, the Tongling polymetallic deposit, and the Luzhong volcanic basin and mineralized district in Anhui.



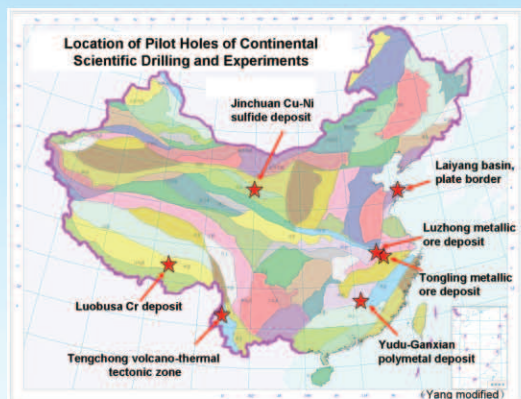


Fig 2.2a Location of pilot holes for continental scientific drilling and experiments



Fig 2.2b Drill-site of the Luobusa chromite deposit, Tibet

SinoProbe-02: An integrated experiment using deep-exploration techniques to reveal the interior structure beneath the continental crust and upper mantle in China (GAO Rui and SinoProbe-02 Team)

SinoProbe-02 is one of the key projects of SinoProbe. We plan to design experiments and use deep geophysical methods such as seismic reflection profiling, deep seismic sounding, broadband seismic observations, magnetotelluric surveys and other methods, augmented by active-passive and controlled-source detection systems, to explore the structure and composition of the continental crust and upper mantle beneath China.

SinoProbe-02 plans to complete four long profiles across major orogens and sedimentary basins to reveal the deep tectonic features of the Chinese continent and to develop an integrated technology program that will include various methods appropriate for investigating different tectonic settings. Fig. 2.3 shows the plan for four major transects that include: Himalaya-Karakoram-Tibet profiles (~500 km); South China profiles (~2200 km); North China profiles (~630 km); Northeast China profiles (~1500 km).

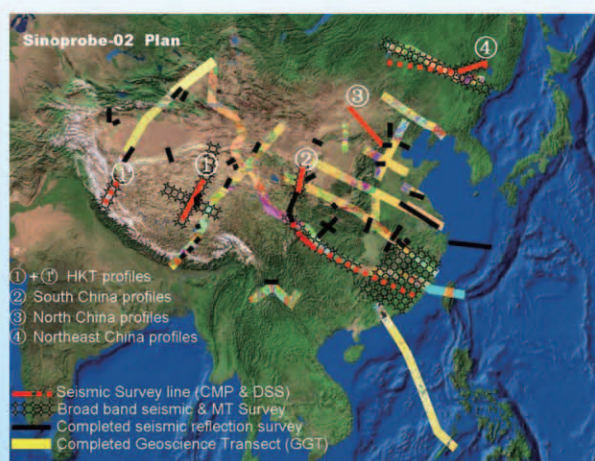


Fig.2.3 Four long transects (red lines) of the SinoProbe-02 plan



Using near-vertical deep seismic reflection profiling as the spearhead technology which can probe the characteristics of the continental crust with greater resolution, accuracy, and reliability, we can greatly enhance imaging of the detailed structure and type of deformation of the crust, augmented by adoption of passive-source earthquake tomography and joint reflection-refraction tomography which can significantly increase the accuracy and resolution of 3-D quantitative velocity imaging. This will also aid in resource identification and exploration under SinoProbe-2.

A1101-1 (National Basic Research Program of China, 973 Project)
Continental convergence processes in southern Tibet and related metallogenesis (HOU Zengqian and his team)

This project has six sub-projects, and their objectives are: (1) To investigate continental convergence processes and ore-forming geological settings in southern Tibet; (2) To understand processes of primary volcanism and magmatism in southern Tibet and their relationship to mineralization; (3) To determine the formation of major metallogenic systems during accretionary orogeny; (4) To determine the formation of major metallogenic systems during collisional orogeny. (5) To develop exploration models and location techniques for the dominant deposit types in southern Tibet; (6) To propose metallogenic models to explain the genesis of dominant mineralization types in southern Tibet through comprehensive study.



Fig.2.4 Prof.HOU Zengqian in southern Tibet





3. Research Achievements

3.1 Results of completed Natural Science Foundation Projects in 2010

Studies of the genesis and tectonic setting of the Yanbian Group at the margin of the Yangtze plate (Chief Investigator: DU Lilin)

The petrology, geochemistry, SHRIMP U-Pb zircon chronology and zircon Lu-Hf isotopes of metabasalts of the Huangtian Formation as well as clastic metasedimentary rocks of the Yanbian Group, the Guandaoshan diorite and the Gaojiacun mafic-ultramafic pluton were studied. Basalts of the Yanbian Group were emplaced within a back-arc basin in the Neoproterozoic from 880 to 830 Ma. There are abundant pyroclastic fragments in quartzites of the Group. Clastic metasedimentary rocks were deposited after 880 Ma and exhibit island arc characteristics. High-Mg diorite, diorite and quartz diorite in the Guandaoshan pluton have comparable ages of emplacement (~856 Ma) and are products of fractional crystallization after partial melting from a depleted upper mantle source. The emplacement age for the Gaojiacun mafic-ultramafic pluton is 822 ± 8 Ma. The western margin of the Yangtze block constituted an island arc environment in the Neoproterozoic.


Tectonic setting and provenance features of Middle Silurian through Lower Carboniferous strata along the northeastern margin of the Junggar Basin (Chief Investigator: LI Jinyi)

Deformation of Paleozoic sedimentary sequences along the northeastern margin of the Junggar basin is characterized by a foreland thrust-fold belt with south-verging thrusting. The provenance of 48 sandstone samples revealed an affinity with island arcs. The ages of more than 1500 detrital zircons imply that pre-Nanhua and Cambrian to early Carboniferous magmatic rocks underlie the sediments of the eastern Junggar basin. Silurian to early Carboniferous sedimentary sequences belong to the passive margin of the back-arc basin, and the provenance of the basement of the eastern Junggar basin is a mature Paleozoic island arc with pre-Nanhua basement. We conclude that the basement of both the Junggar and Turfan-Hami basins and the Haerlik Mountains constituted a united Paleozoic island arc with old crustal basement from the Neoproterozoic to the Carboniferous and was part of the active Siberian paleo-continental margin.

Sedimentary environment of authigenic monazite in Proterozoic strata of northern China (Chief Investigator: LIU Yanxue)

Based on fieldwork, we propose that the Changzhougou Formation (1.8 Ga) and the Dahongyu Formation (1.6 Ga) in the Ming Tombs District are older than the Satakunta Formation of Finland (1.4 Ga). Chemical elements and REE elements of sediments of the Shisanlitai Formation in Fuzhou, Liaoning, reflect a fresh water lagoonal depositional environment fringed by a stromalite reef with low salinity during the diagenetic stage. The tectonic environment was stable after Rodinia breakup. A relationship between ancient earthquake records and litho-paleogeography has been established.





Lithospheric shortening deformation of the northeastern Tibetan Plateau: Evidence from the deep seismic reflection profile (Chief Investigator: GAO Rui)

Although the Tibetan plateau is the largest highland on Earth induced by the India-Asia collision over the past 60-50 Ma, its formation mechanism remains uncertain. The current debate on this issue is centered on two end-member models of continental deformation: (1) deformation during plateau development is vertically uniform and (2) deformation varies with depth as a result of lateral flow in the middle or lower crust (i.e., channel flow). Although spatial correlation between concentrated zones of shear-wave anisotropies in the upper mantle and major Tibetan strike-slip faults exposed at surface support the notion of vertically coherent deformation, widespread low seismic-velocity zones in the Tibetan middle and lower crust have been taken as evidence for channel flow. Here we show for the first time that the 1000-km long Kunlun fault, one of the largest continental-scale strike-slip faults in Tibet, terminates at a sub-horizontal decollement in the lowermost crust of Tibet. Below this decollement, the mode of deformation changes markedly, from left-slip faulting above to imbricate thrusting involving Moho below. Our proposed tectonic model implies that the uplift of northeastern Tibet was accommodated by crustal shortening over the entire lithosphere, with an upper duplex system linked with the left-slip Kunlun fault and the Linxia thrust a lower duplex system duplicating the Moho.

Tectonic attribution and evolution of Precambrian metamorphic basement in the Alax area (Chief Investigator: GENG Yuansheng)

Some early Neoproterozoic syn-collisional granites were recognized in what has previously been interpreted as early Precambrian metamorphic basement in the western Alaxa region. Many Paleozoic volcanic and intrusive rocks were recognized in the Alaxa Group of the basement. We propose that the Helan Mountain basement belonged to northern China at all times. The eastern Alaxan basement was connected to northern China in the early Precambrian. The basement was a continental block affiliated to the Tarim microblock in the early Neoproterozoic and became an independent block in the Paleo-Asian Ocean in the Paleozoic, and was finally attached to the North China Craton in the Mesozoic.

Geochronological study and geological implications of Neoarchean sanukitoids at Guyang, Inner Mongolia (Chief Investigator: JIAN Ping)

Using the SHRIMP method, U-Pb ages for high-Mg diorites (sanukitoids), sodic-potassic granitoids, and high-grade metamorphic rocks (charnockite, enderbite and granulite) from Guyang, Inner Mongolia were determined (ca. 2556-2512 Ma). The results of geochemical analyses show that the high-Mg diorites are enriched in Mg, Cr-Ni and Sr-Ba. The high-grade metamorphic terrane contains charnockite, enderbite and amphibole-gneiss, similar to high-Mg diorites (e.g. Cr, Ni, Sr and Ba), and mafic and felsic granulites occur as xenoliths in the felsic rocks; granulite-facies metamorphism post-dated regional magmatism; The sodic granitoids have low REE and low Cr-Ni and Ba-Sr contents and are undeformed or weakly deformed. Potassic granites are undeformed and have Nd-Sr isotopic compositions indicative of a depleted asthenospheric mantle source.





Vertebrate fauna and its paleoecology from the Early Cretaceous of the Jiuquan area, Gansu Province (Chief Investigator: YOU Hailu)

Sediments in the Yujingzi and Changma basins in the Jiuquan area yielded numerous fossil remnants of dinosaurs and birds. Three new dinosaur genera and species were studied, based on partially preserved specimens from the Yujingzi Basin. *Qiaowanlong kangxii* is the first well-preserved Early Cretaceous brachiosaur in Asia, *Jintasaurus meniscus* is the most evolved hadrosauri form in the Early Cretaceous, and *Suzhousaurus megatherioides* is the largest known Early Cretaceous therizinosauroid. This new dinosaur assemblage is similar but also different from that in the Jehol Biota of western Liaoning Province and represents a later and more evolved stage in the evolution of the Early Cretaceous Psittacosaur-fauna in eastern Asia. Studies on birds and other fossils from the Changma Basin were also conducted. The discovery of filamentous integumentary structure-bearing *Tianyulong confuciusi* represents a major advance in the study of dinosaurs and feathers originating in western Liaoning Province.


Development of a uranium-series dating method without spike using MC-ICPMS (Chief Investigator: HE Xuexian)

The uranium-series dating method is the most useful method to determine the age of geological samples arrange from 500,000 a B.H. It is one of important supporting techniques, powerfully supporting the studies in aspect of volcano, earthquake, geological investigation, the Quaternary environment etc. The results of this project are: setting up a method to determine U and Th isotopic ratios by MC-ICPMS; setting up a chemical method to purify U and Th for MC-ICPMS; setting up the MC-ICPMS uranium-series dating method without spike.

Bio- and chronostratigraphic subdivision of the Ediacaran (Sinian) Period (Chief Investigator: YIN Chongyu)

Two different assemblages were confirmed separately by a $\delta^{13}\text{C}$ negative excursion (EN2) within the second and third members of the sections in East Shanxia. The lower assemblage is characterized by *Tianzhushania* and a high diversification of large acanthomorphic acritarchs. The upper assemblage is distinguished from the lower assemblage by extinction of *Tianzhushania*, the occurrence of smoothly walled spherical microfossils, a high diversification of acanthomorphic acritarchs extended species, and new morphs in this member, the occurrence of unnamed new morphs and the first occurrence of *Sinocyclocyclus guizhouensis*. The assemblage in the third member of the Doushantuo Formation can be correlated with the assemblage of acanthomorphic acritarchs in the Ediacaran of southern Australia. A well-preserved eight-armed, diated, Ediacara body fossil *Eoandromeda octobrachiata*, was found in black shale of the upper part of the Doushantuo Formation in Wenghui, Guizhou Province, and confirmed the existence of Ediacara body fossils in China.





Petrogenesis of early Paleozoic granites from the northern Qilian orogen and its response to the tectonic evolution (Chief Investigator: WU Cailai)

Studies on the geology, petrology, petrochemistry, Rb-Sr and Sm-Nd isotopic geochemistry, and zircon SHRIMP U-Pb dating have been carried out on granitoids from the North Qilian orogen. Five periods of granitoid emplacement can be distinguished. Granitoid magmatism of the first and second periods occurred as a result of southward subduction of the North Qilian oceanic plate. Afterwards, the subduction direction of the North Qilian plate changed from south to north. Quartz diorite and granodiorite magmatism of the third period occurred due to northward subduction of the North Qilian plate. After closure of the North Qilian ocean granitoid magmatism of the fourth and fifth periods occurred due to stretching and collapse of different blocks in the orogen as well as delamination of the lithospheric mantle below the orogenic root.


~2.7 Ga juvenile crust formation in western Shandong: SHRIMP U-Pb zircon dating and geochemistry (Chief Investigator: WAN Yusheng)

This research shows that the granite-greenstone area is mainly composed of ~2.7 Ga and ~2.5 Ga supracrustal and TTG rocks as well as some ~2.6 Ga TTG rocks, and the granite-greenstone area can be subdivided into three belts from northeast to southwest. The supracrustal and TTG rocks in the early Neoproterozoic (~2.7 Ga) were mainly derived from a depleted mantle source, whereas both mantle and crustal magmatism occurred extensively during the late Neoproterozoic. The Shandong granite-greenstone area is unique in being different not only from other parts of the North China Craton where ~2.5 Ga tectono-thermal events are very strong, but also from many typical cratons elsewhere in the world where the majority of tectono-thermal events occurred at around 2.7 Ga.

Deep structure of the Zouge basin and the coupling relationship between the west Qinling orogen and the basin at a lithospheric scale (Chief Investigator: WANG Haiyan)

The DMO velocity analysis method based on relief surface and module development was applied, and its effectiveness and feasibility was verified by processing a theoretical model and seismic reflection data. The deep seismic reflection data and petroleum seismic reflection data were used and then processed with the DMO velocity analysis method. The results reveal the fine structure of the crust and upper mantle beneath the Zouge Basin and the southern margin of the West Qinling orogenic belt. The interpretation reveals the location of the shallowest depth of the Triassic layer and the presence of a structural detachment at 6.0-8.0 s (TWT) in the Zouge basin. Strong reflection amplitudes of the lower crust and strong Moho reflections seem to indicate that there is no lower crustal flow. The lithosphere-scale tectonic relation between the Zouge basin and the West Qinling orogenic belt evolved during a compression tectonic system and dynamic processes.





Determination of age and tectonic significance of the Baishuijiang Group, Southern Qinling Orogenic belt, at the junction between Shaanxi and Gansu Provinces (Chief Investigator: WANG Tao)

The Baishuijiang Group of the southern Qinling belt is widely exposed in the boundary area of Shaanxi and Gansu Provinces. Detailed fieldwork and geological mapping have been conducted, and many fossils of Silurian conodonts, pores and Permian radiolarian were discovered. Dating of detrital zircons from clastic sediments by LA-ICP-MS shows them to be late Devonian to Permian in age. Mafic and ultramafic volcanic rocks of the Group were dated at 771 to 445 Ma, and display geochemical features of oceanic island arcs. These results show that the Baishuijiang Group does not belong to the northern margin of the Yangtze Plate but was part of an active continental margin and, in the late Paleozoic and Triassic, constituted an accretionary complex of the southern Qinling belt together with the Mian-Lue mélange belt.

Field investigations on the geochemical nature and tectonophysical effects of amphibolite partial melting in eastern Shandong (Chief Investigator: ZENG Lingsen)

Systematic investigations on the partial melting behavior and products of amphibolites from the Qixia migmatitic amphibolite as well as from the Himalayan belt were carried out. The results show that a spectrum of melts with distinct geochemistry could be generated from partial melting of amphibolites with two or more hydrous phases. Transitions in melting reactions are closely associated with transitions in tectonic regimes. The northern Himalaya belt has experienced at least two >35 Ma amphibolite partial melting events under overthickened crustal conditions. Water-fluxed melting of amphibolite in young and rapidly exhumed high-grade terranes could be a key process to generate Na-rich peraluminous granitic melts that have an adakite-like geochemistry. These results will promote our understanding of the physical and chemical behavior of high-grade rocks during the tectonic evolution of collisional belts.

High resolution and non-linear seismic tomography of reflection and refraction (Chief Investigator: ZHAO Zhixin)

The three-dimensional (3-D) tomographic method for explosion seismic refraction and reflection surveys is currently one of the most advanced geophysical techniques. It is very effective for studies of the structure of the crust, geodynamics, exploration of resources, etc. We have used this method to undertake offshore exploration in the sea off Kyushu, Japan, and in the Gejiu Mine in Yunnan Province, China. The method revealed complicated geological structures, geometry and physical properties of abnormal objects, and tomographic inversion of the explosion survey is available for detailed geological structural surveys and resource exploration, in particular for resources such as oil, gas and minerals that occur in complicated geological conditions. All tomographic exploration for explosion seismic refraction and reflection surveys in this research project has yielded significant results.





3.2 Results of completed National Key Basic Research & Development Projects in 2010

Terrestrial biota radiation evolution, subrogation and climate variation in the Cretaceous (JI Qiang)

Through four years of research, Late Mesozoic the litho- and bio-stratigraphic systems have been established in northern Hebei and western Liaoning. According to the current study, the Jiufotang Formation could be synchronous with the Yixian Formation, belonging to different depositional facies. The Zhangjiakou Formation consists of a set of volcanics with a wide time span from 144.4 Ma to 130.1 Ma. On the basis of U-Pb zircon dating of volcanic rocks from the Tiaojiashan Formation, Tuchengzi Formation, Zhangjiakou Formation, Dabeigou Formation and Yixian Formation, a geochronologic framework of Late Mesozoic in northern Hebei and western Liaoning was established, showing the Mid-Late Jurassic age of the Yanliao biota and the Early Cretaceous age of Jehol biota. The results show that the Cretaceous-Jurassic boundary age value of 145 Ma recommended by the International Stratigraphic Committee is reliable and feasible. Herein is given a proposal that the terrestrial Jurassic-Cretaceous boundary in northern China should be between the Member II and the Member III of the Tuchengzi Formation. It seems that the debate on the Jurassic-Cretaceous Boundary over tens of years in China could be over.

Lots of palaeontological discoveries and research results are also obtained. A new Early Cretaceous dinosaur fauna characterized by large titanosauriform sauropods and iguanodonts has been unearthed in the Zhongpu area of the Lanzhou Basin. A Early Cretaceous fossil assemblage has been found in the Changma Basin of Gansu Province, yielding rich vertebrate fossils such as birds, turtles, amphibians and fishes. Among them, *Gansus yumenensis* represents the earliest known closest relative of modern birds.

A small dinosaur with long filamentous integumentary structures, *Tianyulong confuciusi*, was from the Lower Cretaceous at Jianchang in Liaoning Province. The discovery of *Tianyulong* expands the distribution of its group (Heterodontosauridae) from the Early Jurassic of Africa to the Early Cretaceous of Asia, providing important new evidence on the origin and early evolution of bird feathers.

A new pterosaur named *Darwinopterus modularis* was discovered from the middle Jurassic deposits in western Liaoning, showing transitional features from primordial to progressive ones. This discovery not only ended up the gap of Pterosaur evolution but also may break up the traditional classification for the Pterosaur.

A pregnant specimen of the Early Cretaceous *Hyphalosaurus baidaiensis* was discovered, providing the first evidence of viviparity in choristoderan reptiles and the sole record of viviparity in fossil reptiles which lived in fresh water in its whole life.

Based on precise dating through sporopollen analysis, the character of climate fluctuations and their effects on terrestrial biota evolution and subrogation in the geologic history have been investigated.





Fig.3.1 Normal specimen of *Hyphalosaurus baitaigouensis*

冀北地区		辽西地区		生物群组合序列	年龄
九佛堂组	中部	九佛堂组	中部	"小盗龙—神州鸟—潜龙"组合带	120.3Ma
火山岩层	下部	黄花山层	下部	"董井氏狼鳍鱼—神州鸟"间隔带	
沉积层	义县组	金刚山层	义县组	"董井氏狼鳍鱼—三尾拟蜉蝣—东方叶肢介"组合带	122.3Ma
火山岩层		火山岩层		"辽宁古果—张和喜—长城鸟"组合带	124.7Ma
西瓜园层		尖山沟层		"中华龙鸟—孔子鸟—始祖兽"组合带	125.6Ma
火山岩层		火山岩层			128.6Ma
大店子层		四合屯层		"戴氏狼鳍鱼—东方叶肢介—女娄介"组合带	
大北沟组				"三尾拟蜉蝣—潘氏北票蚌—比索夫尼斯托叶肢介"组合带	130.2Ma
张家口组					135.2Ma
后城组		土城子组		"朝阳龙—假雕饰介形虫"组合带	139.4Ma
磐石山组		蓝旗组		"热河熊—热河翼龙—真叶肢介"组合带	158.6Ma

Fig. 3.2 The terrestrial Jurassic-Cretaceous boundary in northern Hebei and western Liaoning



3.3 Results of the Projects funded by China Geological Survey completed in 2010

A new late Mesozoic lithostratigraphic unit has been established, and the Jurassic—Cretaceous boundary has been determined in southern Tibet (JI Qiang)

Jurassic-Cretaceous boundary deposits are well developed and widely distributed in southern Tibet and can be subdivided into three lithostratigraphic units (in ascending order): Weimei Formation, Sangxiu Formation, and Jiabula Formation. Traditionally, the Jurassic-Cretaceous boundary is placed between the Weimei Formation and the Sangxiu Formation or the Jiabula Formation.

We have undertaken much work on the stratigraphy and geochronology of southern Tibet in recent years. Nine Jurassic-Cretaceous boundary sections with volcanic interlayers were found and measured, yielding rich fossils such as ammonoids, bivalves and calcareous nannofossils.

A new lithostratigraphic unit, the Rouzha Formation, has been established between the Weimei Formation and the Sangxiu Formation or the Jiabula Formation and is composed of a series of black to dark grey siltstones, silty mudstones and shales. The establishment of the Rouzha Formation is of great geological significance. It represents an anoxic event caused by a sudden fall in sea-level, which is possibly concordant with the greenhouse climate event, the opening of the Atlantic-Pacific connection and the carbon-cycle event at the end of Jurassic.

Three ammonoid zones were recognized: the *Haplophylloceras*—*Blanfordiceras*—*Himalayites* assemblage zone (Late Jurassic), the *Spiticeras*—*Thurmanniceras* assemblage zone, and the *Valanginites*—*Phyllopachyceras* assemblage zone (Early Cretaceous); only one bivalve zone was found, namely the *Inoceramus*—*Buchia* assemblage zone (Early Cretaceous); six calcareous nannofossil zones were established: the *Conusphaera*—*Polycostella*—*Nannoconus*—*Watznaueria* assemblage zone and the *Polycostella beckmanni*—*Nannoconus steinmanni minor* interval zone (Late Jurassic); the *Nannoconus steinmanni minor* zone, the *Nannoconus st. steinmanni* zone, the *Speetonia colligate* zone and the *Calcicalathina oblongate* zone (Early Cretaceous).

More than 36 samples have been collected for geochronology from volcanic interlayers of the Sangxiu Formation in nine sections in southern Tibet, and two SHRIMP U-Pb zircon ages were obtained: 141 Ma for the *Nannoconus steinmanni minor* zone and 137 Ma for the *Calcicalathina oblongate* zone.

Based on our current study, the Jurassic-Cretaceous boundary in southern Tibet should be placed lithostratigraphically between the Rouzha and Sangxiu Formations (or the Jiabula Formation) and between the *Polycostella beckmanni*—*Nannoconus steinmanni minor* interval zone and the *Nannoconus steinmanni minor* zone.

藏南地区侏罗—白垩系界线地层划分与对比					
时代	组	钙质超微化石	菊石	年龄	
早白垩世	桑秀组	<i>Calcicalathina oblongata</i> 带	<i>Valanginites</i> — <i>Phyllopachyceras</i> 组合带	137Ma	
		<i>Speetonia colligate</i> 带	<i>Spiticeras</i> — <i>Thurmanniceras</i> 组合带	141Ma	
		<i>N. st. steinmanni</i> 带			
		<i>N. st. minor</i> 带			
晚侏罗世	<i>P. beckmanni</i> — <i>N. st. minor</i> 间隔带				
	柔扎组	<i>Conusphaera</i> — <i>Polycostella</i> — <i>Nannoconus</i> — <i>Watznaueria</i> 组合带	<i>Haplophylloceras</i> — <i>Blanfordiceras</i> — <i>Himalayites</i> 组合带		
晚侏罗世	维美组				

Fig. 3.3 Jurassic-Cretaceous boundary in southern Tibet



The first laboratory for (U-Th)/He isotopic dating in China has been established (CHEN Wen)

The Geological Survey Project "Research on the apatite (U-Th)/He dating technique", was undertaken by the Isotope Thermochronology Laboratory and has achieved success and made remarkable progress. The main results are as follows:

We have successfully developed the technique of accurate measurement of ^4He in apatite samples by the non-dilution method and established a reliable experimental procedure. We also established experimental procedures for accurate measurement of ^{238}U , ^{232}Th , and ^{147}Sm contents in apatite samples by dilution and non-dilution methods. Besides, we obtained a group of apatite (U-Th)/He ages for geological samples. In addition, the first laboratory of (U-Th)/He isotope dating in China has been established, providing new research methods and technical support for geological studies.

Comprehensive research on the geology of petroleum and area optimization in Central Asia and the Caspian Sea Region (YOU Guoqing)

The project "Comprehensive Research on Petroleum geology and area optimization in Central Asia and the Caspian Sea region", of the Strategic Research Center of Oil & Gas Resources, Ministry of Land and Resources, was undertaken by the Department of Regional Geology and Geological Mapping and was successfully concluded with remarkable progress. The main results are as follows:

The geological conditions of oil and gas reservoir formation and the oil and gas resource potential of petroliferous sedimentary basins in Central Asia and Caspian Sea Region as well as investment conditions in the host countries of these resources have been systematically studied for the first time. The geological settings, the characteristics of hydrocarbon and exploration potential of several sedimentary basins, including the Pre-Caspian Basin, the North Ustyurt Basin, the Mangyshlak Basin, the Northern Cascaucasia Basin, the Terek-Caspian Basin, the South Caspian Basin, Amu Darya Basin, the Turgay, the Chu-Sarysu Basin, and the Fergana Basin have been analyzed in detail. The investment environments of Kazakhstan, Uzbekistan, Turkmenistan, Tajikistan, Kyrgyzstan and Azerbaijan have been documented, which significantly broaden the information on oil and gas resources and the investment environment of this region. Finally, strategic suggestions have been submitted for future oil and gas exploration and investment.



Fig.3.4 The first laboratory of (U-Th)/He isotope dating in China



3.4 Other important progress

New SHRIMP zircon ages have been obtained for the Apollo missions (LIU Dunyi and his team)

SHRIMP geochronology studies of Apollo 12 lunar samples and a lunar meteorite have yielded very important results. Based on a joint project with Washington University at St. Louis, USA, the Beijing SHRIMP Center has determined the zircon ages for a fine-grained high-Th impact melt breccia from meteorite SaU169 and from fragments in soil samples from the Apollo 12 and Apollo 14 missions. These ages are significantly older than the previously accepted age of 3.85 Ga, and this is the first report of a direct U-Pb zircon age determination of for an Imbrium impact.

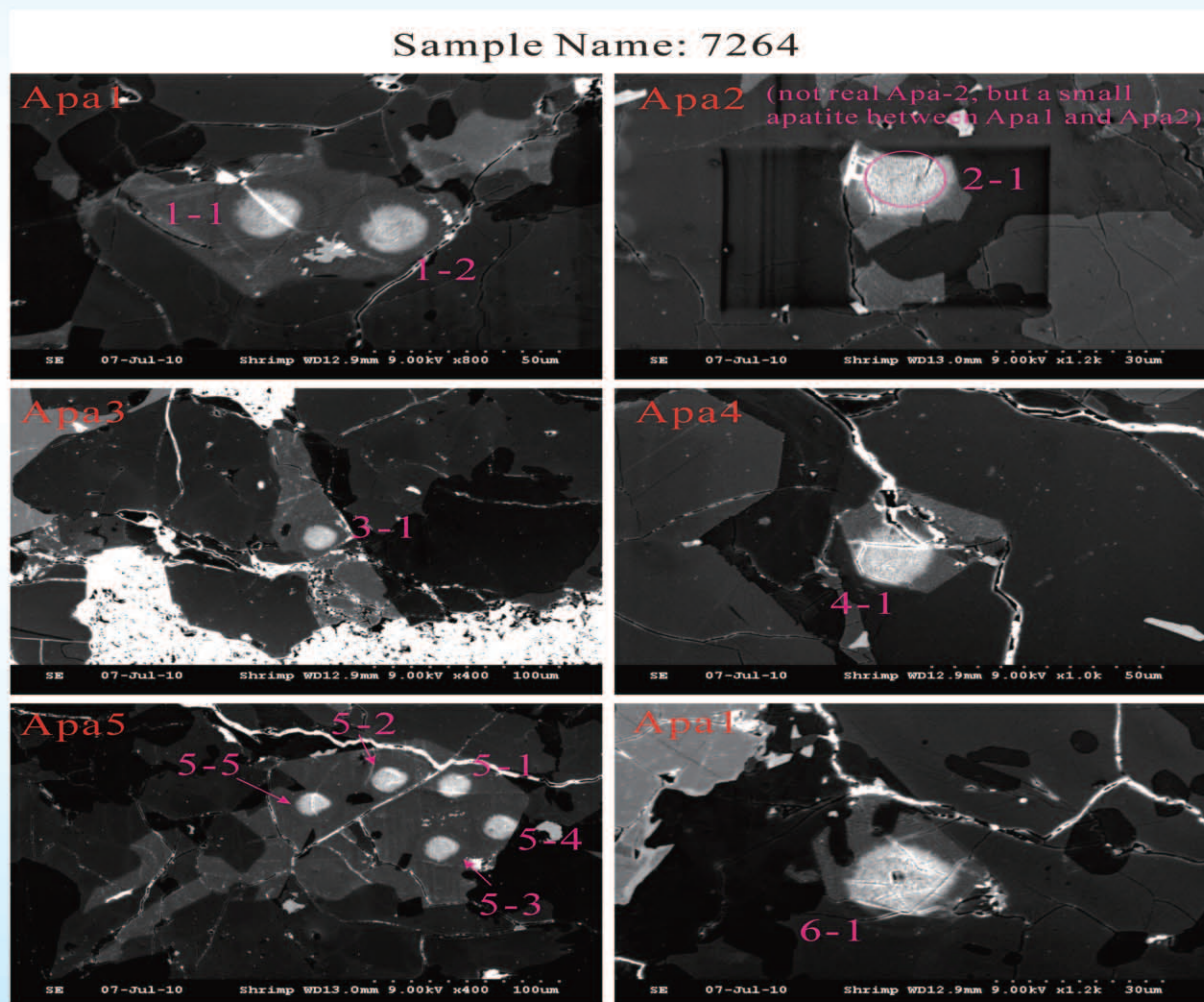


Fig.3.5 Apollo12 lunar samples



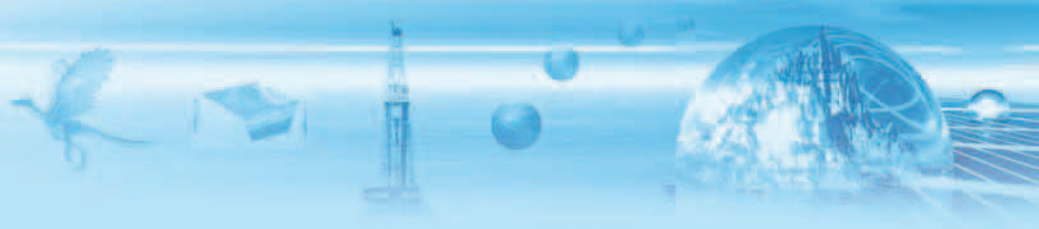
The 1:5 M International Geological Map of Asia (IGMA) has almost been completed (REN Jishun and his team)

The first 1:5 million digital International Geological Map of Asia (IGMA) has nearly been completed by a group of Chinese geologists under the aegis of the CGMW and UNESCO and with the help of dozens of geologists from Russia, France and some Asian countries. The draft map will be evaluated at the 5th Workshop of IGMA in April, 2011, and the final version is scheduled to be published and exhibited at the 34th IGC in 2012. The group members are currently focusing on re-editing the data and writing relative articles and reports.



Fig.3.6 Geological map of Asia





LBS-ZK1 drillhole was completed and diamond found for the first time in peridotite at Ali, western Tibet (YANG Jingsui, XU Xiangzhen, ZHANG Zhongming et al.)

On the basis of pilot-hole drilling as well as surface geological and geophysical investigations, the Luobusa scientific drilling project will focus on the Luobusa ophiolitic diamond-bearing ultramafic massif along the Yarlung- Zangbu suture between the Indian and Eurasian plates. The purpose is to reveal the conditions of formation of deep mantle minerals and the metallogenic mechanism and prospecting criteria for ophiolite-type chromite deposits. The Luobusa pilot-hole drilling (LBS-ZK1) began in May 2009 and ended in July 2010 at a depth of 1478.8 m with an average core recovery rate of 93.6 %. We have successfully set up a core profile for the first hole and revealed that: 1) the ultramafic rocks may constitute an only 1400 m thick rootless tectonic slice; 2) cumulate layers that occur beneath the ultramafic rocks proved a reversed sequence of strata to that obtained from the surface survey.

Drilling of the second hole (LBS-ZK2) began on September 26, 2010 and stopped on December 8, 2010, because of cold weather. It is now at 444.11 m deep with an average core recovery rate of 76.9 %. The first 70 m are Triassic sandstone, marble and chlorite schist. The contact between these strata and the ultramafic massif is not clear but is probably represented by a fault.

Diamonds in the Purang peridotite massif, west of the Yarlung Zangbu suture, Tibet: A new discovery (YANG Jingsui, ZHANG Zhongming, XU Xiangzhen et al.)

Diamonds and many unusual highly reduced minerals such as native Fe, Cr, Ni minerals and metal alloys were reported from chromitite and peridotite in the Luobusa ophiolitic peridotite massif in the eastern segment of the Yarlung Zangbu suture, Tibet. Coesite as pseudomorphs of stishovite from chromitite indicates that these rocks probably originated from the upper mantle at a depth of >300 km. This project first reports diamond and some unusual minerals from the Purang peridotite massif in the western segment of the Yarlung Zangbu suture, more than 1000 km west of Lhasa. The Purang massif is about 700 km² (ca. 60 x 10 km) in size and mainly consists of harzburgite, lherzolite and dunite, with some gabbro and diabase dikes. Mineralogical and petrological studies suggest that the Purang massif is of MOR type. Diamond and some unusual minerals such as moissanite were discovered by traditional mineral separation techniques from a 600 kg lherzolite sample which contains about Ol 70%, Opx 20%, Cpx 10% and Cr-spinel 3%. More than 30 diamond crystals have been found, and they are yellowish-green in color, about 0.1-0.3 mm in size, with octahedral and cone-type morphologies. These diamonds are similar to those found in the Luobusa peridotite massif, but the latter is located more than 1000 km to the east. This discovery proves that the Luobusa is not a unique diamond-bearing massif and challenges the concept that MOR type ophiolites originate from a shallow depth in the mantle.

Development of the Tethys suture zone in southern Tibet (YANG Jingsui)

Many natural element and alloy minerals including kyanite, corundum, diamond, moissanite, native iron, chromium, and Ni/Fe/Cr alloys were found in the Luobusha, Xigazi, Dangqiong, Pulan and Dongpo mantle peridotites of the Yarlung-Tsangpo suture, suggesting a complex evolution for the ophiolite belt.

Our research showed that the Sumdo eclogites mark a Carboniferous Permian suture zone, at least 100 km long, containing ophiolite fragments, eclogites and Indosinian post-orogenic granitoids in the Lhasa block. This suture subdivides the Lhasa block into a northern and southern segment. LA-ICPMS U-Pb zircon dating of a Sumdo eclogite indicates a Permian metamorphic age of ~260-270 Ma and a Carboniferous protolith age of 303±4.8 Ma. An OIB-type basalt yielded a magmatic mean U-Pb age of 306 Ma, suggesting formation in a Paleo-Tethyan basin in the Carboniferous. Zircons from a basaltic andesite yielded a concordant zircon age of 265±3.1 Ma, similar to the metamorphic age (266-270 Ma) of the eclogite and suggesting formation during subduction of oceanic crust. An Indosinian granodiorite with an age of 194±4.3 Ma is exposed north of the Sumdo suture, which most likely formed during continent-arc collision or during closure of the Paleo-Tethys Ocean.



High-pressure mafic granulites were found in the Amdo basement, central Tibet. Formation of these granulites is considered to have resulted from arc-continent collision between the Amdo basement and the Qiangtang terrane in the middle Jurassic, which is a crucial event for the tectonic evolution of the Tibetan Plateau. The average zircon age in a plagiogranite of the Gaize SSZ ophiolite within the middle part of the Bangong Co-Nujiang suture zone is 189.8 ± 1.9 Ma, suggesting that this rock was formed earlier than subduction in the Bangong Co area, within the western part, and later than subduction in the Dingqing area, within the eastern part of the suture.

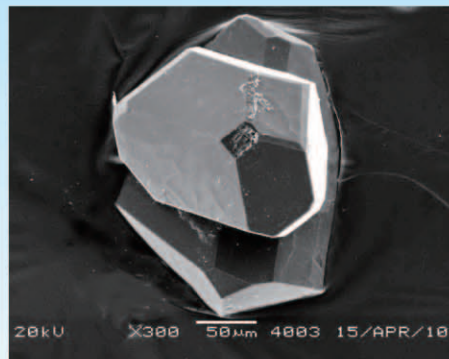


Fig.3.7 The diamond from Pulan mantle peridotite in Yarlung Tsangpo suture zone

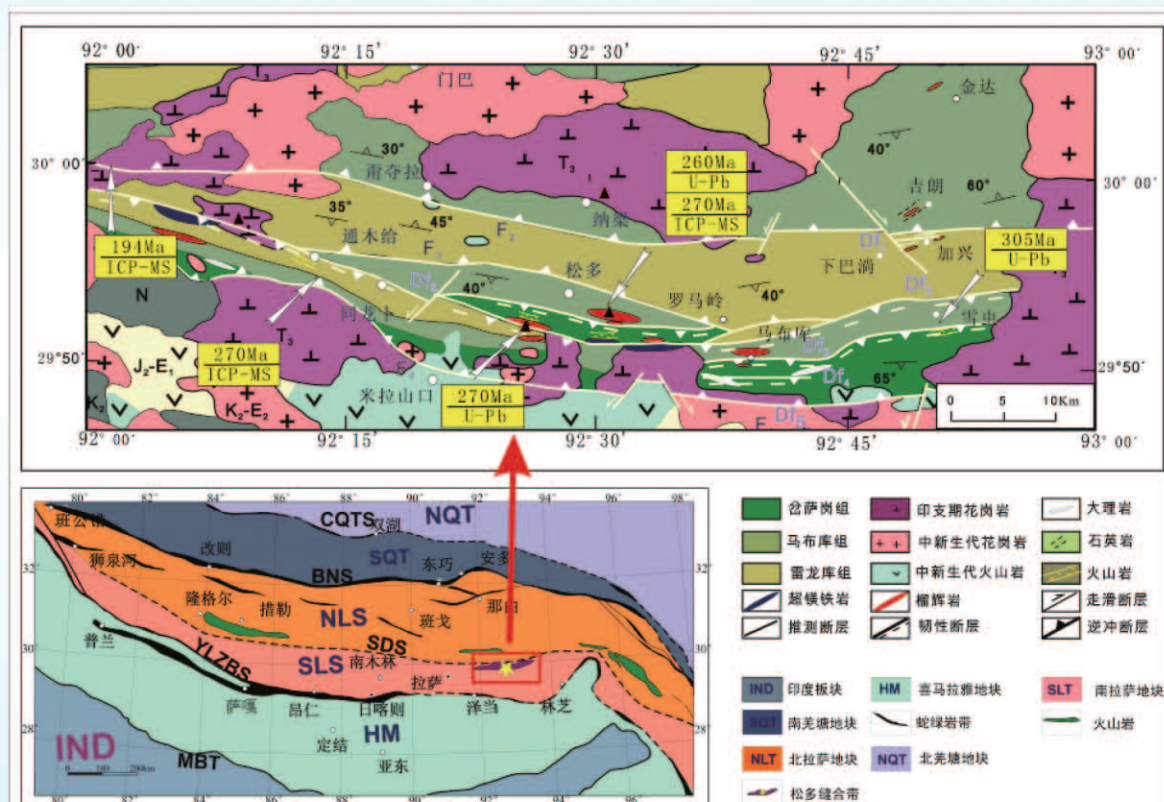


Fig.3.8 The achievements of Sumdo suture zone

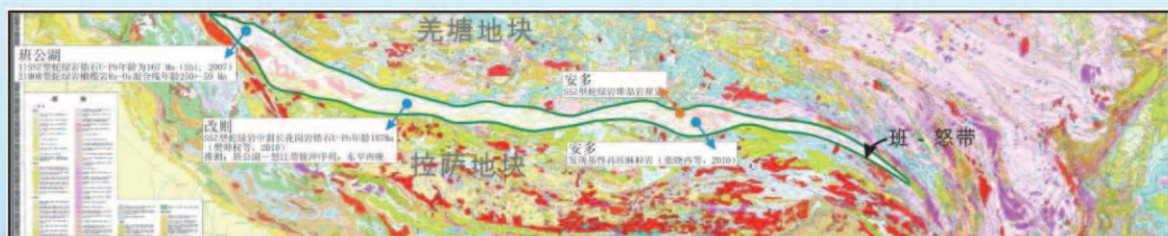


Fig. 3.9 The achievement of Bangong Co-Nujiang suture zone



Study on the Early-Middle Triassic paleontology and stratigraphic correlation in the South Qiangtang Basin (JI Zhansheng)

Main progress has been made in this project as follows:

1. Late Jurassic corals were found in limestone previously thought to represent Early Permian exotic blocks occurring in the Middle-Late Jurassic Mugangri Group, at the northern Oma village, Gêrzê County, Tibet. This discovery indicates that Late Jurassic carbonate sediments represent a widely developed stratigraphic unit and do not represent a tectonic mélange interlayered with the Jurassic Mugangri Group near Oma village in the western part of the Bangong Co-Nujiang Suture.

2. Late Triassic corals were also found in limestone previously thought to represent Paleozoic exotic blocks occurring in the Late Triassic Wanghuling Formation in the Guoganjianian Mountain area, Central Qiangtang Uplift. This discovery indicates that the late Triassic sediments in the Guoganjianian Mountain area not only comprise the Wanghuling Formation calcarenite but also interbedded limestone amongst the Wanghuling Formation calcarenite. These rocks do not represent a tectonic mélange.

3. Middle Triassic radiolarians (Fig.3.10) were found in the Zuoqing Co area at the northern margin of the South Qiangtang Basin. This discovery indicates that the South Qiangtang area reflects a deep sea rather than a shallow sea environment during the Middle Triassic.

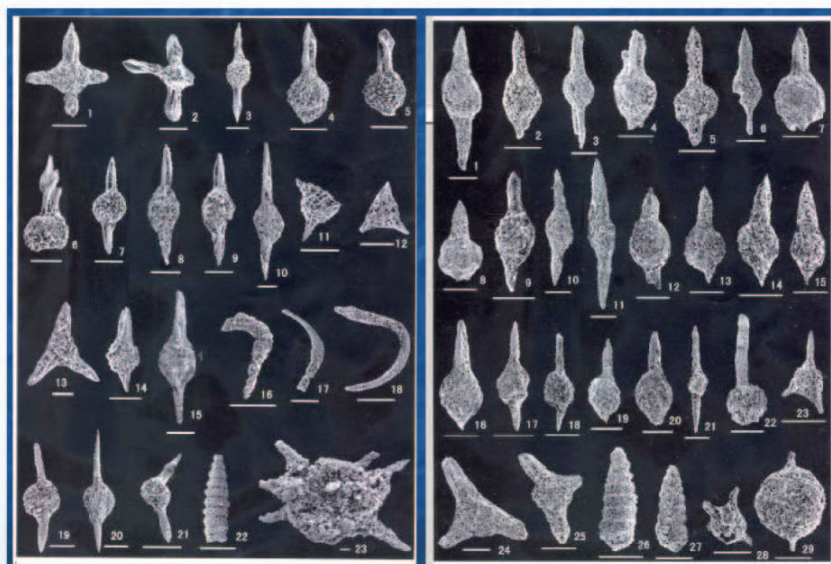



Fig.3.10 Middle Triassic radiolarians found from the Zuoqing Co area

Composite orogeny and scientific problems of the Central Orogenic Belt of China: A review (YANG Jingsui, XU Zhiqin, ZHANG Jianxin et al.)

The Central Orogenic Belt of China (COB) is a huge compound orogen that extends more than 5000 km across central China and marks the boundary between the North China and South China Blocks. This belt has been active for ~600 Ma, and during this time it underwent two major phases of collision, one in the Devonian and one in the Triassic. In addition, the region has been tectonically active since the Cretaceous. The COB differs from other multi-phase orogens in having a very complex structure, multiple long-term orogenic events, orogenic convergence, and accretion of continents. The recent discovery of a large high- to ultrahigh-pressure metamorphic belt (HP-UHP) in the orogen and the recognition of two HP-UHP metamorphic events suggest subduction of both oceanic and continental crust to depths greater than 100 km. Thus, the COB is as important in the tectonic evolution of eastern Asia as the Tibetan Plateau





Some critical and unanswered questions regarding the COB include the nature of continental convergence, collision and orogeny in the Devonian and Triassic, and the formation of intracontinental sedimentary basins during the Mesozoic and Cenozoic. Also uncertain are the temporal and spatial relationships between the HP-UHP metamorphic belts and the conditions under which deep subduction and exhumation of oceanic/continental crust occurred. Likewise, the processes responsible for long-term tectonic activity, multiple and overlapping orogenies, and the thermal structure of the region are unclear. In addition, little is known about the genesis of the mineral deposit in the region and the oil and gas potential of adjacent Mesozoic and Cenozoic basins.

Progress in metamorphic and Precambrian research (LIU Fulai, YANG Chonghui, ZHOU Xiwen, DU Lilin, et al.)

A successive and complete metamorphic P-T-t path has been established for the history of subduction, UHP metamorphism and exhumation in the Sulu Dabie terrane. Evidence was found in the Shandong Peninsula that the country rocks of HP granulites also experienced the high pressure granulite facies event.

High pressure pelitic granulites with the mineral assemblage garnet+kyanite+perthite were discovered for the first time in the Helanshan khondalite series. These rocks show a clockwise P-T path, indicating that the Khondalite Belt of the North China Craton may have resulted from collision between the Yinshan and Ordos blocks.

Sequences of the early Precambrian stratigraphy were redefined. The Paleoproterozoic strata including the Hutuo, Songshan and Liaohe Groups were deposited in an intracontinental rift environment. Late Neoproterozoic magmatic activity documented in Dengfeng, Zanzhuang, Fuping and Wutai occurred from 2.56 to 2.47 Ga and has the characteristics of arc magmatism.

Wenchuan Earthquake Fault Scientific Drilling project (WFSD) (LI Haibing et al.)

During the Wenchuan earthquake (Ms8.0) of 12 May 2008, both Yingxiu-Beichuan and Guanxian-Anxian faults were active simultaneously and surface rupture zones along these two faults were observed. The former fault ruptured along a 270 km-long segment, is steep with thrusting and strike-slip components, while the latter fault is not as steep, with pure thrusting and the rupture is only 80 km-long. To get a better understanding of, and more insight into the mechanical, physical and chemical properties involved in the Wenchuan earthquake faults, the two faults are being drilled under the support of Wenchuan earthquake Fault Scientific Drilling Program (WFSD). The pilot hole drilled through the Yingxiu-Beichuan fault (WFSD-1) is 1201.15 m deep, oblique with an angle of about 79°. Four kinds of typical fault rocks including fault breccia, cataclasite, gouge and pseudotachyte can be observed in the core. There are at least 16 main fault zones and FZ590 seems to be the principal slip zone of the Wenchuan earthquake. Numerous high-precision borehole temperature measurements, logging survey data, fluid monitoring data, together with the magnetic susceptibility variation, gouge and clay minerals characteristics, all present a peak at the Wenchuan fault zone at 590 m depth. Therefore, the Wenchuan earthquake fault plane (for Yingxiu-Beichuan fault) is suggested to dip at an angle of about 62°. The guiding hole of the Anxian-Guanxian fault (WFSD-3P) is a 551.54 m-long vertical hole. Similar to WFSD-1, the other main slip zone might be located at about 506 m depth with a dip angle of about 46°. In view of the fracture density in the core, the Yingxiu-Beichuan fault is centered at the main slip zone and is symmetric on both sides, while the Anxian-Guanxian fault is asymmetric and the fractures mainly occur in the upper side of the main slip zone. The different deformation features of these two faults might be due to the different dip angles.



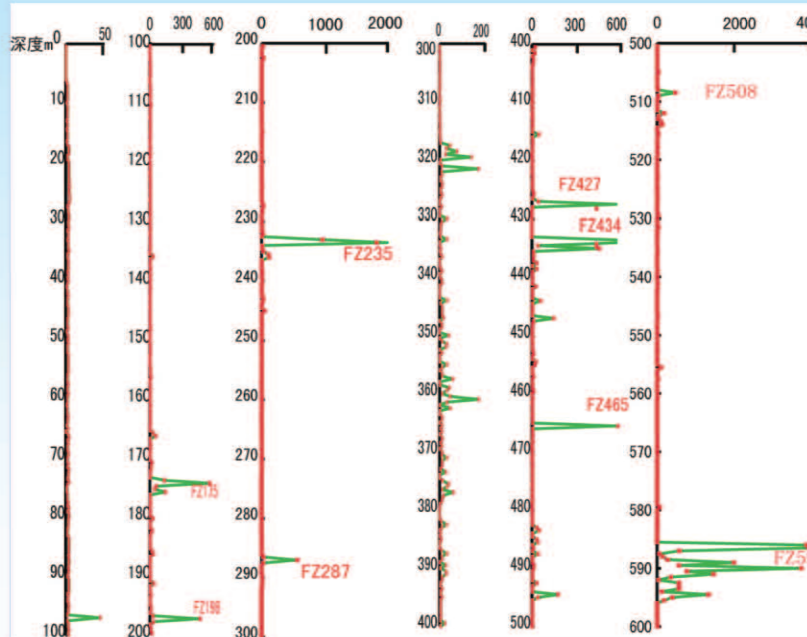


Fig.3.11 Fault density along WFS-1 Cores (0-1200m depth)

Deep seismic reflection profiling of the Bangong suture and Qiangtang terrane in central Tibet (GAO Rui and his team)

The Bangong suture represents the tectonic junction between two major terranes of the Tibetan Plateau, namely the the Lhasa block to the south and the Qiangtang terrane to the north. This suture originally formed during Jurassic collision of these two terranes but has retained considerable significance as the suspected surface position of the buried mantle suture between the Indian and Asian lithosphere that formed during Himalayan collision. As a corollary, these terranes have been subjected to very different styles of mantle tectonics, perhaps as a result of mantle delamination beneath the Qiangtang.

We conducted the first multichannel seismic reflection profile across this critical region. From October 2009 to May 2010, SinoProbe collected 310 km of a deep seismic reflection profile crossing the Bangong-Nujiang suture and successfully revealing structural details down to the Moho and possibly deeper. The profile begins west of Silin Co in the northern Lhasa block, crosses the Bangong-Nujiang suture west of Lunpola, skirts the eastern extension of the central Qiantang anticline and ends at Dogai Coring, just south of the Jinsha suture .

Deep geophysical exploration of the Tarim Basin and inversion of physical parameters (YANG Wencai and his team)

The Tarim Basin, an area of about 560 thousand square kilometers, is China's largest inland petroliferous basin. Geophysical research used in this project include broadband seismic investigations, MT magnetotelluric technology, deep seismic reflection technology and gravity/magnetic joint inversion. The regional seismic tomography and magnetotelluric survey revealed that the crust and upper mantle are characterized by low velocity domains piercing along the upper mantle beneath the southern Tarim Basin. The crustal seismic velocity structure of the Tarim Basin has been established. A gravity and magnetic synthetic study defined the crystalline basement in the Tarim Basin, providing a new understanding of block movements around the Tarim Basin and deposition in the early Paleozoic.



Our integrated geological and geophysical studies provided a more accurate crustal model and generated comprehensive knowledge concerning the movement of fluids and their conditions of preservation. Three new prospecting areas for oil and gas were located: (1) around the Central Manjiaer Depression, (2) the BaDong-TangBei Depression, (3) the Yecheng - Maigaiti - Gudong Hills.

Through geologic and geophysical synthetic studies, we not only propose favorable areas for oil and gas prospecting, but we also found new lithospheric structures and fabric information which was not known before. Our data improve the understanding of regional structures and evolution and provide powerful tools for future petroleum exploration.

Special process of deep seismic reflection and wavelet multi-scale analysis of gravity/magnetic fields (YU Changqing et al)

This project has two aims, the first is to develop new deep seismic reflection processing methods based on χ^2 distribution theory and developing the software. The χ^2 distribution processing enhances information serving the geologic interpretation. This special processing can generate two kinds of profile—line chart maps of the structure and maps of overlap energy profile. The line charts indicate the present crustal framework. However, deep seismic reflection profiles also reflect images generated by tectonic events during various geological epochs, the clear images generally indicate more recent tectonic movements or geologic structures, the fainter images generally reflect older tectonic structures.

The second aim is to process gravity/magnetic data in oil- and gas-bearing basins based on wavelet transform theory and its application algorithms. The wavelet analysis method has grown since the late 20th century and has been named 'mathematical microscope' and is used for the multi-scale analysis of potential field data. The wavelet analysis has been widely applied in signal processing in many domains and obtains good results.

Based on the technology developed by the project, two processing software programs were completed for deep geophysical exploration. Software copyright registration certificates have been granted by the National Copyright Administration.


The software named "potential field multi-scale wavelet layered and density inversion" has already been used in the Tarim oil and gas basin and has detected potential oil-bearing areas around the Manjiaer Depression.

Another software named "Seismic deep reflection special processing and crustal imaging" has been applied successfully in the northeast Song Liao basin seismic reflection project of SINOPROBE, and the 12 second reflection data of the Tarim basin. The results provide many signals for the interpretation of lower crustal and upper mantle structures beneath the Song Liao and Tarim basins.



Fig. 3.12 Equipment used in the project





Helium isotopic composition suggests that the formation of Lasha Terrane eclogites may be related to the activity of a mantle plume (LI Zhaoli, YANG Jingsui, LI Tianfu)

Helium isotopic compositions of eclogites from the Lasha Terrane, Tibet, are reported for the first time. ^3He and ^4He abundances in omphacite are relatively higher than in garnet. This suggests that the isotopic characteristics of helium in eclogites are closely related to generation and source compositions of the rocks. $^3\text{He}/^4\text{He}$ ratios of omphacite and garnet are higher than that of the average crust. Some are even higher than that of MORB. This may indicate that the helium of the Lasha eclogites has a mixed crust-mantle source. The formation of eclogite in the Lasha Terrane may be related to the activity of a mantle plume.

This research suggests that He isotopes of the eclogite may act as a sensitive tracer in recording geochemical information on the subduction environment.

Major results and progresses of the Beijing SHRIMP Center

Use of the SHRIMP II facility in the Beijing SHRIMP Centre was 221.6 days in 2010. About 70 % of machine time was shared with external users (from affiliated organizations except the Beijing SHRIMP Centre and the Institute of Geology, CAGS).

Remote usage (via SHRIMP Remote Operation System, SROS) of SHRIMP II facilities at Curtin University, Australia, was 1440 hours.

Remote usage (via SROS) of the second SHRIMP II of the Beijing SHRIMP Center, which was installed at Australian Scientific Instruments Pty Ltd, in 2010, was 824 hours.

3.5 Important scientific rewards

Three projects won awards by the Ministry of Land and Resources, China

1. First prize for “Terrane amalgamation, collision and uplift in the Qinghai-Tibet Plateau”, undertaken by YANG Jingsui, XU Zhiqin, LI Haibing, ZHANG Jianxin, WU Cailai, JIANG Mei, QI Xuexiang, MENG Fancong, CHEN Songyong, QIAN Fang, CUI Junwen, CHEN Wen, YAO Jianxin, TIAN Shugang, and SU Dechen.
2. Second prize for “Study of major geological problems of Chinese granites” undertaken by XIAO Qinghui, WANG Tao, DENG Jingfu, MO Xuanxue, LU Xingxiang, HONG Dawei, XIE Caifu, LUO Zhaochua, QIU aRuizhao, WANG Xiaoxia, FU Jianming, TONG Ying, MA Changqian, and LIU Cui.
3. Second prize for “The evolution of the metamorphic basement on the western margin of the Yangtze Block”, undertaken by GENG Yuansheng, YANG Chonghui, WANG Xingshe, DU Lilin, REN Liudong, and ZHOU Xiwen.

One project was given a prize by the Government of Henan Province

Second prize for “Resources investigation and evaluation for paleontological fossil traces in Henan Province” undertaken by LV Junchang et al.



Four research achievements were selected as “Ten great scientific progressive results of the Chinese Academy of Geologic Sciences in 2010”, they are as follows:

Zircon U-Pb geochronology of Apollo 12 and lunar meteorite SaU 169 and the age of the Imbrium impact (LIU Dunyi et al.)

The ages of zircons from fine-grained high-Th impact melt breccias from meteorite SaU 169 and from fragments in soil samples from the Apollo 12 mission were determined using the SHRIMP II ion microprobe at the Beijing SHRIMP Center. The samples were provided by project collaborators from Washington University in St. Louis, USA. The age and chemical evidence suggest that meteorite SaU169 and the Apollo 12 soil fragment IMB originated in the Mare Imbrium area within the Procellarum KREEP terrain. The ~3.92 Ga age of the zircons from the Apollo 12 impact melt

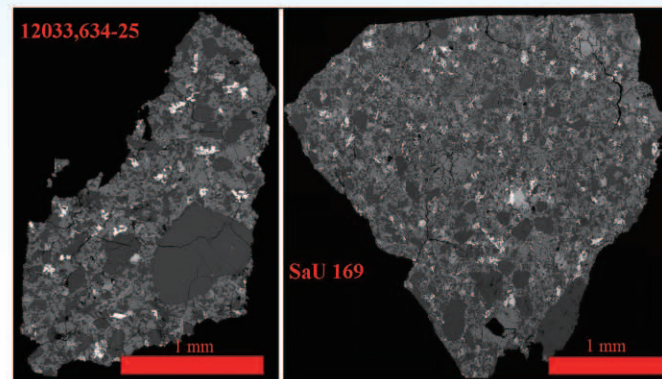


Fig. 3.13. Apollo 12 lunar samples

Structural-lithofacies mapping of the Jinding extra-large deposit and its metallogenic model (HOU Zengqian et al.)

The temporal-spatial distribution and mineralization character of the ore-bearing Yunlong Formation were determined through systematic large-scale geological mapping. Thrust-nappe structural systems controlling the style of the ore bodies and the brecciated ore body emplacement and formation processes were documented. Several residual salt domes and bitumen as well as their relation to the deposit were discovered. Thus, a new model is proposed where regional fluids laterally migrated over long distances along structural decoupling layers, were eventually stored, and metal minerals were controlled by salt domes.



Fig. 3.14. Group members in Jinding extra-large deposit



Lithospheric shortening and deforming of the northeastern margin of the Qinghai-Tibet Plateau: Evidence provided by deep seismic reflection profiling (GAO Rui et al.)

Reprocessed data of the deep seismic reflection profile along the Songpan Terrane-western Qinling Orogen-Lingxia Basin revealed structural details of its lower lithosphere, i.e. upper crustal bidirectional thrust structures and lower crustal superimposition of near-horizontal decoupling faults, revealing the main mechanism of crustal shortening and deformation along the northeastern margin of the Qinghai-Tibet Plateau. Thousands of kilometers of sinistral slip along the Kunlun faults extend from Earth's surface down to the upper part of the lower crust with imbricated thrust faults. The establishment of vertical lithospheric structural features documents a lithospheric-scale correlation between the western Qinling Orogen and the basins on its two sides.

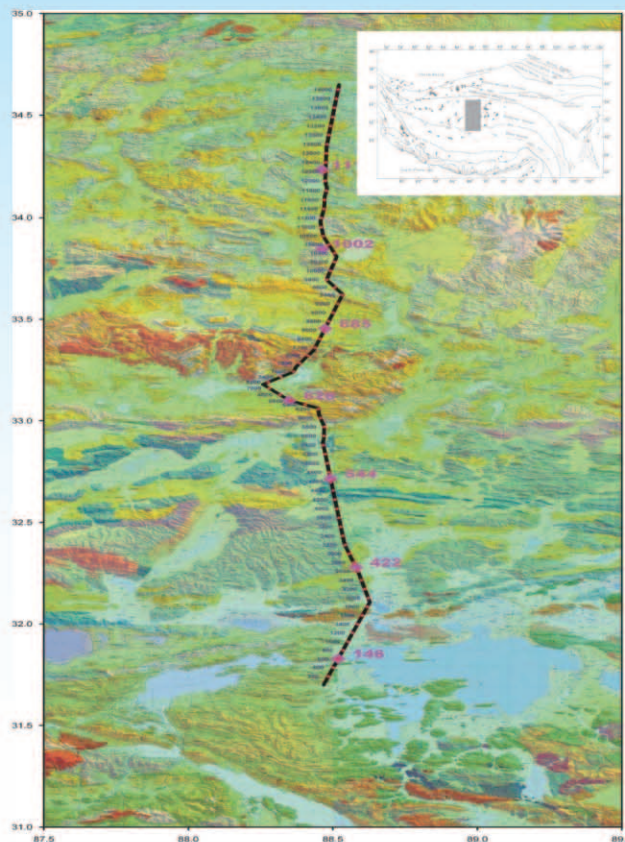


Fig.3.15 Location map of the deep seismic reflection profile. The red circles show CDP site and the pink ploygon big shot site.

Cretaceous chorisroderan reptiles gave birth to live young (JI Qiang et al.)

Viviparity in fossil reptiles has been known only from a few marine groups, namely ichthyosaurs, pachypleurosaurs, and mosasaurs. This research reports a pregnant specimen of the Early Cretaceous *Hyphalosaurus baitaigouensis*, a species of Choristodera, a diapsid group known from unequivocal fossil remains from the Middle Jurassic to the early Miocene. See the detailed introduction under 3.2.



Fig. 3.16. Fossil of hyphalosaurus baitaigouensis with embryos



4. International Cooperation and Academic Exchange

4.1 Overseas visits

Delegation led by Prof. YANG Jingsui visited GFZ, Germany

Prof. YANG Jingsui, Senior Engineer, RONG He, and PhD student XU Xiangzhen visited the SIMS isotope laboratory of GFZ in Potsdam, Germany, from 7 to 25 April for collaborative research. In-situ carbon isotope analyses were undertaken on diamonds discovered in chromite and mantle peridotite from Tibet, China, and Ural, Russia.

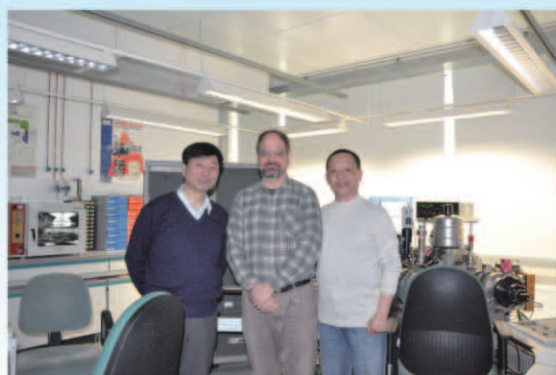


Fig.4.1 Prof. YANG Jingsui Visited GFZ, Germany

Dr. LU Zhanwu visited the USA for collaborative research

Dr. LU Zhanwu visited the Department of Earth & Planetary Sciences, Cornell University, USA, from 7 July to 19 August for collaborative research on collecting and processing of seismic reflection data of the central Qinghai-Tibet Plateau. During his visit, Dr. LU familiarized himself with the use of newly-developed seismic data processing software and independently processed deep seismic reflection data.

Prof. GAO Rui visited the USA for collaborative research

Prof. GAO Rui visited Oklahoma University, Missouri University, and Stanford University in the United States from 6 May to 14 June and undertook collaborative research and student training together with foreign scientists of these universities. He also attended the 25th International HKT (Himalaya-Karakoram-Tibet) Workshop in San Francisco and NSF Tibet Workshop: "Future directions for NSF-sponsored geoscience research in the Himalaya/Tibet" held at the SF State University.

Prof. JI Qiang and his group visited the Japanese Dinosaur Museum (FuKui, Japan)

Prof. JI Qiang and his group visited the FuKui Dinosaur Museum in FuKui, Japan from 7 to 11, July. The signing ceremony for the establishment of a formal partnership between the Institute of Geology, CAGS, and the FuKui Dinosaur Museum was held in the academic auditorium of the museum on 8, July. Prof. JI also gave the several interviews to the local news media.

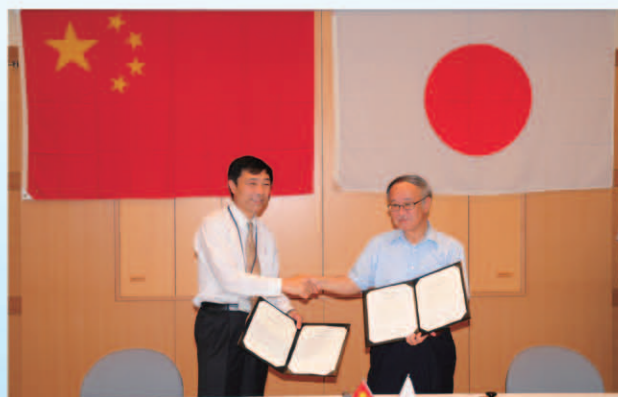


Fig.4.2 Prof. JI Qiang Visited FuKui Dinosaur Museum in Japan



Prof. LIU Dunyi participated in the Lunar and Planetary Science Conference in USA

The Director of the Beijing SHRIMP Center, Prof. LIU Dunyi participated in the 2010 Lunar and Planetary Science Conference in Houston, Texas, USA, from 1 to 5 March. His oral presentation was about SHRIMP zircon dating of Apollo-12 lunar samples, which is a very important contribution to the understanding of early lunar evolution and may update the age of the Imbrium impact.

Prof. LIU Dunyi visited Australian Scientific Instruments Pty Ltd

Prof. LIU Dunyi, Dr. WAN Yusheng and Mr. ZHANG Yuhai of the Beijing SHRIMP Center visited Australian Scientific Instruments Pty Ltd (ASI) in Canberra, Australia, from 7 to 20 April. The main purposes of the visit were to discuss the schedule of shipping and installation of the second SHRIMP II-MC of CAGS to the Beijing SHRIMP new laboratory building and to conduct oxygen isotope analyses on Archean zircons from the Anshan area, North China Craton. The delegation also discussed the application of isotopic analysis in paleoclimate and metallogeny studies with scientists from the Australian National University.



Fig.4.3 Australian Scientific Instruments Pty Ltd

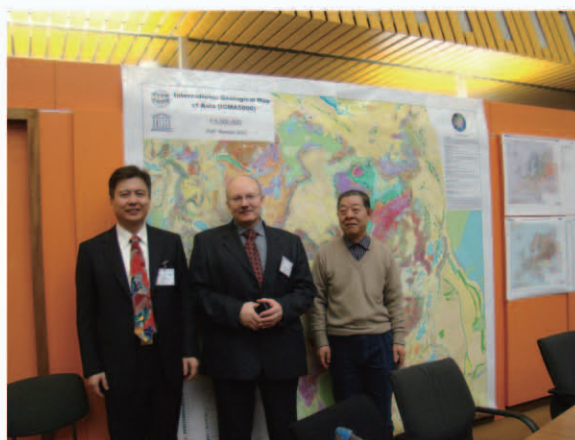


Fig.4.4 Prof. JIN Xiaochi and colleagues attended a symposium in Paris, France

Prof. JIN Xiaochi and colleagues attended a symposium in Paris, France

Three members from the Institute of Geology, CAGS, namely Profs. JIN Xiaochi, NIU Baogui and WANG Jun visited Paris, France, and attended a symposium from 11 to 19 February organized by the Executive Bureau of the Commission for the Geological Map of the World. Major activities of the delegation included examination of the new Geological Map of the Middle East, exhibiting the latest 1:5,000,000 draft of the Geological Map of Asia and discussions on issues concerning the International Geological Map of Asia.

Prof. QI Xuexiang visited Karlsruhe University, Germany

According to the collaboration agreement between the Continental Dynamics Project Group of the Institute and Karlsruhe University, Prof. QI Xuexiang visited the magnetism laboratory of the Institute of Magnetic Applications at Karlsruhe University from 20 to 30 April, and undertook analysis on magnetic group formation of Cenozoic specimens from the Tengchong area in Yunnan Province and also conducted collaborative studies with foreign scientists.



Prof. YANG Jingsui et al. participated in a symposium in Sweden

On the basis of successful experience of Chinese Continental Scientific Drilling and for a comparison with the Sulu high pressure-ultrahigh pressure metamorphic belt in China, six scientists from the Institute of Geology, namely Profs. YANG Jingsui, ZHANG Zeming and LIU Fulai, post-doc LIANG Fenghua, Dr. CHEN Songyong and Mr. DONG Xin, were invited to attend the Swedish Deep Drilling Project (SDDP) Symposium and participated in fieldwork from 14 June to 2 July.



Fig.4.5 An Academic Symposium in Sweden

Assistant Prof. SI Jialiang undertook studies at Taiwan University

Assistant Prof. SI Jialiang undertook further studies on processing and analytical methodologies of fault rocks in the Department of Geology, National Taiwan University, Taipei from 15 March to 28 October.

Assistant Prof. XIE Hangqiang visited South Africa for collaboration on Precambrian research in Kaapvaal Craton

Based on successful experience of collaborative research about early earth in 2007 and 2009 in SA, Assistant Prof. XIE Hangqiang visited Kaapvaal Craton again from 21st May to 6th June to research the early Archaean evolution of Kaapvaal Craton farther. During his visit, Dr. XIE investigated the banded gneiss in Piet Retief area and the greenstone belts near Melmoth, and found the strongly silicified komatiite in Ilangwe greenstone belts at the first time. Moreover, about 300kg samples were taken and shipped back to China for geochemical and geochronological research.

Prof. LI Qiusheng et al. visited the USA for collaboration on processing and studies of deep seismic data

Four technicians from the Institute of Geology, led by Prof. LI Qiusheng, visited Oklahoma University, USA, in January. According to an agreement between the two parties, specialists from America and China continued with their collaboration on processing and interpreting deep seismic data and will jointly publish the results. Postgraduate students of our Institute will participate in this work to jointly study and help each other for the purpose of training well-educated talents in combining geology with geophysics.



Fig. 4. 6 Prof. LI Qiusheng and the party visited Oklahoma University in America



Academician XU Zhiqin attended west Pacific geophysics meeting 2010

Academician XU Zhiqin, Prof. LI Haibing and assistant Prof. SI Jialiang attended the West Pacific Meeting 2010 (WPGM2010) in Taipei, China from June 22 to 25. As a specially-invited guest, Academician XU Zhiqin made report in the meeting. Prof. LI Haibing and Assistant Prof. SI Jialiang gave their posts. They made extensive exchange with the overseas geologists during the meeting and firstly showed the achievements by the Wenchuan scientific drilling project, which got good repercussion.



Fig. 4.7 Academician XU Zhiqin was invited to make a key report in WPGM2010

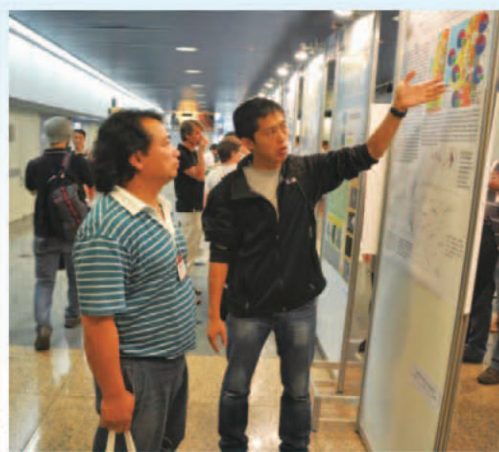


Fig. 4.8 Prof. LI Haibing made exchange with geologists in WPGM2010 hall

Prof. WANG Jun participated in workshops in Berlin, Germany

As the only Chinese representative, Prof. WANG Jun attended the “Workshop of the Committee for Management”, as well as “Application of Geoscience Information (CGI) and Geoscience Marking Language Open Day” in Berlin, Germany, from 23 to 29 August. Due to his outstanding contributions to editing the 1:5,000,000 International Geological Map of Asia and its data base, Prof. WANG was elected as member of the CGI Committee.



Fig. 4.9 Prof. WANG Jun Participated Specialized Conferences in Berlin, Germany



Academician XU Zhiqin and delegation attended the “The Cross-Strait Symposium on Seismic Fault Drilling” in Taipei

A delegation led by Academician XU Zhiqin visited Taiwan from 7 to 17 April for scientific study and collaboration. The delegation jointly organized “The Cross-Strait Symposium On Seismic Fault Drilling” with scientists from National Taiwan University, Central University and Academia Sinica, and visited the Department of Geoscience of National Taiwan University, Department of Geoscience of Central University and the Center for Space and Remote Sensing Research, discussing experiences in engineering, experimental studies and results of the Wenchuan seismic fault scientific drilling and Chelongpu seismic fault drilling in Taiwan.



Fig.4.10 Academician XU Zhiqin and the Party Attended Symposium in Taiwan

Assistant Prof. ZHAI Qingguo visited Taipei for one academic year

Assistant Prof. ZHAI Qingguo visited Taiwan for one academic year from 12 October 2009 to 10 September 2010 at the Institute of Earth Sciences, Academia Sinica. His main research was on eclogites and ophiolites from the Qiangtang area, northern Tibet.



Fig.4.11 Assistant Prof. ZHAI Qingguo and John Borming in the field of Taiwan

Prof. JIN Xiaochi attended an international symposium in Malaysia

Prof. JIN Xiaochi attended the 6th International Symposium of IGCP-516 “Geological Anatomy of East and South Asia” held in Kuala Lumpur, Malaysia, on 9 and 10 November. About 50 geologists from China, Japan, Poland and other countries participated in this meeting, it was organized by the Department of Geology, University of Malaysia.



Profs. ZENG Lingsen and WANG Tao undertook fieldwork in Russia

Invited by Prof. Dmitry P. Gladkochub, the deputy director of the Institute of the Earth's Crust, Siberian Branch of Russian Academy of Sciences, Irkutsk, Russia, Profs. ZENG Lingsen and WANG Tao visited the Lake Baikal-Ulan Ude area in Russia from 7 to 20 August for collaborative field work and academic exchange. The collaboration, supported by International Cooperation Science Foundation of China is very important to compare similarities and differences of the Mesozoic extensional tectonics in both Far East Russia and northern China.



Fig.4.12 Prof. WANG Tao and Prof. ZENG Lingsen went to Russia for field Work



Fig.4.13 Prof. ZENG Lingsen and Prof. WANG Tao did Field work in Russia

Academician XU Zhiqin and the team took part in autumn symposium of AGU

Academician XU Zhiqin, Profs. LI Haibing, ZENG Lingsen, YU Changqing, PAN Jiawei, WANG Haiyan, LU Zhanwu and HOU Hesheng took part in the autumn symposium of American Geophysics Union (AGU) from 13 to 17, December. They discussed with international specialists on the problem of deep seismic reflection profile in the symposium, which is helpful for solving some problems concerning with the "Wenchuan earthquake fault scientific drilling project". They also had a field excursion to the San Andreas Great Fault and San Andreas Deep Drilling Site after the symposium.

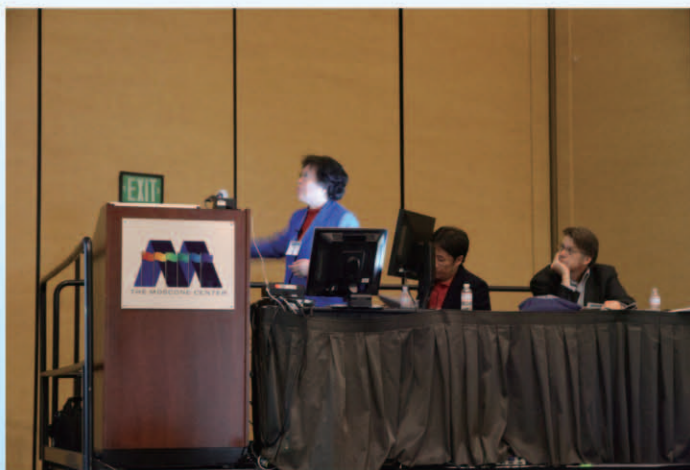


Fig.4.14 Academician Zhiqin Xu made a report in 2010 autumn symposium of AGU



4.2 Academic visitors

Visit of Prof. Shigenori Maruyama from Japan

Prof. Shigenori Maruyama of the Department of Earth & Planetary Sciences, Tokyo Institute of Technology, visited the Institute of Geology from 28 February to 2 March and attended a symposium for the establishment of the “Continental Crust & Mantle Research Branch of China Geological Survey” held in Beijing on 1 March 2010.



Fig. 4.15 Japanese Prof. Shigenori Maruyama made report

Visit of Prof. Yukio Isozaki from Japan

Prof. Yukio Isozaki of the Department of Earth Science and Astronomy, Tokyo University, was invited by Prof. YAO Jianxin to visit the Institute of Geology from 20 to 24 May. Discussions were held on cooperative research and results achieved on similarities and differences of Permian and Triassic strata and their influence on mass extinctions and anabiosis, as well as the interpretation of some analytical results.



Fig.4.16 Field work in Hanzhong, Shaanxi province , China



Fig.4.17 Collect samples in the sections



Visit of professors from USA and New Zealand for purchase of instrument

The long-term observation and research project on geophysical prospecting in the deep hole of CCSD decided to purchase a highly advanced instrument and technology for seismic observations in deep holes from New Zealand. Prof. Peter Malin from Auckland University and Prof. Yonggang Lee from Southern California University, USA, were invited to visit our institute from 19 to 2 May.

Visit of Prof. Mohamed Metwaly Abu Anbar from Egypt

Prof. Mohamed Metwaly Abu Anbar from Tanta University of Egypt visited the Institute for collaboration from 18 May to 5 June. Prof. Abu Anbar gave a lecture on “Egyptian geology and Pan-African tectonic events” during his visit.

Visit of geologists from Russia and Mongolia

Invited by Academician REN Jishun, Academician O. Tomurtogoo, Director of the Institute of Geology and Mineral Resources, Mongolian Academy of Sciences, and Prof. T. Kheraskova and Dr. I. Pospelov from the Institute of Geology, Russian Academy of Sciences, Moscow, visited our Institute in July and August and were involved in the checking and revision of the Central Asian and Mongolian parts of the International Geological Map of Asia (IGMA) 5000, as well as the establishment of a database.



Fig.4.18 Egyptian professor visited China



Fig. 4. 19 Geologists from Russia and Mongolia visited the Institute



Visit of Prof. Antonio Castro from Spain

Invited by Profs. WANG Tao and HOU Zengqian the internationally renowned petrologist Prof. Antonio Castro from the University of Huelva, Spain, visited the Institute and conducted research in Beijing for one month during July and August. During his visit, Prof. Castro gave three lectures on the origin and evolution of magmas to show his research experience and current interests, and also gave several lectures to post-graduate students on the usage of the MELTS program, world-famous thermodynamic software for igneous rocks. He also completed and submitted a manuscript entitled “Magmatism and associated porphyry-type ore deposits in the Tethyan orogenic belt, Iran” during his visit. The visit of Prof. Antonio Castro has broadened the horizon of our geologists and students, and the research work of the institute will also benefit from his visit.



Fig. 4.20 Prof. Antonio Castro visited the Institute of the geology and discussed academic questions with Prof. WANG Tao

Visit of Assistant Professor from India

Invited by Academician REN Jishun, Assistant Prof. Vadlamani Ravikant from the Institute Instrumentation Center, Indian Institute of Technology, Roorkee, visited the Institute from 17 to 25 October. The main purpose of his visit was to undertake collaborative work on the 1:5,000,000 International Geological Map of Asia”. During his visit, Prof. Vadlamani conducted extensive discussions regarding collaboration with Chinese project members.



Fig.4.21 Indian professor visited China

Visit of Prof. David Gee from Sweden

Professor David G. Gee from Uppsala University, Sweden, visited the Institute from 19 August to 14 September. His main purpose of was to observe 1500 m of rock cores from the chromite mine area in Luobusha, Tibet.



Fig. 4.22 Swedish professor made report in Institute of Geology, CAGS



Visit of Geologist Dr. Axel Gerdes from Germany

Invited by Prof. LIU Fulai and Prof. HOU Zengqian, Dr. Axel Gerdes from the Institute of Geosciences, University of Frankfurt, Germany, paid a short visit to the Institute of Geology and was formally honored as 'Visiting Research Fellow' of the Institute on 29 November. After the ceremony, Dr. Gerdes gave an excellent presentation on in-situ isotopic analyses of minerals in the geosciences. He provided an in-depth insight into our work on barite and showed great interest. A collaboration agreement was signed with his laboratory as from 2011, including experiments in his laboratory and training of PhD student.

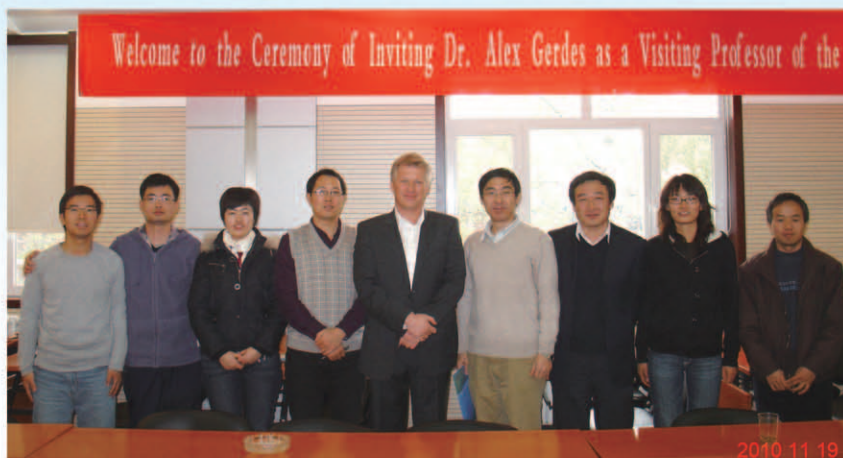


Fig.4.23 Germany geologist visited Institute of Geology, CAGS

Visit of scientists from Great Britain and Canada

Prof. Michael P. Searle from Oxford University, UK, a famous specialist on the geology and tectonics of the Qinghai-Tibet Plateau, and senior geologist Dr. Marc St-Onge of the Geological Survey of Canada visited the Institute for academic exchange and collaboration from 8 September to 7 October.

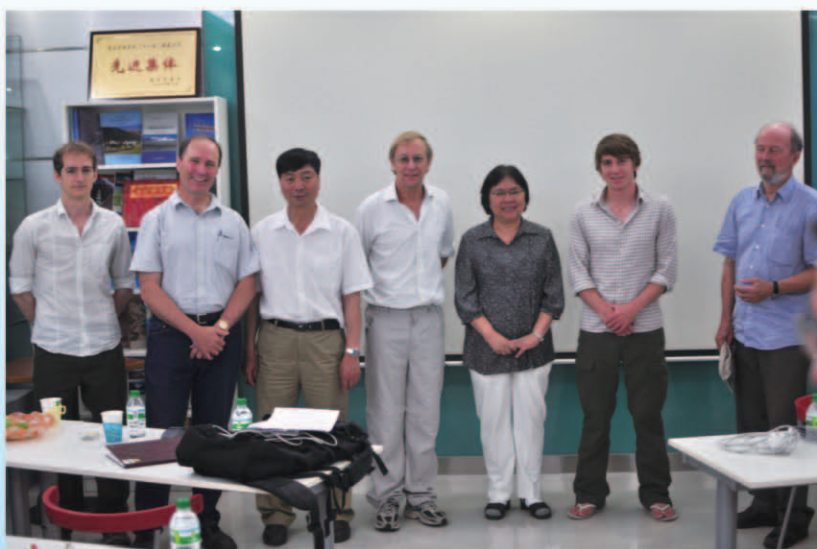


Fig.4.24 Professors from Great Britain and Canada visited Institute of Geology, CAGS



Visit of Vietnam geologists

Invited by Academician REN Jishun, Vietnam geologists Prof. Tran Van Tri, Mr. Nguyen Ba Minh and Mr. Bao Minh Bac visited our Institute on 3 November and helped in modifying the geological map and database of the Indo-China Peninsula part. Some key geological issues about stratigraphic subdivision, correlation and tectonic belt extension to southern China and the Indo-China Peninsula region were also discussed during this visit.

Prof. Robert Pidgeon from Perth, Australia, visited the Beijing SHRIMP Center

The world-renowned zircon geochronologist Prof. Robert Pidgeon of Curtin University, Perth, visited the Beijing SHRIMP Center in October. He discussed some important results of lunar sample geochronology with Prof. LIU Dunyi and helped to draft a scientific manuscript on the dating results of Apollo 12 and meteorite SaU169 zircons.

Dr. Steve Clement from Canada visited the Beijing SHRIMP Centre

The world-renowned instrument scientist Dr. Steve Clement, co-inventor of the SHRIMP instrument) visited the Beijing SHRIMP Center during his participation in the 5th SHRIMP Workshop in October. Dr. Clement and Prof. LIU Dunyi discussed potential cooperation on the development of a TOF-SIMS.

Local and remote SHRIMP users from overseas institutions

Four overseas users visited the Beijing SHRIMP Center and finished their on-site SHRIMP II measurements in Beijing. Nine overseas users from Italy, Brazil and Taiwan undertook their SHRIMP II measurements remotely via SROS.

Prof. Alfred Kröner Won the Chinese “Friendship Award”

The Honorary Professor of the Institute of Geology, Prof. Alfred Kröner of the University of Mainz, Germany, and Beijing SHRIMP Center won the 2010 Chinese Government “Friendship Award” conferred by Vice-Premier of the State Council, ZHANG Dejiang in the Great Hall of the People on 29 September. Prof. Kröner is the 4th foreign scientist collaborating with the Institute and awarded this highest honour of the Chinese Government for foreign experts. Prof. Kröner has been engaged in studies on Precambrian and early Palaeozoic crustal evolution for more than 40 years. He has cooperated with Prof. LIU Dunyi and other members of the SHRIMP Center since 2003 and has become a long-term employed foreign scientist in the Center. He has been an honorary professor of the Institute of Geology since 2008.



Fig. 4.25 Prof. Alfred Kröner Won the Chinese “Friendship Award”



Fig. 4.26 Prof. Alfred Kröner and Prof. LIU Dunyi



4.3 Other international cooperations and foreign affairs

- A delegation of the Geological Survey of Indonesia (4 persons), a delegation of the Geological Survey of Norway (4 persons), the Vice-President of IUGS, Prof. Jacques Charvet, and assistant (2 persons), and a delegation of the École Polytechnique de Montréal (11 persons) visited the Beijing SHRIMP Center.
- China-South Africa (University of KwaZulu-Natal)-Germany (University of Mainz): Geochronology of Archaean greenstone belts in the Kaapvaal craton, South Africa.
- China-U.S.A. (Washington University at St. Louis, Missouri): SHRIMP geochronology of Apollo lunar samples and lunar meteorite.
- China-Australia (Australian National University): Nd isotopic geochemistry of 3.8 Ga old rocks in the Anshan area of northeast China.
- Collaboration with Brazil, Australia, Italy and Academia Sinica, Taipei, on SHRIMP remote operation.

5. Important Academic Activities in 2010

5.1 Establishment of the International Precambrian Research Center of China (IPRCC)

The Beijing SHRIMP Center and the Division of Metamorphic Rocks and Precambrian Geology, Institute of Geology, both in the Chinese Academy of Geological Sciences (CAGS), in cooperation with the Chinese Geological Survey, have established a new International Center for Precambrian Studies during the 5th SHRIMP Workshop held in the Xiyuan Hotel, Beijing, on 10 to 14 October. This Center is based in the Institute of Geology.

Name of the Center: International Precambrian Research Center of China (IPRCC)

Structure of the Center

Director: Prof. LIU Dunyi, Beijing SHRIMP Center, Institute of Geology;

Deputies: Prof. Alfred Kröner, Mainz and Beijing; Prof. Simon Wilde, Perth; Prof. Bor-ming Jahn, Taipei; Prof. WAN Yusheng, Beijing SHRIMP Center, Inst. of Geology; Prof. LIU Fulai, Division of Metamorphic Rocks and Precambrian Geology, Institute of Geology.

Advisor: Academician ZHAI Mingguo, Institute of Geology and Geophysics, Chinese Academy of Sciences, Beijing.

Secretary-General: Prof. WANG Tao, Institute of Geology

Secretariat: Mrs. WANG Chen, Beijing SHRIMP Center, Institute of Geology.

Core members:

Prof. LIU Shuwen, Institute of Earth and Space Sciences, Peking University, Beijing

Prof. ZHAO Guochun, Dept. of Earth Sciences, The University of Hong Kong

Prof. Michael Brown, Dept. of Geology, University of Maryland, USA

Prof. Moon-sup Cho, Dept. of Geology, University of Seoul, Republic of Korea

Prof. K.C. Condie, New Mexico Institute of Technology, Socorro, USA

Prof. W. Griffin, GEMOC, Macquarie University, Sydney, Australia

Prof. Walter Mooney, US Geological Survey, Menlo Park, USA

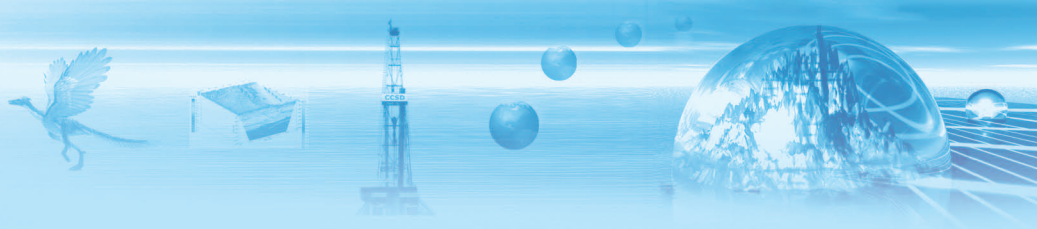
Prof. LIN Shoufa, Dept. of Earth Sciences, Waterloo University, Waterloo, Ontario, Canada

Dr. Martin van Kranendonk, Geological Survey of Western Australia, Perth, Australia

Prof. ZHANG Fuqing, Institute of Geology and Geophysics, Chinese Academy of Sciences

Prof. GENG Yuansheng, Institute of Geology, Chinese Academy of Geological Sciences, Beijing





Prof. LI Huaikun, Center of Geological Survey, Tianjing, Geological Survey of China
Prof. YANG Chonghui, Division of Metamorphic Rocks and Precambrian Geology, Institute of Geology
Prof. ZHOU Xiwen, Division of Metamorphic Rocks and Precambrian Geology, Institute of Geology
Prof. XUE Huaimin, Division of Metamorphic Rocks and Precambrian Geology, Institute of Geology
Dr. DU Lilin, Division of Metamorphic Rocks and Precambrian Geology, Institute of Geology.
Dr. DONG Chunyan, Beijing SHRIMP Center, Institute of Geology
Dr. XIE Hangqiang, Beijing SHRIMP Center, Institute of Geology.

In addition, young geoscientists from China and abroad will be invited as Associate Members to participate in the Center's activities.

Main aims and purpose

To engage in discussion and research on major unresolved global geological issues in the Precambrian and their relevance to Chinese geology and mineral deposits through discussion meetings, field workshops, topical lecture series and specific research projects, involving both

Problems

International research in Precambrian geology over the last 20 years has led to significant improvements in our understanding of the formation and evolution of the early continental lithosphere, mainly due to vastly improved analytical equipment and techniques, new concepts, new methodologies and, most importantly, through a multidisciplinary approach as exemplified by the Canadian Lithoprobe Program. However, major problems remain unresolved such as, for example, formation and evolution of the early Earth, when did plate tectonics begin, the significance of episodicity in Precambrian magmatism and orogeny, and the formation and break-up of early supercontinents.

Potential fields of multidisciplinary research

1. Processes of formation and evolution of Precambrian continental crust in general and relevance for the evolution of Precambrian terranes in China. Search for, and identification of, early Archaean continental nuclei.
2. Precambrian basement rocks in younger orogenic belts: their composition, age, origin and role in the orogenic evolution.
3. Reconstruction of formation and break-up processes in Precambrian supercontinents and their significance for Precambrian blocks in China.
4. Comparative global studies of early continental crust, including China
5. Major Precambrian global crust-forming events, episodicity, and the beginning of plate tectonics.
6. Crustal accretion and reworking in the Precambrian.
7. Precambrian granitoid magmatism and metamorphic events and their significance for crustal growth and evolution.
8. The Precambrian time-scale: Important geological events, major cycles and subdivision of the Precambrian in China in relation to the global time-scale.



Proposed activities

1. Field-based workshops in well- or newly-studied areas to demonstrate new results, models, and research methodologies. Participation of students and post-doctoral researchers is essential, and multidisciplinary participation is desirable.
2. Support for Chinese and foreign post-graduate students to undertake research on specific topics in Precambrian geology involving joint supervision by core members of the Centre.
3. Thematic seminars on controversial and currently popular topics, with contributions from experts as well as research students.
4. Thematic short courses, in the field and/or laboratory, by recognized experts on important topics related to the Precambrian.
5. Joint publication by Chinese and foreign scientists, in high-impact international journals, of research papers on aspects of Precambrian geology, in particular comparative studies.
6. Establishment of a geochronological database for the Precambrian of China and comparison with, and integration into, databases for other continents.
7. Promotional activities including limited financial support for Chinese and international meetings that are relevant to the Centre's aims and activities.
8. Establishment of a home-page, in Chinese and English, listing current and future activities, results of field investigations, workshops, and publications. Preparation of an on-line Annual Report highlighting key activities and achievements of the Centre.



Fig. 5.1 The first working conference of the newly-founded International Precambrian Research Center of China



5.2 Organization of international conferences

Ceremony at the occasion of the 30th Anniversary of Sino-French international cooperation on the Himalayan Colloquium on Continental Dynamics of the Qinghai-Tibet Plateau

The 30th anniversary of Sino-French international cooperation on the Himalayan Colloquium on Continental Dynamics of the Qinghai-Tibet Plateau was hosted by the Chinese Academy of Geological Sciences and the Key Laboratory of Continental Dynamics, MLR, in Beijing on 14 and 15 September. More than 90 specialists from China and France attended the conference.



Fig. 5.2 Celebration of the 30th Anniversary of Sino-French international cooperation



Fig. 5.3 Occasion of celebrating the 30th Anniversary of Sino-French international cooperation

□ 5th SHRIMP Workshop and Workshop on advances in high resolution SIMS and LA-ICP-MS geochronology, and application to geological processes

The 5th SHRIMP Workshop and an international workshop on advances in high resolution SIMS and LA-ICP-MS geochronology, and application to geological processes were held successfully in the Xiyuan Hotel, Beijing, on 10-14 October. More than 100 participants from 17 countries attended both conferences, and about 50 oral presentations on applications and technical advances in SHRIMP isotopic analysis, as well as advances in high-resolution SIMS and LA-ICP-MS geochronology and their application to geological problems were presented during the meetings. Post-conference field excursions were also arranged in the Beijing area and Inner Mongolia. A special volume of *Gondwana Research* is in preparation for contributions to these workshops



Fig. 5.4 The 5th SHRIMP Workshop



□ Zircon geochronology training course organized by the IPRCC

A zircon geochronology training course, organized by the IPRCC on 15 and 16 October in the Xiyuan Hotel, Beijing, was one of the most popular academic activities in 2010. There were more than 120 participants from all over China and other countries, including a significant number of Master and PhD students. Well illustrated lectures concerning zircon geochronology were presented by seven world-renowned zircon geochronologists and mineralogists in order to promote a better understanding of U-Pb and Hf zircon data and their application to crustal evolution processes. Emphasis was on case studies and discussion with young scientists, and the course contents and relevant literature can be downloaded at <ftp://zgtr:zgtr@220.231.23.202/>. The course was followed by a 3-day field trip to the Jining area of Inner Mongolia where ultra high-temperature metamorphic rocks were examined.



Fig. 5.5 Zircon geochronology training course organized by the IPRCC

3rd International symposium on pterosaurs

The 3rd International symposium on pterosaurs was held in Beijing on 6-8 August. About 100 specialists from nine countries attended the colloquium, and 25 oral presentations were made. A few important pterosaurs fossils were exhibited by the participants. After the symposium, the participants visited the excavated fossils site and discovered fossil specimens in Liaoning Province.



Fig.5.6 Opening ceremony of the 3rd International symposium on pterosaurs



5.3 International field excursion and workshop in South Africa/Swaziland

An international field excursion and workshop in southern Africa was held jointly by the International Precambrian Research Center of China (IPRCC) and the School of Geological Sciences, University of KwaZulu-Natal, Durban, from 17 May to 4 June to look at some of the oldest rocks of the African continent. It was attended by 35 geologists from five continents, including 9 members of the IPRCC, and included a sizable number of South African Master and PhD students. The workshop grew out of a cooperative research project between the School of Geological Sciences (UKZN), the Beijing SHRIMP Center, the International Precambrian Research Center of China (IPRCC) and the Universities of Munich and Mainz, Germany. The purpose of the field trip was to study in the field and discuss new data for the early Archaean Nondweni greenstone belt in KwaZulu-Natal and examine field relationships in the equally old Barberton and Dwalile greenstone belts and surrounding TTG assemblages and granulites in Mpumalanga and Swaziland. Post-doc researcher XIE Hangqiang and Prof. Alfred Kröner of the SHRIMP Center reported on results of collaborative research on early Archaean greenstones and ancient granitoid gneisses in South Africa and Swaziland. During the field visit in Swaziland, the Swaziland Minister of Natural Resources and Energy, Her Royal Highness Princess, honoured the



Fig. 5.7 International field excursion and workshop in South Africa organized by the IPRCC

5.4 Organization of several field symposia by the programme “Regional Geology Annals of China”

In view of differences of understanding on major geological problems during the compilation of “Regional Geology Annals of China” and in accordance with the programme's research plan, four symposia (programme coordination meetings) & field excursions were successfully held.

“Symposium & Field Excursion on the Age of Granites in Northeastern China” was held on June 5-8, 2010 to carry out discussions and a field excursion on the lithology, distribution, genesis and evolution of granites in eastern Liaoning Province.



“Symposium & Field Excursion on Mesozoic Continental Volcano- Sedimentary Strata in North China” was held on July 18-24, 2010 to conduct a field excursion on typical Jurassic-Cretaceous stratigraphic profiles in northern Hebei Province, western Liaoning Province and southern Inner Mongolia, during which the Jurassic-Cretaceous boundary of continental strata in North China was determined and the programme for stratigraphic classification and correlation was mapped out.

“Coordination Meeting on the Structure and Stratigraphic Correlation of the Qinling Orogenic Belt” was held in Xi'an on September 6-10, 2010 to discuss the programme on the structure and stratigraphic classification and correlation of the Qinling Orogenic Belt proposed by the Shaanxi Provincial Geological Survey. Detailed suggestions from Gansu, Sichuan, Hubei, Henan and other adjacent provinces were put forward for revision of the programme. The thematic group on the study of structure took a field excursion on the structure and stratigraphy of the Qinling Orogenic Belt.

“Symposium & Field Excursion on Proterozoic Strata of 'Jiangnan Ancient Land'” was held in Changsha of Hunan Province on November 4-9, 2010 to determine scientific evidence for the compilation of related provincial geology annals and geological maps.



Fig. 5.8 Field Excursion to Northeastern Hunan-Angular Unconformity of the Lengjiayi Group and Banxi Group



Fig .5.9 Indoor Exchange and Discussion





Fig. 5. 10 Field Excursion to Neoproterozoic Gaojian (Heibanxi) Group in Shuangfeng County of central Hunan Province

“The 1st Working Meeting on Quaternary Geology and Geomorphologic Maps of Regional Geology Annals of China” was held in Beijing on July 4-7, 2010 to carry out exchanges among various provinces on the progress and problems of comprehensive studies on Quaternary geology and compilation of Quaternary geomorphologic and geological maps, and to hold discussions on pilot compilation of Quaternary geomorphologic and geological maps in 11 provinces (regions), DEM data, processing of key geographic and geological elements and other related issues.

5.5 Annual academic conference

This annual conference of the Institute was held on 13-14 January, 2011 and was the second largest meeting in our institute following the year 2009. 64 scientists presented reports on their research in 2010, covering themes such as geological evolution and mineralization of the Qinghai-Tibet Plateau and adjacent areas, tectono-magmatism of the Central Orogen and basin evolution, geological evolution and mineralizations of northern and eastern China, metamorphism and Precambrian geology, paleontology, stratigraphy and oil-and-gas geology, isotope geochronology, methods and implications. The Academicians, chief investigators of projects supported by the Departments of Science & Technology, Ministry of Land and Resources, National Natural Science Committee, and China Geological Survey, and post-doctoral researchers presented oral reports. Other staff members as well as Masters and doctoral candidates participated in this meeting.

HOU Zengqian, Director of the Institute, presided over this conference on the first day, and ten of the Directors introduced the research progress of their respective divisions. After this, eleven scientific reports were delivered according to the program. On the second day, 53 reports were presented in three parallel sessions. Some were excellent and attracted many listeners and ended in intense discussions and debates.

All participants gained significant new information from this meeting, and there was unanimous agreement that this kind of meeting should be held again next year.





Fig. 5.11 HOU Zengqian addressing the annual conference



Fig. 5.12 Academicians and many staff members attended the meeting.



5.6 Key academic activities in 2011

- The ceremony and symposium for celebrating the 10th Anniversary of the Beijing SHRIMP Centre.
- The second international field excursion of IPRCC in South Korea.
- The second international training course of IPRCC in Beijing--Training Course of Migmatite.
- The 5th International Geological Map of Asia (IGMA) in April, 2011 in Beijing
- Working Meetings, Review and Acceptance Meetings, Symposia and Coordination Meetings of the programme “*Regional Geology Annals of China*”

6. Invitation to Foreign Researchers and Education

6.1 Invitation to high-profile foreign scientists for collaborative research

The Institute of Geology has established a program to invite high-profile foreign researchers to Beijing for scientific collaboration. There are senior and junior researchers. The first is named “HUANG Jiqing scholar” and the second “HUANG Jiqing young scholar”. Academician HUANG Jiqing was a famous Chinese geologist and contributed greatly to the development of geology, in particular to the Geological Survey of China. Distinguished foreign researchers are encouraged to apply for a one to three year scholarship. In 2010, the Belgian scientist Dr. Marie-Luce Chevalier was invited to work in the Institute as “HUANG Jiqing young scholar”. She will stay in Beijing for three years as a member of the Key Laboratory of Continental Dynamics Research and will collaborate with Prof. LI Haibing and join the research team on the Wenchuan Earthquake Fault Scientific Drilling Project (WFSD). Dr. Chevalier obtained her doctoral degree with Prof. Tapponnier in geology at the Institut de Physique du Globe de Paris (IPGP) and the Lawrence Livermore National Laboratory (LLNL) in the USA in 2006. She was engaged in research as a post-doctoral fellow with Prof. Hilley at Stanford University and the IPGP from 2006 to 2009.



Fig. 6.1 Dr. Marie-Luce Chevalier and Academician XU Zhiqin in the field



Fig. 6.2 Dr. Marie-Luce Chevalier did field work in China



6.2 Post-graduate education

6.2.1 Post-graduate advisors

In 2010 there were 28 doctoral and 25 master degree candidates and 44 post-graduate students, as well as 22 doctoral advisors of students and 22 master advisors in the Institute. The Institute will

Advisors of doctoral students				
No.	Name	Title	Specialty	E-mail address
1	SHEN Qihan	Professor	Early Precambrian geology and metamorphic geology	huixiasong@cags.ac.cn
2	XIAO Xuchang	Professor	Tectonic geology ophiolites and HP metamorphic belts	xxchng@public.bta.net.cn
3	XU Zhiqin	Professor	Micro- and macro tectonics, geodynamics	xzq@ccsd.cn
4	REN Jishun	Professor	Geotronics and global tectonics	renjishun@cags.ac.cn
5	YANG Wencai	Professor	Geophysics	yangwencai@ccsd.org.cn
6	HOU Zengqian	Professor	Regional metallogeny	houzengqian@126.com
7	LIU Dunyi	Professor	Isotope geochronology and isotope geochemistry	liudunyi@bjshrimp.cn
8	YANG Jingsui	Professor	Petrology	yangjingsui@yahoo.com.cn
9	GAO Rui	Professor	Deep geophysical probing, lithospheric structure, and geodynamics	gaorui@cags.ac.cn
10	YAO Jianxin	Professor	Conodont fauna, stratigraphy	yaojianxin@gmail.com
11	JI Qiang	Professor	Mesozoic paleontology	jiroud@cags.ac.cn
12	WANG Tao	Professor	Tectonics and magmatic geology	taowang@cags.net.cn
13	LI Jinyi	Professor	Tectonics	jyli2003@126.com
14	CHEN Wen	Professor	Isotope geochronology	chenwenf@vip.sina.com
15	WU Cailai	Professor	Regional igneous petrology, agropetrology	wucailai@yahoo.com
16	WAN Yusheng	Professor	SHRIMP geochronology, isotope geochemistry, and early Precambrian geology	wanyusheng@bjshrimp.cn
17	JIN Xiaochi	Professor	Biostratigraphy, sedimentology and paleogeography	jinxchi@cags.ac.cn
18	LIU Fulai	Professor	UHP metamorphic belts, isotope geochronology,	lfl0225@sina.com
19	ZHANG Jianxin	Professor	Metamorphism and orogenic deformation	zjx66@yeah.net
20	Zhang Zeming	Professor	Paleontology and metamorphic geology	zzm2111@sina.com
21	LI Haibing	Professor	Active tectonics and tectonic geomorphology	lihaibing06@yahoo.com.cn
22	ZENG Lingsen	Professor	Petrology, geochemistry and tectonics	changting1970@yahoo.com
Advisors of Master students				
1	JIAN Ping	Professor	Isotope geochronology	jianping_510@yahoo.com.cn
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6.2.2 Educational activities and news

On 25 June, China University of Geosciences (Beijing) and the Institute of Geology signed a strategic cooperation agreement on postgraduate education, scientific research, laboratory construction and geological strategic research to strengthen bilateral cooperation. Senior researchers of our institute will be able to recruit graduate students from the University of Geosciences. This is the third joint admission university after agreements were signed in 2009 with both Northwestern University and Chang'an University, Xi'an.



Fig. 6.3. Signing Ceremony for Strategic Cooperation between the Institute of Geology of CAGS and China University of Geosciences (Beijing).

ZENG Lingsen was promoted as advisor of doctoral candidate students, YOU Hailu and QI Xuexiang were approved to be advisors of Master students by the Degree Assess Committee of CAGS.



Nine doctoral and eight post-graduate students completed their studies and obtained their degrees. Dr. LEI Min won the “CHENG Yuqi Excellent Graduate Award”; Dr. HUANG Hao and Ms. GAO Li'e received the “CHENG Yuqi Excellent Thesis Award”; Drs. CAI Zhihui and CHEN Shouming were awarded the academic "Outstanding Graduate" honor, and eight additional graduate students received the academic "excellent student" honorary title.



Fig. 6.4 2010 graduation ceremony of the post-graduated students

The graduate students went to visit the long-term geophysical scientific observation Station in Donghai County, Jiangsu Province, during 13-16 October. The Science and Technology Department of the Institute organizes this almost every year for geological training and to take part in other activities.



Fig. 6.5 Graduate Students at the Continental long-term Scientific Observation Station.




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